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New taxa in *Gonocarpus* and *Haloragis* (Haloragaceae)

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Abstract

Orchard, A.E. New taxa in *Gonocarpus* and *Haloragis* (Haloragaceae). Nuytsia 5(3):327-339(1986). Five species of of *Gonocarpus* and two subspecies of *Haloragis* are described as new. *G. ephemerus, G. hispidus* and *G. ericifolius* are from southern Western Australia while *G. effusus* and *G. urceolatus* are from south-eastern Queensland. *Haloragis acutangula* in Western Australia has been re-examined and a new name *H. acutangula* f. *stellata* is proposed to replace *"H. acutangula* f. *occidentalis"* which moves into the synonymy of *H. digyna*. The range of *H. prostrata* is greatly extended, with new subspecies described from the Cook Islands (subsp. *coquana*) and from Tuvalu (subsp. *tuvaluensis*).

Introduction

Work in progress towards an account of Haloragaceae for the "Flora of Australia" has revealed several new species of *Gonocarpus,* based on collections made, for the most part, after publication of my revision of the genus (Orchard 1975). They are described here in greater detail than would be possible in the "Flora", to make the names available for use in the interim.

Gonocarpus ephemerus A.E. Orchard, sp. nov. (Figure 1)

Herba annua 8-15 cm alta; caules graciles, sparsim pilosi pilis patentibus 2-3-cellularibus hyalinis 0.2-0.25 mm longis. Folia opposita (alterna ad basim inflorescentiae), petiolo 2-3 mm longo; lamina ovata, 8-11 mm longa, 4-7 mm lata, margine incrassato, hyalino, serrato dentibus 8-12 parvis, sparsim pilosa ubi juvenia, glabrescentia. Bracteae lanceolatae vel oblanceolatae, 1.2-1.7 mm longae, 0.3-0.7 mm latae, margine incrassato, integro. Bracteolae membranaceae, orbiculares 0.2 mm diametro, in margine ciliato vel subdentato. Flores pedicellis 0.5-0.6 mm longis insidentes. Sepala 4, ovata, 0.5 mm longa, 0.45 mm lata, margine incrassato. Petala 4, flava vel rubra, cucullata, carinata, 1.6 mm longa, 0.4 mm lata (carina ad marginem). Stamina 8, antheris anguste oblongis, 1.3 mm longis, 0.25 mm latis, non apiculatis. Styli 4, clavati, 0.2-0.3 mm longi, stigmatibus capitatis, albis, fimbriatis. Ovarium olivaceum, urceolatum, 0.9 mm longum, 0.8 mm diametro, 8-costatum protruberationibus conicis ca 4 inter uterque par costatum ad basim. Fructus griseus vel ligneus, urceolatus, 1.6 mm longus (sepala inclusa), 0.9 mm diametro in collo valde 8-costatus, basi bulbosa infirme 8-costatus protruberationibus conicis 4 inter uterque par costarum, glaber, vernicosus.

Typus: c. 45 km E of Millbillillie H/S on Barwidgie road, Western Australia, 26°39'S, 120°44'E, spinifex sand plain, 3 May 1978, *L.A. Craven* 5375 (holo: CANB 285596).

Annual *herb* 8-15 cm tall, branching at base; *stems* slender, sparsely pilose with spreading 2-3-celled transparent simple hairs 0.2-0.25 mm long. *Leaves* opposite (becoming alternate at base of inflorescence), with petiole 2-3 mm long, ovate, lamina 8-11 mm long, 4-7 mm wide, midrib prominent below, margin thickened, hyaline, with 8-12 small teeth, sparsely pilose when young, becoming glabrous. *Inflorescence* spike-like with flowers borne singly

in the axils of alternate reduced leaves (bracts). *Bracts* green, lanceolate to oblanceolate, 1.2-1.7 mm long, 0.3-0.7 mm wide, margins entire, thickened. *Bracteoles* membranous, orbicular, minute, 0.2 mm diam., ciliate to subdentate on margins. *Pedicels* 0.5-0.6 mm long. *Sepals* 4, green, ovate, 0.5 mm long, 0.45 mm wide, margins thickened, glabrous. *Petals* 4, yellow to red, hooded, keeled, clawed, 1.6 mm long, 0.4 mm wide (keel to margin), sparsely pilose on keel, becoming reflexed at anthesis. *Stamens* 8; filaments lengthening to 0.6 mm; anthers narrowly oblong, 1.3 mm long, 0.25 mm wide, non-apiculate. *Styles* 4, clavate, 0.2-0.3 mm long; stigmas capitate, white, fimbriate. *Ovary* olive, urceolate, 0.9 mm long, 0.8 mm diam., 8-ribbed with about 4 conical protruberances between the pairs of ribs in the lower (bulbous) part. *Fruit* silver-grey to yellow-brown, urceolate, 1.6 mm long (incl. sepals), 0.9 mm diam., strongly 8-ribbed on neck, weakly 8-ribbed on bulbous part, with 4 conical protruberances between each pair of ribs in lower half, shiny, glabrous.

Distribution. Known only from the type from east of Wiluna in Western Australia.

Ecology. Growing on a spinifex (*Triodia*) sand plain, flowering and fruiting in May.

G. ephemerus is closely allied to *G. pycnostachyus* but differs in its glabrous fruits with 8 vertical rows of 4 tubercles instead of 2 transverse rows. There are also minor differences in the sizes of the floral parts.

The specific epithet refers to the obviously short life span of this plant.

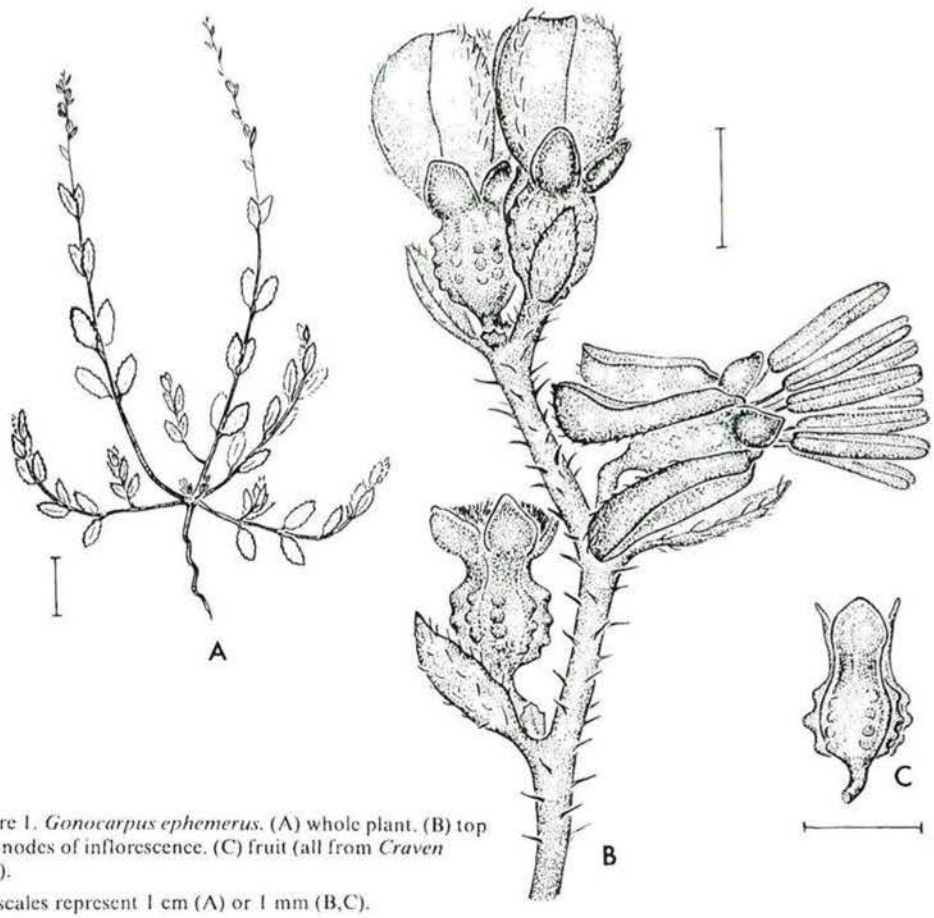

Figure 1. *Gonocarpus ephemerus*. (A) whole plant. (B) top four nodes of inflorescence. (C) fruit (all from *Craven* 5375).

Bar scales represent 1 cm (A) or 1 mm (B,C).

Gonocarpus hispidus A.E. Orchard, sp. nov. (Figure 2A-E)

Fruticulus usque ad 16 cm altum; caules erecti vel ascendentes, dense hispidi pilis patentibus albis 3-4-cellularibus 0.4-0.5 mm longis. Folia alterna, dense congesta, linearia, 6-7 mm longa 0.8-1.0 mm lata, obtusa, succulenta, dense hispida pilis atque caulibus in tuberculis albis insidentibus. Bracteae ovatae vel lanceolatae, 2.5 mm longae, 1.25 mm latae. Bracteolae ovatae, 1.3 mm longae, 0.6-0.7 mm latae, in carina hispida. Flores in pedicellis 0.7 mm longis insidentes, nutantes. Sepala 4, viride, late ovata, 0.6 mm longa, 0.7 mm lata. Petala 4, atro-rubra, cucullata, carinata, 2.2 mm longa, 0.6 mm lata (carina ad marginem), in carina grosse hispida. Stamina 8, antheris anguste oblongis, 1.2 mm longis, non apiculatis. Styli 4, clavati, stigmatibus capitatis, albis, breviter fimbriatis. Ovarium atro-purpureum, turbinatum, 0.75 mm longum, 0.75 mm latum valde et acute 8-costatum, in costis grosse hispidis. Fructus maturis non visus sed certe ovario simili.

Typus: Base of East Mt Barren, Western Australia, stony quartzitic sand, 14 Sept. 1974, *K. Newbey* 4370 (holo: PERTH).

Subshrub to 16 cm tall; *stems* erect or ascending, slightly wrinkled longitudinally, densely hispid with spreading white 3-4-celled simple hairs 0.4-0.5 mm long. *Leaves* alternate, densely crowded, sessile, linear, 6-7 mm long, 0.8-1.0 mm wide, obtuse, fleshy, densely hispid with hairs as for stems seated on whitish tubercles. *Inflorescence* spike-like with flowers borne singly in the axils of ovate to lanceolate bracts 2.5 mm long, 1.25 mm wide. *Lateral inflorescences* arise in axils of upper leaves. *Bracteoles* yellow, somewhat fleshy, ovate, 1.3 mm long, 0.6-0.7 mm wide, with a dark reddish midrib, hispid on keel. *Flowers* on pedicels 0.7 mm long, nodding. *Sepals* 4, green, broadly ovate, 0.6 mm long, 0.7 mm wide, glabrous. *Petals* 4, deep red, hooded, keeled, shortly clawed, 2.2 mm long, 0.6 mm wide (keel to margin), coarsely hispid on keel. *Stamens* 8; anthers narrowly oblong, 1.2 mm long, 0.3 mm wide, non-apiculate. *Styles* 4, clavate, stigmas capitate, white, shortly fimbriate. *Ovary* dark purple-black, turbinate, 0.75 mm long, 0.75 mm wide, strongly and sharply 8-ribbed, coarsely hispid on ribs. *Fruit* unknown, but certainly very similar to ovary.

Distribution. Known only from the type, from East Mt Barren in southern Western Australia.

Ecology. Grows in stony quartzite sand. Flowers in mid September.

G. hispidus closely resembles *G. pithyoides* but differs in its shorter more crowded leaves, harsher hispid hairs, hispid (not glabrous) stems, broader hispid bracteoles and more strongly ribbed ovary.

The distinctive coarse hairs of this species are the basis of the specific epithet.

Gonocarpus ericifolius A.E. Orchard, sp. nov. (Figure 2F-K)

Fruticulus 10-15 cm altus, multicaulis; caules e basi praecipue ramosi, moderate dense strigosi pilis appressis albis unicellularibus 0.4-0.5 mm longis. Folia alterna erecta dense imbricata infra, magis dispersa super, teretia, 4.0-7.5 mm longa, 0.7-1.0 mm lata, acuta, parum canaliculata super, moderate dense pilosa pilis semipatentia ut in caulibus. Inflorescentiae nutantes. Bracteae lineari-lanceolatae, 2.5-3.0 mm longae, integrae, scabrae. Bracteolae lineares 0.5-0.7 mm longae, integrae. Flores pedicellis 0.4-0.5 mm longis, insidentes, nutantes. Sepala 4, olivacea lanceolata 1.25 mm longa, 0.5 mm lata crassa semipatentia margine minute ciliato. Petala 4, rubra, cucullata, valde carinata, 2.2 mm longa, 0.6 mm lata (carina ad marginem), pilis rigidis semipatentibus in carinis, post

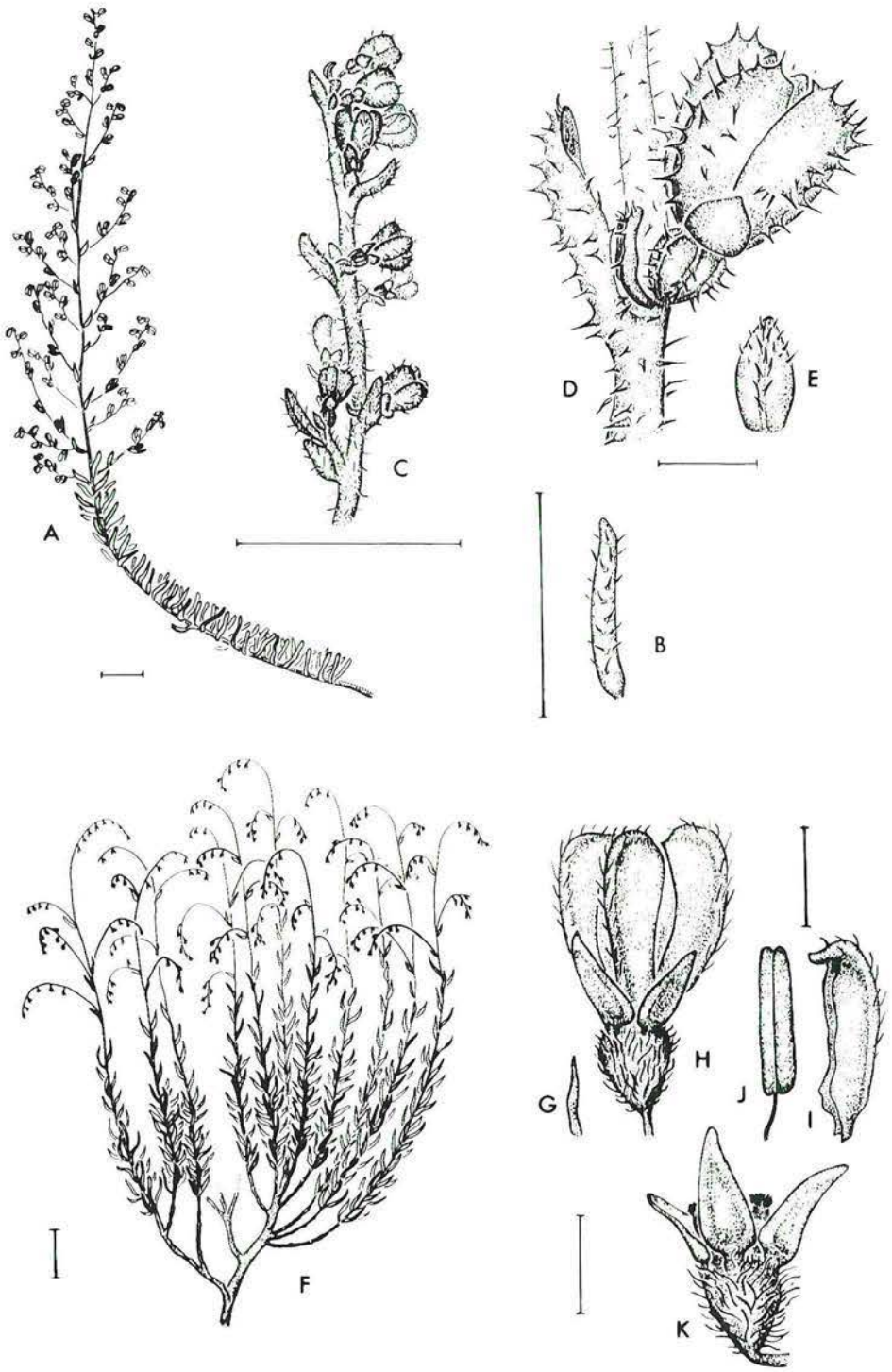

Figure 2. *Gonocarpus* spp. (A-E) *G. hispidus*. (A) flowering branch. (B) leaf. (C) top portion of inflorescence. (D) flower in axil of bract. (E) bracteole. (F-K) *G. ericifolius*. (F) habit. (G) bracteole. (H) flower. (I) petal. (J) stamen. (K) fruit. (A-E *Newbey* 4370; F-K, *Barnsbey* 980).

Bar scales represent 1 cm (A,B,C,F) or 1 mm (others).

anthesin effusa et plusminusve persistentia. Stamina 8, antheris anguste oblongis 1.5 mm longis non apiculatis. Styli 4, clavati, 0.5 mm longi, stigmatibus capitatis flavis fimbriatis. Ovarium ardesiacum, turbinatum 0.8 mm longum, 0.8 mm diametro dense pilosum pilis semipatentibus albis vel brunneolis. Fructus turbinatus 0.8 mm longus, 0.8 mm diametro, dense pilosus, sepalis persistentibus in angulo 45° patentibus, petalis item persistentibus.

Typus: 33 km E of Pingaring along road to Varley, Western Australia, 32°44'S, 118°56'E, gravelly sand over laterite, tall heath with *Casuarina campestris,* 29 Jan. 1979, *B. Barnsley* 980 (holo: CBG 7902172; iso: HO).

Semiwoody *subshrub* 10-15 cm tall, multistemmed; *stems* branching mainly at base, moderately densely strigose with appressed simple white unicellular hairs 0.4-0.5 mm long. *Leaves* alternate, erect, densely imbricate in lower parts of stem, more widely spaced above, sessile, terete, 4.0-7.5 mm long, 0.7-1.0 mm wide, acute, slightly channelled above, moderately densely pilose with semi-spreading hairs as for stems. *Inflorescence* indeterminate spike-like with flowers borne singly in the axils of reduced leaves (bracts). *Lateral inflorescences* arising in axils of the upper leaves. Main and lateral inflorescences nodding. *Bracts* linear-lanceolate, 2.5-3.0 mm long, entire, fleshy, scabrous. *Bracteoles* red, linear 0.5-0.7 mm long, entire. *Flowers* pendant on glabrous pedicels 0.4-0.5 mm long. *Sepals* 4, olive-green, lanceolate, 1.25 mm long, 0.5 mm wide, thick, semi-spreading, minutely ciliate on margin. *Petals* 4, red, hooded, strongly keeled, clawed, 2.2 mm long, 0.6 mm wide (keel to margin) with stiff semi-appressed hairs on keel, spreading and more or less persistent after anthesis. *Stamens* 8; filaments lengthening to 0.5 mm; anthers narrowly oblong, 1.5 mm long, 0.3 mm wide, non-apiculate. *Styles* 4, clavate, 0.5 mm long, stigmas capitate, yellow, fimbriate. *Ovary* dark grey, turbinate, 0.8 mm long, 0.8 mm diam., densely clothed in semi-appressed white to brownish hairs as for stems. *Fruit* turbinate, 0.8 mm long, 0.8 mm diam., densely pilose, sepals persistent and spreading at 45°, petals also more or less persistent.

Distribution. Known only from the type from the Lake Grace district of Western Australia.

Ecology. Rare in tall heath with *Casuarina campestris,* on gravelly sand flats over laterite. Flowering and fruiting in January.

G. ericifolius seems to be related to *G. pithyoides* from which it differs mainly in the size and shape of its sepals. *G. pithyoides* is often more or less glabrous in all of its parts, or has hairs confined to the ovary only. *G. ericifolius* is stiffly strigose/pilose in all of its parts. This species differs from *G. hispidus* in its sepal shape and size, in its nodding inflorescence, and in its less robust semi-appressed to appressed hairs.

The specific epithet alludes to the similarity of the foliage of this species to that of some *Erica* species, e.g. *E. baccans.*

Gonocarpus effusus A.E. Orchard, sp. nov. (Figure 3A-E)

Frutex; caules profuse ramosi 4-angulati, sparsim strigosi, trichomatibus bicellularibus hyalinis 0.25-0.3 mm praecipue ad angulos limitatis. Folia opposita (alterna in ramulos ultimos), late disposita, ovata, 4-5 mm longa, 3 mm lata, discoloria, breviter (0.4-0.5 mm) petiolata, margine incrassato hyalino minute 4-6-dentato, in superficiebus ambabus sparsim strigosis. Bracteolae cinnamomeae, lanceolatae (rare oblanceolatae) vel trifidae, 0.5 mm longae, 0.2-0.25 mm latae, scabrae. Flores pedicellis 0.2 mm longis insidentes. Sepala 4 ovata vel deltoidea, 0.6 mm longa, 0.3 mm lata, margine incrassato hyalino, callo mediano basali. Petala 4 atropurpurea, cucullata, carinata, 1.8-2.1 mm longa, 0.5-0.6 mm lata (carina ad marginem), in carina strigosa. Stamina 8; antheris auguste oblongis 1.4-

1.5 mm longis, non apiculatis. Styli 4, clavati, 0.2-0.3 mm longi, stigmatibus capitatis flavis fimbriatis. Ovarium atropurpureum, ovoideum, 0.8 mm longum, 0.5 mm latum, plusminusve laeve, strigosum. Fructus plumbeus anguste ovoideum, 1.0 mm longus, 0.6 mm latus, 8-costatus, inter costas laevis vel tuberculis 1-2 parvis, in costis minute strigosis.

Typus: Mt Ngungun, Glasshouse Mtns, Moreton District, Queensland, 26°54'S, 152°56'E, 180 m alt., open rocky (trachyte) slopes, shrub community, 2 Oct. 1973, *I.R. Telford* 3399 (holo: CBG 8202121).

Straggling *shrub*; stems brown, 4-angled, profusely branched, sparsely strigose with transparent 2-celled hairs 0.25-0.3 mm long confined mainly to the angles. *Leaves* opposite (becoming alternate on ultimate branchlets) widely spaced, ovate, 4-5 mm long, 3 mm wide, excluding a short (0.4-0.5 mm) petiole, discolorous, with thickened hyaline margins, minutely 4-6-toothed, almost glabrous with sparse appressed scabrous hairs on each surface. *Inflorescence* simple, spike-like, flowers borne singly in the axils of alternate reduced leaves (bracts) to 2 mm long. *Bracteoles* reddish brown, lanceolate (rarely oblanceolate) to trifid, 0.5 mm long, 0.2-0.25 mm wide, entire or with 2-3 teeth, scabrous. *Flowers* on pedicel 0.2 mm long. *Sepals* 4, ovate to deltoid, 0.6 mm long, 0.3 mm wide, margins thickened, hyaline, median basal callus, glabrous. *Petals* 4, deep reddish purple, hooded, keeled, 1.8-2.1 mm long, 0.5-0.6 mm wide (keel to margin), strigose on keel with hairs as for stem. *Stamens* 8, anthers linear, 1.4-1.5 mm long, non-apiculate. *Styles* 4, clavate, 0.2-0.3 mm long, stigmas capitate, yellow, fimbriate. *Ovary* deep reddish purple, ovoid, 0.8 mm long, 0.5 mm diam., more or less smooth, strigose. *Fruit* dark silvery-grey, narrowly ovoid, 1.0 mm long, 0.6 mm wide, 8-ribbed, smooth between ribs or with 1-2 small tubercles, minutely strigose on ribs.

Distribution. Known only from the type from the Glasshouse Mountains of south-eastern Queensland.

Ecology. Growing in shrub community on open rocky slopes. Flowering and fruiting in October.

Gonocarpus effusus is clearly a member of the *G. oreophilus*/*G. longifolius*/*G. teucrioides* group found in forested areas throughout the Eastern Divide. Its distinctive characters are its small ovate leaves and sparse strigose hairs. From *G. teucrioides* it differs also in its small brown membranous (usually) toothed bracteoles, those of *G. teucrioides* being green, more or less fleshy, entire and larger. The four species are easily distinguished by, among other things, their hair type, best seen on young branchlets. The hairs of *G. effusus* are sparse, short and appressed, those of *G. oreophilus* are dense, short and velutinous (occasionally with a few long ones as well), those of *G. longifolius* are moderately dense, long, soft and spreading, while those of *G. teucrioides* are moderately dense, long and short, harsh and stiffly spreading.

The specific epithet alludes to the straggling habit of the plant.

Gonocarpus urceolatus A.E. Orchard, sp. nov. (Figure 3F-J)

Herba usque ad 30 cm altam; caules erecti pilosi pilis moderate dense patentibus 3-4-cellularibus hyalinis 0.5-0.6 mm longis. Folia sessilia opposita, late disposita, ovata 15-22 mm longa, 9-13 mm lata, margine incrassato hyalino grosse serrato dentibus 10-12, pilosa. Bracteae lanceolatae 2.5-3 mm longae 0.7-1.1 mm latae, margine incrassato hyalino integro. Bracteolae testaceae, digitatae c. 0.3 mm diametro. Flores pedicellis 0.8 mm longis insidentes. Sepala 4 lanceolata 1.0 mm longa 0.5 mm lata, basi callo rotundato, margine incrassato hyalino. Petala 4 virides vel atro-rubra, cucullata, carinata, 2.5 mm longa, 0.6

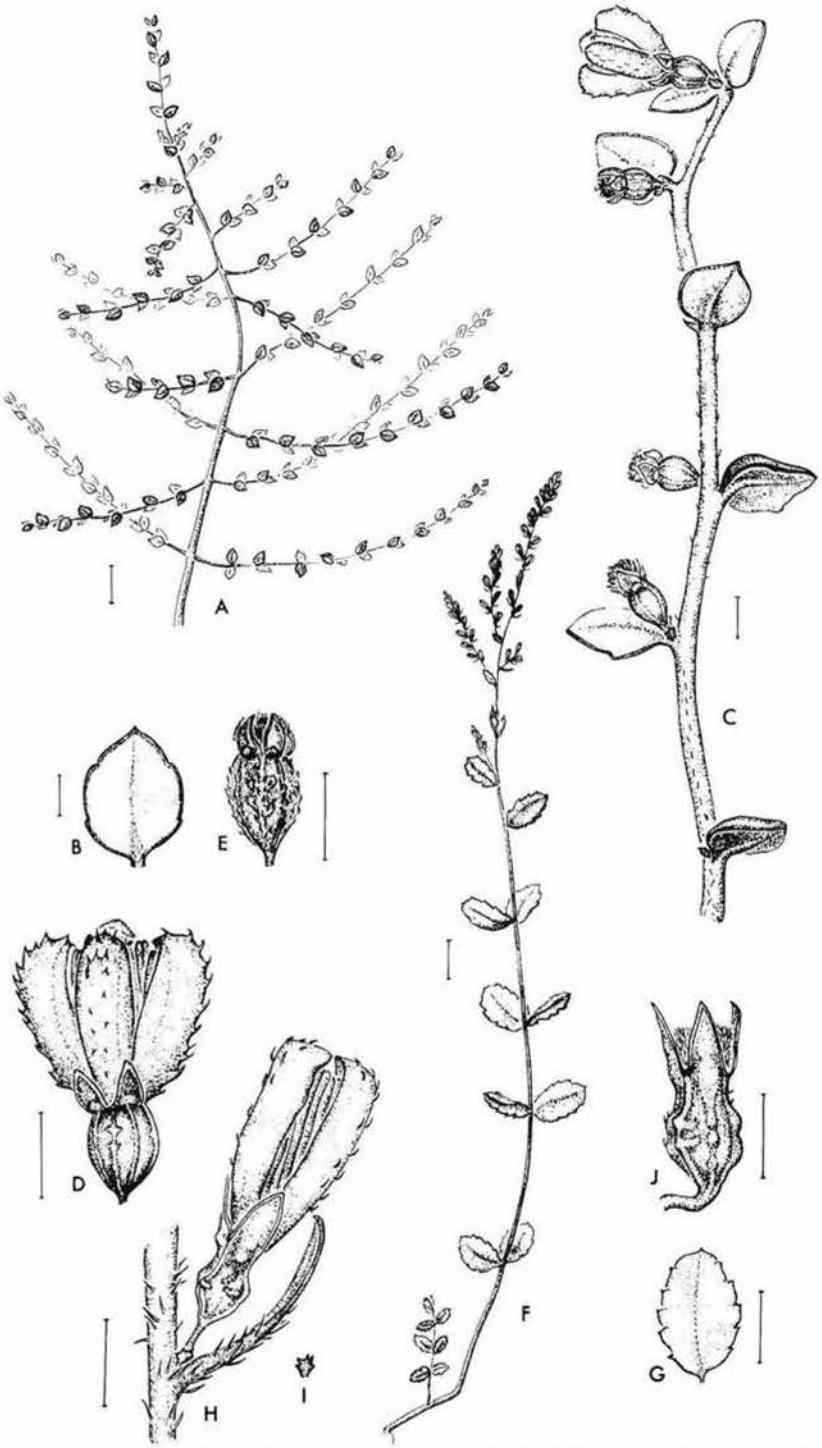

Figure 3. *Gonocarpus* spp. (A-E) *G. effusus*. (A) habit. (B) leaf. (C) inflorescence, (D) flower. (E) fruit. (F-J) *G. urceolatus*. (F) habit. (G) leaf. (H) flower in axil of bract. (I) bracteole. (J) fruit. (A-E, *Telford* 3399; F-J *Lithgow* s.n.).

Bar scales represent 1 cm (A,B,F,G) or 1 mm (others).

mm lata (carina ad marginem), in carina sparsim scabra. Stamina 8, antheris anguste oblongis 1.8 mm longis, non apiculatis. Styli 4, clavati, 0.3 mm longi, stigmatibus capitatis flavis fimbriatis. Ovarium atropurpureum nitens ovoideum usque ad urceolatum, 0.9 mm longum, 0.85-0.9 mm latum, 8-costatum callis 2 obliquis inter uterque par costarum; costis et callis plumbeis. Fructus plumbeus urceolatus, 2 mm longus (sepalis viridibus persistentibus inclusis), 1.1 mm latus, valde 8-costatus longistrorsum, callis 2 magnis V-formibus in costis antipetalis, pilis scabris aliquot in costis.

Typus: Chinchilla area, Queensland, near roadside drain in bulloak soil, Oct. 1978, *M.G. Lithgow* s.n. (holo: BRI 241683).

Herb to 30 cm tall; *stems* branched only at base, erect, pilose with moderately dense simple, spreading 3-4-celled transparent hairs 0.5-0.6 mm long. *Leaves* sessile, opposite, widely spaced, flat, ovate, 15-22 mm long, 9-13 mm wide, margin thickened, hyaline, coarsely serrate with 10-12 cuspidate teeth; sparsely pilose with hairs as for stems. *Inflorescence* simple, spike-like with flowers borne singly in the axils of alternate reduced leaves (bracts). *Bracts* lanceolate, 2.5-3 mm long, 0.7-1.1 mm wide, margins entire, thickened, hyaline. *Bracteoles* yellow-brown, digitate, c. 0.3 mm diam. *Flowers* on pedicel 0.8 mm long. Sepals 4, green, lanceolate, 1.0 mm long, 0.5 mm wide, rounded swollen callus at base, otherwise smooth, margins thickened, hyaline, glabrous. *Petals* 4, green to deep red, hooded, keeled, clawed, 2.5 mm long, 0.6 mm wide (keel to margin), sparsely scabrous on keel. *Stamens* 8; filaments elongating to 1.3 mm long; anthers narrowly oblong, 1.8 mm long, 0.3 mm wide, non-apiculate. *Styles* 4, clavate, 0.3 mm long, stigmas capitate, yellow, fimbriate. *Ovary* deep reddish purple, shiny, ovoid to urceolate, 0.9 mm long, 0.85-0.9 mm wide, 8-ribbed with 2 oblique calluses between each pair of ribs, ribs and calluses silver-grey. *Fruit* silver-grey, urceolate, 2 mm long (including persistent greenish sepals), 1.1 mm diam., strongly 8-ribbed longitudinally with 2 large V-shaped calluses on antipetalous ribs, occasional scabrous hairs on ribs.

Additional specimen examined. In NSW there is a second collection of this species (NSW 99014) which has been attributed to Leichhardt. It has a small label written in pencil reading "135. On the banks of the northern branch of N . . . . . Creek 6 Jun 47". The name of the creek is indecipherable. On 6th June 1847 Leichhardt was camped south of Peak Hill in Queensland, somewhere in the vicinity of the present towns of Emerald and Springsure.

Distribution. Known only from two collections from the Chinchilla and Emerald districts of south-eastern Queensland.

Ecology. "Near roadside drain in bulloak soil". Flowering and fruiting in October.

G. urceolatus seems to be unrelated to any of the other eastern species. In most respects it comes closest to *G. pycnostachyus* of Israelite Bay in southern Western Australia, or *G. confertifolius* of the Western Australian goldfields but is distinct from both in its larger, more coarsely serrate sessile leaves, in fruit ornamentation and in its glabrous sepals.

The specific epithet alludes to the distinctive fruit shape, shared (in broad terms) with only 2-3 other species in the genus.

Haloragis acutangula F. Muell.

In a previous paper (Orchard 1977) I mentioned possible confusion between this species and *H. digyna* that may have occurred in the course of my description of *H. acutangula* f. *occidentalis*. At that time I had not re-examined the type specimen, but this has now

been done. I find that although Western Australian plants of *H. acutangula* do exist and answer the description given by me in 1975, the type specimen chosen then (and a couple of other specimens cited) in fact belong to *H. digyna*. The unfortunate consequence is that the name *Haloragis acutangula* f. *occidentalis* Orchard must now be placed in the synonymy of *H. digyna* and a new name and type is necessary for the Western Australian forma of *H. acutangula*. The following specimens cited in Orchard (1975) under *"H. acutangula* f. *occidentalis"* have now been re-identified as *H. digyna: Gardner* s.n., 18.xii. 1940, Esperance (PERTH): *O.I.C. Esperance* 112, Esperance (PERTH); *Orchard* 1726, 1728, 3 km NE Esperance (AD, AK); *Royce* 6316, 1 mile N of Esperance, (PERTH) — type of *H. acutangula* f. *occidentalis*.

Haloragis acutangula f. **stellata** A.E. Orchard, f. nov.

Fructus brevior quam latior, 1.5-2.0 mm longus (sepala exclusa), 2.0-3.3 mm latus; alae magnae deltatae in medio fructu tota longitudo fructo occupans; callus inter alas absens.

Typus: near small cove below limestone cliffs on eastern side of Middle Island, Recherche Archipelago, Western Australia, 10 Nov. 1974, *A.S. Weston* 9837 (holo: PERTH; iso: CANB).

Specimens examined. WESTERN AUSTRALIA: *Bennett* s.n., Albany, -.i.1941 (PERTH); *Maxwell* s.n., near King Georges Sound (MEL 1003759); *Weston & Trudgen* 8758, Middle Island, Recherche Archipelago, 17.xi.1973 (CANB, PERTH); *Willis* s.n., Boxer Island, Recherche Archipelago, 8.xi.1950 (MEL 38930); *Willis* s.n., Middle Island, 23.xi.1950 (MEL 38931, PERTH).

SOUTH AUSTRALIA: *Copley* 2633, 25 km SE Yalata, 27.vii.1969 (AD); *Orchard* 3101, 3102, 3104, 7 km SSE Mt Hope, 2.i.1971 (AD); *Orchard* 3159, SE end Yalata Aboriginal Reserve, 5.i.1971 (AD).

Haloragis prostrata J.R. & G. Forst.

Since publication of my revision (Orchard 1975) this Pacific species, the type of the genus, has had its range extended dramatically, from New Caledonia to Tuvalu and the Cook Islands. Both of these outlying populations differ from the typical New Caledonian plants in a number of respects, and are recognised below as new subspecies.

Key to the subspecies of *H. prostrata*

1. Plants glabrous
   2. Petals 1.5-1.8 mm long ..... subsp. *prostrata*
   2. Petals 2.9 mm long ..... subsp. *coquana*
1. Plants with a fine dense indumentum ..... subsp. *tuvaluensis*

H. prostrata subsp. **prostrata**

See Orchard (1975) pp. 84-5

H. prostrata subsp. **coquana** A.E Orchard, subsp. nov. (Figures 4A-E, 5)

A subsp. *prostrata* floribus magnis (petalis 2.9 mm longis, antheris 1.8 mm longis) et bracteolis usque ad 2.1-2.2 mm longis, differt.

Typus: Mitiaro, between Omapere and Kakari (east coast), Cook Islands, coastal makatea, level, with much sand, 22 July 1982, *W.R. Sykes* 2415/CI (holo: CHR 397621; iso: HO 72972, CANB).

Perennial glabrous *herb,* stems semi-prostrate to 25 cm long, smooth, the older ones 4-angled. *Leaves* decussate, oblanceolate to obovate, 25-35 mm long, 6-9 mm wide, more or less fleshy, entire, usually with a minute rounded apiculum at tip. *Inflorescence* simple, spike-like with fascicles of 3-5 flowers borne in axils of reduced leaves (bracts). *Lateral inflorescences* arise in axils of upper leaves. *Bracteoles* linear, 2.1-2.2 mm long, 0.4 mm wide, weakly midribbed, flat, acute. Secondary bracteoles similar but smaller. *Flowers* strongly protandrous, on pedicels 1.3 mm long. *Sepals* 4, deltoid, 1.0-1.1 mm long, 0.8 mm wide, smooth, erect. *Petals* 4, hooded, keeled, 2.5-2.9 mm long, 0.8 mm wide (keel to margin). *Stamens* 8, filaments elongating to 1.1 mm; anthers narrowly oblong, 1.6-1.8 mm long, 0.5 mm wide, non-apiculate. *Styles* 4, clavate, 0.8 mm long; stigmas capitate, yellow fimbriate. *Ovary* globular, 1.7 mm diam., slightly sulcate opposite petals. *Fruit* on pedicel 1.3 mm long, reddish, shining, globular, 2.1-2.9 mm in diam., weakly 8-lined longitudinally; developing small irregular tubercles at maturity; sepals persistent, more or less spreading.

Distribution. Confined to the island of Mitiaro in the Cook Islands.

Ecology. Mitiaro is a raised coral or makatea island, apart from three small patches in the middle. The *Haloragis* grows commonly to abundantly all around the outer parts of the island except for the first 20 metres or so in from the low cliff edge. It grows in the light shade of some of the outer, or seaward scrub forest, but best of all on the more open rough coral. The stronger the insolation the more reddish the plants are. The plants die back around July to September as only young vegetative shoots are present at this time. (W.R. Sykes pers. comm.)

This subspecies closely resembles subsp. *prostrata* differing mainly in its larger flowers and bracteoles. In my previous account of *H. prostrata* (subsp. *prostrata*) (Orchard 1975) I mentioned a large leaved form from "Isle St. Marie" probably collected by Lemée. As the species was at that time thought to be confined to New Caledonia the specimen was cited under that locality. Unfortunately the collection bore only young buds, but on leaf size and shape alone it is possible that it too belongs to subsp. *coquana* and that "Isle St. Marie" is Maria Is. in the Tubuai Islands. Removal of the (?) Lemée specimen from subsp. *prostrata* means modification of the range of leaf size for that subspecies is necessary, to 15-20 mm long and 5-6 mm wide.

The fruits on the type specimen are probably immature, and further collections could be anticipated with larger fruits.

H. prostrata subsp. **tuvaluensis** A.E Orchard, subsp. nov. (Figure 4F-I)

A subsp. *prostrata* indumento tenui denso pilorum brevium aureorum mollium crisporum patentium plantam totam tegentem, differt.

Typus: Ipota, Erromanga, New Hebrides, on coral rock above the high water tide mark, 10 Aug. 1971, *P.S. Green* RSNH 1328 (holo: K).

Annual (?) *herb* to 40 cm high, the whole plant with a fine dense indumentum of golden short (c. 0.01 mm) soft crisped spreading hairs; *stems* freely branched, somewhat fleshy, the older ones 4-angled. *Leaves* decussate, obovate, 25-45 mm long, 7-11 mm wide, entire, tip rounded with a short blunt apiculum, only midrib apparent. *Inflorescence* simple, spike-like, of fascicles of 3-5 flowers borne in the axils of slightly reduced leaves (bracts). *Bracteoles* lanceolate 1.0-1.2 mm long, 0.3 mm wide, weakly midribbed. *Flowers* on pedicels 1.5 mm long. *Sepals* 4, deltoid, 0.8 mm long, 0.8 mm wide, smooth, with crisped hairs on outer surface as for stems. *Petals* 4, yellow, hooded, keeled, 1.4 mm long, 0.6-0.7 mm

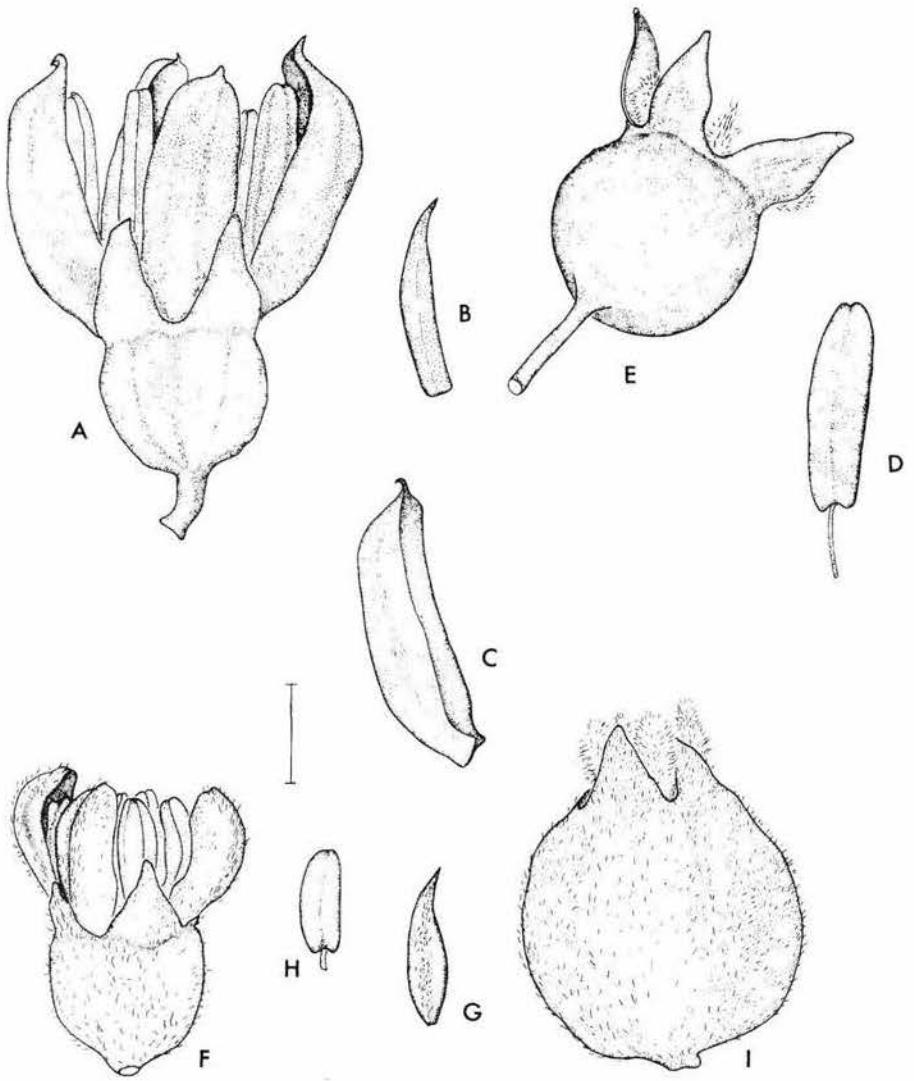

Figure 4. *Haloragis prostrata.* (A-E) subsp. *coquana.* (A) flower. (B) bracteole. (C) petal. (D) stamen. (E) immature fruit. (F-I) subsp. *tuvaluensis.* (F) flower. (G) bracteole. (H) stamen. (I) immature fruit. (A-E, *Sykes* 2415/CI; F-I, *Green* RSNH 1328).

Bar scale represents 1 mm (all illustrations).

wide (keel to margin). *Stamens* 8, filaments lengthening to 0.6 mm; anthers oblong, 1.0 mm long, 0.4-0.5 mm wide, non-apiculate. *Styles* 4, clavate, 0.6 mm long, stigmas capitate, cream, fimbriate. *Ovary* green, globular, 1.3 mm diam., smooth, with crisped hairs. *Fruit* green, globular, 2.5 mm diam., slightly 4-sulcate longitudinally opposite sepals; sepals remaining erect.

Other collection examined. TUVALU: *J. Raynal* RSNH 16003, Nouvelles-Hébrides, Efate, côte S entre Pointe Narabo et Baie François, arrière-plage a *Messerschmidia,* sur blocs coralliens, 30.vi.1971 (K).

Figure 5. *Haloragis prostrata* subsp. *coquana*, type specimen in situ. (A) habit. (B) flowers and young fruits.
(Photos by E.K. Cameron, Botany Dept., University of Auckland, per W.R. Sykes.)

Distribution. Known only from the islands of Erromanga and Efate in Tuvalu.

Ecology. Like the other subspecies this plant is confined to coral sand/rock on shorelines just above high water level, where it is locally abundant.

The subspecies is easily distinguished from the other two by its close indumentum of tiny crisped hairs which clothe the stems, leaves, bracteoles, ovary, sepals and keels of the petals as well as the fruits (the other subspecies are completely glabrous). It differs also in the erect sepals of the fruit and the 4-sulci which are most pronounced in dried collections but which disappear to some extent when the fruits are rehydrated. The apiculum on the tip of the leaf is also more pronounced in subsp. *tuvaluensis* than in the other two subspecies.

The plants here described as subsp. *tuvaluensis* were cited by Green (1979), who mentioned them as an example of one of the few species shared by New Caledonia and Tuvalu. While this is true, his suggestion that they could be relatively recent arrivals cannot be sustained. The Tuvaluan plants have been separated from those on New Caledonia long enough to have developed their characteristic indumentum and other minor differences mentioned above, and for these modified plants to have spread to at least two islands in the group. In fact, subsp. *tuvaluensis* seems to me to be more distinct from subsp. *prostrata* than does the geographically more distinct subsp. *coquana* which may indeed be a relatively recent taxon derived from long-distance dispersal by sea of propagules from New Caledonia.

Acknowledgements

Dr P.S. Green kindly drew my attention to the existence of the Vanuatu collections of *H. prostrata.* Mr W.R. Sykes sent me the Cook Islands material for identification, and provided photographs and ecological information for subsp. *coquana.* Without their encouragement I would probably not have re-examined this species and I thank them for their interest. The Curators of the Herbaria BRI, CANB, CBG, K and PERTH loaned material for study, and the final *Gonocarpus* illustrations were prepared from my sketches by Mrs F. Butterfield. The *Haloragis* drawings were similarly prepared by Mrs L. Button.

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Notes on the informal subgenus "Monocalyptus" of *Eucalyptus* (Myrtaceae) and the description of three new upland species from south-west Western Australia

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Abstract

Brooker, M.I.H. and Hopper, S.D. Notes on the informal subgenus "Monocalyptus" of *Eucalyptus* (Myrtaceae) and description of three new upland species from south-west Western Australia. Nuytsia 5 (3):341-356 (1986). Introductory notes on the informal subgenus "Monocalyptus" are provided. These include an historical account of the "taxon" from Bentham to Pryor and Johnson. Salient morphological features which define the group are discussed. Three new species *Eucalyptus suberea, E. lateritica* and *E. erectifolia* are described. All belong to the informal "*E.* subgen. *Monocalyptus*" Pryor & Johnson. Keys to these and related species in the proposed Mt Lesueur Nature Reserve and the Stirling Range National Park are given. *E. suberea* has no close relatives, whereas *E. lateritica* is related to *E. todtiana* F. Muell. and *E. erectifolia* is related to *E. pachyloma* Benth. and *E. buprestium* F. Muell. All three species are very rare and warrant gazettal under the Wildlife Conservation Act. Allozyme assays for *E. erectifolia* show that the species can occur in circular clumps to 25 m diameter derived from one genetic individual.

Introduction

The informal "*Eucalyptus* subgen. *Monocalyptus*" (Pryor & Johnson 1971) is based on *E.* ser. *Renantherae* Benth. The group is large, consisting of about 140 species, which have captured the interest of botanists and foresters for many years. They are distributed across temperate southern Australia and northwards along the eastern seaboard as far as the Atherton Tableland in Queensland. The group includes many important timber species such as jarrah *E. marginata* Smith, mountain ash, *E. regnans* F. Muell. and messmate *E. obliqua* L'Hérit. In Western Australia, there are also species of horticultural value including bell-fruited mallee, *E. preissiana* Schau., weeping gum *E. sepulcralis* F. Muell., and several recently discovered very rare taxa (Brooker 1972, 1974; Brooker and Blaxell 1978; Rye and Hopper 1981; Pryor 1981).

The monocalypts are characterised morphologically by a single operculum, trends towards reduced leaf venation compared with *"E.* subgen. *Corymbia"* and *"E.* subgen. *Symphyomyrtus"* of the Pryor & Johnson (1971) classification, the kidney-shaped anther, and anatropous ovules which are situated in 2 vertical rows on the placenta (apart from the imputed reversal condition to 4 rows seen in *E. coccifera* Hook. f. (Ladiges, Humphries and Brooker 1983) and in some forms of *E. pauciflora* Sieber ex Sprengel (Boland, Brooker and Turnbull 1980)). The recognition of this suite of diagnostic characters has emerged only recently in the history of morphological studies in *Eucalyptus*.

To the early morphologists, the kidney-shaped anther was the distinguishing feature of the group. This received expression in the classification of Bentham (1867) with his *E.* ser. *Renantherae* ("anthers reniform --- cells divergent --- confluent at the apex"). Maiden (1922) devised a scheme in which he largely retained Bentham's concept of the *Renantherae* (as a section) but modified by the erection of a new section *Renantheroideae* ("anthers have

some resemblance to --- *Renantherae* --- lobes vary --- sometimes nearly parallel"). With this latter taxon it is debatable whether he intended it to be a natural group by his inclusion of species that are clearly not closely related, e.g. *E. cloeziana* F.Muell., *E. cneorifolia* DC., and *E. oligantha* Schau. among others. Blakely (1934), following Maiden, retained the two sections, and in his diagnoses concurred that the renantheroid anther was morphologically distinct from the renantherous. In assigning species to the two groups, he transferred the non-monocalypts named above to other sections.

Nevertheless, with a greater range of characters considered, opinion prevailed that the two sections had far more affinity with each other than to any other of the sections in Blakely's classification. Pryor (1959) suggested that they composed a single taxonomic group ("subgenus Renanthera") that had developed along different lines in east and west.

It was clear, therefore, that the emphasis on anthers as a unifying character could not stand. In an attempt to find a more suitable name for the whole group (renantheroid and renantherous) Carr and Carr (1959) suggested that "*Monocalyptus*" be applied. The species in both groups have, without exception, a single operculum, although the single opercular structure is not exclusive to "*Monocalyptus*".

In their comprehensive classification, Pryor and Johnson (1971) informally adopted the name *Monocalyptus* for one of their eight subgenera, but placed all species in the one "*E.* sect. *Renantheria*" while stating that "*Renantheria*" need not, conceptually, be the only section in "*Monocalyptus*". In fact, Johnson (1976) explicitly restored the concept of two groups when he erected an informal section, "*Hesperia*" (Greek — west) to accommodate the old *E.* sect. *Renantheroideae* and excluded *E. marginata, E. staeri* (Maiden) Kessell & Gardner, and *E. jacksonii* Maiden, which were retained in the informal "*E.* sect. *Renantheria*".

In the 20 or 30 years before the publication of Pryor and Johnson's classification, only a few new eucalypts had been discovered and named (these include *E. porrecta* Blake (1953) from the Northern Territory, *E. tetrapleura* Johnson (1962) from north coastal New South Wales, *E. mannensis* Boomsma (1964) from central Australia). Since then, with intensive exploration, there has been a minor explosion in the number of eucalypt species discovered. These include many monocalypts. A few are from eastern Australia, but most are from the south-west of the continent (Brooker 1972, 1974; Brooker & Blaxell 1978). One of these belongs to "*E.* sect. *Renantheria*" (*E. brevistylis* Brooker) and the remainder (8 before this study) are in "*E.* sect. *Hesperia*".

Recently, intensified eucalypt survey work in the south-west has included two regions renowned for their high numbers of local endemics — Mt Lesueur to the north of Perth, and the Stirling Range (Hopper 1979; Hopkins, Keighery and Marchant 1983). Our interest in the eucalypts of these uplands was stimulated when an undescribed species of "*E.* subgen. *Monocalyptus*" from the Mt Lesueur area was brought to our attention by E.A. Griffin. Subsequently another undescribed monocalypt was found by one of us (S.D.H.) in the same area.

In November 1981 we began a series of field excursions in the Stirling Range National Park. These have resulted in the discovery of a new species in the group and a range of putative hybrids which we discuss elsewhere. With the description of these three new monocalypts plus those of the works cited above, the number of species in western "*E.* subgen. *Monocalyptus*" has doubled since Pryor and Johnson (1971).

Because the new species occur in two distinctive and widely separated areas, we include two keys for the benefit of field workers.

Key to the monocalypts of the proposed Mt Lesueur Nature Reserve and adjacent areas

1. Adult leaves discolorous, bark rough, operculum elongated.....*E. marginata* Smith
1. Adult leaves concolorous, bark rough or smooth, operculum hemispherical or conical
   2. Mallees with smooth slender stems and sparse canopies; branchlets glaucous
      3. Crown prominently drooping; adult leaves 6-12 x 1-2 cm; buds 0.9-1.1 x 0.6-0.8 cm; fruit 1.3-2 x 1.2-2 cm, wrinkled or ribbed .....*E. pendens* Brooker
      3. Crown more or less erect; adult leaves 4-7 x 1-1.4 cm; buds 0.6-0.9 x 0.4-0.5 cm; fruit 1.1-1.5 x 1-1.4 cm, smooth.....*E. exilis* Brooker
   2. Mallees or trees with dense crowns, usually with some rough bark; branchlets not glaucous
      4. Fruit globose with narrow orifice; outer stamens without anthers; crown usually to ground level; inflorescences 7-flowered..... .....*E. johnsoniana* Brooker & Blaxell
      4. Fruit cupular to truncate-globose or urceolate; all stamens fertile; crown not to ground level; inflorescences 7 to more than 20-flowered
         5. Buds smooth, to 0.7 x 0.5 cm; fruit to 0.9 x 1.1 cm; 11 to more than 20-flowered.....*E. suberea* Brooker & Hopper
         5. Buds slightly rough-surfaced, to 1.2 x 0.8 cm; fruit 1.5-2 x 1.5-2.5 cm; 7-15-flowered
            6. Adult leaves to 10 x 1.5 cm, thin, with small glands and sparse lateral venation; fruit to 1.5 x 1.5 cm; bark not rough over whole stems; erect-stemmed mallees.....*E. lateritica* Brooker & Hopper
            6. Adult leaves to 15 x 2.5 cm, thick, not apparently glandular; venation densely reticulate; fruit to 2 x 2.5 cm; bark rough over whole stems; straggly trees or mallees .....*E. todtiana* F.Muell.

Eucalyptus suberea Brooker & Hopper, sp. nov. (Figure 2)

Frutex "mallee" cortice suberoso vel squamoso, canopio plerumque ad terram, foliis falcatis atro-virentibus nitentibus. Alabastra numerosa (ad 25), ad 0.6 x 0.4 cm, rhombea vel globosa, et fructus truncato-sphaerici vel plus minusve urceolati, orificio comparate lato. Semina deltoidea vel aliquantum pyramidalia, brunnea, nitentia.

Typus: Hi Valley farm, Tootbardi road, north of Badgingarra, Western Australia, 24 Jan. 1983, *M.I.H. Brooker* 7930 (holo: PERTH (Figure 1); iso: FRI, NSW, MEL, AD, K)

A mallee up to 3 m tall with grey, corky rough bark at base or to ½ the height of the stems or in large specimens thicker, yellowish and flaky (like a yellow bloodwood, "*E.* ser. *Eximiae*"), lignotuberous. Cotyledons reniform or slightly emarginate, 0.5-1.5 x 0.4-1 cm green above, purple below. Seedling leaves sessile, remaining opposite and held horizontally for up to 7 pairs, elliptical to ovate, up to 12 x 6 cm, edges crinkly and sometimes minutely toothed, dull green to olive green. *Juvenile leaves* shortly petiolate, sub-opposite, turning vertical, lanceolate, up to 18 x 5.5 cm, slightly discolorous, light green, slightly glossy. *Adult leaves* petiolate, alternating, falcate to lanceolate, to 9 x 1.5 cm, dark green, slightly glossy, concolorous. *Inflorescences* axillary, 11 to more than 20 flowered. *Peduncles* up to 1.5 cm long. *Buds* on distinct pedicels, broadly fusiform to clavate, up to 0.7 x 0.5 cm, smooth. *Operculum* single, conical to hemispherical. *Stamens* white, all fertile, partly inflexed, with anthers around the style and appressed to the disc. *Anthers* versatile, dorsifixed, oblong or as long as broad, not truncated, gland obscure,

seen at back, opening by parallel longtitudinal slits, which curve inwards towards the top and are not or scarcely confluent. *Loculi* 3, style long, not smooth due to anther impression, upper part inserted in a tube descending from or formed in the underside of the operculum. *Ovules* in 2 vertical rows. *Fruit* pedicellate, truncate-globose, rarely somewhat urceolate, up to 0.9 x 1.1 cm, with a relatively broad orifice, drying with shallow, irregular wrinkling. *Rim* thick or thin. *Disc* descending vertically. *Seed* up to 0.25 x 0.2 cm, brown, lustrous, D-shaped to slightly pyramidal not or scarcely ribbed, hilum terminal, dorsal side rounded.

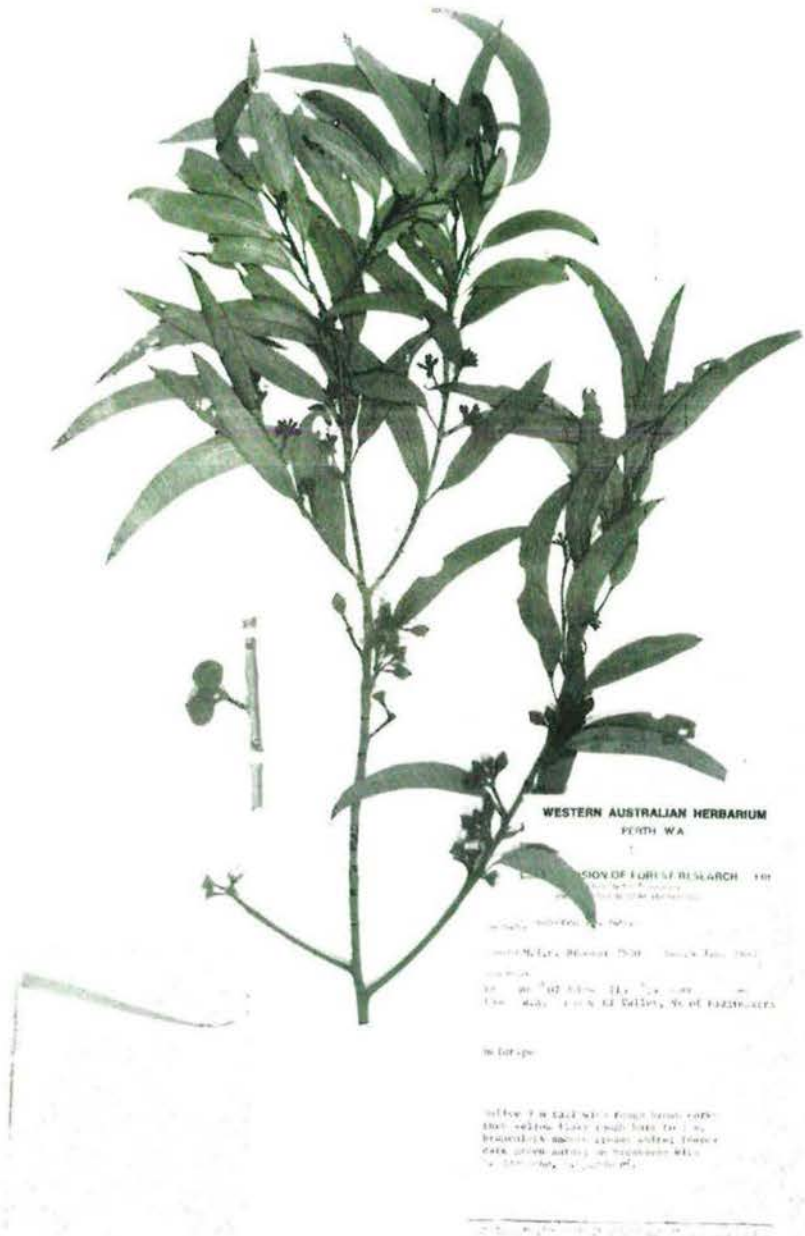

Figure 1. Holotype of *Eucalyptus suberea*.

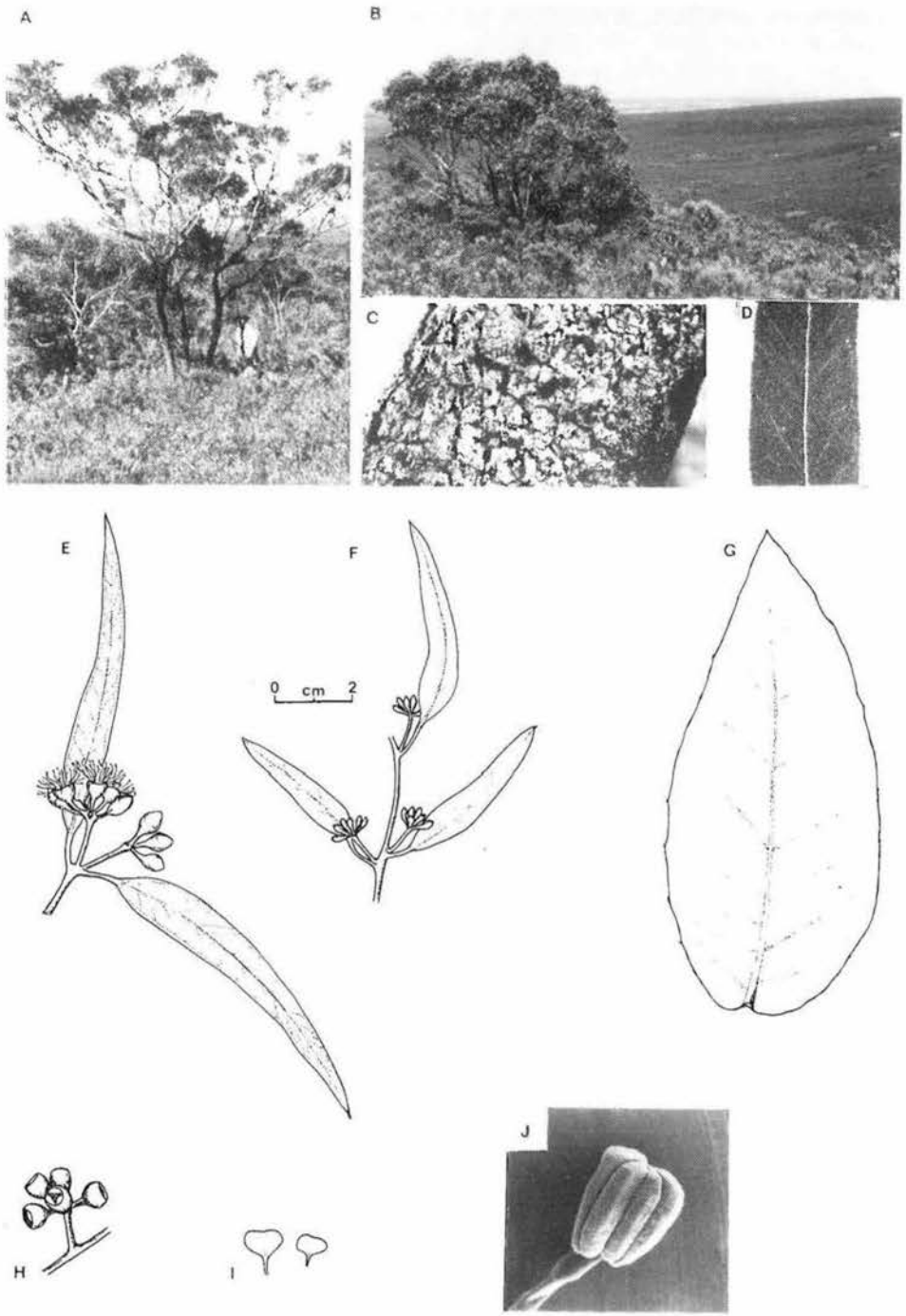

Figure 2. *Eucalyptus suberea*. (A) small tree 6 m tall, NE of Mt Lesueur; (B) mallee 2 m tall, emergent from dense low heath on a small lateritic mesa south of Mt Peron; (C) mature bark on tree shown in (A) above; (D) transmitted sunlight photograph of an adult leaf showing numerous oil glands and inconspicuous secondary venation; (E) adult leaves, buds and flowers; (F) young leaves and buds; (G) a node 5 seedling leaf (from *M.I.H. Brooker* 7992); (H) mature fruit; (I) cotyledons (from *M.I.H. Brooker* 7566); (J) anthers (from *M.I.H. Brooker* 7930). Drawings of E, F, and H are by *S.J. Patrick*, E-H from *E.A. Griffin* 2575. Drawings E-I same scale. Jx40.

Other specimens examined. WESTERN AUSTRALIA: Mt Lesueur, 16 September 1976, *J.S. Beard* 7814 (PERTH); Hill 1 km NW of Mt Lesueur, NE of Jurien, 17 July 1979, *E.A. Griffin* 1956 (PERTH); base of Mt Peron, 23 November 1979, *E.A. Griffin* 2575 (PERTH); Hi Valley farm, 26 August 1980, *G.J. Keighery* 3274 (PERTH); Hi Valley farm, Tootbardi road, north of Badgingarra, 19 August 1982, *M.I.H. Brooker* 7560,7566 (FRI, PERTH, NSW, MEL, AD); Mt Michaud, 21 September 1982, *M.I.H. Brooker* 7638,7639 (FRI, PERTH, NSW); Hi Valley farm, Tootbardi road, north of Badgingarra, 21 September 1982, *M.I.H. Brooker* 7645, 7650 (FRI, PERTH, NSW, MEL, AD) and 24 January 1983, *M.I.H. Brooker* 7930 (FRI, PERTH, NSW, MEL, AD); hill c. 5 km NE of Mt Lesueur, 1 March 1983, *M.I.H. Brooker* 7988 (FRI, PERTH, NSW, MEL, AD); mesa S of Mt Peron, 2 March 1983, *M.I.H. Brooker* 7992 (FRI, NSW, PERTH, MEL, AD); hill ENE of Mt Peron, 2 March 1983, *M.I.H. Brooker* 8005 (FRI, PERTH, NSW, MEL, AD); mesa NW of Mt Michaud, 3 March 1983, *M.I.H. Brooker* 8007 (FRI, PERTH, NSW, MEL, AD); Mt Benia, 3 March 1983, *M.I.H. Brooker* 8014 (FRI, PERTH, NSW, MEL, AD); scarp W of Coomallo Creek, NW of Badgingarra, 3 March 1983, *M.I.H. Brooker* 8016 (FRI, PERTH, NSW, MEL, AD).

Distribution and habitat. E. suberea is a localised endemic of the lateritic uplands near Mt Lesueur and further inland. It has a maximum geographical range of c. 30 km (Figure 3). The species occurs in small populations on the edges and scree slopes of lateritic flat-topped uplands. It grows in open mallee communities over dense low heath with *E. lateritica* Brooker & Hopper, *E. gittinsii* Brooker & Blaxell, *E. marginata, E. accedens* W.V. Fitzg., *E. drummondii* Benth., *E. calophylla* R. Br., *E. exilis* Brooker, *E. pendens* Brooker, *E. gardneri* Maiden, and scattered emergents such as *Hakea neurophylla* Meissn., *Banksia tricuspis* Meissn., *Daviesia epiphylla* Meissn. and *Kingia australis* R.Br.

Conservation status. Only 11 populations of *E. suberea* are known, and all consist of low numbers of plants. The species' rarity alone qualifies it for special legal protection by gazettal as rare flora under the Wildlife Conservation Act (Rye and Hopper 1981). Although most populations of *E. suberea* occur on unvested reserves recommended for inclusion in proposed nature reserves and national parks, none of these reserves has yet been created (Figure 3).

Flowering period. December to March.

Etymology. The Latin name alludes to the nature of the rough corky bark in mature specimens.

Notes. E. suberea has no close relative and is readily distinguished from other Western Australian monocalypts by its small truncate-globose fruit, its grey-yellow corky bark, its many-flowered inflorescences, and its small brown D-shaped seed. Like *E. johnsoniana* Brooker & Blaxell and *Hakea megalosperma* Meissn., *E. suberea* may be a relict species for which the Mt Lesueur region appears to have been a refuge during the climatic perturbations of the Quaternary (Hopper 1979; Hopkins *et al.* 1983).

Eucalyptus lateritica Brooker & Hopper, sp. nov. (Figure 5)

Eucalypto todtianae affinis a qua constanter statura inferiore, cortice minus aspera, foliis adultis viridioribus, parvioribus et tenuioribus, minus reticulatis et glandulis manifestis, et fructibus plerumque parvioribus differt. Semina anguste pyramidalia, brunnea, alis lateralibus latis.

Typus: Mt. Michaud, c. 1 km NW of Mt. Lesueur (30° 15'S, 115° 12'E) 22 April 1982, *S.D. Hopper* 2232 (holo: PERTH (Figure 4); iso: FRI, NSW, MEL, AD, K).

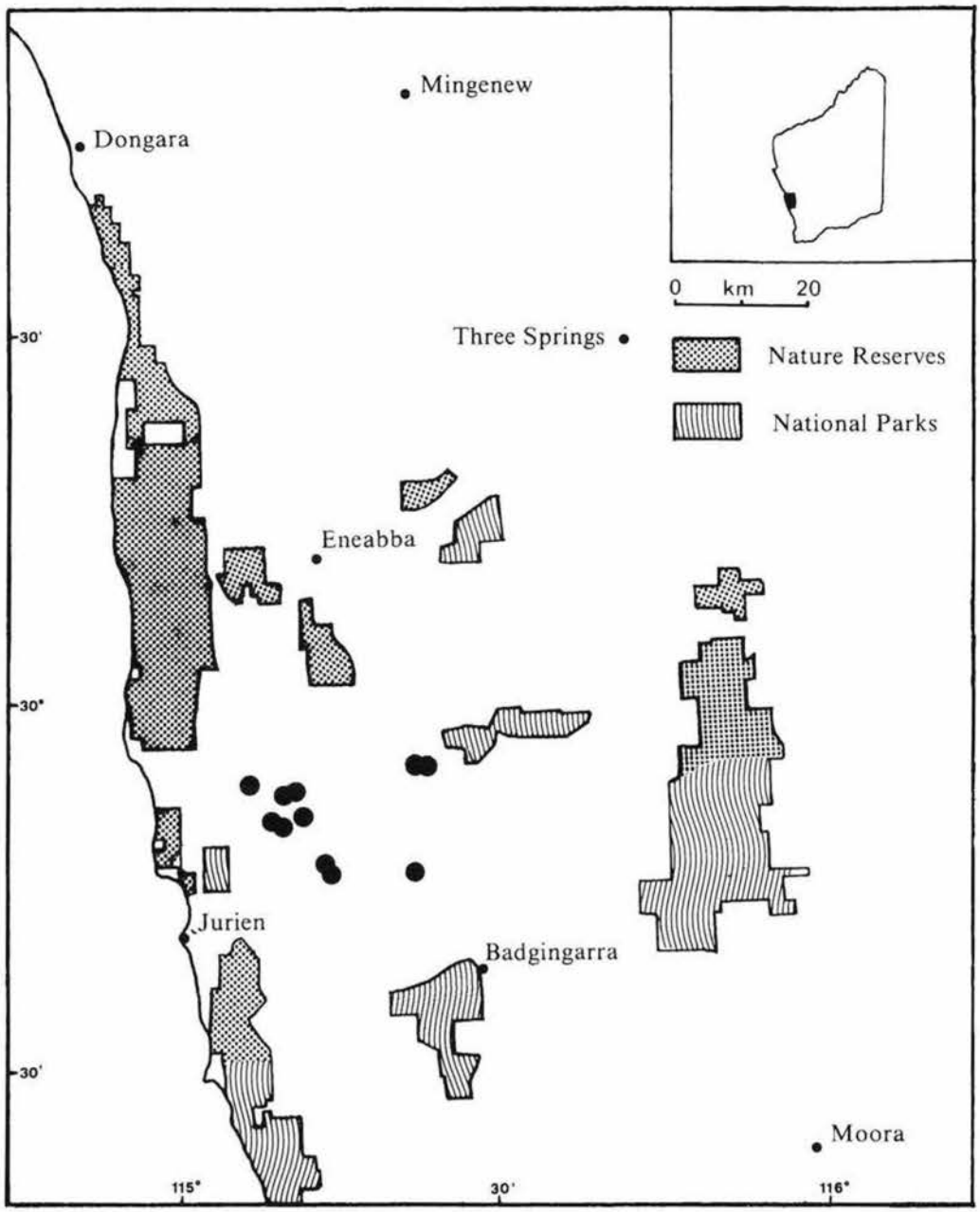

Figure 3. Distribution of *E. suberea* and *E. lateritica* in the Jurien Bay-Eneabba region of Western Australia. Both species occur at all locations designated by ● . Boundaries of Nature Reserves and National Parks greater than 2000 ha in area are shown to highlight the poor reservation status of both new species.

A mallee up to 3 m tall with grey-brown rough bark up to 1.5 m or mostly smooth, lignotuberous. *Cotyledons* reniform, emarginate, 1-1.4 x 0.7-0.9 cm, green above, purple below. *Early internodes* short and leaf pairs relatively crowded. *Seedling leaves* sessile, remaining opposite and held horizontally for up to 10 pairs, oblong to elliptical, up to 15 x 6 cm, slightly toothed, obtuse and minutely apiculate, dull blue-green. *Juvenile leaves*

petiolate, sub-opposite to alternating, held horizontally, lanceolate, up to 18 x 3.5 cm, slightly discolorous, slightly glossy. *Adult leaves* alternating, petiolate, narrow-lanceolate to lanceolate, up to 10 x 1.5 cm, thin, green to dark green, concolorous, slightly glossy, reticulate only to secondary veins, with many small discrete glands. *Inflorescences* axillary, 11-flowered. Peduncles up to 1.7 cm, long. *Buds* shortly pedicellate, broadly fusiform to clavate, up to 1 x 0.7 cm, slightly rough-surfaced. *Operculum* single, conical to hemispherical, more or less equal to hypanthium. *Stamens* white, all fertile, inflexed with anthers basal, resting on green, glandular disc or top of ovary. *Anthers* versatile, dorsifixed, oblong, gland obscure, seen at back, opening by parallel longitudinal slits which curve inwards towards the top and are not or scarcely confluent. *Loculi* 3, style long, smooth, upper part inserted in underside of operculum or in tube descending from it. *Ovules* in 2 vertical rows. *Fruit* shortly pedicellate, cupular to truncate-globose, up to 1.5 x 1.5 cm, with a broad orifice, drying with shallow longitudinal ribbing. *Rim* thick. *Disc* annular or descending obliquely. *Seed* 0.5 x 0.3 cm, brown, lustrous, narrowly pyramidal, with strong lateral ribs ascending to the terminal hilum, dorsal side curved and broader than body of seed by extension into lateral wings.

Other specimens examined. WESTERN AUSTRALIA: Mt Lesueur, NE slope, 20 May 1982, *M.I.H. Brooker* 7514 (FRI, PERTH, NSW); Mt Michaud, 20 May 1982, *M.I.H. Brooker* 7516 (FRI, PERTH, NSW, MEL, AD); Hi Valley farm, Tootbardi road, north of Badgingarra, 19 August 1982, *M.I.H. Brooker* 7563, 7564, 7567 (FRI, PERTH, NSW, MEL, AD); Mt Michaud, 21 September 1982, *M.I.H. Brooker* 7634, 7635, 7636, 7637, (FRI, PERTH, NSW); Mt Michaud, top NE corner, 30° 11'S 115° 11'E, 21 Sept. 1982, *M.I.H. Brooker* 7636 (FRI, NSW, PERTH); Hi Valley farm, Tootbardi road, north of Badgingarra, 21 September 1982, *M.I.H. Brooker* 7646, 7647, 7648, 7649 (FRI, PERTH, NSW); hill c. 5 km NE of Mt Lesueur, 1 March 1983, *M.I.H. Brooker* 7987 (FRI, PERTH, NSW, MEL, AD); Mt Benia, 3 March 1983, *M.I.H. Brooker* 8015 (FRI, PERTH, NSW, MEL, AD); scarp W of Coomallo Creek, NW of Badgingarra, 3 March 1983, *M.I.H. Brooker* 8017 (FRI, NSW, PERTH, MEL, AD); Mt Michaud, 2 km NW of Mt Lesueur, 30° 11'S 115° 12'E, 22 April 1982, *S.D. Hopper* 2231 (PERTH); Williams' farm, ca 5 km NE of Coomallo Hill, N of Tootbardi Rd, 23 Oct. 1984, *S.D. Hopper* 4362 (PERTH); Hills N of Mt Lesueur, Gardner Range — Coomallo district, 16 July 1980, *D. Lievense* (PERTH, CANB).

Distribution and habitat. E. lateritica has an identical geographical range to *E. suberea*, extending from Mt Lesueur some 30 km inland (Figure 3). It also grows in the same habitat on the edges and upper breakaway slopes of dissected lateritic uplands. Common associates in the open mallee communities at these sites include *E. gittinsii, E. suberea, E. accedens, E. drummondii, E. marginata* and *E. gardneri.*

Conservation status. E. lateritica is both rare and, until the creation of proposed nature reserves and national parks, endangered. It occurs in c. 10 small isolated populations, usually of less than 20 individuals. We recommend that the species should be gazetted as rare flora under the Wildlife Conservation Act.

Flowering period. April to September, peaking in May.

Etymology. The specific epithet alludes to the lateritic gravel which dominates the upland soils of the Mt Lesueur region, and which contrasts with the deep sands occupied by *E. todtiana* F. Muell., the species with the closest apparent affinity to *E. lateritica.*

Notes. E. lateritica can be distinguished from *E. todtiana* by its glandular leaves with reduced (not densely reticulate) venation, its longer pedicels, its winter flowering season,

Figure 4. Holotype of *Eucalyptus lateritica*.

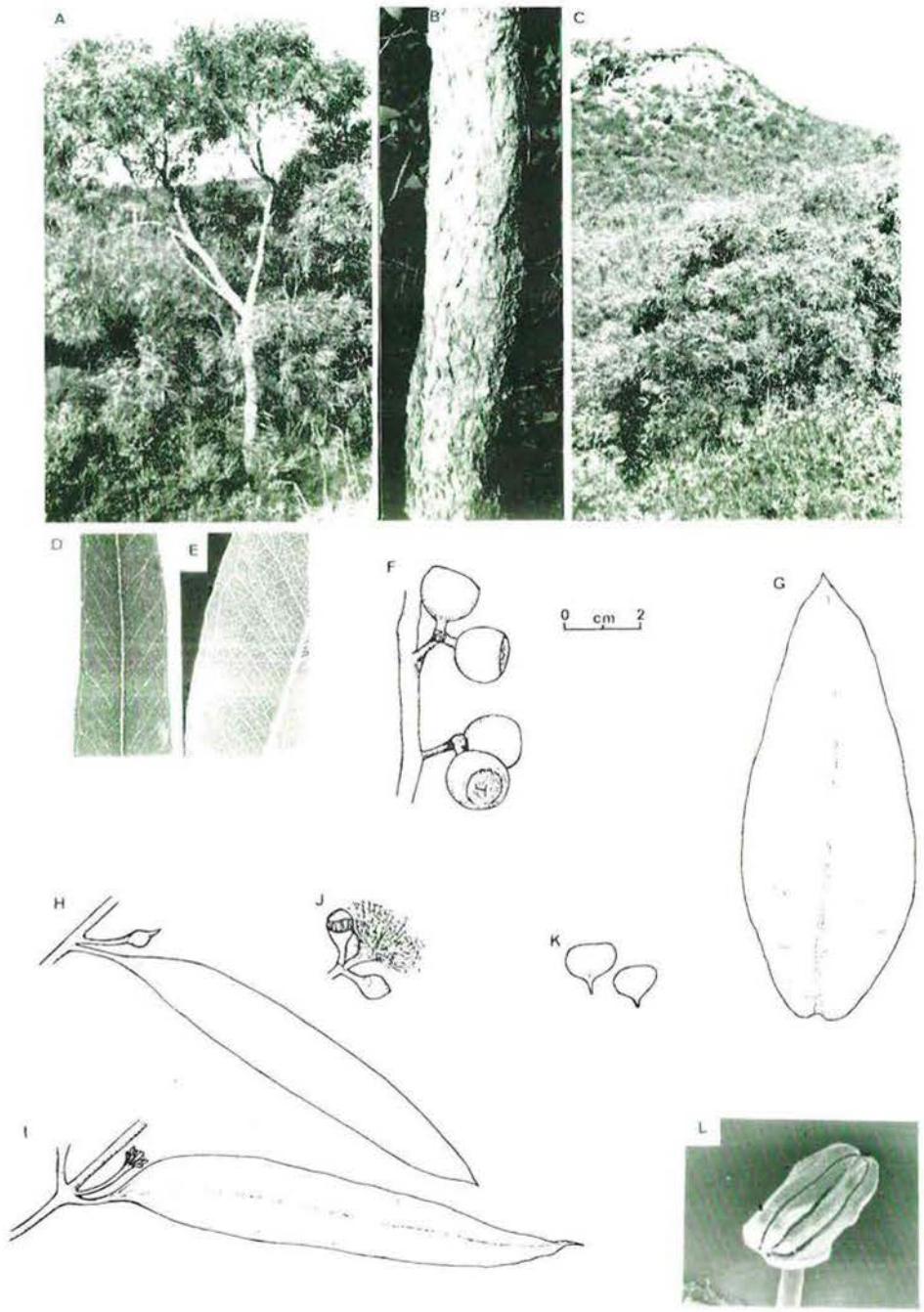

Figure 5. *Eucalyptus lateritica*. (A) small tree 4 m tall NE of Mt Lesueur; (B) trunk of tree in (A) showing mature bark; (C) low mallee 1.5 m tall NE of Mt Lesueur; (D) transmitted sunlight photograph of an adult leaf showing numerous oil glands and simple lateral venation; (E) transmitted sunlight photograph of an adult leaf of *E. todtiana* showing absence of visible oil glands and densely reticulate venation; (F) mature fruit; (G) a node 5 seedling leaf (from *M.I.H. Brooker* 8017); (H) adult leaf and young inflorescence still enclosed in bracts; (I) adult leaf and young buds; (J) mature buds and a flower; (K) cotyledons (from *M.I.H. Brooker* 7564); (L) anthers (from *M.I.H. Brooker* 7564). All drawings same scale; F, H, I, and J by *S.J. Patrick* from holotype. Lx40.

its erect stems and finer bark. The differences in leaf venation between these two species serve as useful field characters for identification. They also pose an interesting evolutionary problem because most close relatives in Western Australian eucalypts do not differ in their leaf venation. It may be that the similarities between *E. lateritica* and *E. todtiana* are due to convergence, and that *E. lateritica* has a closer affinity to other species such as *E. erectifolia*. This hypothesis will be investigated in a forthcoming cladistic analysis of W.A. monocalypts by Dr P.Y. Ladiges and ourselves.

Key to the monocalypts of the Stirling Range National Park

1. Bark rough over whole trunk or stems
   2. Adult leaves distinctly discolorous, with distinct oil glands and moderately reticulate venation, thin ..... *E. marginata* Smith
   2. Adult leaves not or scarcely discolorous, without apparent oil glands and with densely reticulate venation, thick ..... *E. staeri* (Maiden) Kessell & Gardner
1. Bark smooth
   3. Buds and fruits in 3's
      4. Erect mallee or tree; adult leaves lanceolate or falcate; flowers white ..... *E. megacarpa* F.Muell.
      4. Effuse mallee; adult leaves elliptical to broad-lanceolate; flowers yellow ..... *E. preissiana* Schauer
   3. Buds and fruits in 7's or more
      5. Fruit almost globular, often clustered on old wood towards middle of crown, up to 2.5 x 2.5 cm; disc steeply descending; orifice narrow ..... *E. buprestium* F. Muell.
      5. Fruit hemispherical, cupular or truncate-globose, up to 1.6 x 1.8 cm; if disc descending vertically, orifice broad
         6. Peduncles stout, terete, up to 1 cm long; disc broad ascending ..... *E. pachyloma* Benth.
         6. Peduncles slender, terete or flattened, up to 2.5 cm long; disc annular, level or sloping inwards
            7. Buds smooth; fruit up to 1.6 x 1.8 cm ..... *E. erectifolia* Brooker & Hopper
            7. Buds ribbed; fruit up to 1 x 0.9 cm ..... *E. ligulata* Brooker

Eucalyptus erectifolia Brooker & Hopper, sp. nov. (Figure 7)

Frutex "mallee" ad 3 m altus, cortice laevi, foliis adultis erectis ferentibus. Inflorescentiae axillares, 7-11 florae, pedunculis ad 2 cm longis et alabastris pedicellatis, late fusiformibus, ad 1 x 0.6 cm. Fructus breviter pedicellati vel subsessiles cupulares, ad 1.6 x 1.8 cm. Semina pyramidalia, brunnea, alis lateralibus.

Typus: road to Mt. Trio, Stirling Range National Park, Western Australia, Nov. 1981, *M.I.H. Brooker* 7184 (holo: PERTH: iso: FRI (Figure 6), NSW, MEL, K).

A mallee up to 3 m tall with smooth, grey stems, steeply branching. *Cotyledons* reniform or slightly emarginate, 1.2-2 x 0.8-1.5 cm, green above, purple below, tapering to petioles arising well above ground level. *Seedling leaves* sessile, amplexicaul, remaining opposite and held horizontally for up to 4 pairs, elliptical, sometimes apiculate, up to 10 x 6 cm, dull blue-green. *Juvenile leaves* petiolate, sub-opposite to alternating, turning vertical, elliptical to ovate, up to 12 x 6 cm, dull, light green. *Adult leaves* alternating, petiolate, narrow-lanceolate to lanceolate, up to 6 x 1.3 cm, dark green, slightly glossy, concolorous, held erect. *Inflorescences* axillary, 7-13-flowered. *Peduncles* up to 2 cm long. *Buds*

Figure 6. Holotype of *E erectifolia*.

pedicellate, broadly fusiform to ovoid, up to 1 x 0.6 cm. *Operculum* single, conical. *Stamens* white, all fertile, mostly inflexed or irregularly flexed. *Anthers* versatile, dorsifixed, oblong or slightly reniform, gland obscure, opening by parallel longitudinal slits which curve inwards toward the top, not or scarcely confluent. *Loculi* 3 or 4. *Style* tapering with tip enclosed in tube formed in underside of operculum. *Ovules* in 2 vertical rows. *Fruit* shortly pedicellate to subsessile, cupular, up to 1.6 x 1.8 cm. *Rim* thick. *Disc* sloping inwards or descending vertically. *Seed* up to 0.5 x 0.3 cm, brown, pyramidal, dorsal side rounded, extending into lateral wings, ventral side with 2 main ribs ascending to the terminal hilum.

Figure 7. *Eucalyptus erectifolia*. (A) mallee, Bluff Knoll road; (B) stems showing smooth bark; (C) anthers (*M.I.H. Brooker* 8031); (D) juvenile leaves; (E) cotyledons; (F) mature fruit; (G) adult leaves with buds and flowers; (H) transmitted sunlight photograph of an adult leaf showing venation and glands. All drawings same scale; D, E, F and G by *S.J. Patrick*. Cx80.

Other specimens examined. WESTERN AUSTRALIA: Bluff Knoll road, Stirling Range, 5 October 1982, *M.I.H. Brooker* 7661 (FRI, PERTH, NSW); firetrack SW corner of Stirling Range National Park, 9 October 1982, *M.I.H. Brooker* 7723 (FRI, PERTH, NSW, MEL, AD); 1 km SE of Chester Pass road on Bluff Knoll road, Stirling Range N.P., 21 March 1983, *M.I.H. Brooker* 8028, 8031 (FRI, PERTH, NSW, MEL, AD); 5.8 km W of Chester Pass road on Scenic Drive, Stirling Range N.P., 24 November 1983, *M.I.H. Brooker* 8379 (FRI, PERTH, NSW, MEL, AD); 4 km NE of Donnelly Peak, N boundary fire break, W of Chester Pass Rd, 34° 19′S 117° 46′E, 25 March 1982, *S.D. Hopper* 2164 (PERTH); 11.5 km E of Mt Gog, 5.3 km E on East Pillenorup Track, 34° 27′S 118° 08′E, 26 March 1982, *S.D. Hopper* 2166 (PERTH); 1 km E of Wedge Hill, Stirling Range National Park, 34° 26′S 118° 13′E, 26 March 1982, *S.D. Hopper* 2172 (PERTH); 6.5 km SE of Bluff Knoll, Stirling Range National Park, 34° 25′S 118° 19′E, 26 March 1982, *S.D. Hopper* 2175 (PERTH); 4 km SSE of Ross Peak, 4.5 km N of park boundary, Red Gum Pass Rd, 34° 24′S 117° 45′E, 27 March 1982, *S.D. Hopper* 2189 (PERTH); 8 km WNW of Bluff Knoll, 3 km SW of Bluff Knoll Rd, 34° 19′S 118° 11′E, 5 May 1982, *S.D. Hopper* 2296 (PERTH); 5 km ESE of Yungermere Peak, 0.2 km S of East Pillenorup track, Yungermere Cres., 34° 26′S 118° 12′E, 5 May 1982, *S.D. Hopper* 2315 (PERTH); Stirling Range N.P., 1 km SE of Chester Pass Rd on Bluff Knoll Rd, 34° 20′S 118° 12′E, 5 Oct. 1982, *S.D. Hopper* 2625 (PERTH);

Distribution and habitat. Eucalyptus erectifolia is known only from the lower slopes (160-300 m altitude) of the Stirling Range (Figure 8). It usually grows in small isolated clumps in open mallee with associates such as *E. decurva* F. Muell., *E. marginata, E. tetragona* (R.Br.) F. Muell., *E. preissiana* Schauer, *E. buprestium* F. Muell., *E. decipiens* Endl., *E. pachyloma* Benth., *E. falcata* Turcz., and emergent shrubs of *Lambertia inermis* R.Br., *L. ericifolia* R.Br., *Hakea cucullata* R.Br., *Banksia coccinea* R.Br. and *Dryandra sessilis* (R.Br.) Druce.

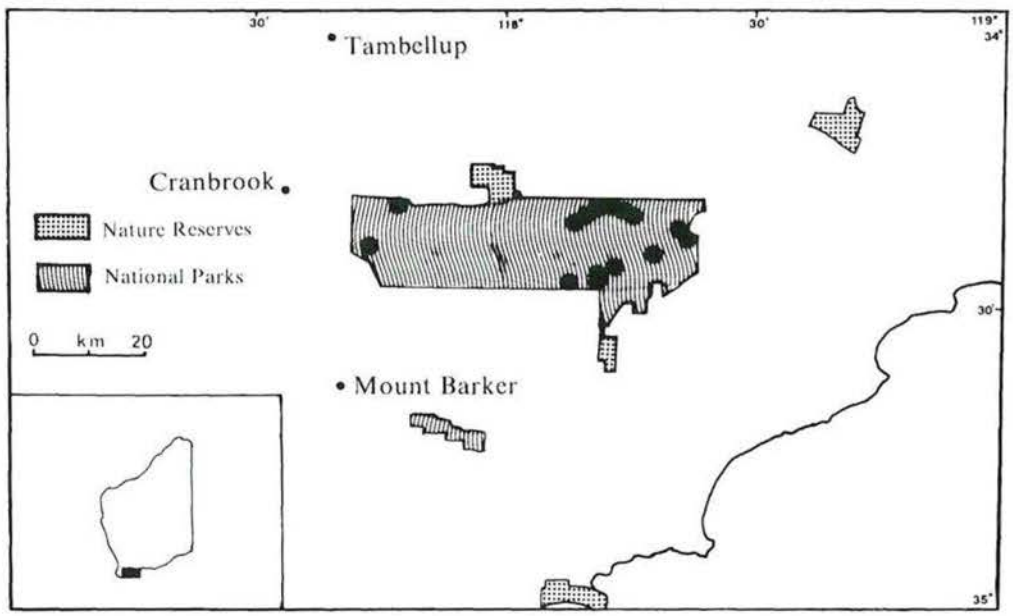

Figure 8. Distribution of *Eucalyptus erectifolia* (●).

Conservation status. The species is very rare, being known from only c. 10 populations each of very few individuals. We recommend that gazettal as rare under the Wildlife Conservation Act would be appropriate. All known populations occur within Stirling Range National Park.

Flowering period. March.

Etymology. The Latin name alludes to the erect manner in which the leaves are held in the crown.

Notes. The close affinities of *E. erectifolia* are not yet clear, although relationships with *E. pachyloma* and *E. buprestium* are evident in the large brown winged seeds of *E. erectifolia*, and its juvenile foliage. The cupular fruit, large pedicellate buds and broader leaves distinguish *E. erectifolia* from *E. pachyloma* and *E. buprestium*.

Instances of sporadic hybridization based on morphology of field specimens and progeny tests between *E. erectifolia* and both *E. buprestium* and *E. marginata* have been documented (unpublished data).

E. erectifolia forms circular clumps up to 25 m in diameter at some locations. Allozyme assays of such clumps have demonstrated that they consist of one genetic individual (G.F. Moran, pers. comm.). The mode of reproduction of such individuals warrants further investigation.

Acknowledgements

We are grateful to E.A. Griffin, G.F. Moran, L.A.S. Johnson, D.F. Blaxell, P.Y. Ladiges and A.R. Griffin for stimulating discussions of the new species in the field. The Director and staff of the National Parks Authority and the Williams family of Badgingarra kindly provided access to populations on their land. We thank the Curator of the Western Australian Herbarium for access to the herbarium research facilities, B. Rockel for raising seedlings in a comprehensive monocalypt trial, and S. Patrick for the illustrations.

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New species and subspecies of the informal *"Eucalyptus* series *Calycogonae"* Pryor & Johnson (*Eucalyptus* series *Aridae* Blakely-Myrtaceae)

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Abstract

Brooker, M.I.H. New species and subspecies of the informal "*Eucalyptus* series *Calycogonae*" Pryor & Johnson (*Eucalyptus* series *Aridae* Blakely-Myrtaceae). Nuytsia 5(3): 357-371 (1986). An historical account is given of the species composing the informal "*Eucalyptus* ser. *Calycogonae*" Pryor & Johnson (*E.* ser. *Aridae* Blakely). This is followed by a key to all species and subspecies in the series, descriptions of two new taxa, viz. *Eucalyptus celastroides* subsp. *virella* and *E. brevipes*, and a description of *E. gracilis* var. *yilgarnensis* which is raised to species rank as *E. yilgarnensis*. The buds and fruit of each taxon are illustrated and distribution maps are given. Notes on variation and distribution follow, and the series is discussed in relation to the informal "*E.* ser. *Foecundae*" and ser. *Ovulares*.

Introduction

Turczaninow (1852) published two new species, viz. *E. calycogona* and *E. celastroides*, the protologues of which include "cupula ... tetragonis" for *E. calycogona* and "cupula .../ .../prope orificium constricta" for *E. celastroides*. These data and the types unambiguously establish these two taxa as we recognize them in the field today.

In 1855 Mueller published *E. gracilis* which Bentham included in "Flora Australiensis" twelve years later (1867). Despite Bentham's presumed access to Mueller's protologue in which there is no mention of angularity in the buds and fruits, a morphological feature of considerable taxonomic value in eucalypts, his digest for *E. gracilis* states that the "calyx tube" was "usually ..... prominently 4-angled". Bentham cited eight specimens, the majority of which presumably had 4-angled "calyx tubes". It can only be assumed that Bentham was unaware that a duplicate of one of these cited specimens (Drummond 5th coll. no. 184) had been published in 1852 as *E. calycogona* by Turczaninow. Another of the specimens (Drummond 5th coll. no. 34) was a duplicate of that published by Turczaninow, as *E. celastroides*.

Bentham apparently did not recognise the various distinctions in what we now know as *E. calycogona, E. celastroides* and *E. gracilis* in the few specimens available to him and having based his description of *E. gracilis* on a specimen with 4-sided "calyx tubes" his observation of a further group of specimens with non-angled "calyx tubes" moved him to erect a variety based on this character. Thus *E. gracilis* var. *breviflora* was published at the end of his digest on *E. gracilis*. The holotype (K) consists of 4 separate pieces, 3 of which are clearly *E. gracilis* var. *gracilis* and the remaining piece is *E. calycogona*. The synonymy of *E. gracilis* var. *breviflora* with *E. gracilis* var. *gracilis* was later established by Maiden (1903). Subsequent to the publication of Bentham's classification, Mueller became aware of the names (if not specimens) of *E. calycogona* and *E. celastroides* but

he appears not to have known that they were published before *E. gracilis*, as he treated them as synonyms of *E. gracilis* in "Eucalyptographia" (1879-1884). His description in this work of the fruit of *E. gracilis*, "semiellipsoid or somewhat obconical or slightly urnshaped, faintly angular", could pass for forms of any of the three species.

Maiden, at first (1903), was not wholly convinced of the specific distinctions of the three species and established them as *E. calycogona* (thus recognising the priority of the name), *E. calycogona* var. *celastroides* and *E. calycogona* var. *gracilis*. He referred to the "slight angularity" in some specimens of *E. celastroides* and to the "insensible gradations" between *E. gracilis* and *E. calycogona*. He also regarded the recently collected Pritzel 332 (Figure 9) which Diels labelled "*E. yilgarnensis*" as "referable" to *E. calycogona* var. *gracilis*.

Later (1918) Maiden recognised the specific rank of *E. celastroides*, *E. gracilis* and *E. calycogona* but he suggested that all western *E. gracilis* were somewhat apart. He based his contention on "the longer and more slender peduncles and pedicels" among other features and he established this form as *E. gracilis* var. *yilgarnensis*.

The specific rank of the three species, *E. gracilis*, *E. calycogona* and *E. celastroides* was upheld in subsequent floras and handbooks (Black 1926, Ewart 1931, Blackall 1954, Willis 1973), in Gardner's census (1931) and in Blakely's Key (1934). In the latter work, *E. gracilis* var. *yilgarnensis* was relegated again to synonymy with *E. gracilis*. Blakely erected three new taxa, viz. *E. calycogona* var. *staffordii*[1], *E. gracilis* var. *erecta* and *E. gracilis* var. *viminea*.

Of the taxa so far referred to, Pryor and Johnson (1971) in their informal classification recognised *E. calycogona*, *E. celastroides* and *E. gracilis*. They anticipated subspecies status for *E. gracilis* var. *yilgarnensis*. All other varieties were considered to be only minor variants.

In the following account I establish *E. gracilis* var. *yilgarnensis* as *E. yilgarnensis* and in addition I erect the western part of *E. celastroides* as a new taxon *E. celastroides* subsp. *virella* and describe a new species *E. brevipes*. In the notes following the taxonomic treatment of these taxa, I have used the names of Pryor and Johnson (1971) for the sections and series. The legitimate names where they exist are given in brackets following the informal names.

Key to the species and subspecies

1. Buds and fruit manifestly square in section; bark smooth ..... *E. calycogona*
1. Buds and fruit round in section (upper part of pedicel and lower part of hypanthium may be angled); usually a stocking of rough bark present.
   2. Adult leaves greyish or bluish green; branchlets glaucous; buds and fruits often glaucous..... *E. celastroides* subsp. *celastroides*
   2. Adult leaves green; buds, fruit and branchlets not glaucous.
      3. Fruit urceolate or contracted at the rim; peduncles up to 0.8 cm long; juvenile leaves ovate..... *E. celastroides* subsp. *virella*
      3. Fruit cupular or barrel-shaped or slightly campanulate, if urceolate, peduncles up to 1.4 cm long, pedicels up to 0.8 cm long.
         4. Peduncles 0.3-0.5 cm long; opercula conical to slightly beaked..... *E. brevipes*
         4. Peduncles more than 0.5 cm long; opercula patelliform or conical.
            5. Buds up to 0.6 x 0.4 cm; pedicels slender or stout, 0.1-0.4 (0.5) cm long; fruit cupular or barrel-shaped, up to 0.7 x 0.5 cm..... *E. gracilis*
            5. Buds up to 0.4 x 0.3 cm; pedicels always slender, (0.2) 0.3-0.7 (0.8) cm long; fruit barrel-shaped to slightly urceolate, up to 0.5 x 0.4 cm..... *E. yilgarnensis*

[1] Blakely published this as var. *staffordii* but it was intended to honour W.J. Spafford (Black 1952).

Descriptions

Eucalyptus celastroides Turcz. subsp. **virella** Brooker, subsp. nov. (Figures 1-3)

A subspecie typica glaucedine absenti, pedunculis brevioribus et generaliter alabastris fructibusque minoribus distinguenda.

Typus: 13.2 km NE of Calingiri on Wongan Hills Road, Western Australia, 28 Aug. 1983, *M.I.H. Brooker* 8283 (holo: PERTH; iso: FRI, NSW, MEL, AD, BRI, K).

A *mallee* up to 4 m tall with smooth grey, greenish or bronze bark, or with a stocking of rough, grey flaky bark; lignotuberous. *Cotyledons* bisected. *Juvenile leaves* distinctly petiolate, alternating, ovate, up to 4 x 2.5 cm, greyish green, with perfect or imperfect suprabasal lateral primary veins. *Adult leaves* petiolate, alternating, narrowly lanceolate, up to 9 x 1 cm, bright glossy green, with conspicuous oil dots which are translucent when fresh, black when dry. *Immature adult leaves* may be duller, bluish green. *Inflorescences* axillary, umbel-like, 7-flowered. Peduncles slender, up to 0.8 cm. *Buds* shortly pedicellate, clavate, up to 0.7 x 0.3 cm, operculum conical or hemispherical-apiculate, shorter than hypanthium. *Flowers* white, November-December. *Fruit* shortly pedicellate, urceolate or contracted at the rim, up to 0.6 x 0.4 cm, rim thin. *Seed* compressed-ovoid, reddish brown to grey-brown, more or less smooth, with 1-3 shallow, longitudinal furrows; hilum ventral, central, not conspicuous.

Specimens examined. WESTERN AUSTRALIA: Harrismith, 6 March 1924, *C.A. Gardner* 2117 (PERTH); between Cleary and Beacon, 16 Jan. 1947, *C.A. Gardner* 8351 (PERTH); Manmanning, 4 Nov. 1956, *J.W. Green* 810 (PERTH); northwards from Beacon, Feb. 1957, *C.A. Gardner* (PERTH); 2 miles NW of Ongerup, 10 Nov. 1961, *K. Newbey* 117 (PERTH); Hyden-Norseman road, ± 50 miles W of Eyre Highway, *A.S. George* 4342 (PERTH); 212.6 mile peg (sic) on Morawa-Perth road, 5 March 1966, *E.M. Scrymgeour* 392, 394, 396, 397, 398 & *S.G.M. Carr* (PERTH); 0.4 miles E of Manmanning, 21 Oct. 1966, *G.M. Chippendale* 67 (PERTH, FRI): 11.8 miles S of Burakin, 21 Nov. 1966, *G.M. Chippendale* 66 (PERTH, FRI): 0.9 miles E of Korrelocking, 9 Aug. 1967, *G.M. Chippendale* 253 (PERTH, FRI); 260 mile peg E of Southern Cross, 16 April 1969, *R.D. Royce* 8588 (PERTH); 5 mile W of Wyalkatchem, April 1969, *B. Rockel* s.n. (PERTH); 1 mile W of Tammin, 3 June 1969, *M.I.H. Brooker* 1977 (PERTH, FRI); 8.2 miles SW of Three Springs, 7 Jan. 1970, *M.I.H. Brooker* 2369 (PERTH); Fitzgerald National Park, 12 July 1970, *A.S. George* 9928 (PERTH); 3.5 km SW of Yelbeni, Aug. 1973, *M.D. Tindale* 3721 (PERTH, NSW); reserve 14001, Kulin, 21 Oct. 1977, *J.S. Beard* 8151 (PERTH); Mason's Road, E of Gunyidi, 25 May 1982, *M.I.H. Brooker* 7529 (PERTH); 23 km NW of Strawberry on Burma Road, 26 Jan. 1983, *M.I.H. Brooker* 7948 (PERTH, FRI, NSW, MEL); 15.3 km NE of Calingiri towards Wongan Hills, 16 Feb. 1983, *M.I.H. Brooker* 7964 (PERTH, FRI, NSW, MEL); Chiddarcooping Nature Reserve, 17 Feb. 1983, *M.I.H. Brooker* 7978 (PERTH, FRI, NSW, MEL); 4.9 km E of Dudinin t/o on Kulin-Wickepin road, 5 May 1983, *M.I.H. Brooker* 8106 (PERTH, FRI, NSW, MEL); Wongan Hills, 29 May 1983, *M.I.H. Brooker* 8145, 8146 (PERTH, FRI, NSW, MEL); Rollands Road, NW of Esperance, 6 June 1983, *M.I.H Brooker* 8169 (PERTH, FRI, NSW, MEL).

Distribution. Endemic to southern Western Australia, and bounded approximately by Walkaway in the north-west, Ongerup in the south-west, to east of Southern Cross and to Esperance in the south-east (Figure 4).

Discussion. The specimens now designated as *Eucalyptus celastroides* subsp. *virella* can be distinguished from *E. celastroides* subsp. *celastroides* by the non-glaucous branchlets, leaves, buds and fruit, the shorter peduncles, and the generally smaller buds and fruit. Its

Figure 1. Holotype of *Eucalyptus celastroides* subsp. *virella* Brooker (PERTH, ex FRI.).

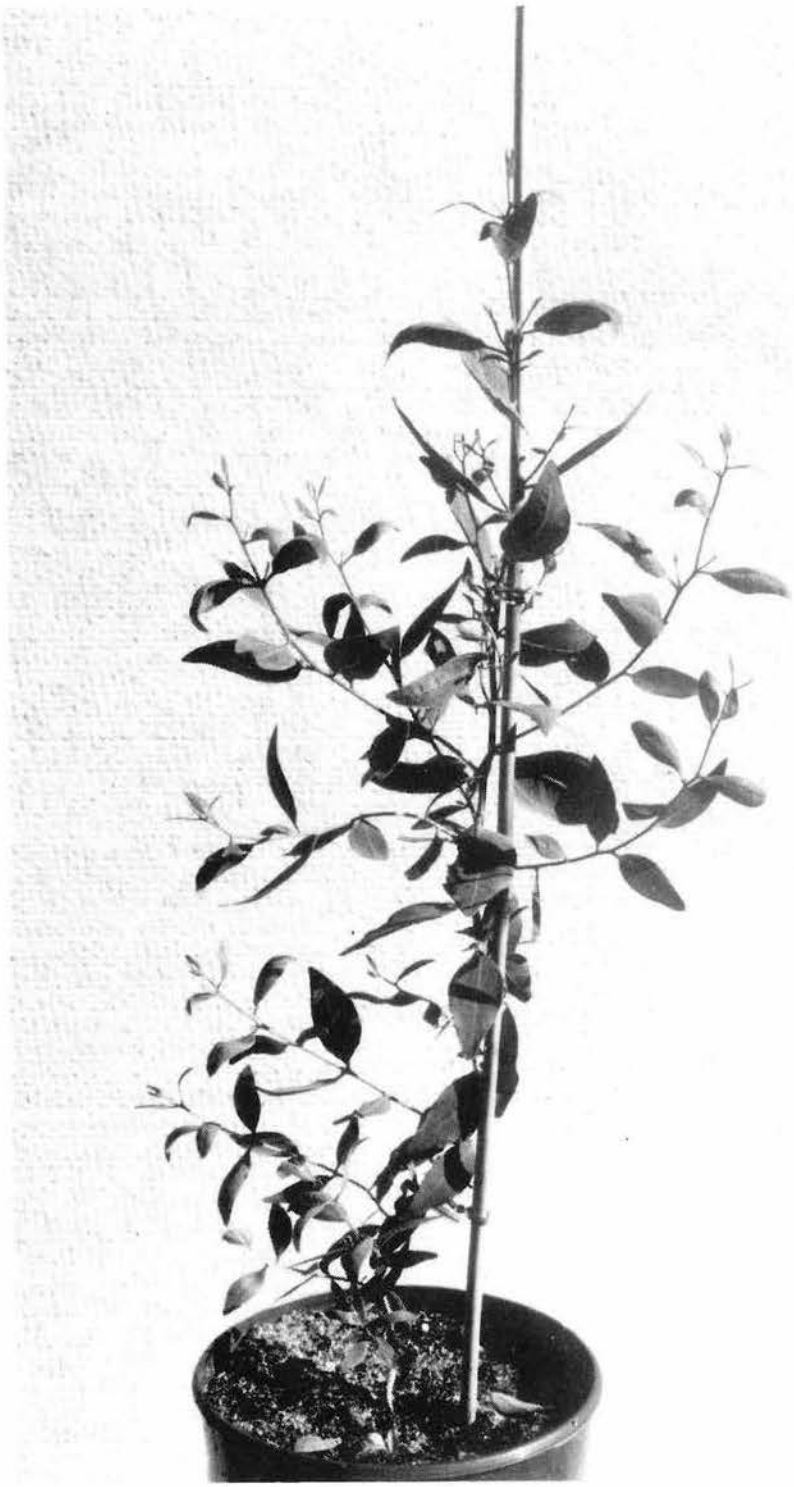

Figure 2. Seedling of *Eucalyptus celastroides* subsp. *virella* (from *Brooker* 7948).

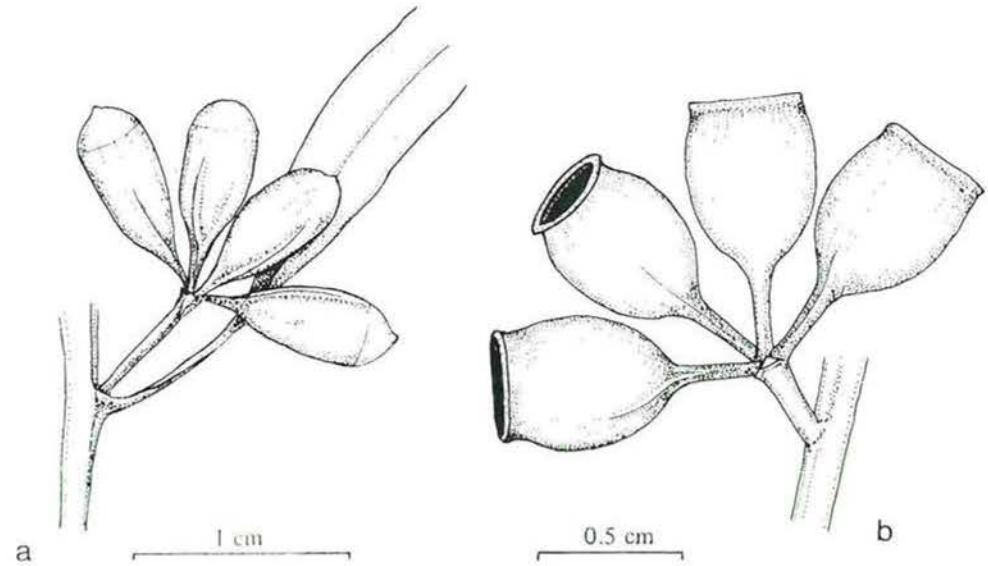

Figure 3. *Eucalyptus celastroides* subsp. *virella*. a Buds (from Wongan Hills). b Fruit (from *Brooker* 8146).

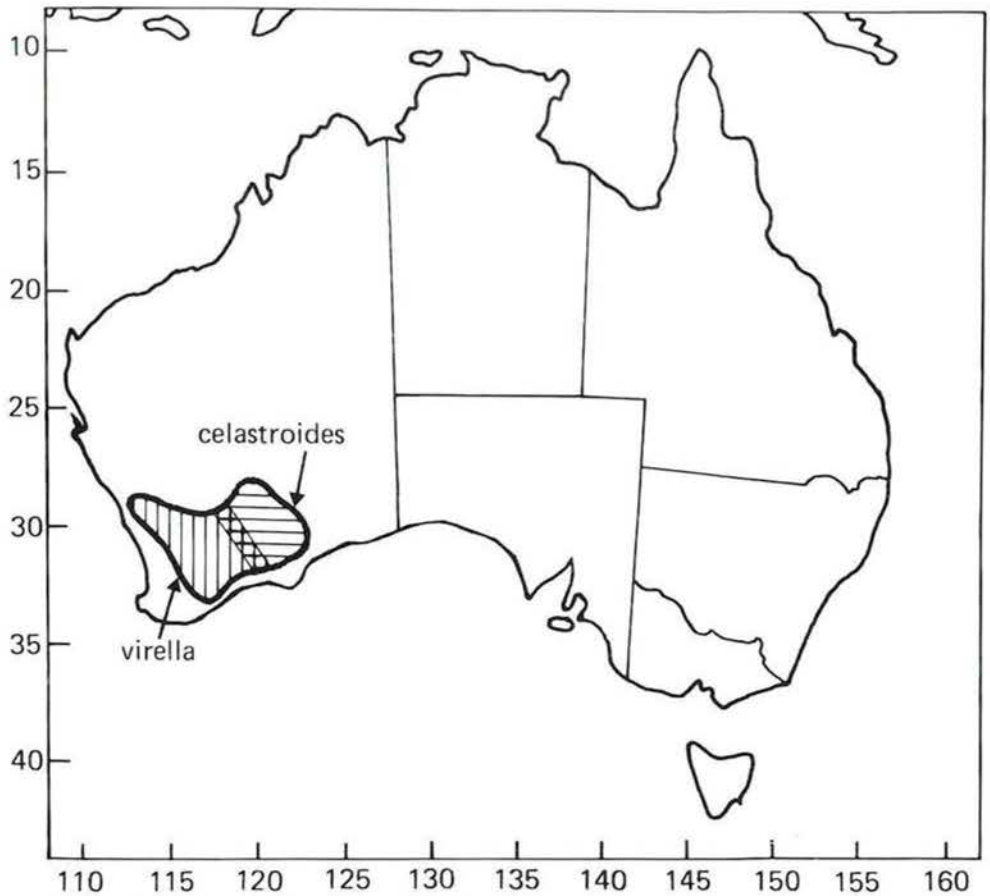

Figure 4. Distribution of *Eucalyptus celastroides* subspp. *celastroides* and *virella*.

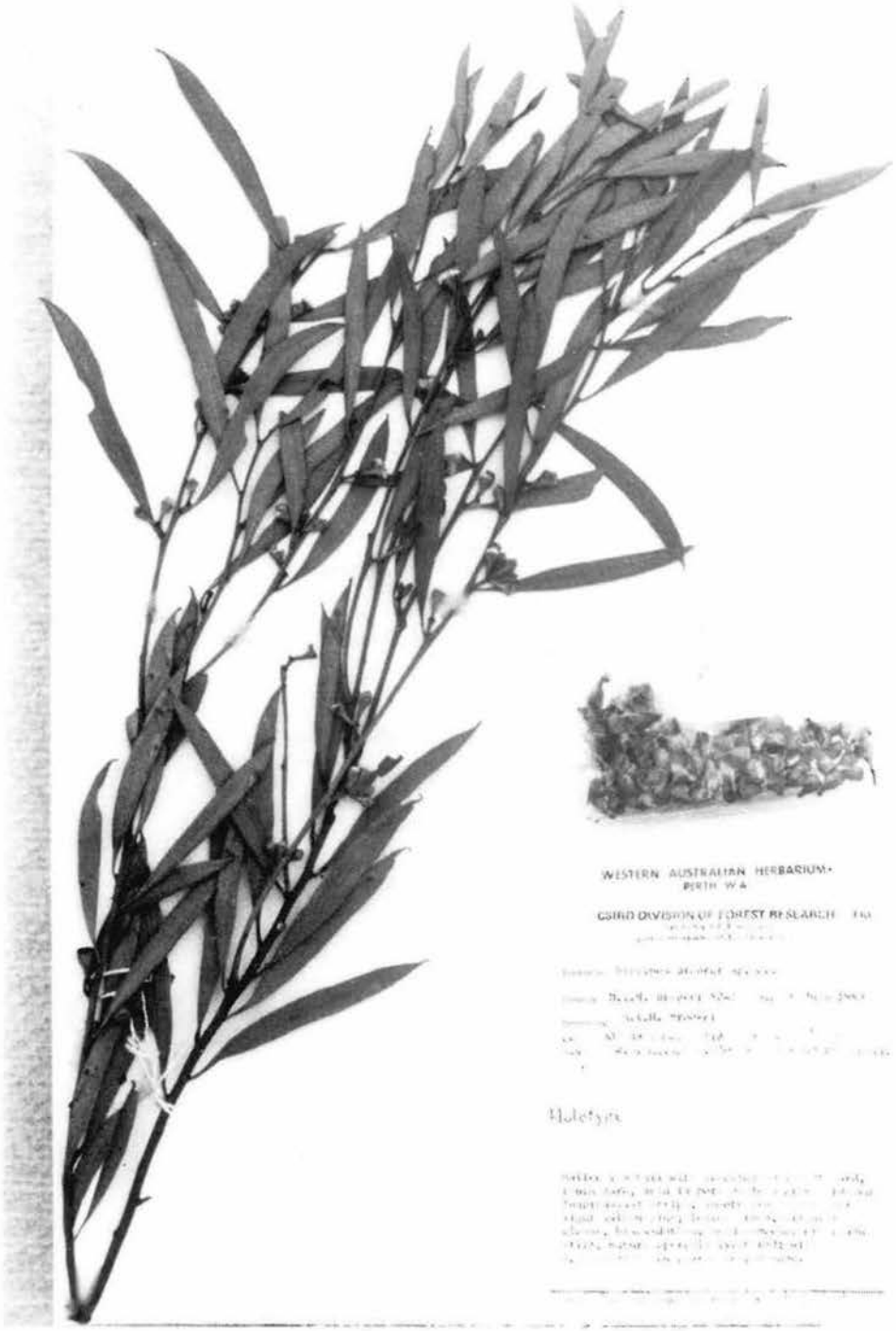

Figure 5. Holotype of *Eucalyptus brevipes* Brooker.

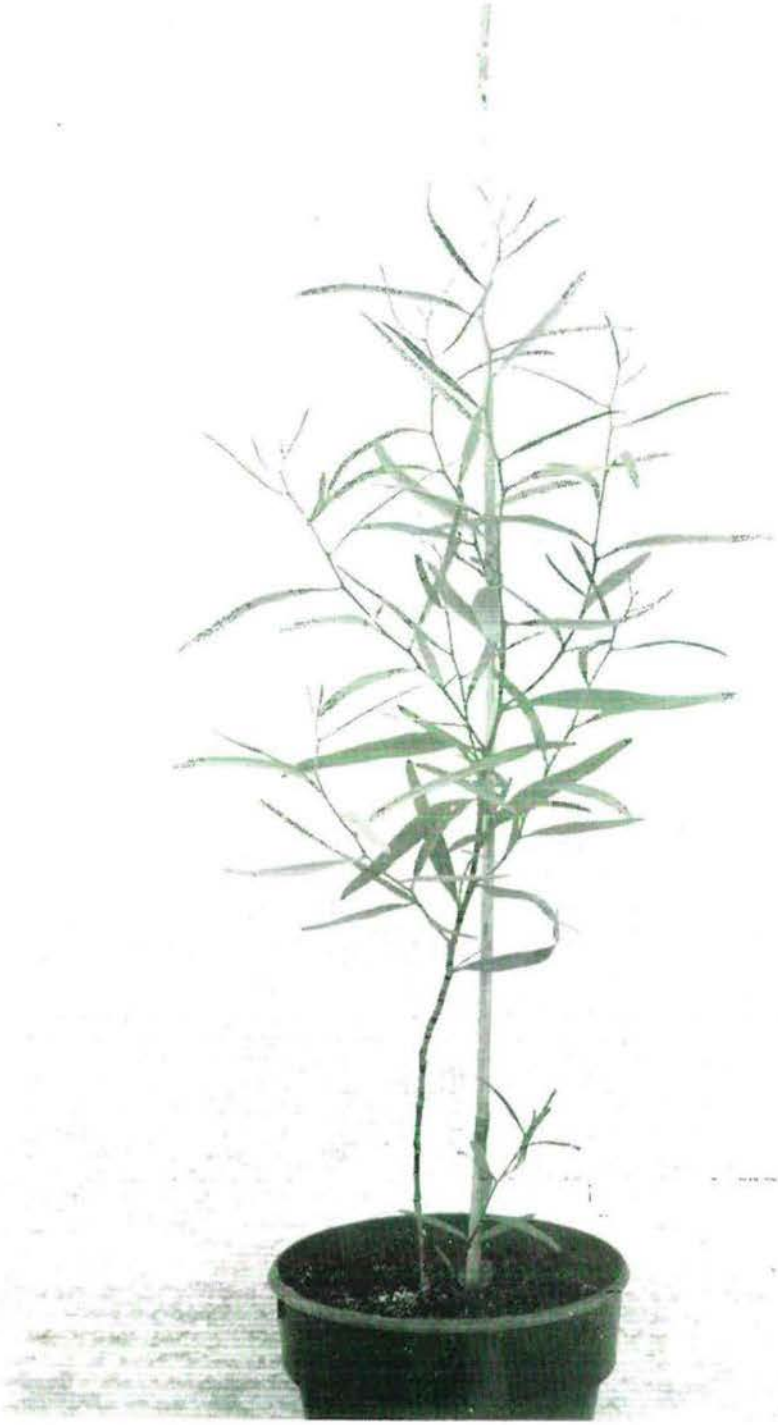

Figure 6. Seedling of *Eucalyptus brevipes* (from *Brooker* 7970).

distribution is west of that for *E. celastroides* subsp. *celastroides* but specimens of intermediate character are found in the intervening zone.

Eucalyptus brevipes Brooker, sp. nov. (Figures 5-7)

Eucalypto gracilis F. Muell. affinis sed foliis adultis angustioribus, rigide erectis, pedunculis brevioribus, operculis conicis vel rostratis, et foliis plantularum longioribus et dispersioribus distinguenda.

Typus: c. 200 metres south of Cunderin Hill (30°38'S, 118°29'E), Western Australia, 20 July 1983, *M.I.H. Brooker* 8242 (holo: PERTH; iso: FRI, NSW, AD, MEL, K).

A *mallee* up to 5 m tall with a stocking of hard rough bark to about 1 m, becoming softer and lighter in colour with age, bark smooth grey over bronze or salmon pink above; lignotuberous. *Cotyledons* bisected. *Juvenile leaves* shortly obscurely petiolate, alternating, linear to narrowly lanceolate, up to 8 x 1.5 cm, dull green, venation prominent only in broader leaves. *Adult leaves* petiolate, alternating, linear to narrowly lanceolate, stiff, held erect, up to 10 x 0.8 cm, green, slightly glossy (depending on maturity) with conspicuous black (seen with reflected light) oil dots. *Inflorescences* axillary, umbel-like, 7-flowered. Peduncles short, broadening at the summit, up to 0.5 cm long. *Buds* on distinct tapering pedicels, becoming angled on drying, clavate, with black oil dots, up to 0.7 x 0.5 cm, operculum conical to slightly beaked, often reddish when mature (Figure 7). *Flowers* white. *Fruit* pedicellate, barrel-shaped to cupular, up to 0.7 x 0.6 cm, disc obliquely descending, whitish. *Seed* compressed-ovoid, reddish brown to grey-brown, more or less smooth, usually with 1-3 shallow longitudinal furrows; hilum ventral, central, not conspicuous.

Specimens examined. WESTERN AUSTRALIA: Cunderin Hill, 1979, *P. de Rebeira* s.n. (PERTH); Echo Valley road, south of Yanneymooning Hill, 16 Feb. 1983, *M.I.H. Brooker* 7970 (FRI, PERTH, NSW, MEL); type locality, 20 July 1983, *M.I.H. Brooker* 8243 (FRI, PERTH, MEL, NSW, AD).

Distribution. Endemic to Western Australia and restricted to a small area north-east of Mukinbudin (Figure 8).

Discussion. E. brevipes is the most geographically restricted species in the series and occurs wholly within the distribution of *E. yilgarnensis*. Its natural affinity, however, is with the widely distributed *E. gracilis* which occurs to the south. Any connections between the two which presumably once occurred in the form of an ancestral type or may currently exist as intergrades are not evident in the available collected material.

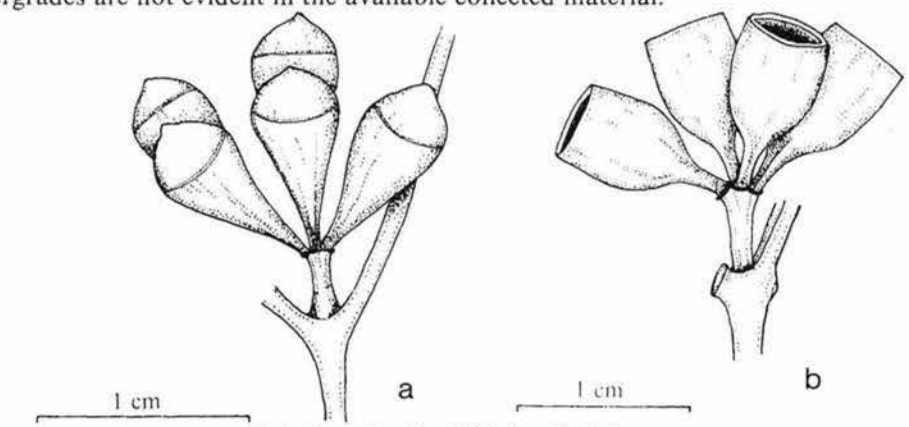

Figure 7. *Eucalyptus brevipes*. a — Buds (from *Brooker* 8142). b — Fruit (from *Brooker* 8142).

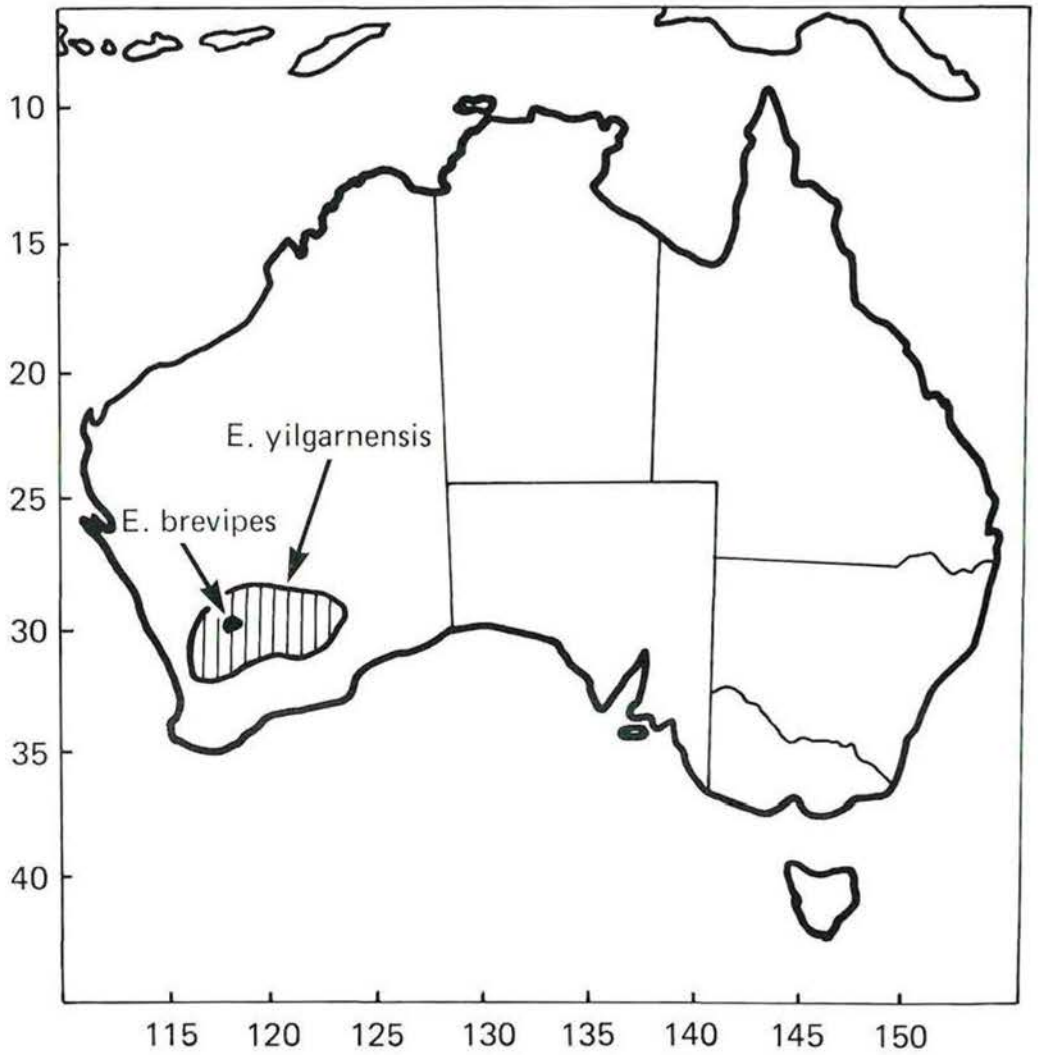

Figure 8. Distribution of *Eucalyptus yilgarnensis* and *E. brevipes*.

Eucalyptus yilgarnensis (Maiden) Brooker, comb. et stat. nov. (Figures 9-10)

E. gracilis F. Muell. var. *yilgarnensis* Maiden, Proc. Roy. Soc. New South Wales 52: 489 (1918).

Type: Yilgarn and Coolgardie Goldfields *in silvis valde apertis*, May 1901, *E. Pritzel* 332 (holo: NSW; iso: BM, G, K, L, P, PERTH, W).

A *tree* or *mallee* up to 6 m tall with a persistent stocking of short-fibred, flaky, dark grey bark, smooth bronze or grey above, rarely completely smooth-barked; lignotuberous. *Cotyledons* bisected. *Juvenile leaves* petiolate, alternating, broadly lanceolate (up to 8 x 1.5 cm) or ovate (up to 6 x 3 cm), dull grey-green to bluish green, commonly with perfect or imperfect suprabasal lateral primary veins. *Adult leaves* petiolate, alternating, narrowly lanceolate, up to 8 x 1.3 cm, glossy green with conspicuous oil dots which are translucent

Figure 9. Isotype of *Eucalyptus yilgarnensis* (Maiden) Brooker.

Figure 10. Seedling of *Eucalyptus yilgarnensis* (from *Brooker* 1816).

when fresh, black when dry; venation sometimes almost parallel. *Inflorescences* axillary, umbel-like, 7- or 9-flowered. *Peduncles* slender, up to 1 (1.4) cm long. *Pedicels* usually long and slender, (0.2) 0.3-0.7 (0.8) x 0.05-0.1 cm. *Buds* ovoid, pyriform or clavate, up to 0.4 x 0.3 cm, operculum shallowly conical to hemispherical-apiculate, much shorter than hypanthium, patelliform, equal to or less than maximum diameter of hypanthium. *Flowers* white, March to September. *Fruit* with slender pedicels, barrel-shaped to slightly urceolate, up to 0.5 x 0.4 cm, often smooth and shiny, rim thin. *Seed* compressed-ovoid, reddish brown to grey-brown, more or less smooth, usually with 1-3 shallow, longitudinal furrows; hilum ventral, central, not conspicuous.

Specimens examined. WESTERN AUSTRALIA: Coolgardie, April and July 1899, *R. Helms* s.n. (PERTH); Southern Cross, 19 May 1901, *L. Diels* s.n. (NSW); Cowcowing, June, October 1904, *M. Koch* 986, 989 (PERTH); 70 miles N of Kurrawang, Sept. 1909, *J.H. Maiden* s.n. (NSW); Korrelocking, 22 August 1920, *C.A. Gardner* 182 (PERTH); Kumarl, May 1938, *L.A. Horbury* 40 (PERTH); North Bungulla, 2 May 1945, *C.A. Gardner* s.n. (PERTH); Bullabulling, 31 May 1949, *C.A. Gardner* 9276 (PERTH); 12 miles W of Zanthus, 26 Jan. 1956, *R.D. Royce* 5257 (PERTH); bank of Goddard Creek, 28 Jan. 1956, *R.D. Royce* 5361 (PERTH); Jumnania Rocks, W of Coonana, 29 Jan. 1956, *R.D. Royce* 5373 (PERTH); 18 miles N or Norseman, 24 March 1962, *K. Newbey* 162 (PERTH); 18 miles E of Norseman, 29 May 1963, *F.G. Smith* 1646 (PERTH); 40 km S of Coolgardie, 11 April 1966, *P.G. Wilson* 4092 (PERTH); 9 miles W of Karalee, 19 Sept. 1966, *R. Filson* 8940 (PERTH, MEL); 26.3 miles N of Kalgoorlie, 9 March 1967, *G.M. Chippendale* 120 (FRI, PERTH); 9.2 miles SE of Coolgardie, 11 March 1967, *G.M Chippendale* 139 (FRI, PERTH); 1 mile S of Sandford Rock, 15 Jan. 1970, *M.I.H. Brooker* 2431 (PERTH); 10 miles N of Lake Varley, 4 Dec. 1970, *K. Newbey* 3332 (PERTH); 92 km E of Hyden, 3 Oct. 1975, *D.F. Blaxell* W75/31 (NSW, CANB, K, PERTH, FRI); 21 km E of Karonie, 9 Nov. 1976, *H. Demarz* 6244 (PERTH); 44 km W of Coolgardie, 13 May 1978, *G.J. Keighery* 1740 (PERTH); 7 miles E of Yellowdine, 13 June 1978, *J.W. Green* 4696 (PERTH); c. 105 km SSW of Coolgardie, 19 Sept. 1979, *M.D. Crisp* 5932 (CBG, PERTH); 32 km SSW of Norseman, 13 March 1980, *K. Newbey* 6737 (PERTH); 25.7 km S of Koorda towards Wyalkatchem, 14 Sept. 1982, *M.I.H. Brooker* 7615 (PERTH, FRI, NSW); 29.6 km S of Mollerin towards Koorda, 10 Jan. 1983, *M.I.H. Brooker* 7912 (PERTH, FRI, MEL, NSW).

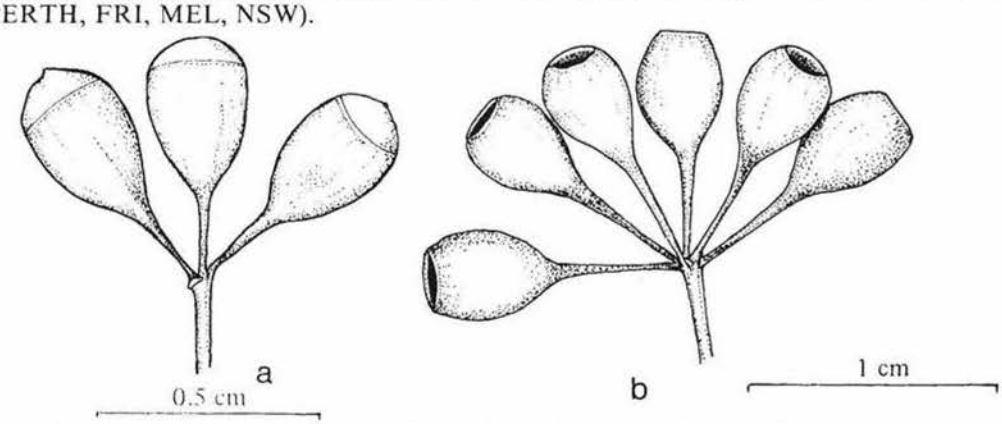

Figure 11. *Eucalyptus yilgarnensis*. a — Buds (from *Kennecott* s.n.). b — Fruit (from *Kennecott* s.n.).

Distribution. Endemic to Western Australia in the northern wheatlands and Goldfields area (Figure 8).

Discussion. Eucalyptus yilgarnensis is distinguished by the small, delicate pedicels, buds and fruit. The buds sometimes resemble those of *E. myriadena* Brooker. The fruits are

always barrel-shaped to slightly urceolate. The juvenile leaves are broad-lanceolate to ovate and contrast with the narrower leaves of *E. gracilis*. Maiden (1918) had earlier recognised the distinction in the juvenile leaves.

Notes on the informal "*Eucalyptus* series *Calycogonae*"

The "*Eucalyptus* ser. *Calycogonae*" is one of the eight mallee series with representatives in both western and eastern Australia (east of Spencer Gulf). With 6 taxa it is one of the smallest series. It is distinctive, its members being instantly recognisable among those of the informal "*Eucalyptus* sect. *Bisectaria*" Pryor & Johnson (1971) by the possession of staminodes. In flower these outer, long, barren filaments spread and become characteristically twisted while the inner short stamens merely become erect in flower or remain inflexed.

The series is further distinguished in "*E.* sect. *Bisectaria*" by the strongly glandular disc of the buds and by the constriction at the base of the style. A similar constriction is also seen in the unrelated *E. loxophleba* Benth. (Brooker 1972).

The series maintains the typical distribution pattern of the mallees, i.e. a concentration of species in the west with some in the east. In this case six taxa occur in the west where four are endemic and the remaining two, *E. gracilis* and *E. calycogona* occur in both east and west although in Western Australia, *E. gracilis* occurs only in the eastern part of the State.

The absence of *E. calycogona* from most of New South Wales is surprising when it is considered that there are habitats available which support several species in common with the adjacent areas in Victoria, e.g. *E. gracilis, E. socialis* F. Muell. ex Miq., *E. oleosa* F. Muell. ex Miq., *E. dumosa* A. Cunn. ex Schau., *E. leptophylla* F. Muell. and *E. incrassata* Labill. Site studies for *E. gracilis* and *E. calycogona* have not been made for their whole range of distribution, but Parsons and Rowan (1968) found that in parts of eastern South Australia and north western Victoria, *E. calycogona* occurs on heavier soils than *E. gracilis*.

It appears that *E. gracilis* was not known on Kangaroo Island until collected by M.D. Crisp in 1971. I recently visited his collection site which is on the peninsula on the north side of Pelican Lagoon at the eastern end of the island. There the species occupies the top of a coastal dune with much limestone rubble in the soil surface. The mallees are tall, up to 10 m, and the crown is distinctly terminal (it occurs in dense *Melaleuca lanceolata* shrubbery) with prominently erect leaves. In this character and its coastal occurrence, it is similar to *E. gracilis* var. *erecta* from Boston Island but I have not been able to discern other characteristics that should result in the variety being accorded formal status.

In *Eucalyptus*, morphological distinctions between species of a series, compared with the distinctions between series, between sections, and between subgenera, are frequently blurred and may be attributable to their incomplete divergence. This is no less the case with all six taxa of the "*E.* ser. *Calycogonae*" than with the "*E.* ser. *Foecundae*" (*E.* ser. *Fruticosae* Blakely), and *E.* ser. *Ovulares* (Brooker 1979, 1981). When such groups of related species are subjected to conventional taxonomic treatment, the morphological boundaries between taxa will always be somewhat subjective and may or may not be found realistic when the group is reassessed with more material available. This became the case with *E. gracilis* and *E. yilgarnensis*, where recent collections, field observations and seedling trials have shown that these taxa are as distinct as many other species pairs among the mallees.

The problems of specific delimitation are greatest with the widely distributed species such as *E. leptophylla* and *E. gracilis* which have undergone adaptive or gratuitous morphological and presumably physiological changes. No doubt incipient speciation can be observed in such forms as the *E. leptophylla* around Kumarl and perhaps recent speciation in *E. fruticosa* Brooker (1979). Some coastal forms of *E. gracilis*, e.g. near Port Lincoln and on the south coast of Western Australia, which are slightly coarser in the buds and fruit, and *E. gracilis* var. *erecta* (see above) may presage the selection of coastal taxa derived from typical *E. gracilis* stock.

It is possible that gene exchange is constantly taking place between most of the contiguous or sympatric taxa within the "*E.* ser. *Calycogonae*" and "*E.* ser. *Foecundae*", thus hindering the emergence of more distinctive forms under the existing selection regimes. On the other hand, I know of no evidence that inter-series crossing is possible between species of these series nor between species of the *E.* ser. *Ovulares* and species of any other series in the informal "*E.* sect. *Dumaria*" Pryor and Johnson (E. ser. *Dumosae* Blakely), yet I have recently seen evidence (segregation in the F1 progeny) of a hybrid between *E. redunca* ("sect. *Bisectaria*") x *E. incrassata* ("sect. *Dumaria*") showing that inter-sectional crossing, though apparently extremely rare, does occur under natural conditions.

Acknowledgements

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Eucalyptus ferriticola and *E. pilbarensis* (Myrtaceae), two new species from the Pilbara region of Western Australia

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Abstract

Brooker, M.I.H. and Edgecombe, W.B. *Eucalyptus ferriticola* and *E. pilbarensis* (Myrtaceae), two new species from the Pilbara region of Western Australia. Nuytsia 5(3): 373-380 (1986). *Eucalyptus ferriticola* and *E. pilbarensis* (Myrtaceae), two new species occurring in the Pilbara region of Western Australia (*E. ferriticola* also occurs at Mt Augustus to the south-west of the Pilbara) are described and illustrated. *E. ferriticola* belongs in the informal subgenus *Blakella* Pryor and Johnson, its closest ally being *E. aspera* F. Muell., and *E. pilbarensis* belongs in the informal subgenus *Symphyomyrtus* (Schauer) Pryor and Johnson, its closest ally being *E. trivalvis* Blakely.

Descriptions

1. **Eucalyptus ferriticola** Brooker and Edgecombe, sp. nov. (Figures 1 and 2)

Eucalypto asperae F. Muell. affinis a qua statura generaliter inferiore, cortice chlorino vel subroseo, foliis juvenilibus petiolatis, foliis in arbore summa adultis, laevibus, et habitatione rupestri differt.

With affinity to *E. aspera* F. Muell. from which it differs in its lower stature, greenish or pinkish bark, petiolate juvenile leaves, the development of smooth adult leaves in the mature crown and strong adaptation to harsh rocky sites.

Typus: Wittenoom Gorge (22° 17'S, 118° 19'E), 30 October 1983, *M.I.H. Brooker* 8314 and *W.B. Edgecombe* (holo: PERTH; iso: FRI, NSW, MEL, K).

Tree or *mallee* up to 8 m tall, bark smooth, greenish in winter, pinkish in early summer, lignotuberous. *Cotyledons* reniform, up to 0.8 x 1.2 cm. Seedling leaves opposite for 1 or 2 pairs, shortly petiolate, elliptical, up to 2 x 1 cm. *Juvenile leaves* opposite for an indefinite number of pairs, petiolate, ovate, up to 7 x 3 cm, dull, light green, with prominent, pinnate venation. *Seedling stems* and underside of midribs with bristle glands. *Adult leaves* alternating*, petiolate, narrow-lanceolate to lanceolate, up to 10 x 1.5 cm, dull grey-green, smooth, sometimes tapering to a long fine point. *Inflorescences* axillary, compound; rachis short, bearing crowded, many-flowered bud clusters. *Buds* shortly pedicellate, clavate, up to 0.5 x 0.4 cm; outer operculum thin, breaking into fragments and shed imperfectly during bud development leaving a ragged scar; inner operculum hemispherical. *Stamens* all fertile, inflexed in bud. *Anthers* versatile, dorsifixed, oblong, opening by longitudinal slits. *Ovary* 3-locular; ovules in up to 4 vertical rows. *Fruit* shortly pedicellate, cupular, cylindrical or slightly barrel-shaped, up to 0.9 x 0.7 cm, thin walled; rim thin; disc steeply descending, valves broad, sunken. Seed reddish brown, patelliform, thin; hilum ventral.

* Leaf arrangement is apparently alternate by elongation at the nodes (Jacobs 1955)

Figure 1. Photograph of holotype of *Eucalyptus ferriticola* (PERTH ex FRI).

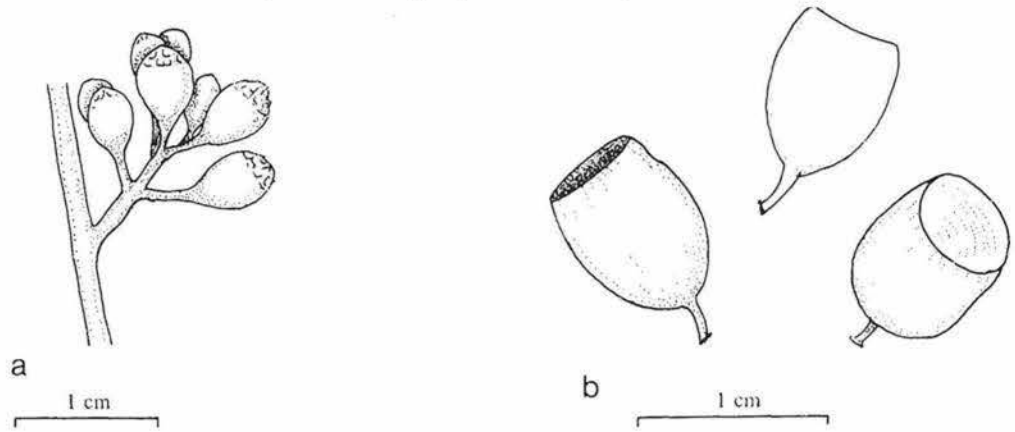

Figure 2. *Eucalyptus ferriticola*. a — Buds. b — Fruit.
From type collection.

Distribution. Hamersley and Ophthalmia Ranges, Mt Augustus, Western Australia (Figure 3).

Flowering period. Flowers November-December.

Other specimens examined. WESTERN AUSTRALIA: Hamersley Gorge (22°15′S, 118°00′E), 29 September 1969, *M.I.H. Brooker* 2169 (PERTH); Ophthalmia Range (23°17′S, 119°42′E), 4 July 1983, *M.I.H. Brooker* 8196 and *W.B. Edgecombe* (FRI, PERTH, NSW, MEL, DNA); Round Hill, west of Capricornia roadhouse (23°27′S, 119°46′E), 5 July 1983, *M.I.H. Brooker* 8199 and *W.B. Edgecombe* (FRI, PERTH, NSW, AD, Karratha College); north of Mt Newman (23°16′S, 119°33′E), 6 July 1983, *M.I.H. Brooker* 8212 and *W.B. Edgecombe* (FRI, PERTH, NSW, MEL, BRI); Hamersley Gorge (22°15′S, 118°00′E), 8 July 1983, *M.I.H. Brooker* 8233 and *W.B. Edgecombe* (FRI, PERTH, NSW, MEL, DNA); 1.7 km from Wittenoom-Tom Price road on road to Hamersley Gorge, 8 July 1983, *M.I.H. Brooker* 8237 and *W.B. Edgecombe* (FRI, PERTH, NSW, MEL, AD); Mt Augustus (24°20′S 116°51′E), 19 August 1983, *S.D. Hopper* 3146 (PERTH); Mt Nameless (22°43′S, 117°45′E), 31 October 1983, *M.I.H. Brooker* 8316 and *W.B. Edgecombe* (FRI, PERTH, NSW, MEL, Karratha College).

The Latin name refers to the habitat which characterises its distribution in the iron-rich Pilbara area.

Discussion. Eucalyptus ferriticola has a widespread though sporadic distribution in the Pilbara region, from Mt Nameless in the west to the Ophthalmia Range north of Newman in the east, a distance of about 200 km. It usually occurs as isolated trees and is almost wholly confined to gorges and more or less vertical slopes of mesas where it is often found anchored to and emerging from crevices of ironstone which are otherwise bare of vegetation.

At Mt Nameless it occurs near the top at about 1000 m elevation where the rock is from the Dales Gorge member of the Brockman Iron Formation.

It occurs on similar rock formations in the Ophthalmia Range at about 500-550 m elevation where it is associated with *E. leucophloia* Brooker, *Ficus platypoda* (Miq.) Miq., *Astrotricha hamptonii* F. Muell. ("iron ore plant"), *Eremophila* sp. and *Triodia* sp. It also

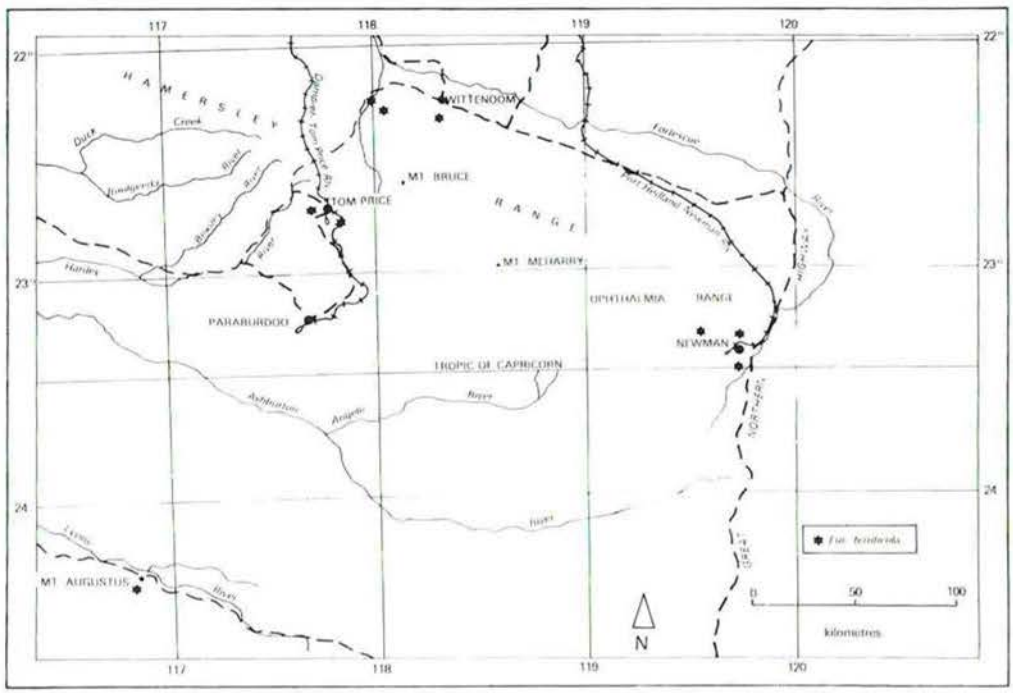

Figure 3. Distribution of *Eucalyptus ferriticola*.

grows on the steep upper slopes of mesas at about 700-800 m elevation between Hamersley Gorge and the Wittenoom-Tom Price road, where it occurs above a pure stand of *E. pilbarensis* Brooker & Edgecombe.

Hamersley Gorge itself has been formed by the south branch of the Fortescue River cutting through the Hamersley Range revealing the Mt Sylvia Formation and Wittenoom Dolorite. *Eucalyptus ferriticola* occurs as small trees on the rocky floor of the gorge with *E. camaldulensis* Dehnh. and *Melaleuca leucadendra* (L.) L. The upper extension of Hamersley Gorge to the south has been formed through a colluvium layer at least 40 m deep and the substrate is red clay/silt material with chert pebbles derived from Mt McRae shale and Dales Gorge member. Here the floor of the gorge and the lateral valleys running into it support well developed *E.ferriticola* to 8 m in height.

At Mt Augustus *E. ferriticola* occurs on lower and mid slopes and steep gullies on the northern and western sides at about 700-900 m elevation. The rock is granite and the associated tree species are *Acacia aneura* F. Muell. and *A. pruinocarpa* M. Tindale.

The axillary compound inflorescences, early loss of the outer operculum, inflexed stamens, oblong anthers, thin-walled fruit and patelliform seed clearly place *E. ferriticola* in the informal "*E.* subgenus *Blakella*" Pryor and Johnson (1971).

2. **Eucalyptus pilbarensis** Brooker and Edgecombe, sp. nov. (Figures 4 and 5)

Eucalypto trivalvi Blakely affinis a qua cortice semper laevi, foliis juvenilibus consistentem ovatis, adultis viridibus moderate nitidis, et alabastris fructibusque plus minusve sessilibus et saepe majoribus differt.

With affinity to *E. trivalvis* Blakely from which it differs in always having smooth bark, consistently ovate juvenile leaves, green moderately glossy adult leaves, and buds and fruit more or less sessile and often larger.

Typus: Base of mesa west of Hamersley Gorge (22°15'S, 117°59'E), 8 July 1983, *M.I.H. Brooker* 8236 and *W.B. Edgecombe* (holo: PERTH; iso: FRI, NSW, MEL, K).

Mallee up to 4 m tall; bark smooth, grey or pinkish grey or whitish grey; lignotuberous. *Pith* of branchlets glandular. *Cotyledons* bisected; lobes broad, diverging at a wide angle. *Seedling leaves* opposite for 1 or 2 pairs, petiolate, elliptical, up to 3.5 x 1.5 cm, dull blue-green. *Juvenile leaves* alternating, petiolate, ovate, up to 8 x 5 cm, dull green, many with purple pigmentation on underside, with imperfect, supra-basal side veins. *Adult leaves* petiolate, alternating, narrow-lanceolate, lanceolate or slightly falcate, up to 12 x 2 cm, green, moderately glossy, densely reticulate. *Inflorescences* axillary, simple, 7-flowered; peduncles flattened, up to 1.2 cm long. *Buds* sessile or very shortly pedicellate, broadly fusiform to clavate, up to 1.6 x 0.6 cm; operculum conical to hemispherical, outer operculum shed early and scar present. *Stamens* all fertile, variously flexed in bud or strongly inflexed. *Anthers* versatile, dorsifixed, oblong, opening by longitudinal slits. Ovary 3- or 4-locular. *Ovules* in 4 vertical rows. *Fruit* more or less sessile, cylindrical to obconical, up to 1.5 x 0.9 cm; rim moderately thin; disc steeply descending; valves sunken. Seed brown, ellipsoid to ovoid, slightly flattened, with shallow reticulum; hilum ventral.

Distribution. In the Hamersley Range at medium to high altitudes and also near Roy Hill, Western Australia (Figure 6).

Flowering period. Flowers in July.

Other specimens examined. WESTERN AUSTRALIA: Hamersley Gorge (22° 15'S, 118°00'E), 28, 29 September 1969, *M.I.H. Brooker* 2152, 2153, 2154, 2162 (PERTH); 54 miles N of Shepherd's roadhouse towards Roy Hill, 21 April 1974, *M.I.H. Brooker* 4556, 4557 (FRI, PERTH); Mt Nameless (22°43'S, 117°45'E), 8 July 1983, *M.I.H. Brooker* 8221, 8222, 8223, 8229 and *W.B. Edgecombe* (FRI, PERTH, NSW, MEL, AD); Hamersley Gorge (22°15'S, 118°00'E), 8 July 1983, *M.I.H. Brooker* 8234, 8235 and *W.B. Edgecombe* (FRI, PERTH, NSW, DNA, Karratha College); Mt Nameless (22°43'S, 117°45'E), 31 October 1983, *M.I.H. Brooker* 8315 and *W.B. Edgecombe* (FRI, PERTH, NSW, Karratha College).

Discussion. Eucalyptus pilbarensis has a more restricted distribution than *E. ferriticola* and has only been found at Mt Nameless, near Hamersley Gorge, near Mt Brockman and near Roy Hill. Unlike *E. ferriticola* it occurs in small populations. On Mt Nameless it occurs on the slopes as well as the top at about 800-1000 m in elevation. The summit of Mt Nameless bears a remarkable number of eucalypt species, viz. *E. gamophylla* F. Muell., *E.* affin. *terminalis* F. Muell., *E. lucasii* Blakely, *E. kingsmillii* Maiden & Blakely, *E. socialis* F. Muell. ex Miq., *E.* affin. *patellaris* F. Muell., *E. leucophloia* Brooker, *E.* affin. *setosa* Schau., *E. striaticalyx* W. Fitzg., *E. ferriticola* Brooker & Edgecombe and *E. pilbarensis* Brooker & Edgecombe. *Cassia* sp. and *Triodia* sp. are also abundant.

Near Hamersley Gorge *E. pilbarensis* occurs on scree slopes derived from shale and banded chert of the McRae and Mt Sylvia Formations respectively. The species occurs in more or less pure stands with *E. ferriticola* higher on the mesa cliff faces and with scattered trees of *E. leucophloia* on the surrounding slopes.

The simple axillary inflorescences, bi-operculate buds, oblong anthers, bisected cotyledons, glandular pith, non-waxy straight-sided fruit, and elliptical to ovate seed with

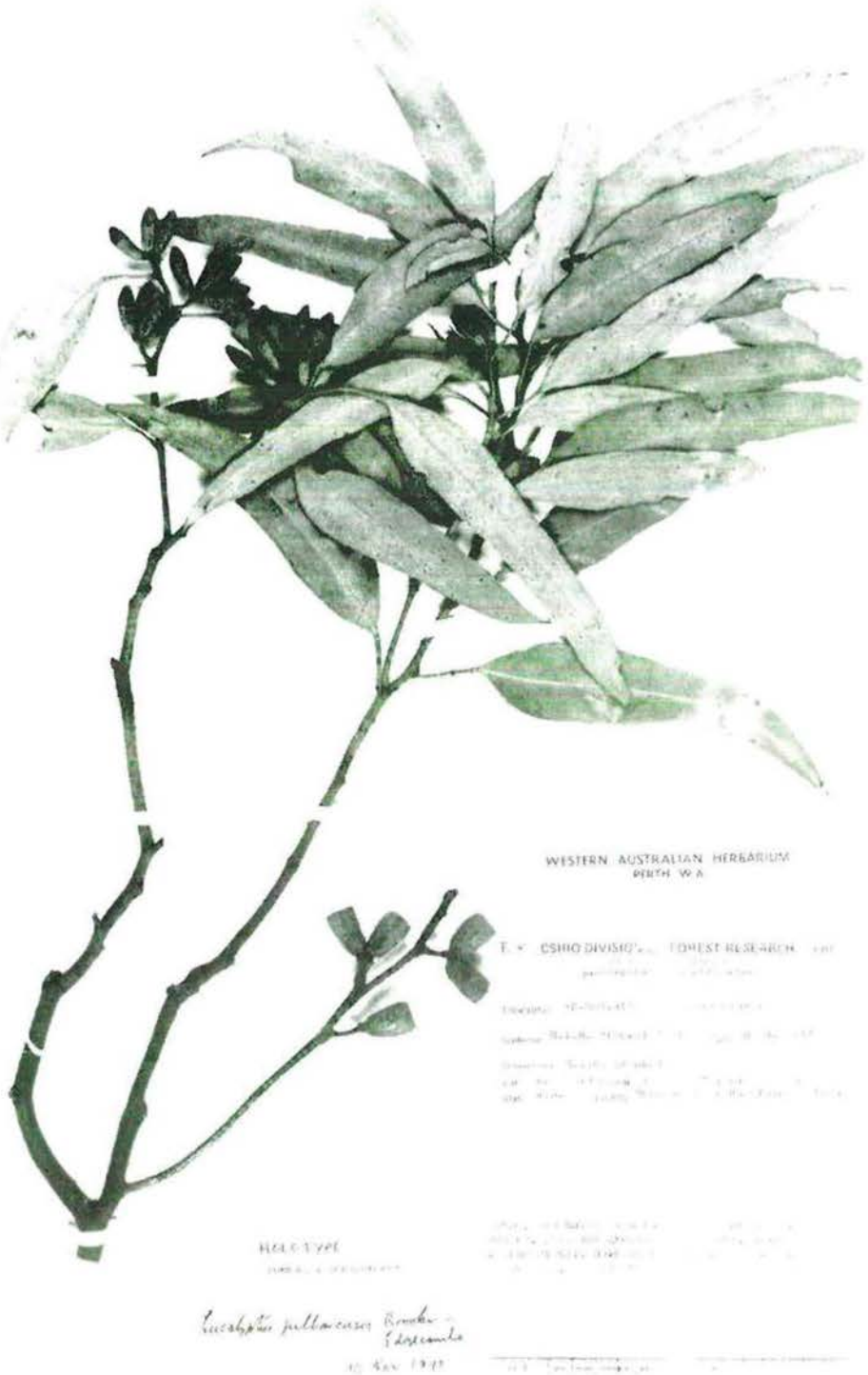

Figure 4. Photograph of holotype of *Eucalyptus pilbarensis*.

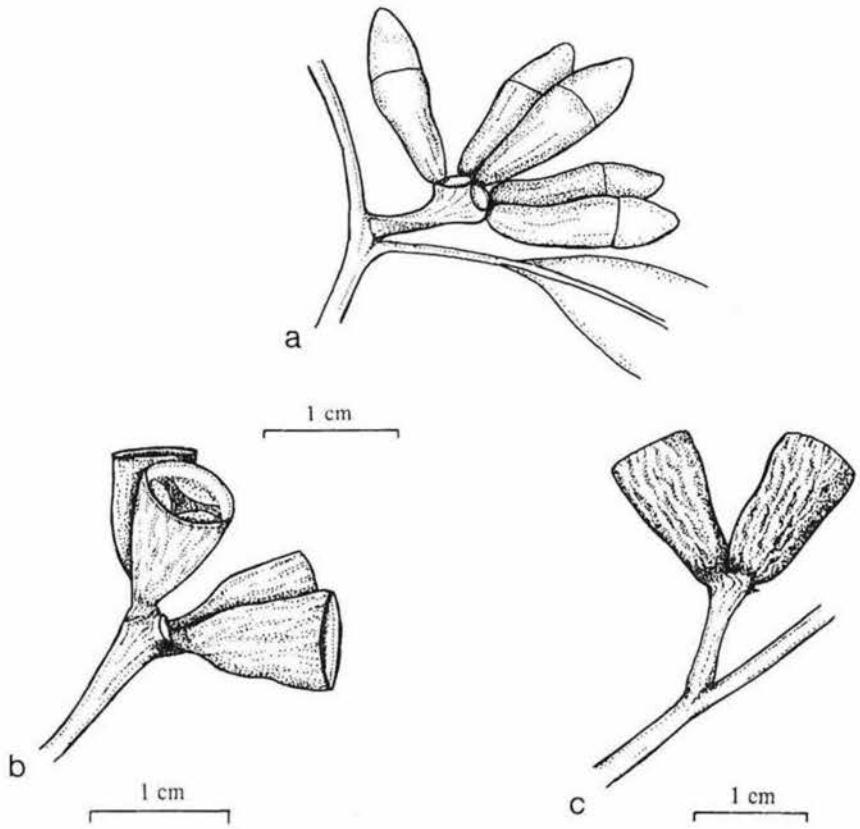

Figure 5. *Eucalyptus pilbarensis*. a — Buds. b and c — Fruit. a and b from holotype. b from *Brooker* 8221.

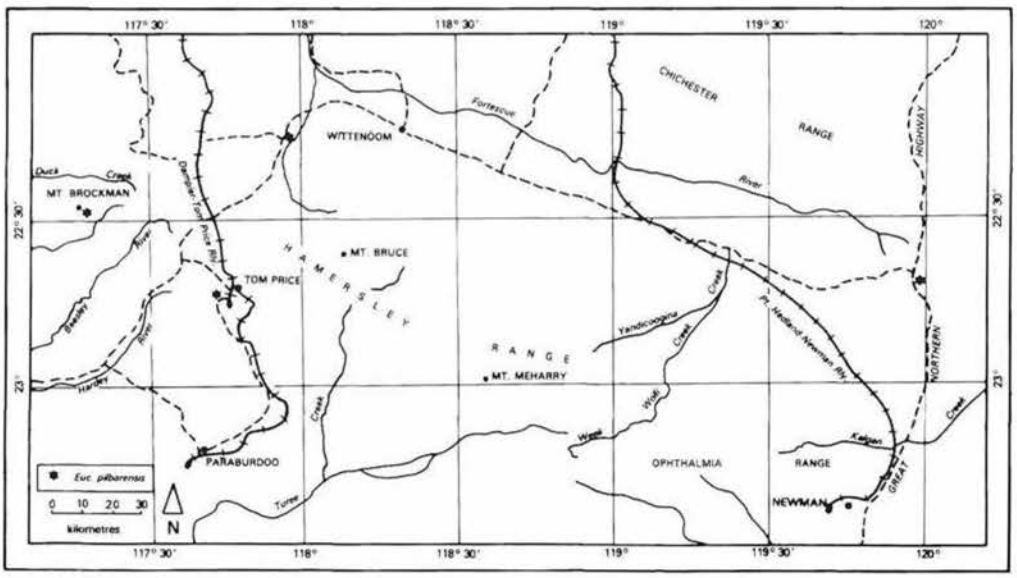

Figure 6. Distribution of *Eucalyptus pilbarensis*.

a shallow reticulum place *E. pilbarensis* in "*E.* subgenus *Symphyomyrtus* sect. *Bisectaria*, series *Accedentes*" of the informal classification of Pryor and Johnson (1971).

Acknowledgements

We are grateful to Mary Deighton of Newman for showing us *E. ferriticola* in the Ophthalmia Range, Barry Rockel for growing seedlings, Gillian Crook for the drawings, David Holmes for the maps, Bill van Aken for photography of the holotypes, and Ken Walker for supplying flowering material.

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Eucalyptus ceracea, E. rupestris and *E. chlorophylla* (Myrtaceae), three new species in the Kimberley Division of Western Australia

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Abstract

Brooker, M.I.H. and Done, C.C. *Eucalyptus ceracea, E. rupestris* and *E. chlorophylla* (Myrtaceae), three new species in the Kimberley Division of Western Australia. Nuytsia 5(3): 381-390 (1986). Three new species occurring in the Kimberley Division of Western Australia, *E. ceracea, E. rupestris* and *E. chlorophylla* are described and illustrated. A brief account of eucalypt collecting and publications concerning eucalypts in the Kimberley area is also given.

Introduction

No systematic survey of the eucalypts of the Kimberley Division (Mulcahy & Bettenay 1972) has ever been made. Various specimens have been collected since the early nineteenth century and two of the earliest known collections, i.e. those of Allan Cunningham from along the coast in 1820, include types. These are Cunningham 241/1820 (*E. miniata* Cunn. ex Schauer) from York Sound, and Cunningham 242/1820 (*E. clavigera* Cunn. ex Schauer) from Careening Bay.

The next significant expeditions in the region for the collection of eucalypts, were those of W.V. Fitzgerald in 1905 and 1906. From specimens collected by Fitzgerald and in some cases named and/or described by him, the following species were published, *E. houseana* W.V. Fitzg. ex Maiden (1915), *E. confluens* W.V. Fitzg. ex Maiden (1915), *E. argillacea* W.V. Fitzg. in Maiden (1918), *E. cliftoniana* W.V. Fitzg. in Maiden (1919) (syn. *E. pyrophora* Benth.), *E. lirata* W.V. Fitzg. ex Maiden (1920), *E. collina* W.V. Fitzg. in Maiden (1923), *E. perplexa* Maiden & Blakely in Maiden (1929) (syn. *E. jensenii* Maiden), *E. macropoda* Blakely (1934) (syn. *E. collina*), *E. zygophylla* Blakely (1934), and *E. fitzgeraldii* Blakely (1934).

Two new eucalypts were named from Kimberley collections made by C.A. Gardner in 1921, viz. *E. herbertiana* Maiden (1923) and *E. arenaria* Blakely (1934).

Since Gardner's expedition, only one new *Eucalyptus* species has been published from collections made in the Kimberley Division. This is *E. cupularis* Gardner (1964) which was described from specimens collected by its author in 1951. There are two other species occurring in the Kimberley area which were apparently not known by their authors at the time of publication to occur in the region. These are *E. apodophylla* Blakely & Jacobs (Blakely 1934) and *E. abbreviata* Blakely & Jacobs (Blakely 1934) which were described from populations in the Northern Territory.

The only specifically taxonomic treatment of the Kimberley eucalypts is that of Blake (1953) who cited remarkably few specimens from the Kimberley Division. His treatment was primarily concerned with the Northern Territory, therefore he excluded the Western

Australian endemics, *E. collina*, *E. lirata* and *E. houseana*. He included another endemic, *E. zygophylla* Blakely, only because his treatments of the *Eucalyptus* series *Clavigerae* (Maiden) S. Blake and *Corymbosae* (Benth.) Maiden ("*E.* subg. *Blakella*" and "*E.* subg. *Corymbia*" respectively of Pryor and Johnson's 1971 informal classification) were essentially revisions of both groups.

Pryor and Johnson (1971), in effect, reviewed many of Blake's conclusions on the status and synonymies of the Kimberley species. In their classification they recognised about 40 species in the region. Since then no new species for the region have been published and no published species from elsewhere have been found to extend to the area.

In 1972-1974, twenty nine species of *Eucalyptus* from the Kimberley Division were treated in the Commonwealth Forestry and Timber Bureau's Forest Tree Series Leaflets (Hall and Brooker 1972-1974, Turnbull and Hall 1973).

In recent years important collections have been made by A.S. George (1974-1978) and K.F. Kenneally (1974-1984). These were reported in the results of comprehensive biological surveys of the Prince Regent River Reserve (Miles & Burbidge 1975) and the Drysdale River National Park (Kabay & Burbidge 1977) in which they listed 15 and 31 eucalypt species respectively. In the former publication, the specimen, A.S. George 12839, is the earliest known collection of *E. rupestris* which is described in this paper.

The recent book by Petheram and Kok (1983) includes descriptions and illustrations of 30 species of eucalypts. It is the most comprehensive treatment of Kimberley eucalypts so far published, although the omission of *E. cupularis* appears to be an error.

In the last few years further access to remote areas and critical examination of eucalypts in better-known areas have resulted in the discovery of several new species. We describe three new species in this paper. A fourth new species in the Kimberley Division is currently being described by C.R. Dunlop and C.C. Done. Insufficient information and material have prevented us from deciding on the status of some additional populations. These include a taxon with an obvious affinity to *E. microtheca*, and also a taxon belonging to Pryor & Johnson's informal "*Eucalyptus* subgenus *Blakella*".

Descriptions of new species

Eucalyptus ceracea Brooker & Done, sp. nov. (Figures 1 and 2)

Eucalypto phoeniceae affinis a qua statura constanter inferiore, foliis arboris maturae omnino juvenilibus, et arbore tota (cortice excepto) pruinosa differt.

Typus: 33 km south-east of King George Falls, Kimberley district of Western Australia (14°18'S, 127°29'E), 14 July 1982, *C. Done* 612 (holo: PERTH; iso: FRI, NSW).

Small *tree* up to 3 m tall with yellow, flaky, fibrous bark. *Cotyledons* reniform, petioles ascending, hypocotyl very short or apparently absent. *Stems* in seedling and juvenile plants hairy. *Seedling leaves* decussate, sessile, 1 or 2 pairs, elliptical, up to 2 x 1 cm, slightly hairy. *Juvenile leaves* decussate, very shortly petiolate, many pairs, ovate, up to 4.5 x 3 cm, densely hairy, glaucous. *Crown of mature tree* entirely of sessile, glaucous juvenile leaves. *Inflorescences* simple, axillary, to 9-flowered; all inflorescence structures covered with white wax. Peduncles stout, flattened, up to 3 cm long. *Buds* on short stout pedicels, clavate or pyriform, up to 1.6 x 0.7 cm, prominently glandular, with a single, obtusely conic to hemispherical operculum which is somewhat lobed at summit. *Stamens* all fertile, inflexed in bud, bright orange at flowering. *Anthers* versatile, dorsifixed, oblong to ovoid, opening by parallel, longitudinal slits. *Ovules* in 4 vertical rows. *Fruit* very shortly

Figure 1. Holotype of *Eucalyptus ceracea* (*Done* 612).

pedicellate, cylindrical to barrel-shaped, usually narrowed towards the rim into a neck, up to 2.2 x 1.3 cm; loculi 2(3). *Seed* light reddish brown, oval to flattish, smooth or with a few wrinkles, hilum ventral, central.

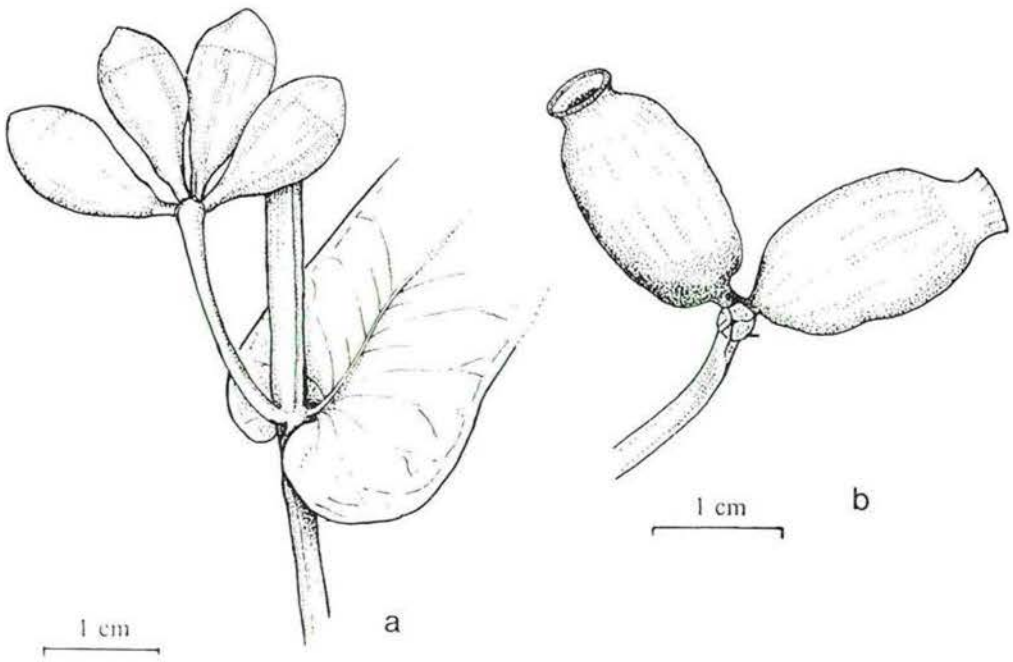

Figure 2. *Eucalyptus ceracea* a Buds (*Done* 612). b Fruit (*Done* 612).

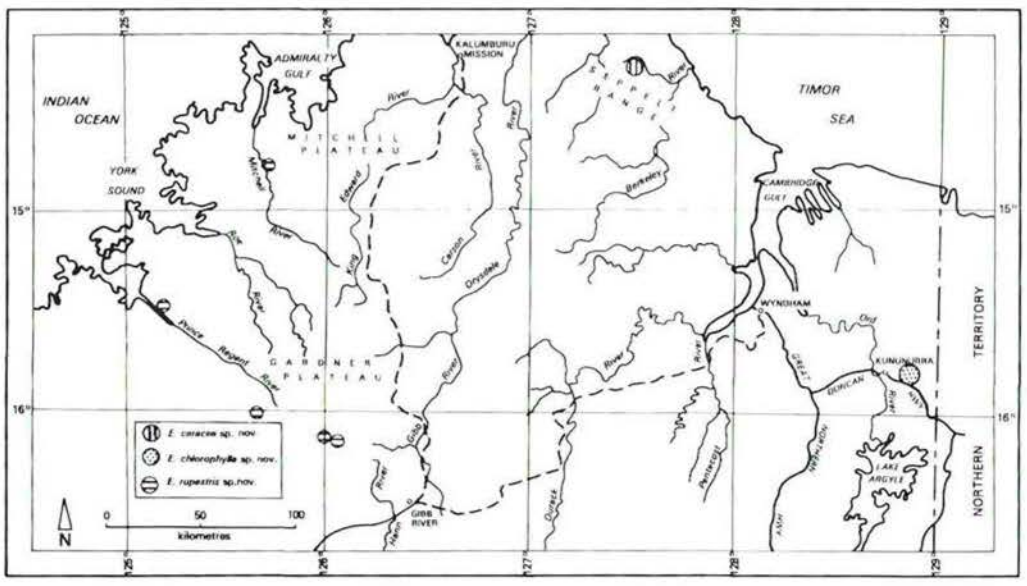

Figure 3. Distribution of *Eucalyptus ceracea, E. rupestris, E. chlorophylla*

Other specimen examined. Type locality, 1 Nov. 1982 *M.I.H. Brooker* 7771 (FRI, PERTH, NSW).

Distribution. Known only from the type locality where it occurs as a small pure population covering about 1 hectare half way up the north face of a ridge (Figure 3).

Flowering period. August-November.

Etymology. The specific epithet alludes to the extreme waxiness of the whole plant.

Affinities. The seedlings, mature bark, buds, flowers and fruits closely resemble those of *E. phoenicea*. *E. ceracea* is usually a smaller tree and differs strikingly in the entirely juvenile crown and conspicuously glaucous upper axis, leaves, buds and fruit. In the informal classification of Pryor & Johnson (1971), the species would be placed adjacent to *E. phoenicea* in the informal "*E.* subgenus *Eudesmia*, sect. *Apicaria*" (*E.* ser. *Miniatae* Blakely).

Notes. Eucalyptus ceracea is a small tree of striking appearance due to its yellow flaky bark, extreme white waxiness of the leaves, buds and fruits, and orange flowers. It has obvious potential as an ornamental plant. It occurs on the northern face of the Seppelt Range among jumbled boulders of coarse grained quartz sandstone. The understorey is of spinifex (*Plectrachne* sp.) and associated tree species include *Eucalyptus tectifica* and *Erythrophleum chlorostachys* (F. Muell.) Baill. We suggest the common name "Seppelt Range Gum".

Eucalyptus rupestris Brooker & Done, sp. nov. (Figures 4 and 5)

Arbor ad 5 m alta, cortice laevi albido. Folia plantularum petiolata. Folia adulta petiolis gracilibus elliptica vel lato-lanceolata, ad 7 x 2.5 cm, pallido-virentia, hebetia. Inflorescentiae axillares, 7(9) floribus. Pedunculi graciles, breves. Fructus breviter pedicellati, cylindrici, ad 0.5 x 0.3 cm.

Typus. Prince Regent River Reserve (15°32′S, 125°13′E), Western Australia, 30 August 1974, *A.S. George* 12839 (holo: PERTH; iso: FRI)

Tree up to 5 m tall with smooth, very powdery light orange-white bark, sometimes black-spotted. *Cotyledons* reniform. *Seedling leaves* decussate, petiolate, 2 or 3 pairs, ovate to spathulate, up to 1.5 x 1 cm. *Juvenile leaves* decussate, petiolate, many pairs, orbicular, up to 4 x 4 cm. *Adult leaves* alternating, on slender petioles to 2 cm long, elliptical to broad-lanceolate, up to 7 x 2.5 cm, thin, dull light green, concolorous. *Inflorescences* simple, axillary, 7(9)-flowered, rarely clustered on leafless, apparently terminal shoots. *Peduncles* slender, up to 0.4 cm long. *Very young buds* clavate to ovoid; outer operculum shed as fragments, inner operculum obtusely conical. *Mature buds* not seen. *Fruit* shortly pedicellate, cylindrical (sometimes slightly contracted near the rim to form a short neck), up to 0.5 x 0.3 cm; loculi 3; rim thin; disc steeply descending. *Seed* dark brown, irregular in shape, mostly elongated, flattish, with one end pointed, with a shallow reticulum on the dorsal side, hilum ventral, central.

Other specimens examined. WESTERN AUSTRALIA: Glider Gorge, Carson Escarpment, Drysdale River National Park (± 14°49′S, 126°49′E), 10 August 1975, *A.S. George* 13646 (CANB, PERTH); top of Carson Escarpment at Coucal Gorge, Drysdale River N.P. (± 15°02′S, 126°49′E), 15 August 1975, *A.S. George* 13870, 13872 (CANB, PERTH); Euro Gorge, Drysdale River N.P. (15°03′S, 126°44′E), 17 August 1975, *K.F. Kenneally* 4399 (CANB, PERTH); Morgan Falls, Worriga Gorge, Drysdale River N.P. (± 15°02′S, 126°40′E), 19 August 1975, *A.S. George* 14073 (CANB, PERTH); 49 km west

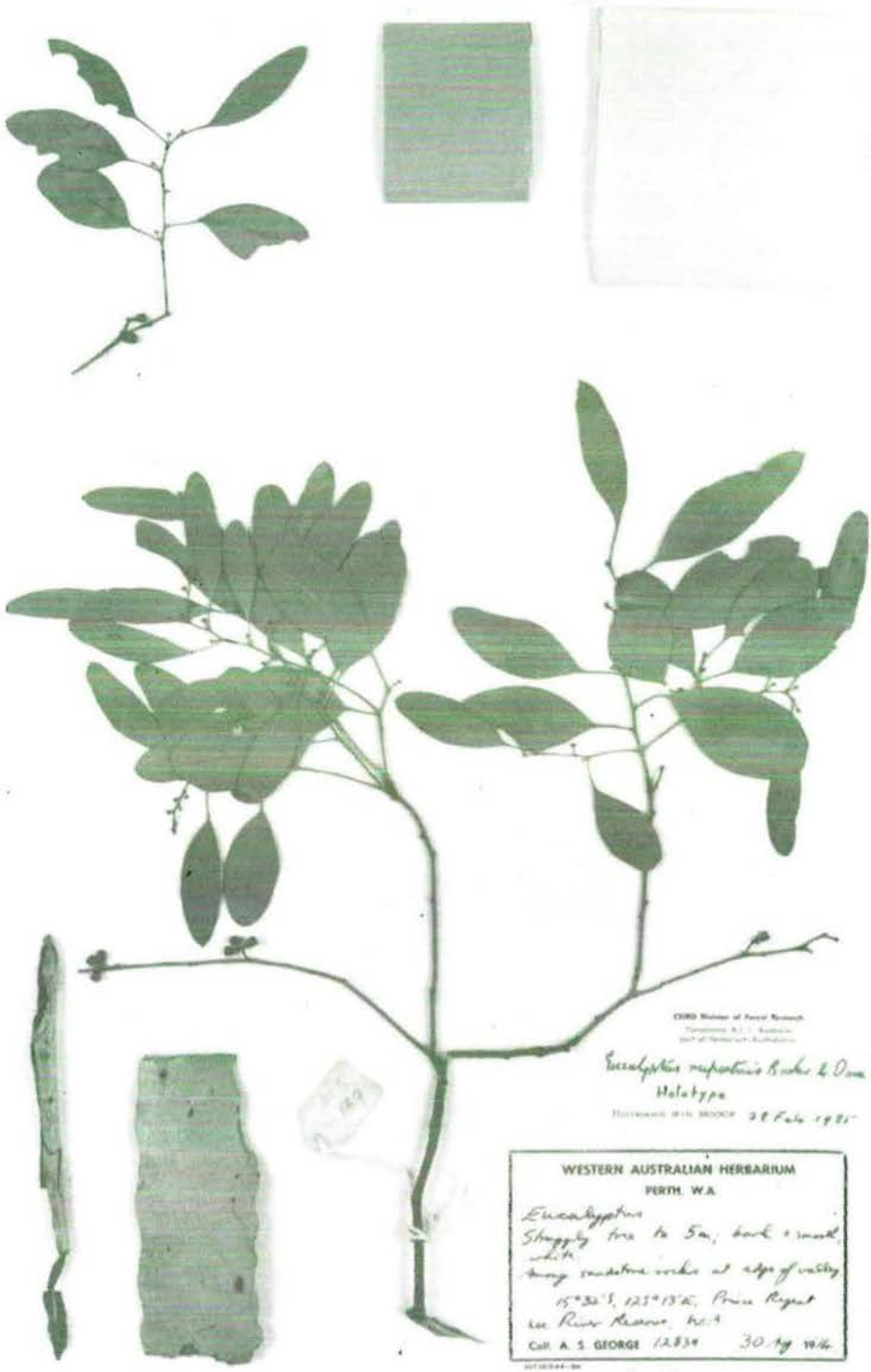

Figure 4. Holotype of *Eucalyptus rupestris* (*A.S. George* 12839).

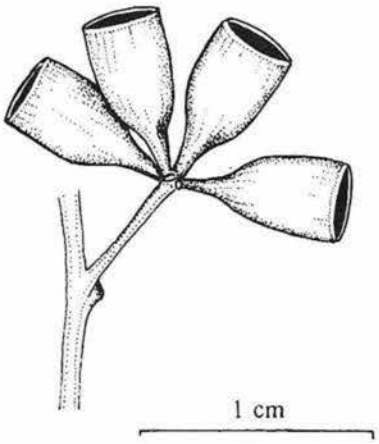

Figure 5. Fruit of *Eucalyptus rupestris* (*Done* 653).

of Mt Elizabeth Station (new) (16°09'S, 125°59'E), 30 Oct. 1982, *M.I.H. Brooker* 7763 (FRI, NSW, PERTH); 17.5 km west of Hann River crossing west of Mt Elizabeth Station (new) (16°15'S, 126°05'E), 30 Oct. 1982, *M.I.H. Brooker* 7764, 7765 (FRI, NSW, PERTH); Mitchell Falls (14°49'S, 125°41'E), 29 June 1983, *C. Done* 653 (PERTH).

Distribution. Kimberley Division of Western Australia. Currently known only from the Prince Regent River, Caroline Ranges and Mitchell River areas of the northern part of the Kimberley Division (Figure 3).

Flowering period. March-July.

Etymology. The specific epithet refers to the rocky situation in which the new species has always been found.

Affinities. Without mature buds and flowers, we cannot be certain of the natural affinity of *E. rupestris*. The buds are bi-operculate. The most cursory observation of the trees eliminates any affinity with two bi-operculate subgeneric groups, viz. "*Blakella*" and "*Corymbia*", of the informal Pryor and Johnson classification (1971). This conclusion is substantiated by examination of the seeds of *E. rupestris* which have no morphological similarities with the patelliform seeds of "*Blakella*" and the winged seeds of "*Corymbia*". In habit, habitat and bark, *E. rupestris* resembles *E. umbrawarrensis* Maiden but close examination distinguishes it by its orbicular seedling leaves (ovate in *E. umbrawarrensis*) and dull, elliptical to broad-lanceolate adult leaves (glossy, narrowly lanceolate in *E. umbrawarrensis*). The fruit of the two species are similar although the fruit pedicels in *E. umbrawarrensis* are more prominent.

Notes. Eucalyptus rupestris grows in association with *Eucalyptus papuana* F. Muell., *E. brachyandra* F. Muell. and *E. herbertiana* Maiden on deep or skeletal sandy soils in areas of massive sandstone. Whilst the known distribution is restricted to the areas cited, it is likely that the species occurs widely within largely inaccessible areas of sandstone in the northern part of the Kimberley Division. We suggest the common name "Prince Regent Gum".

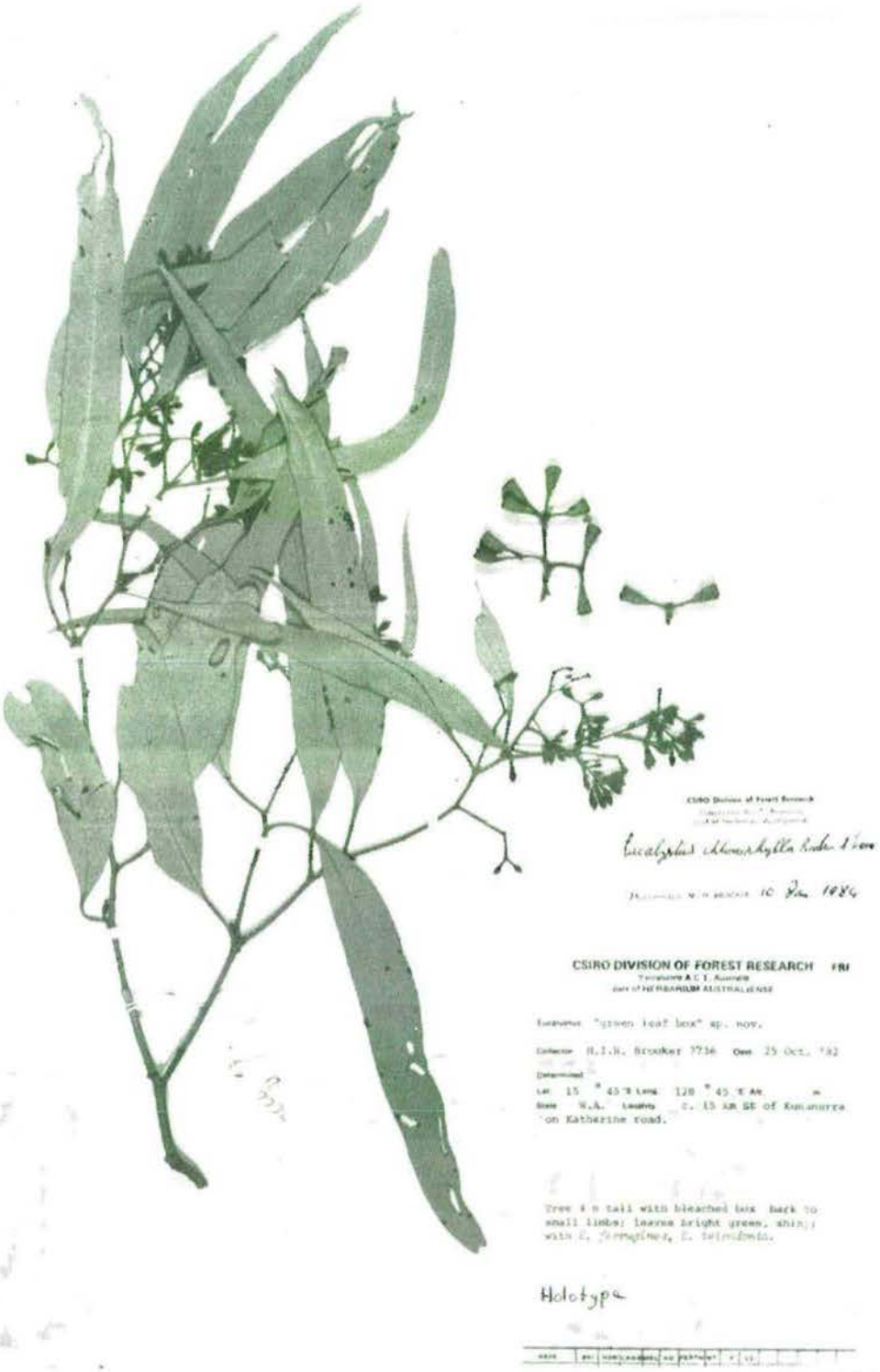

Figure 6. Holotype of *Eucalyptus chlorophylla* (*M.I.H. Brooker* 7736).

Eucalyptus chlorophylla Brooker & Done, sp. nov. (Figures 6 and 7).

Eucalypto argillaceae affinis a qua foliis adultis angustioribus et prasinis et alabastris fructibusque parvioribus et non-glaucis differt.

Typus. c. 15 km south-east of Kununurra on Katherine road (15°45'S, 128°45'E), Western Australia, 25 Oct. 1982, *M.I.H. Brooker* 7736 (holo: PERTH, iso: DNA, FRI, NSW).

Tree up to 5 m tall with bleached, whitish to yellowish grey box bark up to the small limbs. *Cotyledons* reniform. *Seedling leaves* decussate, petiolate, 2 or 3 pairs, linear to lanceolate, up to 3 x 0.8 cm. *Juvenile leaves* descussate, petiolate, many pairs, lanceolate to broad-lanceolate, up to 9 x 2.3 cm. *Adult leaves* alternating, petiolate, narrow-lanceolate or falcate, up to 18 x 2 cm, bright shining green, concolorous. *Inflorescences* terminal panicles. *Peduncle* up to 1 cm long subtending 7 flowers. *Immature buds* on long pedicels, broadly fusiform, outer operculum shed early in bud development. *Stamens* (seen only in immature bud): outer erect, inner inflexed. *Anthers* (seen only in immature bud) adnate, more or less globular with terminal gland. *Fruit* on long pedicels, obconical or campanulate, up to 0.8 x 0.5 cm; loculi 3 or 4; rim thick; disc prominent, level and just below rim or sloping inwards towards broad-based, but strongly exserted valves. *Seed* dark brown, irregular, flattish, many pointed at one end, dorsal side with shallow reticulum, hilum ventral, central.

Other specimen examined. Type locality (15°50'S, 128°45'E), 5 Sept. 1983, *C. Done* 658 (BRI, FRI, NSW, PERTH).

Distribution. The population from which the type was collected is of up to 20 individuals growing adjacent to the Duncan Highway (Figure 3). *Eucalyptus chlorophylla* may be widely distributed in the Kimberley Division extending as far west as the Erskine Range (C.C. Done personal observations). Discussions with Dr L.A.S. Johnson suggest that the same species occurs in adjacent parts of the Northern Territory.

Flowering period. July-October.

Etymology. The specific epithet alludes to the unusual leaf colour for eucalypts of this region.

Affinities. The bi-operculate buds and adnate anthers place *E. chlorophylla* in Pryor & Johnson's informal "*E.* subgenus *Symphyomyrtus*" sect. *Adnataria* (*E.* sect. *Poranthoroideae* Maiden). The prominent disc of the fruit places it with the northern boxes, viz. "*E.* ser. *Oliganthae* subser. *Oliganthinae*" of the Pryor and Johnson (1971) classification (*E.* ser. *Buxeales* Blakely)

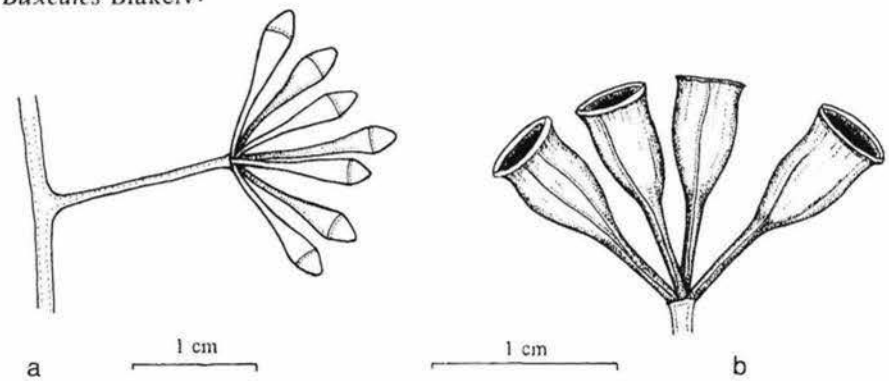

Figure 7. *Eucalyptus chlorophylla* a — Buds (*Done* 667). b — Fruit (*Done* 667).

Notes. E. chlorophylla occurs on sandy soil with lateritic gravel in a depression which is seasonally moist. It is easily separated from all other box species in the Kimberley, viz. *E. patellaris*, *E. oligantha* Schau., *E. microtheca*, *E. tectifica*, *E. argillacea*, by the bright green shiny leaves. It grows near *E. ferruginea* Schauer, *E. tetrodonta* F. Muell., *E. tectifica* and *Erythrophleum chlorostachys*. There is an understorey of canegrass (*Sorghum* sp.). We suggest the common name "Green-leaf Box".

Acknowledgements

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Five endangered new species of Myoporaceae from south-western Australia

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Abstract

Chinnock, R.J. Five endangered new species of Myoporaceae from south-western Australia. Nuytsia 5(3): 391-400 (1986). Five new species of Myoporaceae, namely *Myoporum turbinatum, Eremophila compressa, E. lactea, E. nivea* and *E. verticillata* are described and illustrated. All species are restricted to relatively small areas within agricultural or potential agricultural regions and are therefore considered to be at serious risk.

Introduction

Under the provisions of the Western Australian Wildlife Act 1950-1979 one hundred Western Australian plants were listed in the Government Gazette on November 14th, 1980 as rare flora. The two *Eremophila* species listed, namely *E. virens* and *E. denticulata,* occur in the South-West Botanical Province (Beard 1980) and are known from relatively few populations. *E. virens,* for example, is known only from one small population of a few hundred individuals.

On March 12th, 1982, a further 36 species were added to, and 4 deleted from the gazetted rare flora schedule. In this listing *Eremophila inflata, E. merrallii, E. microtheca, E. resinosa, E. serpens, E. viscida* and *Myoporum salsoloides* were added and these, like the previously gazetted Myoporaceae, were confined to the South-West Botanical Province and known from relatively few populations. Individual accounts of these rare species are provided by Rye & Hopper (1981) and Patrick & Hopper (1982).

In addition to the 9 Myoporaceae already gazetted as rare flora in Western Australia I have been aware for some time of another 5 species which, in my opinion, should be added to the rare flora schedule as soon as possible. Like those species already gazetted, these species are confined to the South-West Botanical Province in existing agricultural lands or in areas where active vegetation clearance for agricultural expansion is occurring.

Although I will be producing a monograph of the Myoporaceae in the next few years, I consider it appropriate to publish these new species at this stage so that their consideration for gazettal as rare flora can proceed without delay.

Species descriptions

1. **Eremophila compressa** Chinnock, sp. nov. (Figure 1)

Frutex ramis tuberculatis glabris; *foliis* alternis ellipticis obovatis usque oblanceolatis, obtusis, integris vel 2-3-dentibus prope apicem, glabris vel pilis glanduliferis in marginibus dispersis; *corolla* crema extra glabra, lobis acutis vel obtusis; *staminibus* inclusis, glabris; *fructu* sicco compresso, bicylindrico, obtuso, glabro.

Typus: R.J. Chinnock 4988, 11.x.1979 (holo: AD; iso: CANB, K, MEL, MO, NSW, PERTH).

Erect, often spindly shrub, 0.8-2 m tall. *Branches* terete, light to dark-brown, prominently tuberculate, glabrous, obscurely glandular-papillose, viscid at apices. *Leaves* sessile, alternate, erect and often obscuring branch, mid-green, often tinged purplish along margins, elliptic, obovate to oblanceolate, (6)8-16(21) x 2-7 mm, obtuse, but with a small mucro, margins entire or with two to three prominent teeth towards the apex, surfaces smooth or obscurely tuberculate, glabrous or occasionally with scattered glandular hairs along margins, slightly viscid at least when immature. *Flowers* 1 or 2 per axil; pedicel 1-3.5 mm long, straight or curved, slightly flattened, glabrous. *Sepals* 5, valvate, narrowly triangular to triangular, 1-2 x 0.4-0.7 mm, glabrous. *Corolla* 6.5-10.5 mm long, cream, unspotted or yellow-brown spotted in tube, 2-lipped, glabrous except for bearded inside surface of medial lobe of lower lip and tube below it; lobes obtuse but medial lobe of lower lip dilated, emarginate. *Stamens* 4, included, glabrous. *Ovary* ovoid-cylindrical, 1.6-1.8 x 0.6-0.8 mm, pale yellow, bilocular with one ovule per loculus, glabrous; style glabrous. *Fruit* dry, bicylindrical, 3.5-5.5 x 1.5-1.7 mm, compressed, obtuse, surface slightly verrucose, glabrous. *Seed* unknown.

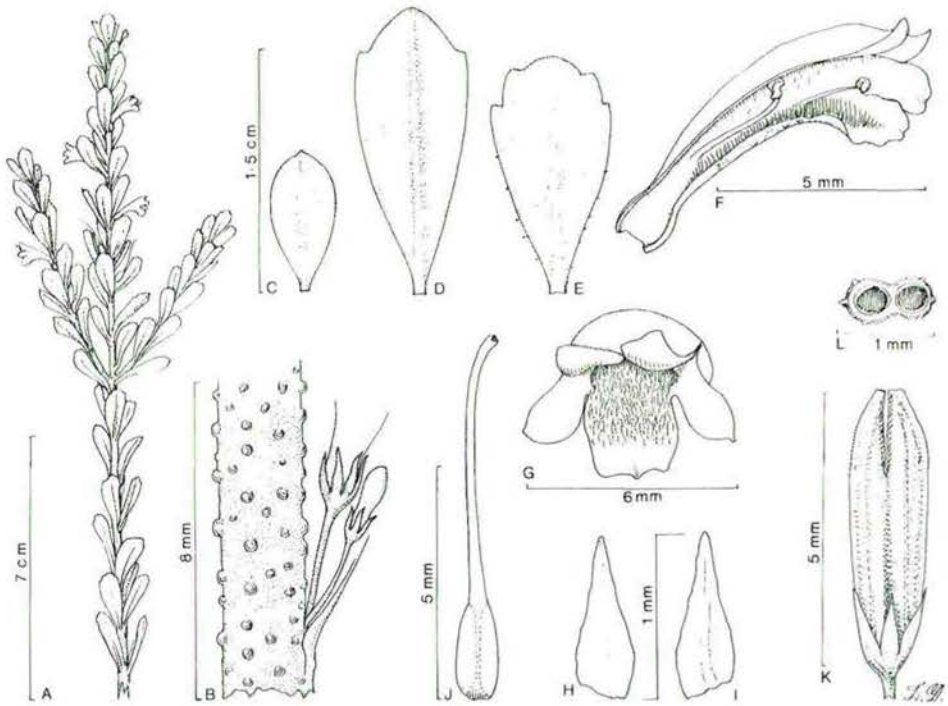


Figure 1. *Eremophila compressa*. A — Habit. B — Enlargement of branch. C to E — Leaf variation. F and G — Side and front view of corolla. H and I — Outer and inner surface of sepal. J — Gynoecium. K and L — Side and cross-section of fruit.

A — I from *Chinnock* 4988; K — L from *Chinnock* 5048.

Specimens examined. WESTERN AUSTRALIA: *W.E. Blackall* 1003, 14.x.1931 (PERTH); *M.A. Burgman* 2587, no date (PERTH); *R.J. Chinnock* 4987, 11.x.1979 (AD); *R.J. Chinnock* 4989, 11.x.1979 (AD); *R.J. Chinnock* 5048, 7.xi.1981 (AD); *R.J. Chinnock* 5452, 7.xi.1981 (AD); *C.F. Davies* 215, 2.v.1963 (PERTH); *C.A. Gardner* s.n., Jan. 1940 (PERTH); *K. Newbey* 6720, 12.iii.1980 (PERTH); *J.W. Wrigley* 5345, 2.xi.1968 (AD, CBG); *J.W. Wrigley* 5817, 12.xi.1968 (AD, CBG).

Distribution and habitat. Eremophila compressa is confined to the eastern part of the Roe Botanical District (Map 1) where it occurs in the vicinity of Grasspatch to the north of Salmon Gums. It is usually found on disturbed brown clay loams adjacent to roads or along the railway line, although one large population was found growing in undisturbed *Eucalyptus* woodland (*Chinnock* 5452).

The Gardner specimen was reputedly collected at Bencubbin. However, this is considered highly unlikely and it is presumed that the locality data provided is incorrect.

Affinities. The structure of the flower and fruit of this species clearly ally it to *E. saligna. E. compressa* differs from this species, however, by its smaller size, prominently tuberculate branches, smaller leaves with at most two or three teeth near the apex and its bicylindrical, obtuse fruit.

Conservation status. Most of the locations at which *E. compressa* is known to occur are on road verges or along railway lines. All populations in these situations consist of relatively few individuals. The only large population of this species occurring in undisturbed *Eucalyptus* woodland (to the west of Salmon Gums) is situated near areas which were cleared during 1981. The conservation status for this species is 2V (after Leigh, Briggs & Hartley 1981).

Etymology. The specific epithet is taken from a feature of the fruit.

2. **Eremophila lactea** Chinnock, sp. nov. (Figure 2)

Frutex erectus glaber maculis prominentibus albis parvis magnisque in ramis foliisque; *foliis* alternis, imbricatis, ellipticis usque oblanceolatis, acutis, glandulifero-pubescentis: *corolla* dilute lilacina, extra dense glandulifero-pubescentia, lobis acutis; *staminibus* inclusis, glabris; *fructu* sicco, ovoideo-oblongo, acuto, crustaceo, villoso.

Typus: R.J. Chinnock 4389, 14.xi.1978 (holo: AD; iso: AD, CANB, K, MEL, MO, NT, PERTH, US, W).

Erect compact or spindly shrub 1-3.5 m high, often weeping when old. *Branches* erect, subterete and ribbed towards apex, terete in older parts, green becoming light brown in woody parts, non-tuberculate, glabrous, obscurely glandular-papillose, prominently white-blotched at least in upper parts, the blotches consisting of dried exudate. *Leaves* sessile, alternate, erect, overlapping and normally obscuring branch, (7)10-31(44) x 2-6(11) mm, elliptic to oblanceolate, acute, margins entire, surfaces smooth or obscurely glandular-papillose, glabrous, viscid when immature, white-blotched at least towards branch tips, somewhat shiny. *Flowers* 3 or 4 per axil; pedicel 2-3 mm long, flattened, sparsely glandular-pubescent in upper part, often white-blotched. *Sepals* 5, valvate, green, oblong to oblanceolate, 3-5.5(8) x 0.5-1.5 mm, acute often broadly so, veins prominent after flowering, sparsely glandular-pubescent on both surfaces. *Corolla* 8-13.5 mm long, very pale lilac outside, deeper lilac and faintly purple spotted inside tube, 2-lipped, densely glandular-pubescent outside, inside of tube villous and lobes glabrous; lobes obtuse, similar in shape. *Stamens* 4, included, glabrous. *Ovary* ovoid c. 1.5 x 0.8 mm, pale greenish yellow, bilocular with one ovule per loculus, densely villous except for swollen glabrous base; style glabrous except for a few scattered eglandular hairs towards base. *Fruit* dry, ovoid-cylindrical, 3-3.5 x 1.5-2 mm, acute, crustaceous, villous, hairs eglandular. *Seed* unknown.

Specimens examined. WESTERN AUSTRALIA: *R.J. Chinnock* 4392, 14.xi.1978 (AD); *R.J. Chinnock* 4393, 14.xi.1978 (AD); *R. Isaacson* 60, 62, 14.viii.1978 (AD); *T. Loffler* 4, viii.1967 (AD); *K. Newbey* 6760, 16.iii.1980 (PERTH).

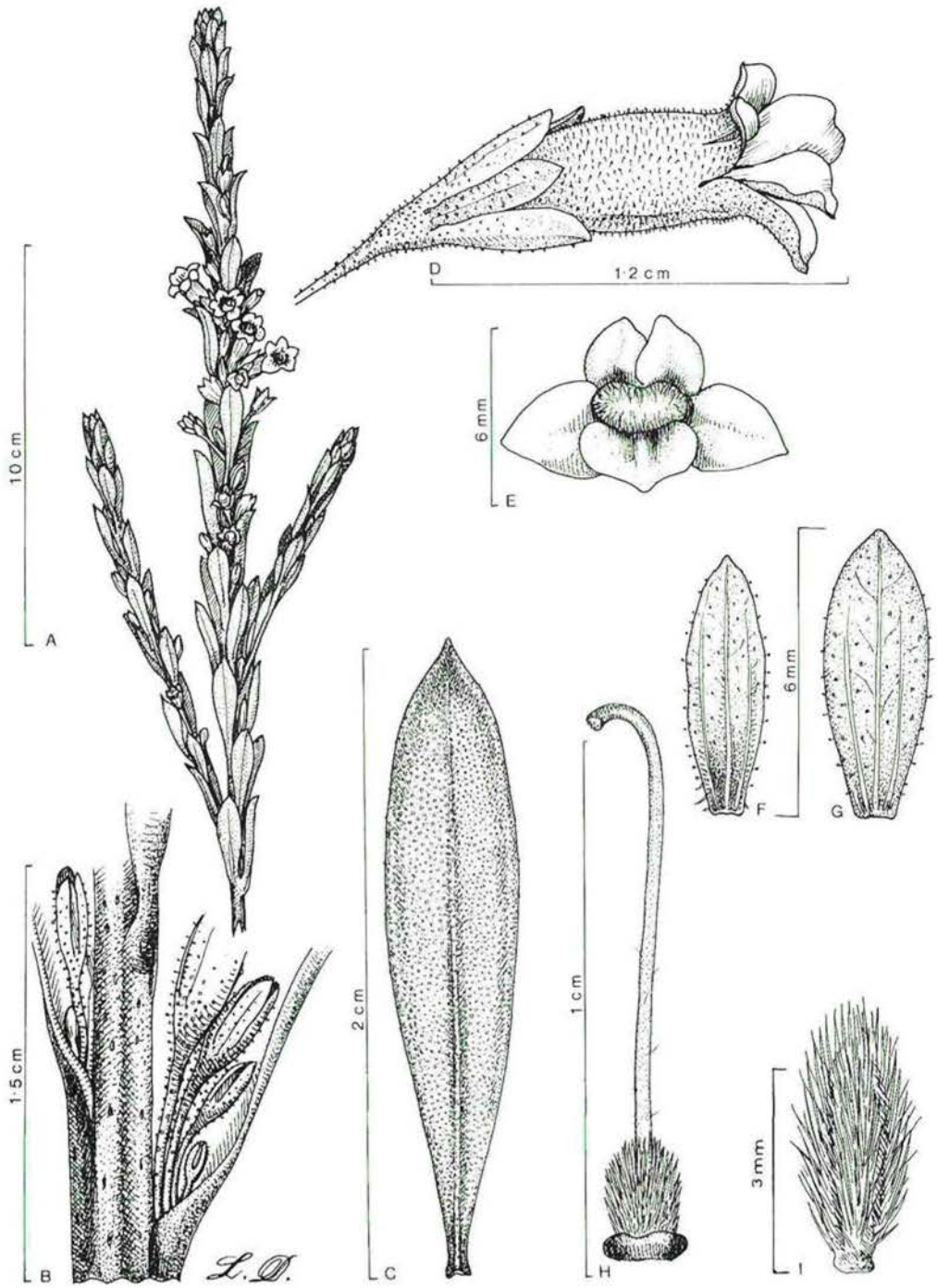


Figure 2. *Eremophila lactea*. A — Habit. B — Enlargement of branch. C — Leaf. D and E — Side and front view of flower. F and G — Sepals outside and inside surfaces, post flowering. H — Gynoecium. I — Fruit. A — I cultivated material, Adelaide.

Distribution and habitat. Eremophila lactea is known only from a small area west of Grasspatch, Roe Botanical District (Map 2) where it grows on light-brown to grey-brown sandy loams in open *Eucalyptus* (including mallee) woodland. It is commonly associated with *Acacia* and *Melaleuca* species.

Affinities. Allied to *Eremophila psilocalyx* F. Muell. (syn. *E. pachyphylla* Diels) but differing in having thinner, broader leaves, a milky exudate on the branches and leaves, smaller sepals and a smaller, glandular-pubescent corolla.

Conservation status. Eremophila lactea has a conservation status of 2V (after Leigh, Briggs & Hartley 1981) and like *E. compressa* occurs in areas subjected to rapid agricultural expansion in recent years.

Etymology. The specific epithet is taken from the milky exudate which occurs on the branches and leaves.

3. **Eremophila nivea** Chinnock, sp. nov. (Figure 3)

Frutex lanatus *foliis* alternis vel aliquot interdum oppositis, linearibus, acutis, marginibus incrassatis; *sepalis* 5, imbricatis, triangularibus usque lanceolatis, acuminatis; *corolla* lilacina, extra glabra vel paucis pilis dispersis, lobis obtusis; *staminibus* inclusis, glabris; stylo piloso; *fructu* sicco, ovoideo, manifeste rostrato, glabro.

Typus: R.J. Chinnock 4916, 30.ix.1979 (holo: AD; iso: PERTH).

Shrub to 1.6 m tall with branches, leaves, pedicels and sepals (outer surface) completely clothed in white to greyish white lanate tomentum. *Branches* terete, non-tuberculate, hairs branched and often floccose in older parts. *Leaves* sessile, alternate but occasionally with a few opposite, linear, (6)8-18(22) x 1.5-3.5 mm, acute, margins entire, slightly revolute, thickened. *Flowers* 1 or 2 per axil; pedicel 2-5.5 mm long, terete. *Sepals* 5, imbricate, tips purplish black sometimes visible through indumentum, subequal, triangular to lanceolate, 7-11 x 0.7-2.5 mm, acute to attenuate, inside surface glabrous below, with dense white branched hairs above especially towards the margins. *Corolla* 15-23 mm long, lilac, tube white inside on the lower side, faintly lilac to brownish spotted, 2-lipped, outside surface glabrous or with a few scattered branched hairs, inside of tube arachnoid hairy and lobes glabrous; lobes obtuse, medial one of lower lip dilated, emarginate. *Stamens* 4, included, glabrous. *Ovary* ovoid, c. 3 x 1 mm, pale yellow, quadrilocular with one ovule per loculus, glabrous; style eccentric, pilose. *Fruit* ovoid, 4-5 x 2.2-2.6 mm, prominently beaked, splitting at apex, glabrous; exocarp buff-coloured, papery, endocarp brown, smooth. *Seed* ovoid, c. 1.5 x 0.7 mm, buff-coloured.

Specimens examined. WESTERN AUSTRALIA: *C. Chapman* s.n., 10.x.1975 (NSW 108470); *R.J. Chinnock* 3710, 15.viii.1977 (AD).

Distribution and habitat. Eremophila nivea is known only from the type population which occurs along one kilometre of road near Three Springs, Avon Botanical District (Map 1). The plants grow under scattered *Eucalyptus* trees on brown clay loam.

Affinities. This species is allied to *Eremophila eriocalyx,* sharing with this species a branched indumentum on the vegetative parts, thickened revolute leaf margins and glabrous fruits. It differs from *E. eriocalyx* in the more dense persistent indumentum, the glabrous, or almost glabrous corolla, the open corolla throat, the shorter pedicel and sepals.

Conservation status. The only known population consists of less than two hundred individuals and is enclosed on either side by cultivated land. Any roadside clearing could

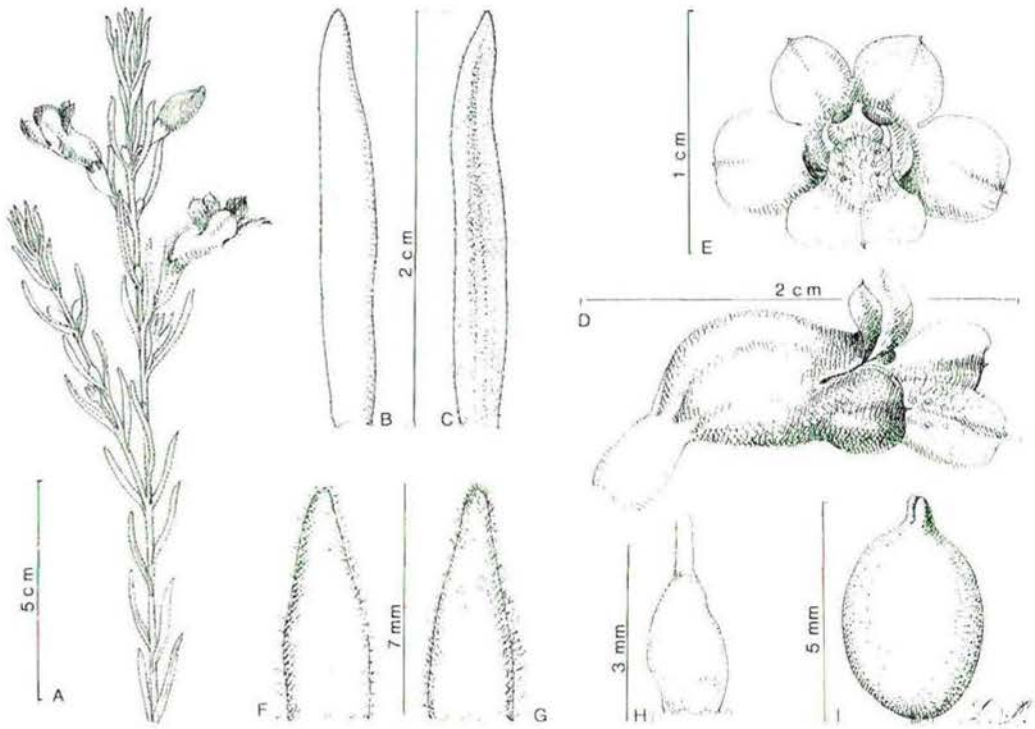


Figure 3. *Eremophila nivea*. A Habit of branch. B and C Upper and lower surface of leaf. D and E Side and front view of corolla. F and G Outside and inside surface of sepal. H Ovary and lower part of style. I Fruit.
A I based on Holotype.

decimate the population and accordingly its conservation status is 2E (after Leigh, Briggs & Hartley 1981). Fortunately *E. nivea* has considerable horticultural merit and is widespread in cultivation, especially in South Australia.

Etymology. The specific epithet refers to the indumentum of this species.

4. **Eremophila verticillata** Chinnock, sp. nov. (Figure 4)

Frutex humilis effusis odorem graveolentum emittens, *ramis* sparse ad dense hirsutis; *foliis* ternato-verticillatis, appressis, oblongis obtusis; *floribus* sessilibus; *sepalis* 4, valvatis, linearibus usque lanceolatis, acutis, extra glabris, intra glandulifero-pubescentis; *corolla* purpurea, extra pubescentia, lobis obtusis; *staminibus* inclusis, glabris; stylo glabro; *fructu* sicco, ovoideo, rostrato, crustaceo, hirsuto.

Typus: R.J. Chinnock 4369, 12.xi.1978 (holo: AD; iso: BRI, K, MEL, MO, NSW, NT, PERTH, US).

Low spreading shrub up to 0.8 m high and 1 m diameter, emitting a strong, slightly offensive odour. *Branches* terete, erect or spreading, non-tuberculate, sparsely to densely hirsute. *Leaves* sessile, in whorls of 3, appressed to branches, green to purplish, fleshy, narrowly oblong, 2.5-6 x 1 mm, obtuse, hirsute on adaxial surface, obscurely glandular-papillose on abaxial surface. *Flowers* 1 per axil, sessile. *Sepals* 4, valvate, green, subequal, linear to lanceolate, (1)1.5-5 x 0.3-1 mm, acute, outside surface glabrous or glandular-

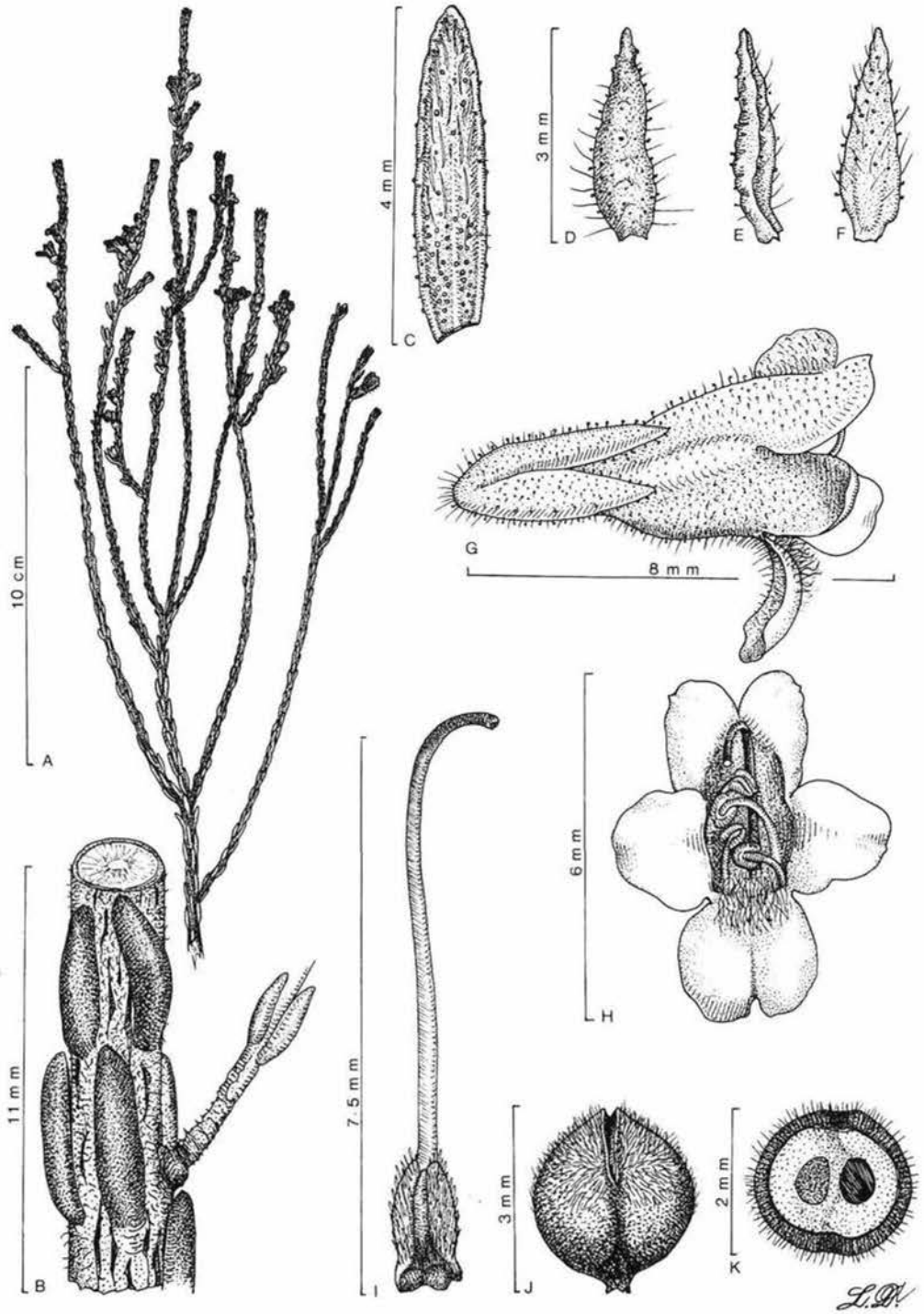


Figure 4. *Eremophila verticillata*. A — Habit. B — Enlargement of branch to show appressed leaves. C — Adaxial leaf surface. D to F — Outside surface, side view and inside surface of sepal. G and H — Side and front view of flower. I — Gynecium. J and K — Side and cross-section of fruit.
A — I based on Holotype.

pubescent, inside surface glandular-pubescent. *Corolla* (5)8-11 mm long, violet, but inside of tube white on lower side and purple spotted, 2-lipped, outside surface pubescent, hairs consisting of short glandular and longer eglandular ones, lower half of medial lobe of lower lip villous, with hairs extending down tube below lobe; lobes obtuse, medial lobe of lower lip dilated, emarginate. *Stamens* included, glabrous. *Ovary* ovoid, c. 1.5 x 0.5 mm, green, bilocular with one ovule per loculus, hirsute; style glabrous. *Fruit* dry, ovoid, 2-3 x 1-2.5 mm, beaked and slightly separated into two at apex, hirsute with short glandular and longer eglandular hairs. *Seed* unknown.

Specimens examined. WESTERN AUSTRALIA: *R.J. Chinnock* 4370, 4375, 12.xi.1978 (AD); *P.D. Luscombe* s.n., 6.xii.1979 (AD, PERTH); *J.W. Wrigley* 5625, 7.xi.1968 (AD, CBG).

Distribution and habitat. E. verticillata is known only from a few localities in the Roe Botanical District (Map 1).

At Lake Cobham *Eremophila verticillata* occurred on powdery brown loam in an open low *Eucalyptus* woodland of *E. longicornis, E. annulata* and *E. floctoniae*. It was associated with *Maireana erioclada* and *Threlkeldia diffusa*.

Affinities. Eremophila verticillata is very closely allied to *E. ternifolia* but differs in having smaller, narrower appressed leaves and a fruit in which the carpels are neither unequal nor free in the upper half.

Conservation status. As far as I am aware the population between Kalgarin and Pingaring was destroyed in early 1980 during vegetation clearance but fortunately plants from this population are in cultivation in Adelaide. The population on the Lake King-Newdegate road (*Wrigley* 5625) could not be located although searched for in two successive years. The two populations at Lake Cobham are adjacent to the road and any roadside clearance could decimate them. The conservation status of this species according to Leigh, Briggs & Hartley (1981) is 2E.

Etymology. The specific epithet refers to the whorled leaves.

5. **Myoporum turbinatum** Chinnock, sp. nov. (Figure 5)

Frutex glaber, viscidus, saepe spiculatis in ramis, foliis, floribusque, ramis tuberculatis; *foliis* alternis, erectis, linearibus complanatis subteretibus in dimidio distali dentatis, tuberculatis; *sepalis* valvatis anguste triangularibus; *corolla* alba vel suffuse lilacina, extra glabra, lobis obtusis; *staminibus* exsertis, glabris; *fructu* sicco, tubinato in dimidio distali manifeste complanato et rostrato, 4-costato ad 4-alato, alis membranceis et translucidis saltem apicem versus, glabro.

Typus: K. Newbey 7915, 9.xi.1980 (holo: PERTH, iso: AD, CANB, K, MEL).

Erect shrub to 4 m high, at first multistemmed and broom-like, but eventually consisting of one or a few long slender erect stems with leafy branches restricted to uppermost part. *Branches* greenish brown, light brown to purplish brown in older parts, prominently tuberculate, glabrous, glandular-papillose, viscid, more or less granulate and frequently spiculose at least when dry. *Leaves* sessile, alternate, erect, straight or incurved, deep green or immature leaves sometimes reddish brown, linear, flat to subterete, (10.5)15-50(80) x 0.5-1(1.5) mm, uncinate, margin with small conical teeth especially in the distal half, surface tuberculate and often spiculose, midrib distinctly grooved on both surfaces, glabrous, viscid, shiny. *Flowers* 4 to 8 per axil; pedicel 1.5-4.5 mm long, dilated in upper part and 5-ribbed when dry, glabrous, glandular-papillose, viscid. *Sepals* 5, valvate, green, narrowly

triangular, c. 1 x 0.3 mm, keeled, glabrous. *Corolla* 2.5-4.5 mm long, almost rotate, white but often tinged lilac, unspotted or with irregular sized blotches on lower half of lobes and in tube; glabrous outside but often spiculose when dry, inside of lobes and tube with a few scattered hairs; lobes obtuse, equal in size but one distinctly pouched. *Stamens* 4, exserted, glabrous. *Ovary* conical but obscurely 4-sided, 1-1.5 x 0.5 mm, purplish black, bilocular with one ovule per loculus, rugose to tuberculate, glabrous; style glabrous. *Fruit* dry, turbinate, 3-4.5 x 1.5-2.5 mm, prominently flattened and beaked in distal part, 4-ribbed to 4-winged, wings membranous and translucent at least near apex, glabrous.

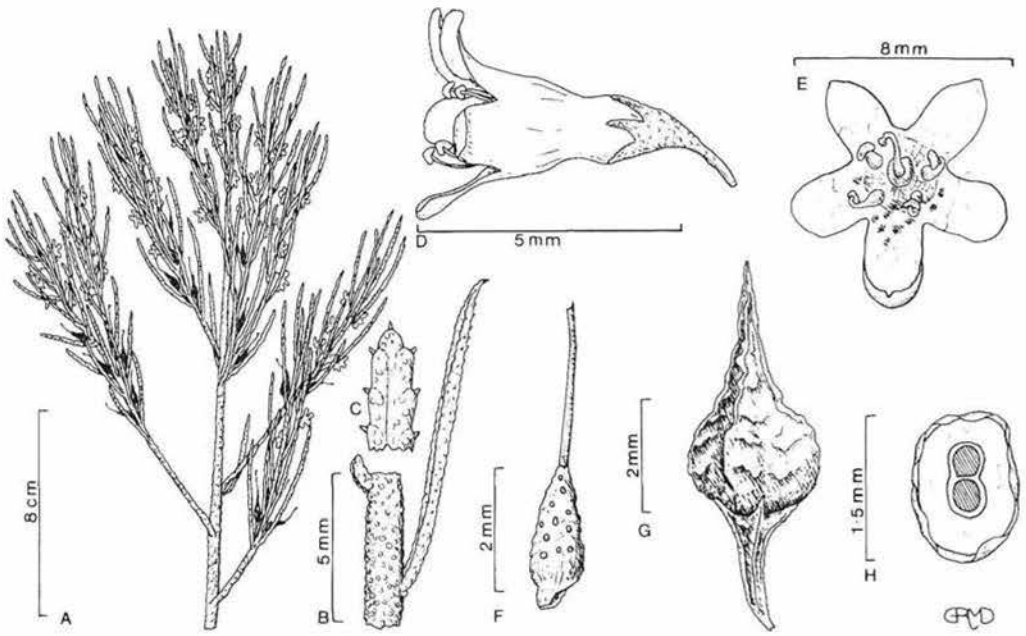


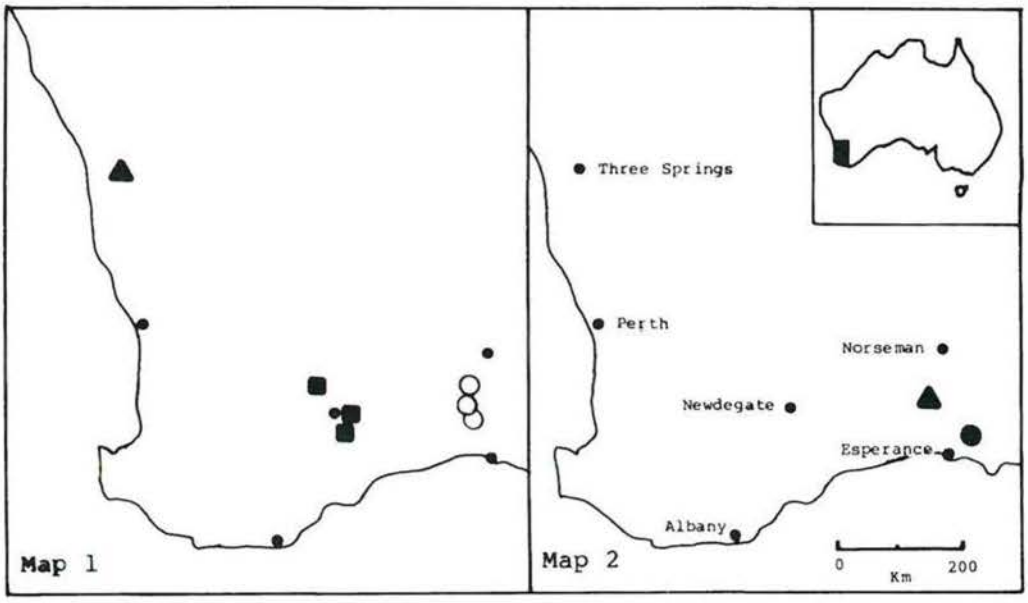
Figure 5. *Myoporum turbinatum*. A — Habit. B — Enlargement of branch. C — Leaf apex showing teeth. D and E — Side and front view of flower. F — Ovary and lower part of style. G and H — Side view and cross-section of fruit.
A — H based on Holotype.

Specimens examined. WESTERN AUSTRALIA: *R.J. Chinnock* 5547, 7.xi.1981 (AD, CANB, PERTH); *R.J. Chinnock* 5449, 7.xi.1981 (AD, B, BRI, K, MEL, W).

Distribution and habitat. Myoporum turbinatum is known only from road verges in a small area north-east of Esperance, in the eastern Roe Botanical District (Map 2) where it occurs on sandy pedal duplex soils on the margins of saline depressions in mallee/heath scrub. Areas adjacent to the known populations are under cultivation. The conservation status of this species is 2E according to Leigh, Briggs & Hartley (1981).

Affinities. Myoporum turbinatum belongs to section *Disoon* (DC.) Benth. and would appear to be closely related to *M. platycarpum* R.Br., sharing with this species a similar fruit although not flattened in the lower half. In addition, the dentitions of the leaf of both species are comparable and sometimes one corolla lobe of *M. platycarpum* is pouched.

Etymology. The specific epithet is taken from the fruit shape.



Map 1. Distribution of *Eremophila compressa* (circle), *E. nivea* (triangle) and *E. verticillata* (square).

Map 2. Distribution of *Eremophila lactea* (triangle) and *Myoporum turbinatum* (solid circle).

Acknowledgements

I thank Mr G. Bell who has ably assisted me on field trips and in the preparation of descriptions; Mr L. Dutkiewicz and Mr G.R.M. Dashorst for preparing the illustrations; Dr J. Green, Western Australian Herbarium and Dr S. Hopper, Department of Fisheries and Wildlife for arranging transport and accompanying me to many locations of these rare species. This work was partly funded by the Australian Biological Resources Study.

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Bentleya, a new genus of Pittosporaceae from southern Western Australia

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Abstract

Bennett, E.M. *Bentleya,* a new genus of Pittosporaceae from southern Western Australia. Nuytsia 5 (3): 401-406 (1986). A new genus and species in the family Pittosporaceae, *Bentleya spinescens* E.M. Bennett, is described and illustrated from Newdegate, Western Australia. A key to the genera of Pittosporaceae is provided.

Introduction

The plant described here was originally collected in September 1982 when the author was accompanying final year horticultural students from the Bentley Technical College, Perth. It proved difficult to identify with known families: it certainly represents a distinct new genus.

The genus is considered to belong to the family Pittosporaceae because it has the following characters: leaves alternate, often appearing clustered; flowers regular, 5-merous, sepals free, petals weakly united at the base to form a more or less definite corolla tube; stamens 5, alternating with the petals, anthers tetrasporangiate, opening by longitudinal slits; gynoecium of 2-3 carpels, united to form a compound ovary with simple style and capitate or slightly lobed stigma; numerous ovules in each carpel; fruit a loculicidal capsule. However the plant does show several differences from genera presently included in this family: a well developed fleshy gland at the base of the ovary; petals which remain fused in the middle of their length post-anthesis, (in other genera of the Pittosporaceae the petals remain fused until anthesis and then separate); free lobes of petals never spreading but always remaining imbricate and erect. The Pittosporaceae typically have 2 bracts, but this species has two whorls totalling about 10-12 bracts.

The new genus also has many characters in common with the family Rutaceae, including alternate leaves; flowers regular, 5-merous (although some of the Rutaceae have 4-merous flowers); anthers tetrasporangiate; nectary-disc intrastaminal, annular. However the new genus differs in that it lacks the major character of the Rutaceae, the presence of oil glands. Sectioned leaves showed schizogenous secretory glands which are also found in the Pittosporaceae, but no oil glands (H.T. Clifford, pers. comm.). Also in the Rutaceae the stamens are rarely a single antepetalous whorl, but often up to 3-4 times as many as the petals and the ovary is 4-5-celled, with usually 2, rarely several ovules.

There is a possibility that it may represent a new family, but for the purpose of describing the plant it is placed in the family Pittosporaceae.

Descriptions

Bentleya E.M. Bennett, gen. nov.

Frutices humiles, rhizomatibus subterraneis effusis, valde ramosi; rami spinis terminati. Folia exstipulata, alterna vel fasciculata, linearia, sessilia vel breviter petiolata; stomata

paracytica; margines integri, revoluti; foliorum fasciculi gemmarum squamis nonnullis deltoideis suffulti. Flores solitarii, perfecti, pedicellati, e basibus truncorum vel paulo supra oriundi, pedicelli basin verticillis 2 bractearum suffulti. Sepala 5, imbricata, libera, pubescentia. Petala 5, imbricata, in tertia parte mediana cohaerentia, basi leviter connata, corollae tubum ± distinctum formantia, utrinque sparse pilosa. Stamina 5, cum petalis alternantia, quam ea paulo breviora; filamenta linearia; antherae versatiles, sagittatae ad ovatae, tetrasporangiatae et ditheeae, longitudinaliter dehiscentes. Discus intrastaminalis ad ovarii basin prominens, 5-lobus, annularis, viridis, crassus. Ovarium superum, integrum, 2-3-loculare, ovulis numerosis; placentatio axilis; styli petala excedentes, simplices; stigma capitatum vel bilobum. Fructus capsula 2-(3)-locularis, ad ½-⅔ longitudinis septicida et usque ad dimidiam longitudinem loculicida. Semina lateraliter compressa, reniformia; embryo minutus, ad basin endospermii carnosi bene evoluti.

Typus: B. spinescens E.M. Bennett

Low growing shrubs with spreading underground rhizomes, from which above ground stems arise. *Stems* much branched, at first pubescent, becoming glabrous, terminating in spines. *Leaves* exstipulate, alternate or clustered, linear, sessile or shortly petiolate, subtended by a few deltoid bud scales; margins entire, revolute; stomates paracytic. *Flowers* solitary, perfect, pedicellate, occurring on stems at or just above ground level, occasionally along branches; subtended by two whorls of bracts at base of pedicel. *Sepals* 5, imbricate, free, pubescent. *Petals* 5, imbricate, coherent in middle third, at first weakly united at base to form a more or less definite corolla tube, both surfaces with scattered hairs. *Stamens* 5, alternate with and slightly shorter than petals; filaments linear; anthers versatile, sagittate to ovate, tetrasporangiate and ditheeal, longitudinally dehiscent. *Intrastaminal disc* prominent at base of ovary, five-lobed, annular, green, fleshy, thick. *Ovary* superior, entire, 2- or 3-celled; ovules numerous; placentation axile; style exceeding the petals, simple; stigma capitate or 2-lobed. *Fruit* a 2-(3)-celled capsule, splitting septicidally for half to three quarters of its length and loculicidally for up to half of its length. *Seeds* laterally compressed, reniform; embryo tiny, at base of well-developed, fleshy endosperm.

Relationships. There are two genera, *Billardiera* and *Citriobatus*, which share several characters with *Bentleya*. *Billardiera* and *Bentleya* both have the petals united in the young flower but separating with age, versatile anthers, filaments free from the petals, typically 2 cells in the ovary and capsular fruits (sometimes a berry in *Billardiera*). *Bentleya* differs from *Billardiera* most conspicuously in possessing a disc. *Citriobatus* and *Bentleya* both have an intrastaminal disc although it is less well developed in *Citriobatus*, solitary flowers and petals coherent in the lower part to form a tube. *Bentleya* differs from *Citriobatus* in having 2 or sometimes 3 cells in the ovary rather than 1, a dehiscent fruit, not indehiscent, seeds not immersed in sticky pulp, anthers versatile instead of basifixed, and filaments free from rather than adnate to the petals. The spinescence character of *Bentleya* is also to be seen in other genera including *Billardiera* and *Citriobatus*. Suckering from underground rhizomes, found in *Bentleya*, is unusual in the Pittosporaceae but is known to occur also in *Pittosporum phylliraeoides*.

Etymology. It is to commemorate the students of Bentley Technical College, particularly those in their final year in 1982, one of whom located this new genus, that the generic name of *Bentleya* has been given.

Bentleya spinescens E.M. Bennett, sp. nov. (Figures 1 and 2)

Frutex 5-20 cm altus, 2-20 cm diametro. Folia usque ad 7-na fasciculata, 2-6 x c. 0.5 mm, supra glabra vel disperse albo-pilosa, subtus pubescentia; squamae deltoideae 1-1.5 mm longae. Bracteae exteriores 5-6, 0.5-1 mm longae cum aliis 0.25-0.5 x 0.3 mm, pallide

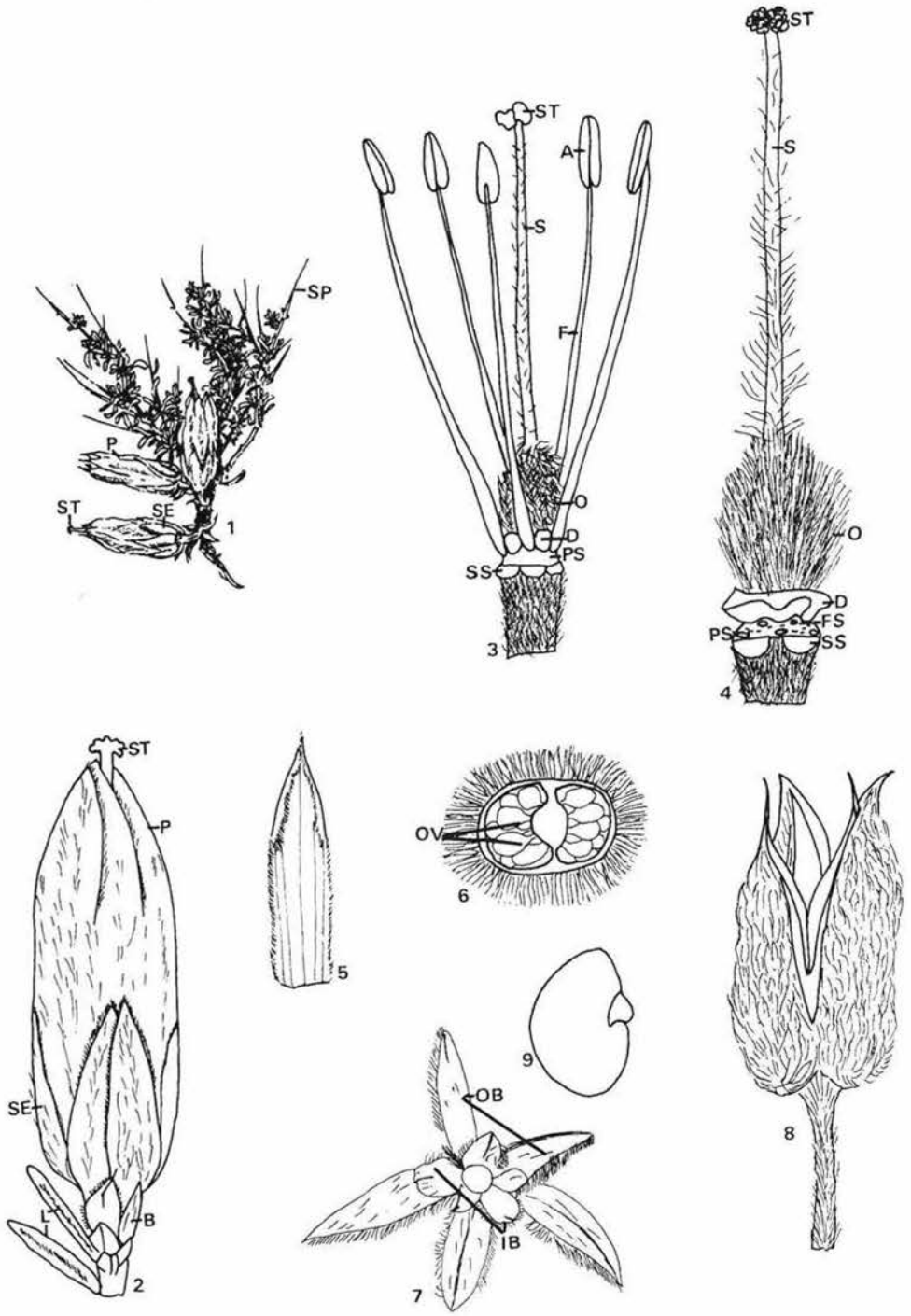

Figure 1. *Bentleya spinescens* E.M. Bennett. 1-Habitat x0. 2-Flower x0. 3-Flower with petals removed x0. 4-Flower with petals and stamens removed x0. 5-Petal x0. 6-Ovary x0. 7-Bracteoles x0. 8-Capsule x0. 9-Seed x0. A-anthers. B-bracteoles. D-fleshy disc. F-filament. FS-filament scar. IB-inner bracteoles. L-leaf. O-ovary. OB-outer bracteoles. OV-ovules. P-petals. PS-petal scar. S-style. SE-sepal. Sp-spinescent branch. SS-sepal scar. ST-stigma. 1-from *E.M. Bennett* 81083, illustrated by S. Bird. 2-7 from plants collected at the type locality. 8-9 from *E.M. Bennett* 291282. 2-9-illustrated by E.M. Bennett.

brunneis, densissime longe pilosis, margine ciliatis, alternantes; bracteae interiores 5, pallide brunneae, secus costam medianam saepe purpurascentes, margine dense ciliatis, 1-3.5 mm longis. Sepala 6-7 x 1.5-2 mm, virescenti-alba, parce albo-pilosa. Petala 1.2-2 cm longa, albido-viridia ad cremea; antherae 2-3 mm longae, pallide malvaceae; pollen pallide malvaceus. Ovarium 1.5-2.5 mm longum. Stylus 1-1.9 mm longus, pallide roseus, per maximan partem longitudinis parce pilosus; stigma purpureo-rubrum, bilobum, in flore maturo prominenter exsertum. Fructus 10-14 x 5-8 mm, brunneus, albo-velutinus. Semina 1.75-2.25 x 1.5-2 mm, rubescenti-brunneus, rugosus.

Typus: 0.5 km west of the Newdegate township (lat. 33° 06′S; long. 119° 01′E), Western Australia, *E.M. Bennett* 81083 (holo: PERTH; iso: B, CANB, K, MEL, MO, NSW.)

Shrub 5-20 cm tall, 2-20 cm across. *Stems* much branched, lower and older part of stem with grey, fissured bark, younger branches reddish-brown, with scattered white hairs, becoming glabrous with age, ending in spines; spiny branches often arising from prominent protuberances. *Leaves* in fascicles of up to 7, linear to narrowly obovate, 2-6 x c. 0.5 mm, minutely mucronate, glabrous or with scattered white hairs on upper surface, pubescent on lower surface, midrib prominent on lower surface, bearing several white hairs; margins revolute; *leaf clusters* subtended by deciduous, deltoid scales c. 1-1.5 mm long. *Flowers* mainly on stems at or just above ground level, occasionally a few along the stems; each flower subtended by two whorls of bracts; *outer bracts* 5-6, of two sizes, some 0.5 x 1 mm, alternating with others 0.25-0.5 x 0.3 mm, pale brown, very densely hairy with long hairs, ciliate on margins; *inner bracts* 5, pale brown, 2-3.5 x 1-1.5 mm, often purplish along midrib, abaxial surface with scattered hairs; margins densely ciliate; pedicel 3 mm long, densely hairy. *Sepals* 6-7 x 1.5-2 mm, greenish-white, scattered white hairy on surface, hairs shorter and denser on margin. *Petals* 1.2-2 cm long, coherent when young for $^2/_3$ of their length, becoming free at base with age but remaining joined in middle for 2-3 mm, lobes imbricate, whitish-green to cream, 3-nerved, outer surface with scattered white hairs, inner surface with white hairs scattered along veins, more abundant in upper third, margins incurved, distinctly ciliate along margins of lobes and inner surface of tube; apex acute. *Filaments* 0.9-1.5 mm long, white; *anthers* 2-3 mm long, pale mauve; pollen pale mauve. *Ovary* 1.5-2.5 mm long, velutinous; style 1-1.9 mm long, pale pink, hairy except for upper 2 mm; stigma purple-red, papillate, prominently exserted in the mature flower. *Capsule* brown, velutinous with white hairs, 10-14 x 5-8 mm. *Seeds* 1.75-2.25 x 1.5-2 mm, reddish-brown, rugose.

Distribution. The type locality is the only one so far from which the plant has been recorded. Although several other locations of similar soil and species complement were searched, cursorily, no further plants were seen. At the type locality there were many plants present but, due to the suckering habit, the number of actual genotypes may be small as several plants are probably from one original parent.

Habitat. Bentleya spinescens grows in sandy clay soil associated with *Eucalyptus occidentalis, E. flocktoniae, Santalum acuminatum, Melaleuca violacea, M. uncinata, Oxylobium parviflorum, Olearia revoluta, Daviesia* affin. *aphylla, Grevillea pauciflora, G. pritzelii, Lasiopetalum rosmarinifolium* and *Westringia rigida.*

Flowering time. September — October.

Fruiting time. December — January.

Etymology. The specific epithet refers to the spinescent habit of the plant, all the short branchlets ending in distinct spines.

Figure 2. Habit of *Bentleya spinescens*.

Key to the genera of Pittosporaceae

Below is provided a key to the world's genera of Pittosporaceae which incorporates *Bentleya*.

1. Anthers linear, equal in length to the filaments.
   2. Flowers irregular, anthers turned to one side ..... *Cheiranthera*
   2. Flowers regular.
      3. Anthers free becoming prominently recurved with age ..... *Pronaya*
      3. Anthers cohering by apical tips, not becoming recurved with age ..... *Sollya*
1. Anthers ovate, much shorter than the filaments.
      4. Filaments adnate to petals; fruit globular, not dehiscent ..... *Citriobatus*
      4. Filaments free from petals; fruit a berry or dehiscent capsule.
         5. Seeds winged; petals up to 44 mm long ..... *Hymenosporum*
         5. Seeds not winged; petals less than 25 mm long.
            6. Ovary and capsule distinctly stipitate; seeds flat ..... *Bursaria*
            6. Ovary sessile or shortly stipitate; seeds irregularly shaped, compressed, but not flat.
               7. Shrubs or trees; fruit a coriaceous or woody capsule ..... *Pittosporum*
               7. Climbers or small shrubs; fruit a membranous or slightly coriaceous capsule, or a berry.
                  8. Prominent intrastaminal disc present ..... *Bentleya*
                  8. No intrastaminal disc present ..... *Billardiera*

Acknowledgements

Thanks must be given to Mr P.G. Wilson and Dr H.T. Clifford for the assistance given in assigning the plant to a family. Dr N. Marchant and Dr T. Macfarlane assisted with checking and criticising the manuscript, and Ms S. Bird with the illustrations. Prof. K.H. Rechinger prepared the Latin descriptions.

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Two new species of *Wurmbea* (Colchicaceae or Liliaceae s. lat.) from south western Australia

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Abstract

Macfarlane, T.D. Two new species of *Wurmbea* (Colchicaceae or Liliaceae s. lat.) from south western Australia. Nuytsia 5(3): 407-413 (1986). *Wurmbea graniticola* T.D. Macfarlane and *W. murchisoniana* T.D. Macfarlane are described, illustrated and mapped.

Introduction

At the time of my revision of the Australian species of *Wurmbea* (Macfarlane 1980), available collections of the two species described here were inadequate for judging their taxonomic status. Thus they were cited at the end of my paper under "Unplaced specimens". As a result of my subsequent collections, and those of others, sufficient data have now accumulated to confirm both taxa as species. In the following formal descriptions, the format of my revision is used except for minor changes to wording. No new key or key supplement is provided here because a new taxonomic treatment of *Wurmbea* in Australia is in preparation for a forthcoming volume of the "Flora of Australia".

Species descriptions

Wurmbea graniticola T.D. Macfarlane, sp. nov. (Figure 1)

Folia plerumque bene separata. Scapi floribus 1-3 hermaphroditis vel interdum masculis. Perianthium pallide lilacinum nectariis albis vel cremeis vel pallide ad saturate roseis; segmenta brevius quam ad decimam partem longitudinis connata; nectaria plerumque ad $^2/_3$ a basi sita; nectaria per perianthii segmenta singula, fasciam transversalem margine proximali curvatam formantia. Stamina quam nectarium plerumque breviora.

Typus: Mt Cramphorne, 31° 49'S, 118° 43'E, SE of Muntadgin, Western Australia, 21 July 1984, *T.D. Macfarlane* 1360 (holo: PERTH; iso: CANB, K, MEL, NSW).

Plants 1.5-11 cm tall to top of inflorescence, usually less than 6 cm. *Corm* 4.5-9 cm below ground, c. 1 cm long. *Leaves* 3, blades usually well separated, occasionally close, especially of the lower 2; lowest leaf basal, usually not dilated at base, tapering, often sinuous, 0.4-2.6 mm wide at base, channelled on upper surface; middle leaf dilated at base, otherwise long and tapering; uppermost leaf dilated, often with a shorter to longer, narrow, tapering apical portion. *Flowers* 1-3 per plant, forming an open spike when more than 1, hermaphrodite or occasionally the uppermost flower, or the flower when solitary, male with a vestigial ovary. *Perianth* white or pale pinkish lilac with white, cream or faint to dark pink nectary, or perianth pale pinkish lilac with nectary similar or white to cream; segments 6, occasionally 7 in uppermost flowers, connate at base for less than $^1/_{10}$ of their length, linear and spreading below nectary, broadening and upcurved at about the nectary, 6.5-10.5 mm long, acute to obtuse at apex; *nectary* 1 per perianth-segment, usually situated

c. 2/3 from base of segment, occasionally 1/3-1/2 from base, consisting of a more or less inconspicuous somewhat raised band or ridge spanning the adaxial face of the segment, continuous or occasionally with a break at the midline of the segment, the proximal margin of the band or ridge clearly defined, upwardly convex, the distal margin usually indistinct, more or less straight. *Stamens* c. 1/2 as long as perianth, usually not reaching nectaries but occasionally exceeding them; anthers obloid, c. 1 mm long, red, versatile, dorsifixed slightly below the middle. *Ovary* angular, sharply delimited from the 3 free styles. Mature *capsules* and *seeds* not seen.

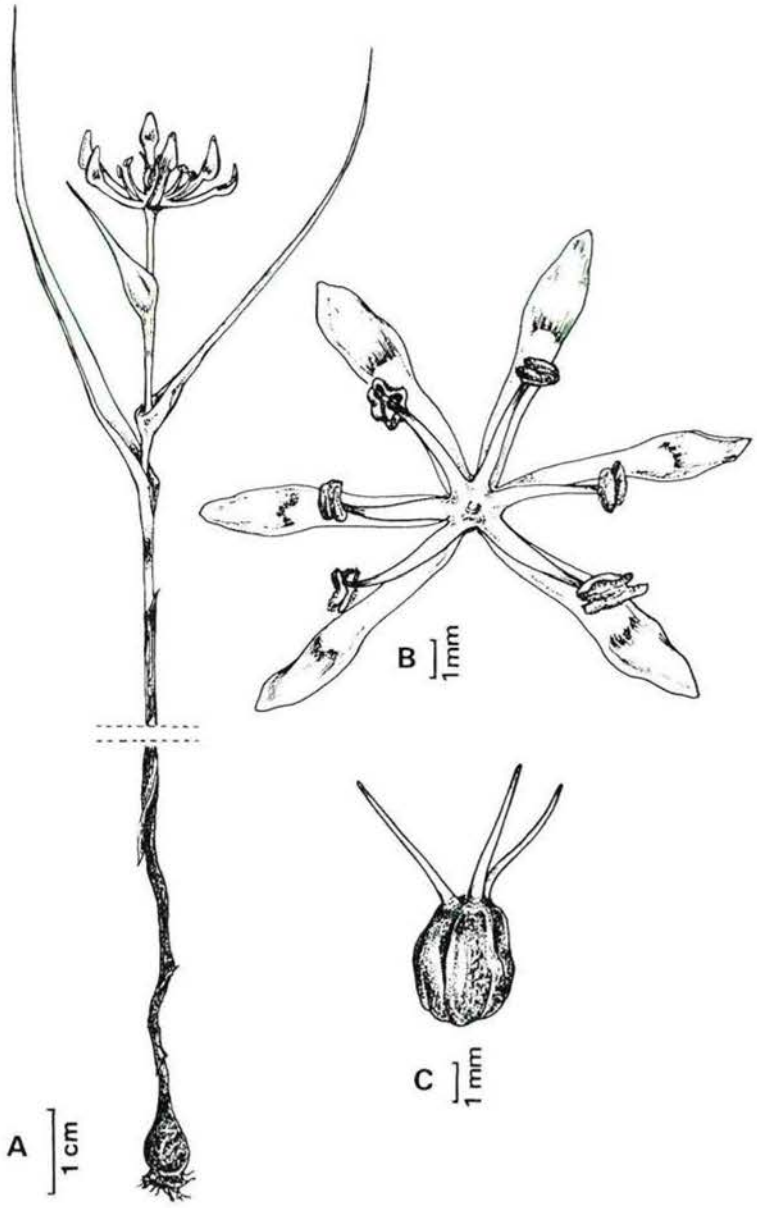

Figure 1. *Wurmbea graniticola*. A — Habit. B — Flower from above with gynoecium removed: nectaries depicted by shading just distal to anthers. C — Gynoecium.
Drawn by S. Bird from *T.D. Macfarlane* 1378.

Other specimens examined. WESTERN AUSTRALIA: Strawberry Rocks, 31° 27'S, 119° 17'E, 26 km S of Southern Cross on Southern Cross South Road, 5 Sept. 1984, *A. Brown* s.n. (PERTH); 9 miles [14.5 km] E of Boorabbin, Great Eastern Highway, 18 Sept. 1966, *A.S. George* 8066 (PERTH); Wattengutten Hill, 30° 58'S, 116° 59'E, ESE of Wongan Hills, 6 Sept. 1980, *A.S. George* 16192 (PERTH); 18 km E of Boorabbin along Great Eastern Highway, big outcrop 500 m S of road, 15 Aug. 1984, *S.D. Hopper* 3974 (CANB, PERTH); Boorabbin Rock, 31° 12'S, 120° 17'E, 15 Aug. 1984, *S.D. Hopper* 3981 (AD, BRI, CANB, K, MEL, NSW, PERTH); 9.5 km E along Muntadgin Road from Merredin-Narembeen road, 31° 43'S, 118° 30'E, SE of Merredin, 30 July 1982, *T.D. Macfarlane* 871 (PERTH); Mt Caroline, 31° 48'S, 117° 38'E, ca 20 km SSE of Kellerberrin, 20 July 1984, *T.D. Macfarlane* 1388 (PERTH); The Humps, 32° 19'S, 118° 57'E, near Hyden, 21 July 1984, *T.D. Macfarlane* 1367 (AD, BRI, PERTH); Wave Rock, 32° 27'S, 118° 54'E, near Hyden, 21 July 1984, *T.D. Macfarlane* 1368 (PERTH); Bushfire Rock, 32° 27'S, 119° 21'E, E of Hyden, 22 July 1984, *T.D. Macfarlane* 1374 (CBG, PERTH); Lily McCarthy Rock, 32° 41'S, 119° 21'E, SE of Hyden, 22 July 1984, *T.D. Macfarlane* 1378 (PERTH); 4.5 km SSE of Boorabbin (Boorabbin National Park), 27 Aug. 1981, *K. Newbey* 8688 (PERTH); Emu Rock, ca 51 km E of Hyden, 8 Oct. 1981, *K. Newbey* 9231 (PERTH); Hyden Rock, 13 Sept. 1983, *R. Ornduff* 9307-30 (PERTH); The Humps, near Hyden, 13 Sept. 1983, *R. Ornduff* 9309-13 (PERTH); Mt Cramphorne, E. of Muntadgin, 28 July 1963, *R.D. Royce* 7855 (PERTH).

Distribution. (Figure 3). *Wurmbea graniticola* occurs in Western Australia, at scattered localities in the central and eastern wheatbelt and slightly further east, from Wattengutten Hill eastward to Boorabbin and southward to Lily McCarthy Rock near Holt Rock. Although found on most rocks of high relief that were examined in its area of distribution, *W. graniticola* was not seen at Holt Rock or Mt Walker.

Habitat. Wurmbea graniticola grows in herbfields in shallow winter-wet patches of brown clay containing coarse granitic particles on and at the margins of high granite outcrops. It is absent from very low or ground-level rock exposures. *Wurmbea tenella* often occurs on the same rocks and flowers at the same time as does *W. graniticola,* but grows in separate, often closely adjacent and apparently deeper soil patches.

Flowering period. The species flowers mainly in July-September.

Discussion. In its most usual variant, *Wurmbea graniticola* is characterised by its scape having 1-3 flowers which are usually hermaphrodite but occasionally male, with nectaries positioned about $^2/_3$ from the base of the perianth segments, by the morphology of its nectaries, by its stamens not reaching the level of the nectaries, and by the shape of the flower and its coloration even though variable. This typical variant occurs at the majority of known localities including the type locality. At each of these localities, the individuals are relatively uniform although there can be variation in flower size and in coloration, especially of the nectaries (i.e. pale to dark pink) but flower colour varies much more between localities.

The populations at Mt Caroline and Strawberry Rocks and on some, but not all rocks in the vicinity of Boorabbin differ from the most common variant in having the nectaries lower on the segments (about $^1/_3$-$^1/_2$ from the base) and apparently more or less raised (for the full width or only at the sides), sometimes with a break at the middle, and in having the stamens equalling or exceeding the nectaries. Despite these differences the flower colour, shape and sex condition of these variants and their habitat and distribution all agree with those of the typical variant of the species. Extensive variation is in any case not surprising in a species that occurs as numerous isolated populations. The atypical variants are therefore here included in *W. graniticola.*

Wurmbea graniticola bears some resemblance to *W. dioica* (R.Br.) F. Muell. subsp. *alba* T.D. Macfarlane in being small pale-flowered plants with sometimes pale, continuous, transverse nectaries. This is especially evident in the variants mentioned above. Indeed I cited *A.S. George* 8066 under *W. dioica* subsp. *alba* in my 1980 account. However, *W. dioica* subsp. *alba* has pure white flowers (except for occasional plants in some populations which have pink nectaries) with nectaries located above 1/3 from the base of the perianth segments, which consist of a transverse band with well-defined distal as well as proximal margins, and a high proportion of male plants or plants with upper flowers male in its populations, and it occurs west of the range of *W. graniticola*. The more inland populations of *W. dioica* subsp. *alba*, being dioecious, with diminutive plants and exhibiting sexual dimorphy, are less like those of *W. graniticola* than the coastal plants are.

Etymology. The specific epithet refers to the occurrence of the species on granite outcrops.

Wurmbea murchisoniana T.D. Macfarlane, sp. nov. (Figure 2)

Folia bene separata. Scapi 1-7-flori, flores omnes hermaphroditi. Perianthium album nectariis albis; segmenta brevius quam ad decimam partem longitudinis connata; nectaria per perianthii segmentum bina, ad 1/3 basi sita, distincta, marginalia, prominentia, incrassata. Styli liberi vel ad quartam partem longitudinis connata.

Typus: 100-150 metres S of Murchison River Bridge on North West Coastal Highway, 27° 50'S, 114° 42' E, Western Australia, 28 July 1982, *T.D. Macfarlane* 864 (holo: PERTH; iso: CANB).

Plants 10-26 cm tall to top of inflorescence. *Corm* not seen. *Leaves* 3, blades well separated; lowest leaf basal, slightly to markedly dilated at base, remainder long, narrow, tapering, 1-3.5 mm wide, channelled on upper surface; middle leaf dilated at base, remainder long, narrow, tapering; uppermost leaf dilated in basal portion, apical portion longer, narrow, tapering. *Flowers* 1-7 per scape, in an open spike when more than 1, all hermaphrodite. *Perianth* white with white nectaries; segments 6, narrow below nectaries, elliptical, ovate or broadly ovate above them, 7.5-11 mm long, connate at base for less than 1/10 of their length, acute or obtuse at apex; *nectaries* 2 per perianth segment, situated about 1/3 from base of segment, consisting of 2 well defined, marginal, ledge-like thickenings (sometimes appearing pouch-like when dried), not clasping the filament. *Stamens* c. 1/2 as long as perianth; filaments adnate to base of perianth segments, not swollen basally; anthers ellipsoidal, 0.8-1.5 mm long, versatile, dorsifixed at the middle, dark red. *Ovary* angular. *Styles* clearly delimited from the ovary, connate for up to 1/4 of their length or free. Mature *capsules* and *seeds* not seen.

Other specimens examined. WESTERN AUSTRALIA: Murchison River Bridge, 14 Aug. 1983, *A.C. Burns* 28 (PERTH); Murchison River [near bridge on North West Coastal Highway, *H. Demarz*, pers. comm.], 19 Aug. 1978, *H. Demarz* 6857 (PERTH); south side of Murchison River Bridge, North West Coastal Highway, *A.S. George* 11675, 18 July 1973 (PERTH).

Distribution. (Figure 3). This species is known only from the type locality close to the Murchison River.

Habitat. The type collection is from a highly restricted, dense population then growing in temporarily very wet red clay in a 15 metre long depression in otherwise flat terrain, which may be an old river terrace now above the river's flood level. Growing with the *Wurmbea* plants were perennial clump grasses, annual grasses and *Marsilea* sp. The surrounding vegetation was *Acacia* shrubland. Several other depressions containing

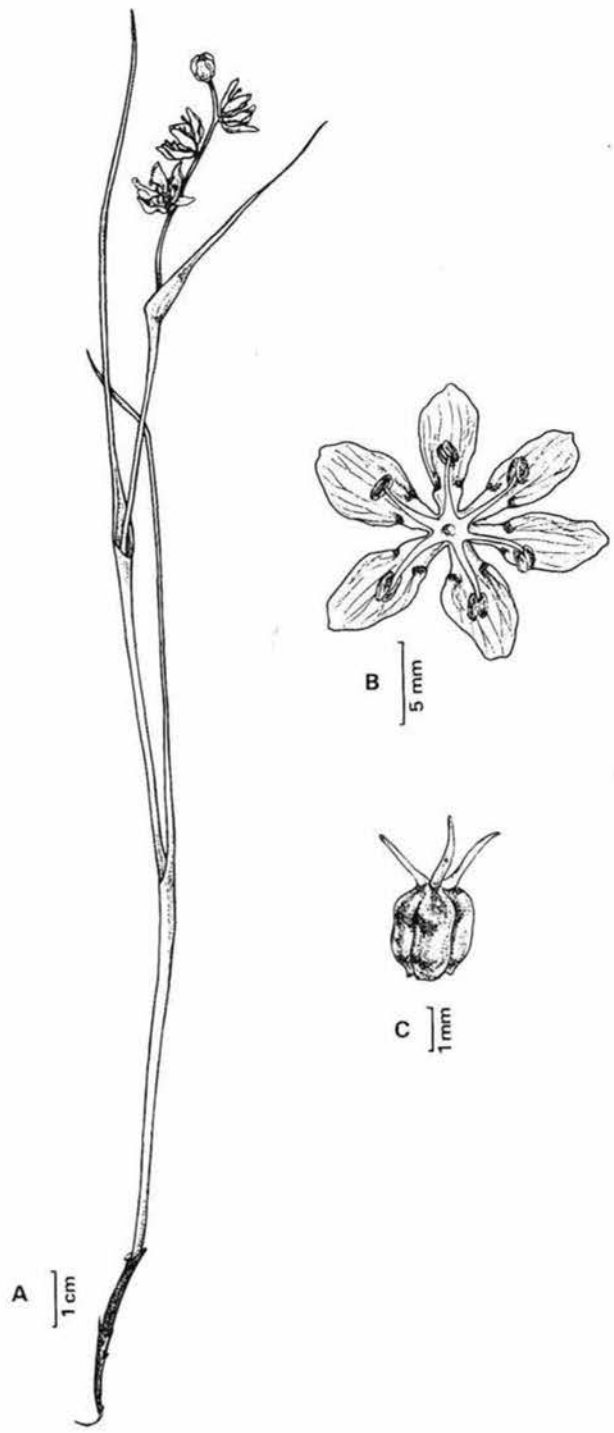

Figure 2. *Wurmbea murchisoniana*. A — Habit. B — Flower from above with gynoecium removed: nectaries depicted by stippling in lower part of each segment. C — Gynoecium.
A from *A.C. Burns* 28. B and C from *T.D. Macfarlane* 864, spirit material. Drawn by S. Bird.

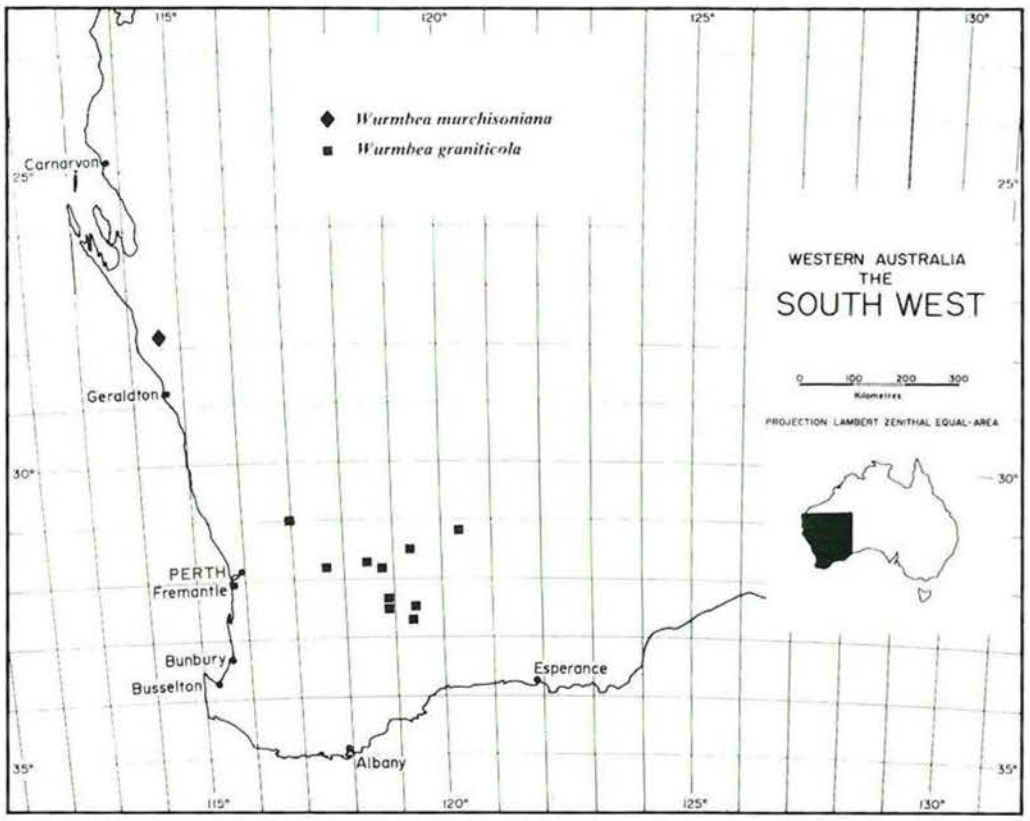

Figure 3. Distribution of *Wurmbea graniticola* and *W. murchisoniana*.

Wurmbea plants were seen in the vicinity. The labels of the other collections all mention wet or swampy conditions.

Discussion. Besides *Wurmbea murchisoniana*, several other species of *Wurmbea* have two nectaries per perianth segment and of these, the type variant of *W. centralis* T.D. Macfarlane seems to bear the greatest resemblance to *W. murchisoniana*. *Wurmbea centralis*, which grows in rocky habitats in South Australia and at The Olgas in the Northern Territory, has pink flowers with pink nectaries which clasp the filaments. *Wurmbea sinora* T.D. Macfarlane from the south coast of Western Australia has a flower colour similar to that of *W. murchisoniana* but its perianth segments and nectaries are differently shaped, its plants are much smaller, and they grow in different habitats. Such features also differentiate *W. murchisoniana* from the eastern Australian species *W. biglandulosa* (R.Br.) T.D. Macfarlane and *W. uniflora* (R.Br.) T.D. Macfarlane. From the Geraldton area southward, *W. dioica* (R.Br.) F. Muell. subsp. *alba* T.D. Macfarlane occupies shallow, seasonal, standing fresh-water pools like those in which *W. murchisoniana* grows further north at the Murchison River. *W. dioica* subsp. *alba* also grows in shallow soil on or near rock outcrops. This taxon has white flowers with white nectaries but the nectaries are usually present only as continuous transverse, thickened bands, although sometimes there is greater thickening towards the margins of the perianth segment, and occasionally also a slight unthickened, non-nectariferous area in the middle. There are, however, never two distinct nectaries with such a broad gap between them and with such well-defined proximal and inner margins as occur in *W. murchisoniana*. In addition, populations composed of completely hermaphrodite-flowered plants, as occur in *W. murchisoniana*, are not known in *W. dioica* subsp. *alba*.

The specimen *A.S. George* 11675, cited here under *W. murchisoniana,* was previously (Macfarlane 1980) considered to be conspecific with the specimen *A.S. George* 9538, collected at Deep Well, Bungabandi Creek, about 36 km NNW of the provenance of the former. I now consider *A.S. George* 9538 to be from a variant of *W. dilatata* T.D. Macfarlane, which shares with the typical variant its flower shape, extensive perianth fusion and enlarged filament bases. These characters, especially the latter two, differentiate it from *W. murchisoniana.* The Deep Well variant differs from typical *W. dilatata,* which has been collected 47 km away at Lake Culcurdoo, in having two distinct collateral nectaries per segment instead of one as a continuous band across the tepal.

Conservation status. Until further occurrences are discovered, possibly in similar seasonally wet places in river valleys in this area of Western Australia, this species must be classed as rare. Furthermore, in view of its position close to a bridge on a main road, it is vulnerable to development and road maintenance activities.

Etymology. The specific epithet refers to the occurrence of the species near the Murchison River.

Acknowledgements

I thank Dr J.W. Green and Mr P.G. Wilson for useful comments on the manuscript, Prof. K.H. Rechinger for Latin translations, Ms S. Bird for the drawings and Mrs C.M. Parker for preparing the map.

Reference

Macfarlane, T.D. (1980). A revision of *Wurmbea* (Liliaceae) in Australia. Brunonia 3: 145-208.

Reinstatement and revision of *Rinzia* Schauer (Myrtaceae, Leptospermeae, Baeckeinae)

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Abstract

Trudgen, Malcolm E. Reinstatement and revision of *Rinzia* Schauer (Myrtaceae, Leptospermeae, Baeckeinae). Nuytsia 5(3): 415-439 (1986). *Rinzia* Schauer is reinstated and a revision of the genus is presented. Twelve species are recognised for the genus which is endemic to south-western Western Australia. *Rinzia morrisonii* Trudgen, *R. rubra* Trudgen, *R. affinis* Trudgen, *R. communis* Trudgen and *R. sessilis* Trudgen are new species while *R. schollerifolia* (Lehm.) Trudgen, *R. carnosa* (S. Moore) Trudgen and *R. dimorphandra* (F.Muell. ex Benth.) Trudgen are new combinations. *Rinzia's* closest relatives are considered to be *Baeckea L.* section *Euryomyrtus* and *Hypocalymma* Endl. *Rinzia*, section *Euryomyrtus* of *Baeckea*, *Hypocalymma* and a small number of related south-western and eastern Australian species are considered to form a natural group, all of whose species have reniform seeds which in some species (especially in *Rinzia*) have an aril. This appears to be the first record of an aril for a seed in Myrtaceae. Seeds of ten species and the flower of one species are illustrated.

Introduction

The Baeckeinae is a heterogeneous assemblage of species within the Myrtaceae; the species in it are held together as a group by the following characters: seed coats crustaceous, embryos consisting of a large radicle with small cotyledons on a slender neck, and leaves opposite. Within the group there is considerable variation in many characters including seed shape, the presence or absence of a growth (aril) attached to the testa, the shape of the cells in the testa, the degree of and mode of dehiscence of the fruit (i.e. the role of the different tissues in dehiscence of the fruit), the number and arrangement of the stamens, the morphology of the anthers and their mode of dehiscence and their attachment to the filaments, the shape and degree of fusion of the filaments, the shape and position of the connective gland, placentation, and life form which ranges from small trees to plants with prostrate stems bearing short erect shoots. It is not intended in this paper to discuss all this variation, rather to state that, within the group as a whole, three major subdivisions can be recognised and that *Rinzia* belongs in one of these, the species of which have reniform seeds (with or without an aril), anthers opening in slits and external filament glands.

Reinstatement of *Rinzia* Schauer

Rinzia was described by Schauer (1843) with the name honouring *"Sebastianus* et *Jacobus Rinz,* pater et filius, hortulani Francofurtenses, viri de plantarum exoticarum cultu in Germania eximie meriti." (Schauer 1843) and was based on one species: *Rinzia fumana* Schauer. He did not cite a type for *R. fumana* at the time, but the following year (Schauer 1844) provided an expanded description of the species and cited a specimen.

Bentham (1867) reduced the genus to a section of *Baeckea* L., a reasonable course of action at the time, as he was dealing with a smaller number of species than are now known and he had broader generic concepts than are now accepted. To a significant degree his generic limits were artificial, as is shown by the fact that he included *Rinzia* and some

of its close relatives in *Baeckea* while maintaining *Hypocalymma* Endl. as a distinct genus. *Hypocalymma* with its more numerous and exserted stamens with basifixed anthers is distinct, but its reniform seeds, anthers opening in slits, and fruit morphology, show that it is more closely related to *Rinzia* than *Rinzia* is to Bentham's sections *Harmogia, Babingtonia* and *Schidiomyrtus* of *Baeckea*.

Rinzia is reinstated here as the type species, *Rinzia fumana*, has been found to belong to a group of species which can be separated from their nearest relatives on the basis of the following combination of characters:

(1) Filaments flattened rather than terete and often with an emarginate apex (especially the filaments of the antepetalous stamens).

(2) Anthers attached (but only at the mid-point) to the adaxial surface of the filament (see terminology and morphology section below, and also Figure 1 parts 2 and 3) rather than dorsifixed and versatile (as in section *Euryomyrtus* of *Baeckea* L. and some related eastern Australian species) or basifixed (as in *Hypocalymma*), but see the note under *R. carnosa* which is an exception as it has dorsifixed, versatile anthers.

(3) Stamens 10 (or 12 when the flowers are 6-merous), or when less having one or more of the antesepalous stamens missing.

(4) Flowers borne on a well developed anthopodium, but having only a rudimentary peduncle.

The first of these characters (flattened filaments) separates *Rinzia* from the other species of Baeckeinae that have reniform seeds. There are parallel developments of flattened filaments in other groups of species within the Baeckeinae but the species in these groups have different seeds, anther attachment and placentation. For example, *Baeckea drummondii* was included in section *Rinzia* by Bentham (1867), but while its stamens have broad filaments, its anthers, placentation and seeds indicate that it is not closely related to *Rinzia* as the genus is defined here. It is felt that the combination of characters given above quite adequately justifies the reinstatement of *Rinzia* to generic level.

Systematic Position of *Rinzia*

Rinzia was placed by Schauer (1843) in the Baeckeae, while Bentham (1867) treated the genus as a section of *Baeckea* L. which he placed with *Hypocalymma, Scholtzia, Astartea* and *Balaustion* as a subtribe "Baeckeaeae" of the tribe Leptospermeae. Niedenzu (1898) apparently recognised that the species placed in section *Rinzia* by Bentham were more closely related to *Hypocalymma* as he removed them from *Baeckea* and placed them in *Hypocalymma* (he perpetuated the error with *Baeckea drummondii* however). While this placement recognises the close relationship between the species placed in *Rinzia* and those in *Hypocalymma* it ignores the differences between them. Briggs and Johnson (1979) considered that *Baeckea* needed futher study to determine whether or not its sections (including section *Rinzia*) deserved generic rank and placed it in a *Baeckea* suballiance of their *Chamelaucium* alliance, subsequently (Johnson and Briggs 1985) they have abandoned suballiances in the *Chamelaucium* alliance.

It is outside the scope of this paper to consider the relative merits of these placements above the genus level. The more recent system of Briggs and Johnson is not used because it has only been proposed informally.

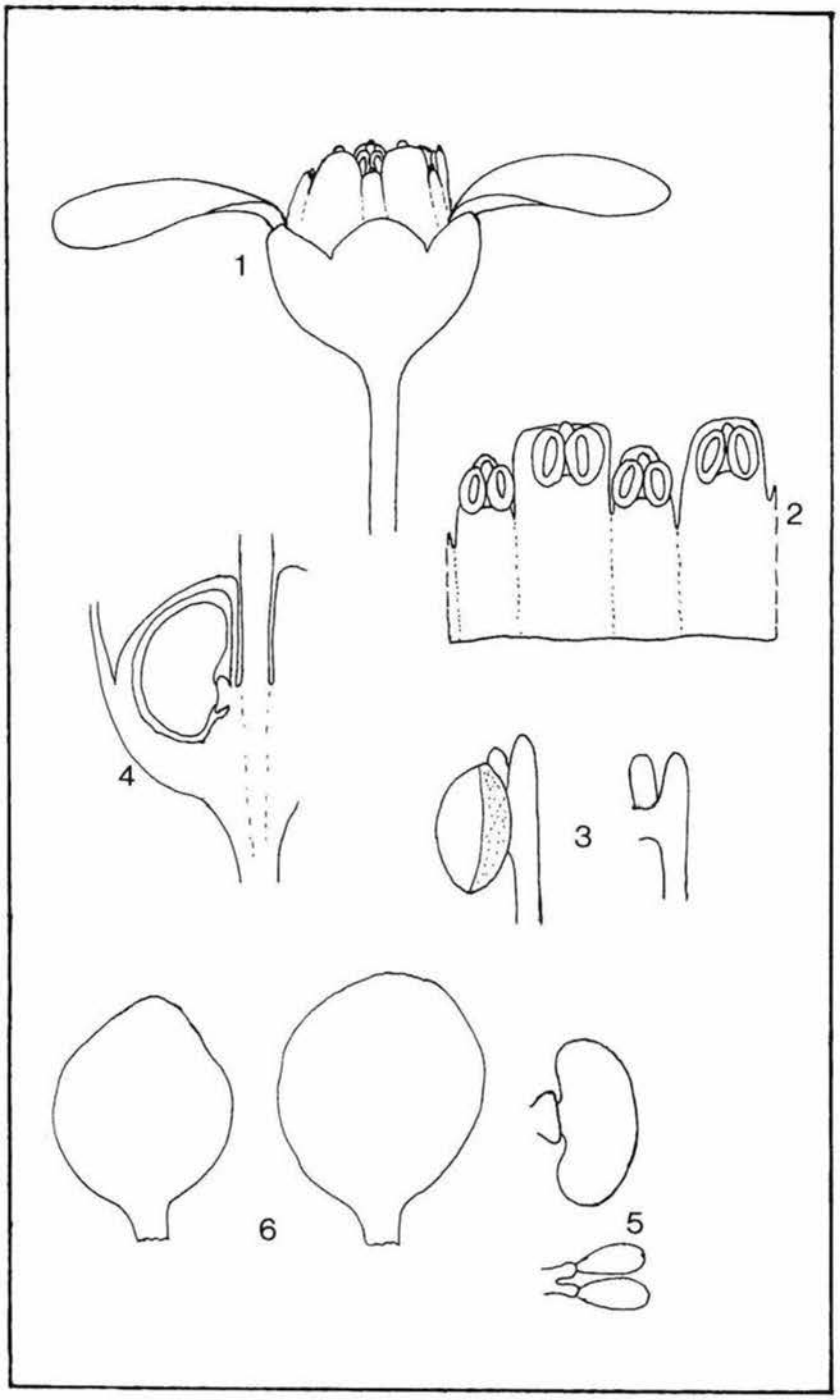


Figure 1. *Rinzia sessilis*. 1.Flower (x10, some petals removed). 2. Stamens, adaxial view (x20, flattened out). 3. Anther and tip of filament of antesepalous stamen from side and same with anther removed to show connective gland (x40). 4. Longitudinal section through the flower showing the insertion of the style into the ovary, the fusion of the ovary to the hypanthium and the placentation (x20). 5. Side view of ovule on placenta and cross section of placenta showing attachment of the two ovules (x30). 6. Two petals showing claw and irregular outlines (x10). (All from *K. Newbey* 1125).

Terminology and Morphology

Anthopodium is used as defined by Briggs and Johnson (1979), ("The internode between a flower and the most distal node of the axis that it terminates.") to describe part of the axis on which the flower is borne. In *Rinzia* the anthopodium is the longest part of this axis, the proximal part of which is here referred to as the *peduncle* and which is quite short in all members of the genus.

Aril is used to describe the outgrowth from the hilum which clasps the seed of most species of the genus. This appears to be the first time such a structure has been reported for the Myrtaceae. It is dry and quite thin in dried specimens but swells when the seeds are soaked in water, indicating that in fresh seeds it may be fleshy. No information is currently available as to what role it might play in the dispersal of the seeds. See photographs of seeds in Figure 2.

Hypanthium has been used to refer to the cup or tube around the ovary. This term has been widely used for this structure in the literature on the Myrtaceae and reflects its most probable origin which is a development of the receptacle. The term "floral tube" is rejected on the basis advanced by Briggs and Johnson (1979), i.e. that it is often confusing. Briggs and Johnson (1979) used the term "perigynium" but rejected it in a later publication (Briggs and Johnson 1985) in favour of hypanthium. Where the diameter of the hypanthium has been given it was measured at the base of the calyx lobes (this point usually has the largest diameter).

Flower size, which is quite valuable in differentiating between species, is given as the diameter of the circle that would include the petals (e.g. 5.0-8.0 mm across corolla).

Anther attachment: Except in *R. carnosa* the anthers in *Rinzia* are attached at their mid-point to the adaxial surface of the filaments (see Figure 1.1) rather than being dorsifixed and versatile (i.e. attached at the tip of the filament to the mid-point) as in section *Euryomyrtus* of *Baeckea* or basifixed as in *Hypocalymma.* The dorsifixed, versatile condition with terete filaments is the most widespread in the natural group to which *Rinzia* belongs, occuring in species groups with different stamen arrangements, different sized and coloured seeds and different mechanisms of fruit dehiscence, and as it is also widespread in the Myrtaceae as a whole is considered to be the primitive condition. The condition in *Rinzia* is interpreted as developing through the extension of the filaments from the point behind the attachment point to give the appearance that the anthers have moved from the tip to the adaxial surface, with the filaments appearing not to end at the centre of the anthers but to carry on, often extending past the top of anthers. Although still dorsifixed this constitutes a character state different to dorsifixed, versatile anthers and basifixed anthers and is one of the character states which separates *Rinzia* from its relatives. *R. carnosa* has dorsifixed, versatile anthers but has the broad filaments of *Rinzia.* This may indicate that the adaxial position of the anthers in the other species has evolved within the genus. The basifixed attachment in *Hypocalymma* appears to have developed through the fusion of the filament to the lower part of the anthers.

Stamen arrangement: As noted above the stamens are typically very regularly arranged, with one opposite each petal and sepal, although there are variations. Johnson and Briggs (1985, Figure 8) have proposed a schematic outline of trends in androecial evolution in the Myrtaceae, with the development being from fascicles opposite the petals to single stamens opposite the sepals, or irregularly spaced, in the *Baeckea* suballiance (Johnson and Briggs 1985, Figure 8, J-M). The typical arrangement in *Rinzia* could be viewed as part way down this "sequence" with the occasional pair of stamens opposite the sepals

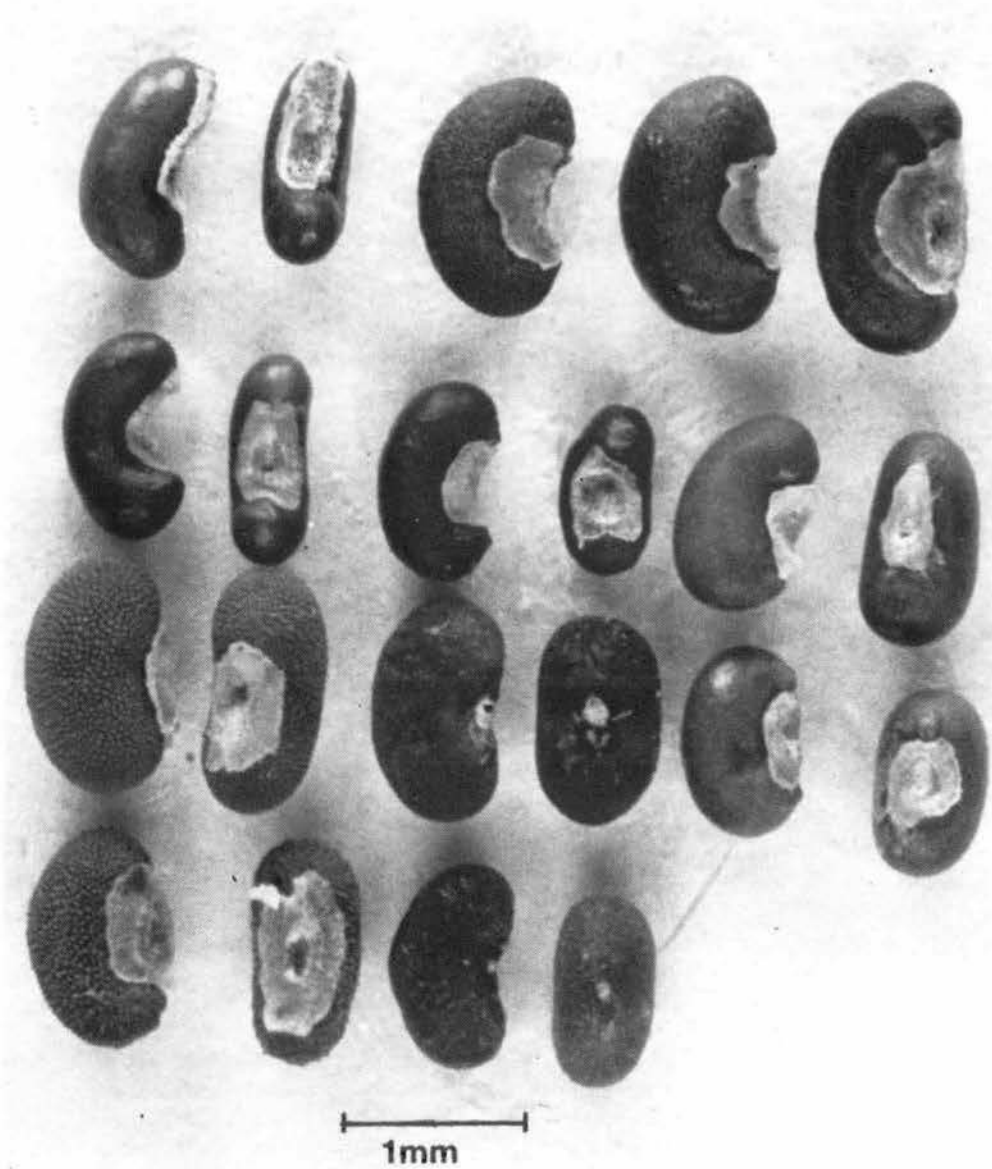


Figure 2. Seeds of *Rinzia* species. Left to right from top left hand corner. Top row: *R. affinis* (2 seeds, from *C.A. Gardner* 13845, Tarin Rock), *R. communis* (3 seeds, from *M.E. Trudgen* 1463, 18 miles east of Lake King post office). Second row: *R. dimorphandra* (2 seeds, from *H. Demarz* 6304, Duke of Orleans Bay road), *R. fumana* (2 seeds, from *M.E. Trudgen* 1883, Albany Highway just south of Gordon River), *R. morrisonii* (2 seeds, from *G.J. Keighery* 1119, lower northern slopes of Hostelliers, Stirling Range). Third row: *R. oxycoccoides* (2 seeds, from *A.S. George* 7141, Thumb Peak Range), *R. rubra* (2 seeds, from *M.E. Trudgen* 1765, 1.3 km E of 90 Mile Tank, Lake King to Salmon Gums), *R. schollerifolia* (2 seeds, from *R.D. Royce* 3728a, Lower Kalgan). Bottom row *R. crassifolia* (2 seeds, from *M.E. Trudgen* 2195, 9 km SW of Calingiri) and *R. carnosa* (2 seeds, from *F.M.C. Schock* 421, Westonia). Scale bar is 1 mm.

in *R. carnosa* possibly indicating this species is less developed in this character. Those species which lose some or all of the antesepalous stamens would indicate a divergence in *Rinzia* from the the trend to single stamens opposite the sepals only.

Inflorescence: The most common inflorescence structure is a monad with a very short peduncle and a relatively long anthopodium. Metaxytriads occur rarely in *R. dimorphandra* which usually has dichasia, the two flowers of which appear to be at different stages of development. The latter situation also occurs in *R. affinis*.

Testa surface terminology follows Murley (1951) as given in Stearn (1973).

Processes: Hair-like structures found at the base of the abaxial side of the antepetalous filaments of some species (e.g. *R. sessilis*). They may be vestigial staminodia.

Materials and Methods

This paper was based on the study of the gross morphology of herbarium material borrowed from Australian herbaria supplemented by observations and collections made in the field of nine of the twelve species (*R. carnosa, R. longifolia* and *R. oxycoccoides* were not observed in the field by the author).

The material examined included type specimens of all the previously described species.

The specimens cited were selected to cover the geographical ranges of the species, with preference being given to collections with duplicates lodged in more than one institution.

The measurements given for the parts of flowers were made on material that had been boiled in water with a small amount of detergent in it. The measurements of leaves refer to dry material.

Rinzia Schauer

J. C. Schauer, Linnaea 17: 239 (1843).-*Baeckea* section *Rinzia* (Schauer) Bentham, Flora Austral. 3: 74 (1867). Type: *Rinzia fumana* Schauer.

Subshrubs low and straggling to erect, or with prostrate branches, rarely entirely prostrate. Glabrous except for one species. Leaves opposite, appressed to spreading, shortly petiolate or sessile (one species), linear to orbicular, ovate or obovate, flat or margins recurved, or variously thickened (plano-convex or concavo-convex, abaxial surface shallowly convex to semi-terete or semi-elliptic), entire, rarely with hairs on the margins, glandular dotted, occasionally discolorous. Flowers 1-12 near the tips of the branchlets, or along them, small to medium (3-19 mm diameter), solitary or 2-3 on a common peduncle in axils of upper leaves; peduncles very short with a pair of terminal bracteoles; anthopodia each with a pair of bracteoles at the base when more than one flower on a peduncle, 0.8-27 mm long; bracteoles elliptic to cymbiform, persistent, often coloured or with a coloured edge. Hypanthium obconical to hemispherical or shortly cylindrical. Calyx lobes half to as long as the hypanthium, triangular, deltoid, semi-circular or semi-elliptic. Petals suborbicular to obovate, or angular. Stamens 5-12, usually 10 with one opposite each petal and calyx lobe, when less than 10 all or some of the antesepalous missing, 12 when flowers 6-merous, or occasionally *(R. carnosa)* two stamens opposite some calyx lobes. Filaments all flattened, the antepetalous broad, the antesepalous narrower, the antepetalous longer than the antesepalous and fused to them from shortly (near base) to up to their whole length, sides straight or incurved, apices truncate, rounded, or emarginate, antesepalous sometimes pointed. Anthers usually attached to the adaxial surface of the filaments, dorsifixed and versatile in one species; loculi parallel, opening in straight or rarely curved

slits. Connective gland globular to obovoid. Style terete, slender to stout, inserted shortly to deeply into the ovary; stigma capitate or not enlarged. Ovary 3- or rarely 4-locular, globular to obovoid, depressed around base of style. Placentation axile; placentas consisting of raised elliptic areas on the floral axis, only attached near their centre in some species, but not stalked, longitudinally slit. Ovules reniform, one end pointed in some species, rarely the abaxial edge straight, 2-9 per loculus, collateral or ± in two rows or rarely almost radially arranged, attached to the placenta on either side of the longitudinal slit. Fruit a globular or cylindrical capsule, ± equal to the calyx lobes, fused to hypanthium only near the base, pendent. Dehisced fruit: valves rounded, opening widely (until almost at right angles to the fruit axis); hypanthium flattened or saucer-shaped, the underneath often turned in at the centre. Seeds reniform, arillate (except in *R. carnosa* and *R. rubra);* hilum in centre of the concave side; testa crustaceous, smooth to papillose, brown to dark brown. Embryo filling seed; cotyledons small on a slender neck, flattened parallel to the plane between them, cotyledons and neck folded back onto, or wrapped around the massive radicle. Aborted ovules thin, translucent, not developing as "chaff".

Distribution. Twelve species, all endemic to the south west corner of Western Australia.

Key to the species

1. Leaves flat or margin slightly to prominently recurved, occasionally arched from midrib, discolorous; anthopodia 4-27 mm long (greater than 7 mm except in some specimens of *R. schollerifolia).*
   2. Ovules 4 or 5 per loculus; flowers 5-8 mm across corolla; petals usually not spreading widely; seeds 1.3-1.4 mm long. ..... 1. *R. schollerifolia*
   2. Ovules 5-12 per loculus; flowers 8-19 mm across corolla; petals spreading; seeds 1.5-1.8 mm long.
      3. Ovules 8-12 per loculus; leaf margins prominently recurved; seeds 1.7-1.8 mm long. ..... 4. *R. oxycoccoides*
      3. Ovules 5-8 per loculus; leaves almost flat to margins recurved, or leaves arched from midrib; seeds 1.5-1.6 mm long.
         4. Plants with main stems prostrate and branchlets erect, short, usually densely leaved; antepetalous stamens 1.9-2.4 mm long. ..... 3. *R. longifolia*
         4. Plants variable in form (including prostrate) but otherwise not as above; antepetalous stamens 1.6-1.8 mm long. ..... 2. *R. morrisonii*

1. Leaves plano-convex or concavo-convex, concolorous; anthopodia 0.8-4 mm long except for *R. rubra* (2.5-5.5 mm) and *R. crassifolia* (1.2-6.5 mm).
   5. Flowers in pairs in leaf axils.
      6. Hypanthium obconical, smooth and chartaceous in fruit; leaves usually overlapping next pair by 1/5-1/2; flowers white less commonly pink; seeds 1.4-1.5 mm long. ..... 8. *R. affinis*
      6. Hypanthium hemispherical to shortly cylindrical, rarely almost obconical, minutely pitted and fairly thick in fruit; leaves just overlapping next pair; flowers pink or rarely white; seeds 1.1-1.3 mm long. ..... 7. *R. dimorphandra*
   5. Flowers solitary in leaf axils.
      7. Ovules 4-9 per loculus; seeds not arillate.
         8. Leaves spreading, plano-convex; flowers 7.5-11 mm across; seeds c.1.5-1.7 mm long. ..... 6. *R. rubra*
         8. Leaves appressed, concavo-convex; flowers 5.5-7.5 mm across; seeds c. 1.4-1.5 mm long. ..... 5. *R. carnosa*
      7. Ovules 2 per loculus; seeds arillate.

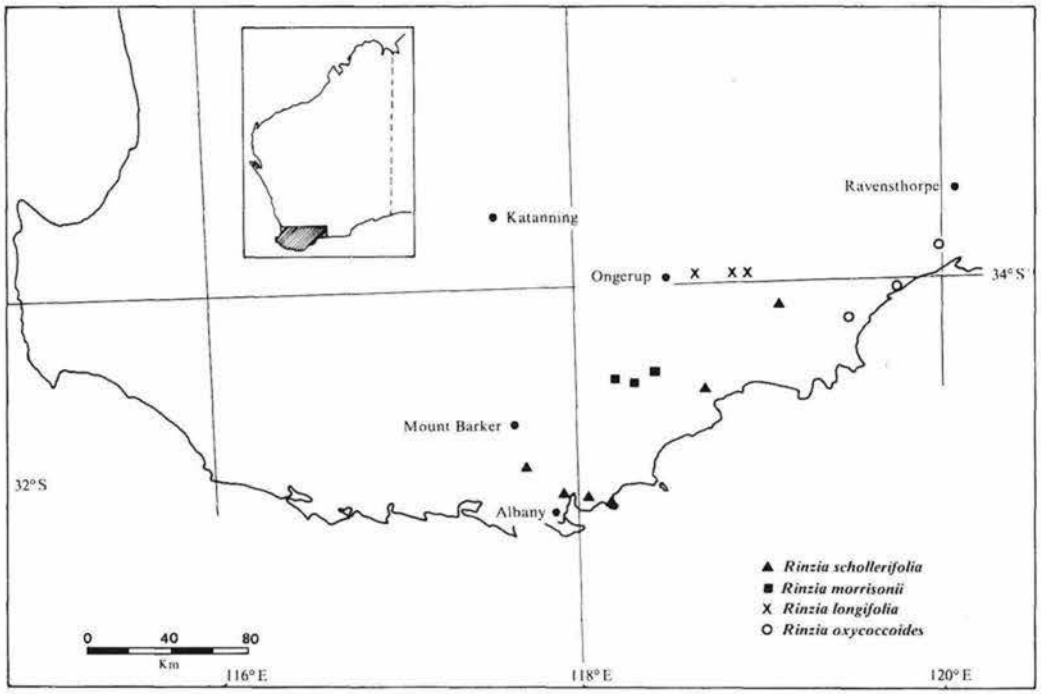
9. Flowers 1-12, not clustered near ends of branchlets; seeds verrucose or with ends somewhat pointed; leaves not regularly four ranked (i.e. not quadrifarious).
    10. Seeds verrucose, ends rounded; corolla 7.5-11.0 mm across.....12. *R. crassifolia*
    10. Seeds smooth to colliculate, ends somewhat pointed; corolla 6.0-7.5 mm across.....9. *R. fumana*
9. Flowers 1-5 clustered near ends of branchlets; seeds neither verrucose nor with ends pointed; leaves regularly four ranked (i.e. quadrifarious).
    11. Hypanthium hemispherical; petiole absent or indistinct.....11. *R. sessilis*
    11. Hypanthium shortly cylindrical or rarely broadly hemispherical; leaves definitely petiolate.....10. *R. communis*

1. **Rinzia schollerifolia** (Lehm.) Trudgen, comb. nov.-*Baeckea schollerifolia* Lehm., Pl. Preiss. 2: 369 (1848). *Type:* Seven Mile Bridge, Plantagenet, Western Australia, *Preiss* 2015 (iso: MEL).

Subshrub to 20 cm tall and 60 cm across, *stems* spreading to procumbent, or scrambling, or lower ones, or all, prostrate. *Leaves* distant, spreading to divaricate, or occasionally twisted towards each other; lamina lanceolate, acute 3-10 mm long, 1-2.5 mm wide, almost flat to margins recurved, smooth, discolorous (pale below), often reddish, especially near tips of shoots, oil glands rarely visible. *Flowers* 1-4 on a shoot, solitary in axils of upper leaves, erect; anthopodia 4-16 mm long; bracteoles narrow elliptic, concave, acute, 1.8-3.0 mm long, often reddish. *Hypanthium* obconical, 1.7-2.4 mm wide, green or reddish; calyx lobes erect, not keeled, semi-circular to oblong, 1.0-1.7 mm long, petaline at least on margin, pink to white then with reddish blotches, entire to lacerated. *Corolla* bright deep pink to white, 5.0-8.0 mm across; petals sub-orbicular to orbicular, clawed, not spreading widely. *Stamens* 10, one opposite each petal and calyx lobe, or rarely up to three antesepalous stamens missing; antepetalous filaments broad, flat, tapering slightly from base, adnate to the claws of the petals and just equalling the calyx lobes, 1.2-1.7 mm long, 0.6-0.8 mm wide, shortly united to the antesepalous filaments; antesepalous filaments flattened but not much broader than thick, c. 0.8-1.1 mm long; anthers 0.3-0.4 mm long; connective gland small, globular to shortly cylindrical. *Ovary* 3-locular, $^2/_3$ length of hypanthium, lower $^3/_4$ fused to hypanthium. Style fairly stout, reaching to between antesepalous and antepetalous anthers; stigma capitate. Placentas oval, c. 0.4 mm long and 0.3 mm wide. Ovules 4-5 per loculus. *Undehisced fruit:* hypanthium hemispherical; capsule equaling calyx lobes. *Dehisced fruit:* hypanthium almost flat (disc shaped) with a short cylindrical edge; calyx lobes erect; valves opening very widely, obtuse. *Seeds* reniform to stoutly reniform, 1.3-1.4 mm long, 0.7-0.8 mm broad, arillate; testa dark brown, neither dull nor shiny, minutely colliculate. *Embryo* filling seed, radicle massive, cotyledons small on a slender neck, both appressed to the radicle.

Selected specimens. WESTERN AUSTRALIA: Near King Georges Sound, 1884, Miss *Franklyn* (MEL 76374); 5 miles (8 km) S of Narrikup on the Albany road, *R. Melville* 4397 (K, MEL, NSW, PERTH); King Georges Sound, *J. R. Muir* (MEL 76316); Gardiner River road, 34° 21′S, 119° 23′E, *G. Perry* 205 (PERTH); Ledge Point road, 34° 59′S, 117° 58′E, *D. Whibley* 5165 (AD, PERTH).

Distribution. Endemic to the area from Albany to Bremer Bay, Western Australia. Map 1.



Map 1. Distribution of *Rinzia schollerifolia, R. morrisonii, R. longifolia* and *R. oxycoccoides.*

Habitat. Jarrah *(Eucalyptus marginata)* scrub and forest (and probably other vegetation types) on sand, sandy clay with surface laterite, lateritic soil, and sandy peat.

Notes. Rinzia schollerifolia is closely related to *R. morrisonii* and *R. longifolia* and the choice of specific (rather than subspecific) rank was made only after careful consideration of the variation within and between them. *R. schollerifolia* and *R. morrisonii* are both quite variable while *R. longifolia* is only known from a few specimens, making it's variability difficult to assess. The small, yet constant, differences in morphology between the three taxa was felt to justify specific rank. The characteristic habit of *R. longifolia* (prostrate with dense erect stems arising from the prostrate ones) adds to its distinctiveness.

Conservation status. Rinzia schollerifolia is found in at least one reserve (Two Peoples Bay Nature Reserve) so its conservation status is probably satisfactory.

2. **Rinzia morrisonii** Trudgen, sp.nov.

Fruticulus effusus vel prostratus. Folia modice disposita, patentia vel divaricata, anguste oblonga vel lanceolata, acuta; lamina 4.0-9.4 mm longa, 1.0-2.3 mm lata, discolor, margine plerumque recurvo. Flores solitarii, 1-6 secus ramulos positi; anthopodium 7-10 mm longum. Hypanthium breviter cylindraceum, 2.5-3.0 mm diam., basi obconica. Corolla rosea vel alba, 8.0-10.8 mm diam. Stamina 10, petala aequantia vel eis longiora; filamenta antepetalina pro 1/4 longitudine connata; filamenta antepetalina gradatim angustata, apicibus emarginatibus, 1.6-1.8 mm longa. Ovarium 3-loculare, parte inferiore ad hypanthium connatum; ovula 5-8 per loculum. Fructus: hypanthium breviter cylindraceum, ovario calyce-lobum aequanti. Semina reniformia vel crasso-reniformia, arillata; testa laevis vel minute colliculata, fusca.

Typus: Western Australia, Stirling Range National Park, on Stirling Range Drive to Red Gum Pass, c. 9 km by road NW of Chester Pass Road turn off, *E.N.S. Jackson* 3329 (holo: PERTH; iso: AD, CANB, K).

Perennial subshrub to 60 cm across scrambling or prostrate, or lower branches prostrate others scrambling or spreading. *Leaves* neither distant nor crowded (except near tips of shoots), somewhat spreading near tips of branches, divaricate lower down, occasionally twisted, lamina narrow oblong to oblong-lanceolate or lanceolate, 4.0-9.4 mm long, 1.0-2.3 mm wide, usually rounded (rather than flat), acute, margins recurved, smooth, discolorous, older leaves often reddish, oil glands small but frequently visible. *Flowers* erect, 1-4 (6) per shoot, solitary in leaf axils; anthopodium 7-19 mm long; peduncle 0.1-0.2 mm long; bracteoles lanceolate, concave, 2.2-3.2 mm long usually reddish. *Hypanthium* shortly cylindrical with an obconical base, 2.5-3.0 mm diameter, green or reddish; calyx lobes erect, not keeled, triangular to obtuse or semi-circular, 1.4-1.6 mm long, petaline on margin, entire. *Corolla* pink to white, 8.0-10.8 mm diameter; petals suborbicular to orbicular, spreading widely. *Stamens* 10, one opposite each petal and calyx lobe, equalling or exceeding petals; filaments flattened, broad, tapering from base, fused to ¼ length of antepetalous filaments, antepetalous filaments 1.6-1.8 mm long, 0.7-0.8 mm broad, adnate at base to petals, apices emarginate; antesepalous filaments1.2-1.3 mm long 0.5-0.7 mm broad; anthers c. 0.4 mm long; connective gland small, cylindrical. *Ovary* 3-locular, equalling staminophore, lower half fused to the hypanthium. Style stout, not tapering under stigma, equalling anthers of antepetalous stamens; stigma capitate. Placenta oval, c. 0.5 mm long, 0.4 mm wide. Ovules 5-8 per loculus in two interlocking rows. *Undehisced fruit:* hypanthium shortly cylindrical, ovary expanded, equalling calyx lobes; pendent. *Dehisced fruit:* valves opening very widely. Seeds reniform to stoutly reniform c. 1.5 mm long, arillate; testa dark brown, neither dull nor shiny, smooth to minutely colliculate. *Embryo* similar to *R. schollerifolia.*

Selected specimens. WESTERN AUSTRALIA: Stirling Range, National Park, *A.M. Ashby* 3681 (AD, PERTH, NY, TI); Stirling Range National Park, Lower northern slopes of Hosteliers, *G. Keighery* 1119 (PERTH); Stirling Range National Park, Pillenorup fire break, behind Bluff Knoll, *M.E. Trudgen* 1730 (PERTH, NSW) east from Solomon's Well, Stirling Range, 28 September, 1902, *A. Morrison* (PERTH).

Distribution. Endemic to the Stirling Range, Western Australia. Map 1.

Habitat. Found in mallee heath with *Eucalyptus* (including *E. marginata,* Jarrah), *Allocasuarina, Xanthorrhoea, Dryandra,* Restionaceae, and Cyperaceae on lower hillslopes with dun coloured sandy or clayey sandy soils.

Notes. Rinzia morrisonii is closely related to *R. longifolia* and *R. schollerifolia* (see discussion under the latter species).

Due to crowding from the larger antepetalous stamens (which converge to form a cone around the style) the tops of the antesepalous stamens are pushed inwards towards the style. Adventitious roots have been observed on prostrate branches of one collection of *R. morrisonii (M. E. Trudgen* 1730).

Conservation status. Rinzia morrisonii is apparently not uncommon in the Stirling Range National Park. It has been observed there in several areas with different fire histories including areas that had been unburnt for 3-5 and greater than 15 years. Consequently, the species is probably secure and needs no special attention for its conservation.

Etymology. The species was named for Alexander Morrison (1849 to 1913) who made many collections of plants from the Stirling Range in the early years of this century.

3. **Rinzia longifolia** Turcz., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg ser. 2, 10: 331(1852). *Type:* Swan River Colony [South-western Australia], *J. Drummond* coll. 5, no. 121 (iso: MEL, PERTH).

Baeckea schollerifolia auct. non Lehm.: Benth., Fl. Austral. 3: (1867), as to *Drummond* coll. 5, no. 121.

A subshrub to 40 cm or more (? 80 cm) across with long prostrate *stems* which bear short (to 8 cm), erect branchlets. *Leaves* distant on prostrate stems and crowded on erect stems, moderately spreading to divaricate; lamina linear to oblong or oblong lanceolate, acute, 2.5-9.0 mm long, 1.0-2.1 mm wide, almost flat to margins recurved, or arched from the midrib, smooth, discolorous (paler below), often reddish especially near tips of shoots, oil glands small (visible at x10). *Flowers* 1-4 (or more ?) per shoot, erect, solitary in axils of upper leaves; anthopodium 7.5-18.5 mm long; peduncle 0.2-0.5 mm long; bracteoles elliptic to elliptic-obovate, concave, acute, 2.0-3.2 mm long, almost hyaline, green or pinkish. *Hypanthium* shortly cylindrical with an obconical base, 2.8-3.7 mm diameter, green or reddish; calyx lobes almost erect to spreading, shallowly triangular to semicircular to oblong and obtuse, 1.0-2.1 mm long, petaline at least on margin, entirely pink, or centre pink or greenish with a white edge, entire, not keeled. *Corolla* pale pink or white, 9.5-13.2 mm diameter; petals sub-orbicular to orbicular, clawed, spreading. *Stamens* 10 or less commonly 11-12, one opposite each petal and one or two opposite each calyx lobe; antepetalous filaments oblong, adnate to the claws of the petals, exceeding calyx lobes, shortly or to 1/3 united to the antesepalous filaments, 1.9-2.4 mm long, 0.6-0.8 mm wide; antesepalous filaments oblong or tapering slightly from base, 1.3-1.8 mm long, 0.4-0.6 mm wide; anthers 0.4-0.5 mm long; connective gland small, globular. *Ovary* 3- (or rarely 4-) locular, 3/4 length of hypanthium, lower 1/2 fused to hypanthium. Style equalling anthers of antepetalous stamens; placentas oval, c. 0.6 mm long, 0.5 mm wide, ovules 6-8 per loculus in two interlocking rows. *Undehisced fruit:* hypanthium shortly cylindrical, base obconical, ovary expanded but not equalling calyx lobes. *Dehisced fruit:* hypanthium becoming flat; valves opening widely, obtuse. *Seeds* stoutly reniform, arillate, 1.5-1.6 mm long, 0.8-0.9 mm broad; testa dark brown, shiny, minutely colliculate. *Embryo:* radicle massive, colytedons small on a slender neck which is twisted around the radicle.

Selected specimens. WESTERN AUSTRALIA: 9 miles (14.5 km) east of Ongerup, *A.S. George* 6872 (PERTH); 2 miles (3.2 km) west of Jerramungup, *K. Newbey* 1351 (PERTH); 24 miles (28.5 km) east of Ongerup, 13 Oct 1961, *J.H. Willis* (MEL, PERTH); Ongerup, 26 August 1964, *F. Lullfitz* 3635 (PERTH).

Distribution. Known only from the vicinity of Ongerup and Jerramungup in the south-west of Western Australia. Map 1.

Habitat. "... in clay with mallee scrub..." (*A. S. George* 6872).

Notes. The habit of this species, prostrate with short erect stems, is unique in the genus and indeed in the subtribe Baeckeinae. Due to its prostrate habit and attractive flowers *R. longifolia* may be a useful species for cultivation as a groundcover in gardens. And, while cultivation is a poor substitute for the conservation of plant species in the wild, there may be a need to introduce this species into cultivation to protect it from extinction.

Conservation status. Rinzia longifolia is known only from the type and four other collections, none of which is very recent. As the area from which it is known has been extensively cleared, this species must be considered endangered and in need of surveying to enable protection of any remaining populations.

4. **Rinzia oxycoccoides** Turcz., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg ser. 2, 10: 331 (1852). *Type: Drummond,* 5th coll. no. 120 (holo: KW (n.v.); iso: K (n.v.), MEL, PERTH, NSW). *Baeckea oxycoccoides* Benth., Fl. Austral. 3: 75 (1867). nom. illeg.

Perennial subshrub to 60 cm across, diffuse, sprawling or procumbent. *Leaves* close together to distant, spreading to divaricate or slightly recurved; lamina sub-orbicular, ovate or broad to narrow oblong, obtuse, 2-8 mm long, 1.3-3 mm wide, strongly recurved, thick, markedly discolorous; petiole c. 0.5 mm long. *Flowers* erect, 1-5 on a shoot, solitary in axils of upper leaves; anthopodium 8-27 mm long, peduncle c. 0.1 mm long; bracteoles linear to elliptic to oblanceolate, concave, 1.7-3.5 mm long. *Hypanthium* obconical to hemispherical, pitted over oil glands, 2-4.2 mm diameter; calyx lobes erect, triangular to semi-circular to obtuse, 1.0-1.5 mm long, reddish with an entire or lacerated petaline margin, not keeled. *Corolla* pale to deep rose pink, 9.0-19.0 mm diameter; petals sub-orbicular to obovate, clawed, spreading. *Stamens* 10, one opposite each petal and calyx lobe, exceeding calyx lobes; filaments flat, broad, very shortly united at the base, antepetalous almost oblong (tapering slightly), 2.2-2.5 mm long, antesepalous tapering from base, 1.8-2.0 mm long; anthers c. 0.5 mm long; connective gland small, globular. *Ovary* 3-locular, equal in length to hypanthium, lower $^1/_2$-$^2/_3$ fused to the hypanthium. Style stout, tapering to stigma, equalling antesepalous anthers; stigma small, capitate. Placentas oval, ovules 8-12 per loculus, approaching radially arranged. *Undehisced fruit:* hypanthium hemispherical to shortly cylindrical; *capsule* globular, exceeding calyx lobes. *Seeds* reniform, arillate; testa brown to dark brown, dull, minutely colliculate.

WESTERN AUSTRALIA: Middle Mt Barren, *C.A. Gardner* 291 (PERTH); Thumb Peak Range, *A.S. George* 7141 (AD, PERTH); Mt. Bland, Nov. 1932, *H. Steedman* (PERTH); South east ridge of Annie Peak, Eyre Range, *A.S. Weston* 12797 (PERTH); Annie Peak, Eyre Range, *A.S. George* 7252 (PERTH); Thumb Peak, Fitzgerald River National Park, *R.D. Royce* 9254 (PERTH).

Distribution. Known only from the Fitzgerald River National Park on the south coast of Western Australia. Map 1.

Habitat. Found in proteaceous-myrtaceous heath on hillslopes with stony soils.

Notes. Turczaninov and Bentham apparently described this taxon independently, from duplicates of the same collection, both applying the same specific epithet.

Rinzia oxycoccoides is the largest flowered species in the genus and, whereas the flowers of most species are not conspicuous, the flowers of this species are quite striking. It has a large ovule number and as a consequence the ovules are not arranged in rows but around the placenta. However, they are not neatly radially arranged as in sections *Babingtonia* and *Harmogia* of *Baeckea* L.

Conservation status. The conservation status of *R. oxycoccoides* must be considered as excellent as it occurs in a large National Park and, from collection records, is apparently not uncommon there.

5. **Rinzia carnosa** (S. Moore) Trudgen, comb. nov.-*Baeckea carnosa* S. Moore, J. Linn. Soc. Bot. 45: 175 (1920). *Type:* Bruce Rock, *W.A., Stoward* 315 (holo: BM n.v.; iso: MEL).

Baeckea minutifolia E. Cheel, J. and Proc. Roy. Soc. W. Austral. 10: 5 (1923). *Type:* Westonia, W. A., April 1918, *F.M.C. Schock* (holo: NSW).

Woody subshrub to 1.3 m tall, much branched with slender (often long) branchlets. *Leaves* appressed, just overlapping or rarely crowded or distant; lamina sub-orbicular to

elliptic and obtuse, shallowly concave above and deeply convex (semi-circular) to very deeply convex below, 0.5-2.5 mm long, 0.5-1.0 mm wide, rough due to pits over oil glands; petiole minute. *Flowers* 1-4 clustered at or near tips of branchlets, erect, solitary in leaf axils; anthopodium 0.5-2.5 mm long; peduncle 0.1-0.2 mm long; bracteoles lanceolate, shallowly to deeply cymbiform, 1-1.2 mm long. Hypanthium hemispherical to shortly cylindrical, 2.2-2.8 mm diameter; calyx lobes erect, semi-circular to triangular, 0.5-1.0 mm long, reddish with a narrow white petaline edge, not keeled, entire. *Corolla* white to rose pink, 5.5-7.5 mm across; petals sub-orbicular to almost oblong, spreading. *Stamens* 10, or rarely 12, one opposite each petal and one or two opposite each calyx lobe; filaments flattened, tapering towards apex, curved inwards, shortly united at base, crowded to somewhat distant from each other, antepetalous markedly exceeding calyx lobes, not adnate to claw of petals 1.3-2.3 mm long, 0.5-0.7 mm wide, antesepalous 0.5-0.7 mm long, 0.3-0.5 mm wide; anthers dorsifixed 0.3-0.4 mm long; connective gland small, globular. *Ovary* 3-locular, almost equal in length to hypanthium, lower third fused to hypanthium. Style stout, tapering, equalling antepetalous anthers; stigma scarcely capitate. Placenta oval, c. 0.4 mm long; ovules 4-6 per loculus in two interlocking rows. *Undehisced fruit:* hypanthium shortly cylindrical, chartaceous, capsule just equalling calyx lobes. *Dehisced fruit:* capsule not opening very widely. *Seeds* reniform, not arillate, c. 1.4-1.5 mm long; testa closely and finely granulate, dark brown.

Selected specimens. WESTERN AUSTRALIA: Tandegin Siding, NE of Bruce Rock, October 1932, *E.T. Bailey* (PERTH); ca 35 km, WSW of Coolgardie, *N.N. Donner* 4555 (AD, PERTH); 8 miles (12.9 km) N of Bencubbin, *C.A. Gardner* 2746 (CANB, HO, K, PERTH); Queen Victoria Rocks, SW of Coolgardie, *A.S. George* 8035 (CANB, MEL, PERTH); Golden Valley, 1888, *E. Merrall* (MEL); 4 miles (6.4 km) W of Coolgardie, *M.E. Phillips* W.A./62-612 (CBG, L, PERTH); Westonia, October 1918, *F.W.C. Schock* (NSW, PERTH).

Distribution. Found from the Kalgoorlie area west to Kellerberin and Burakin, Western Australia. Map 2.

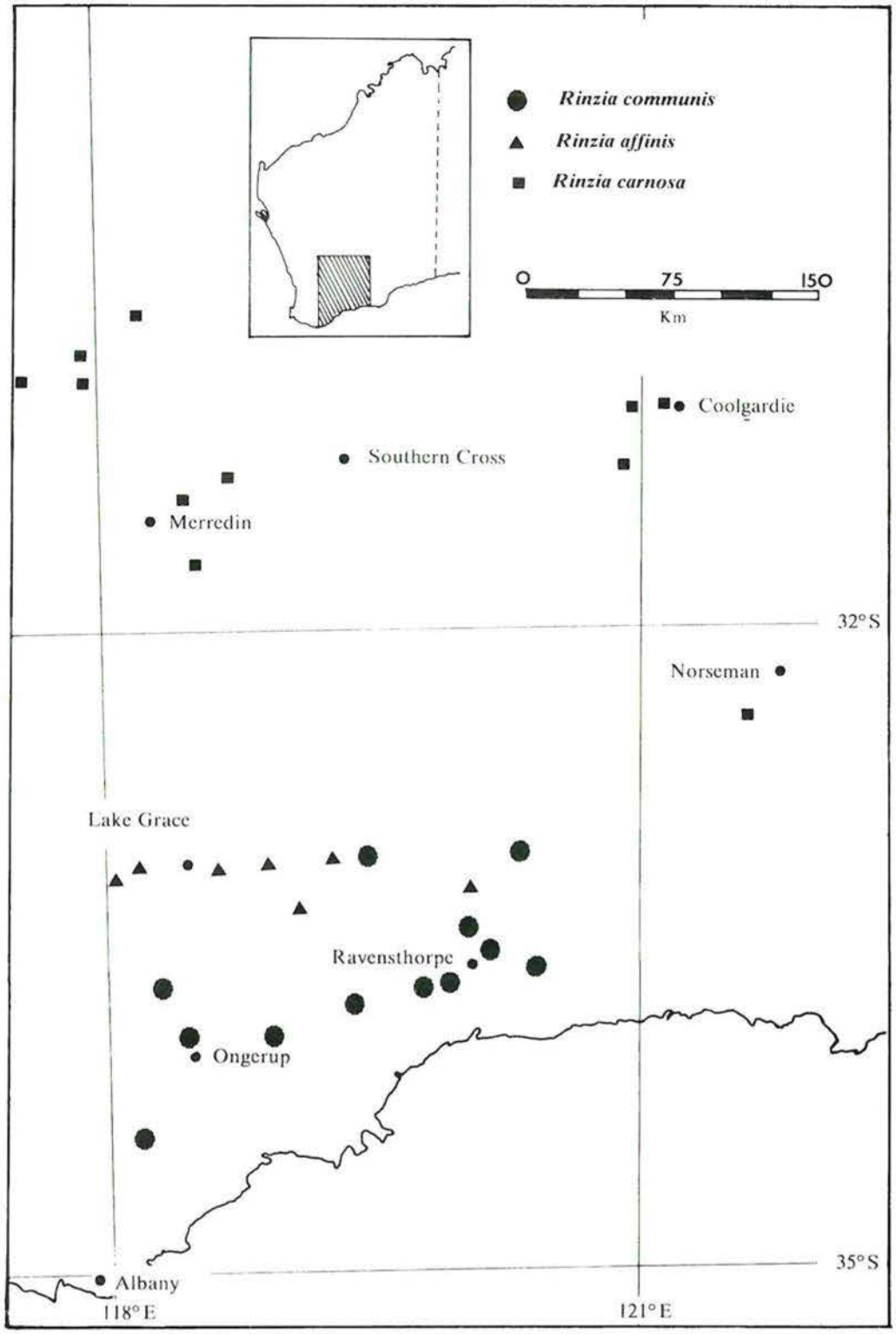
Habitat. Found in thickets of *Acacia* 'scrub' growing on loam or granitic loamy sands.

Notes. The stamens of *Rinzia carnosa* are not typical of the genus. While the filaments are flattened as in the other species, they taper to the end as in section *Euryomyrtus* of *Baeckea* L. (the species of which have terete filaments) and the anthers are dorsifixed as in that section, rather than being attached to the adaxial surface of the filaments as in other *Rinzia* species. This may indicate that the adaxial attachment of anthers in *Rinzia* developed within the genus.

Conservation status. While *R. carnosa* is known from at least fourteen collections, most of these were made more than 20 years ago and came from areas where much clearing has since taken place for agriculture. Its conservation status is therefore uncertain as there are no records from National Parks. Fortunately there has been less clearing in the eastern part of its range and populations there may be relatively secure.

6. **Rinzia rubra** Trudgen, sp. nov.

Frutex erectus demum effusus, ramulis parvis numerosis dense foliatis. Folia quadrifaria, imbricata, patentia, vel raro appressa, anguste oblonga vel anguste obovata, semi-teretia vel profunde plano-convexa, adaxialis interdum leviter convexa, obtusa; lamina 0.7-4.3 mm longa, 0.6-1.3 mm lata, interdum glandibus prominentibus ornata. Flores solitarii, 1-4 versus apices ramulorum positi; anthopodium 2.5-5.5 mm longum. Hypanthium breviter cylindraceum, 2.0-2.5 mm diam., basi obconica. Corolla alba, 7.5-11 mm diam.



Map 2. Distribution of *Rinzia communis*, *R. affinis* and *R. carnosa*.

Stamina 10, petalis longiora; filamenta usque ad 2/3 altitudinum filamentorum antesepalorum connata; filamenta antepetalina gradatim angustata, apicibus emarginatibus, 1.5-2.0 mm longa. Ovarium 3-loculare, basi ad hypanthium connatum; ovula 4-9 per loculus. Fructus: hypanthium prope basim tumidum, basi profunde excavata. Semina reniformia, non arillata, c. 1.5-1.7 mm longa; testa subtiliter granulata, brunnea.

Typus: 1.3 km east of 90 Mile Tank on the Lake King to Salmon Gums road Western Australia, 3 November 1976, *M.E. Trudgen* 1765 (holo: PERTH; iso: CANB, K, MEL, NSW).

Shrub to 70 cm tall and 100 cm across, erect when young, sprawling and open when mature with numerous densely leaved small branchlets from the main stems. *Leaves* quadrifarious, overlapping, divergent c. 45 degrees from stem, rarely appressed (on quick growing shoots); lamina narrow-oblong to narrow-obovate, or when very small orbicular, obtuse, 0.7-4.3 mm long, 0.6-1.3 mm wide, flat or shallowly concave above, deeply to very deeply convex below, oil glands visible on abaxial surface only, smooth or rarely with raised oil glands. *Flowers* 1-4 shortly below the tip of a branchlet, solitary in leaf axils, erect; anthopodium 2.5-5.5 mm long; peduncle 0.2-0.3 mm long; bracteoles elliptic to lanceolate, cymbiform, 0.9-1.9 mm long. *Hypanthium* shortly cylindrical with a small obconical base, 2.0-2.5 mm diameter, surface smooth, usually a deep dull red; calyx lobes erect to spreading, deltoid, acute to obtuse, dull red, keeled (but not strongly), edges thin. *Corolla* white, 7.5-11 mm diameter; petals oblong to sub-orbicular, clawed, spreading. *Stamens* 10, one opposite each petal and calyx lobe, exceeding petals, forming a cone around the style; antepetalous filaments flattened, broad, tapering slightly, sides straight or shallowly concave, 1.5-2.0 mm long, apices emarginate but not extended past attachment to anthers; antesepalous filaments slightly to markedly flattened, oblong 1-1.4 mm long, apices acute to obtuse, edges of filaments fused for 1/2 to 2/3 length of the antepetalous filaments; anthers c. 0.5 mm long, attached to adaxial surface of filaments; connective gland small, curved. *Ovary* 3-locular, half the length and diameter of hypanthium, lower third to half fused to hypanthium. Style tapering slightly towards stigma, equalling antepetalous anthers; stigma a rounded tip to the style. Placentas oval, only attached to ovary wall near their centres, divided longitudinally. Ovules 4-9 per loculus, attached to placentas in two interlocking rows. *Undehisced fruit* pendent on recurved anthopodium, calyx lobes and stamens persistent; hypanthium thin, chartaceous, broadened at base, otherwise cylindrical. *Dehisced fruit* not seen. *Seeds* reniform, c. 1.5-1.7 mm long, not arillate; testa brown, closely and finely granulate.

Selected specimens. WESTERN AUSTRALIA: 14.4 miles (23.2 km) from Southern Cross toward Bullfinch, *E.M. Canning* W.A./68-2526 (CBG); 1 km south west of 90 mile tank, Norseman (or Salmon Gums) to Lake King road, *K. Newbey* 6859 (NSW, PERTH); 20 km south west of Coolgardie, *K. Newbey* 5675 (PERTH).

Distribution. Endemic to Western Australia, known from near Coolgardie, Southern Cross and east of Lake King. Map 3.

Habitat. Known from various vegetation types including *Eucalyptus* spp. woodland, *E. transcontinentalis* very open shrub mallee, low open heath with emergent mallees and *Allocasuarina* scrub on gently undulating plains. Soils include orange brown clayey sand, shallow sand over sandy clay and pink-brown sand over grey sand.

Notes. The specimens from Southern Cross and Coolgardie differ from those at the type locality in appearance, the degree of fusion of the filaments and the size of the flowers; further collections are needed to assess the significance of this variation.

Conservation status. Rinzia rubra is known from only a few collections, and most of these are from a small area near the 90 Mile Tank on the Lake King to Salmon Gums road. The area from there north and east to Southern Cross and Coolgardie is not well collected and, as areas of suitable habitat occur, may well contain additional populations of *Rinzia rubra*. However, until such populations are found the conservation status of *R. rubra* must be considered unsatisfactory.

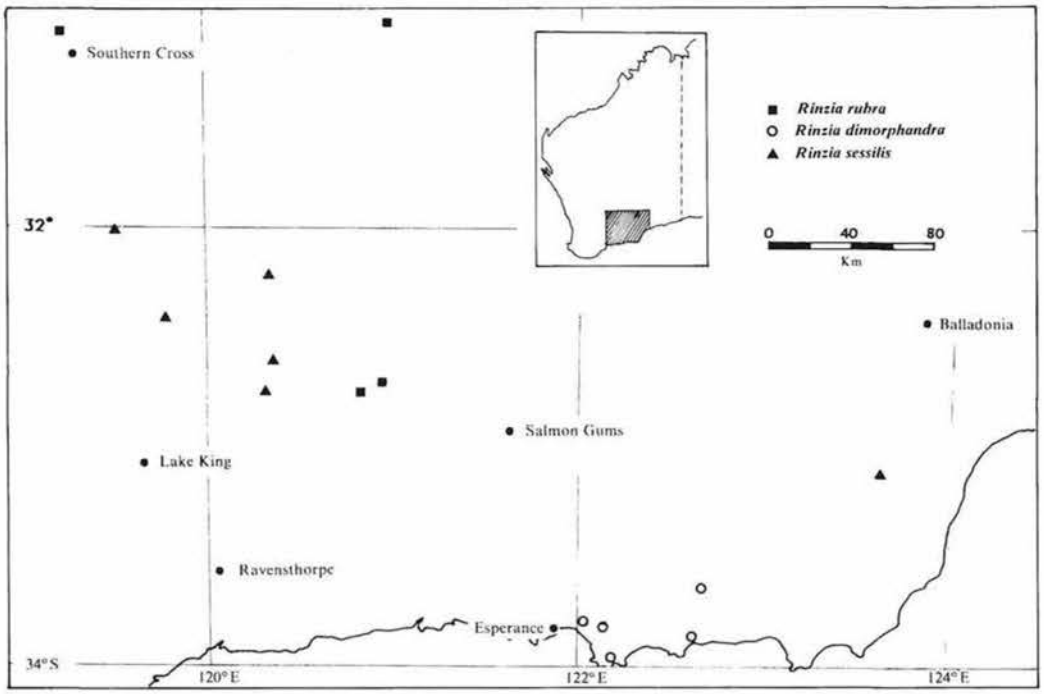
Etymology. The specific epithet alludes to the dull reddish colour of the hypanthium and calyx lobes. While some other species occasionally have these parts reddish, it is pronounced and apparently constant in *Rinzia rubra*.

7. **Rinzia dimorphandra** (F. Muell. ex Benth.) Trudgen, comb. nov.-*Baeckea dimorphandra* F. Muell. ex Benth. Fl. Austral. 3: 74 (1867). *Type:* Sandy places near Cape le Grand, *Maxwell* (holo: MEL; iso: MEL).

A rounded subshrub to 25 cm tall and 30 cm across, fairly open; branches long, very slender. *Leaves* appressed to very slightly spreading, not quite to just overlapping or rarely up to half of length overlapping; lamina narrow-elliptic to elliptic or rarely obovate, acute to obtuse, 1.5-3.9 mm long, 0.5-0.8 mm wide, deeply convex below, shallowly to moderately concave above, smooth, oil glands small; petiole 0.2-0.4 mm long. *Flowers* 1-8 clustered at or just below the tips of the branchlets, rarely spread along branchlets, in pairs on a common peduncle or less commonly solitary, erect; peduncles 0.2-0.3 mm long, terminated by a pair of bracteoles; anthopodia 1.0-2.4 mm long, each subtended by a pair of bracteoles; bracteoles on peduncles and anthopodia elliptic-lanceolate and shallowly concave to cymbiform, 0.8-2.2 mm long. *Hypanthium* shortly cylindrical to hemispherical or obconical, tapering into the anthopodium, 2.0-2.3 mm diameter; calyx lobes erect or slightly spreading, triangular or sub-triangular to semi-elliptic 1-1.5 mm long, entire. *Corolla* pink or rarely pale pink to white, 6.0-9.0 mm diameter; petals sub-orbicular to very broadly elliptic, or outline quite angular, spreading. *Stamens* 10, one opposite each petal and calyx lobe; antepetalous filaments oblong, or slightly dilated at apex, 1.2-1.7 mm long, 0.6-0.7 (1.0) mm wide, shortly or to lower one quarter fused to filaments of antesepalous stamens, equalling or slightly exceeding sepal lobes, apex emarginate; antesepalous filaments flattened, tapering, 0.7-1.3 mm long 0.3-0.5 mm wide, apex acute to obtuse and not equalling top of anthers; anthers c. 0.3-0.4 mm long; connective gland small, narrow-obovoid. *Ovary* three locular, not or just equalling staminophore, lower ½ fused to hypanthium. Style tapering or fusiform, reaching between anthers of antepetalous and antesepalous stamens; stigma not or scarcely capitate. Placentas circular, slightly raised, c. 0.4 mm diameter. Ovules 3-4(5) per loculus. *Undehisced fruit:* hypanthium shortly cylindrical, base truncate, capsule expanded but not equalling calyx lobes. *Dehisced fruit:* hypanthium hemispherical or shallower. *Seeds* reniform 1.1-1.3 mm long, arillate, aril large; testa, smooth, mid brown, shiny. *Embryo:* cotyledons small on a slender neck coiled on the end of the massive radicle.

Selected specimens. WESTERN AUSTRALIA: 3 km south east of Hill 49, Cape Le Grand National Park, *R.J. Cranfield* 1375 (CANB, K, MEL, NSW, PERTH); 12 km south of Howick Hill, ca. 75 km ENE of Esperance, *N.N. Donner* 2749 (AD, L, OSH, PERTH, Z); 8.5 km WSW of Howick Hill, *Hj. Eichler* 19861 (AD, CANB, K, PERTH); 1.8 miles (2.9 km) along the road to Wittenoom Hills from the Esperance to Cape Arid road, *M.E. Trudgen* 1475 (BRI, MEL, NSW, PERTH).

Distribution. Endemic to Western Australia, found from Esperance east to Howick Hill. Map 3.



Map 3. Distribution of *Rinzia rubra, R. dimorphandra* and *R. sessilis.*

Habitat. Rinzia dimorphandra grows in *Banksia speciosa* scrub, low shrublands or heath with taller shrubs of *Banksia speciosa, Lambertia* sp. and *Nuytsia floribunda,* on white, grey and yellow sands.

Notes. Rinzia dimorphandra is closely related to *Rinzia affinis* with which it has been confused in the past. However, they are disjunct and there are constant differences of habit, morphology and habitat preference. *Rinzia dimorphandra* is a finely branched shrub to 25 cm tall while *Rinzia affinis* reaches c. 75 cm and is more erect. Both species have appressed leaves but those of *Rinzia affinis* are generally larger, though the range of leaf sizes overlaps. In the same way, while the range of flower size overlaps, *Rinzia affinis* usually has larger flowers. While *Rinzia affinis* has white or pale pink corollas *Rinzia dimorphandra* has pink or only rarely pale pink to white corollas. *Rinzia dimorphandra* grows on sands in vegetation dominated by Proteaceae but *Rinzia affinis* grows in loams or sands with lateritic gravel in vegetation dominated by *Eucalyptus* spp.

The pair of flowers on a common peduncle, although apparently in the same relative position, are at different stages; e.g. one may be at anthesis while the other is still in bud. The peduncle apex occasionally continues growth as a vegetative shoot.

Conservation status. Rinzia dimorphandra is found in at least one conservation reserve (Cape Le Grand National Park), so its conservation status is probably satisfactory.

8. **Rinzia affinis** Trudgen, sp. nov.

Frutex rotundatus vel erectus. Folia appressa vel subappressa, plus minusve imbricata, anguste oblonga vel oblanceolata, interdum elliptica, infra profunde convexa, supra concava vel fere plana, acuta vel obtusa; lamina 2.0-4.3 mm longa, 0.7-0.9 mm lata. Flores binati vel solitarii, 2-24 versus apices ramulorum aggregati; anthopodium 1.3-4.0 mm

longum. Hypanthium obconicum, 2.1-3.0 mm diam. Corolla alba, interdum rosea, 8.5-10.3 mm diam. Stamina 10, petala nec superantia, versus basim breviter connata; filamenta antepetalina oblonga, 1.5-1.9 mm longa, versus apicem gradatim angustata vel dilatata, apice emarginato. Ovarium 3-loculare, parte inferiore ad hypanthium connatum; ovula 3-7 per loculum. Fructus: hypanthium perbreviter cylindraceum, laeve, basi obconicum. Semina reniformia, arillata, 1.4-1.5 mm longo; testa laevis, rufescens.

Typus: 14 km W of Newdegate, Western Australia, 12 August 1968, *P.G. Wilson* 7032 (holo: PERTH; iso: CANB, K, NSW).

A rounded or erect shrub to 70 cm tall, open (especially when larger), branches long slender. *Leaves* appressed to very slightly spreading, 1/5-1/2 overlapping or rarely just overlapping; lamina narrowly oblong or rarely elliptic to oblanceolate, 2.0-4.3 mm long, 0.7-0.9 mm wide, concave or rarely almost flat above, deeply convex below, apex acute to obtuse, smooth, oil glands obscure to easily visible; petiole 0.2-0.5 mm long. *Flowers* 2-24 per branchlet, in pairs or sometimes solitary in upper leaf axils, erect; peduncles 0.3-0.5 (1.0) mm long, each terminated by a pair of bracteoles; anthopodia 1.3-4.0 mm long each subtended by a pair of bracteoles; bracteoles on peduncles and anthopodia lanceolate and concave-convex to cymbiform, 1.5-2.3 mm long, thin, occasionally red tipped, otherwise pale. *Hypanthium* obconical, 2.1-3.0 mm diameter; calyx lobes erect to slightly spreading, sub-triangular to semi-circular or semi-elliptic to shortly oblong and obtuse, 1.0-2.0 mm long, thin, occasionally ribbed, maroon (often blotchy). *Corolla* white or less commonly pale pink, 8.5-10.3 mm diameter; petals suborbicular to very shortly oblong, spreading. *Stamens* 10, one opposite each petal and calyx lobe; filaments of antepetalous stamens oblong, slightly tapering or dilated near apex, 1.5-1.9 mm long, 0.6-0.9 mm wide, shortly fused to antesepalous filaments at base, exceeding calyx lobes, apex emarginate; antesepalous filaments flattened, tapering from base 0.8-1.3 mm long, 0.3-0.5 mm wide, apex acute and not equalling top of anthers; anthers c. 0.3-0.4 mm long; connective gland small, globular to obovoid. *Ovary* 3-locular, not quite equalling staminophore, lower 1/3-1/2 fused to hypanthium. Style slender, fusiform, reaching to between anthers of antepetalous and antesepalous stamens; stigma barely capitate. Ovules 3-7 per loculus. *Undehisced fruit:* hypanthium very shortly cylindrical with an obconical base, rather dry and chartaceous; capsule not quite equalling calyx lobes; calyx lobes thin, erect. *Dehisced fruit* not seen. *Seeds* reniform, arillate,1.4-1.5 mm long; aril large and extending to one end of seed; testa smooth shiny, mid brown (a little reddish); *embryo* with small cotyledons on a long neck wrapped around radicle.

Selected specimens. WESTERN AUSTRALIA: Halfway between Newdegate and Lake Grace, *A.M. Ashby* 189 (AD); 25 km S of Newdegate, *B.R. Maslin* 3859 (NSW, PERTH); 100 miles N of Stirling Range, 1879, *Muir* (MEL); ca. 25 km W of Lake Grace near Tarin Rock, *D.J.E. Whibley* 5300 (AD, PERTH).

Distribution: Endemic to Western Australia, found from the Lake King area west to Kukerin. Map 2.

Habitat. Found in a variety of vegetation types including open heath with *Eucalyptus* spp. high shrubland (ie. two strata) and low dense sandplain scrub with *Eucalyptus tetragona,* on a range of soils including yellow sand, loam with lateritic pebbles, sand with lateritic pebbles over laterite and sandy clay over laterite.

Conservation status. None of the collections of this species is from a conservation reserve, and as it is known from only 11 collections and ocurs in an area heavily cleared for agriculture, its conservation status must be considered unsatisfactory.

Etymology. The name *Rinzia affinis* was chosen to reflect the fact that this species is closely allied to *R. dimorphandra* and was until now confused with it. The two species are quite distinct.

9. **Rinzia fumana** Schauer, Linnaea 17: 239 (1843).-*Baeckea fumana* (Schauer) F. Muell., Fragm. 4: 68 (1864). *Type:* 'In interioribus Sinus Regis-Georgei III., distr. Plantagenet', *L. Preiss* 164 (iso: MEL).

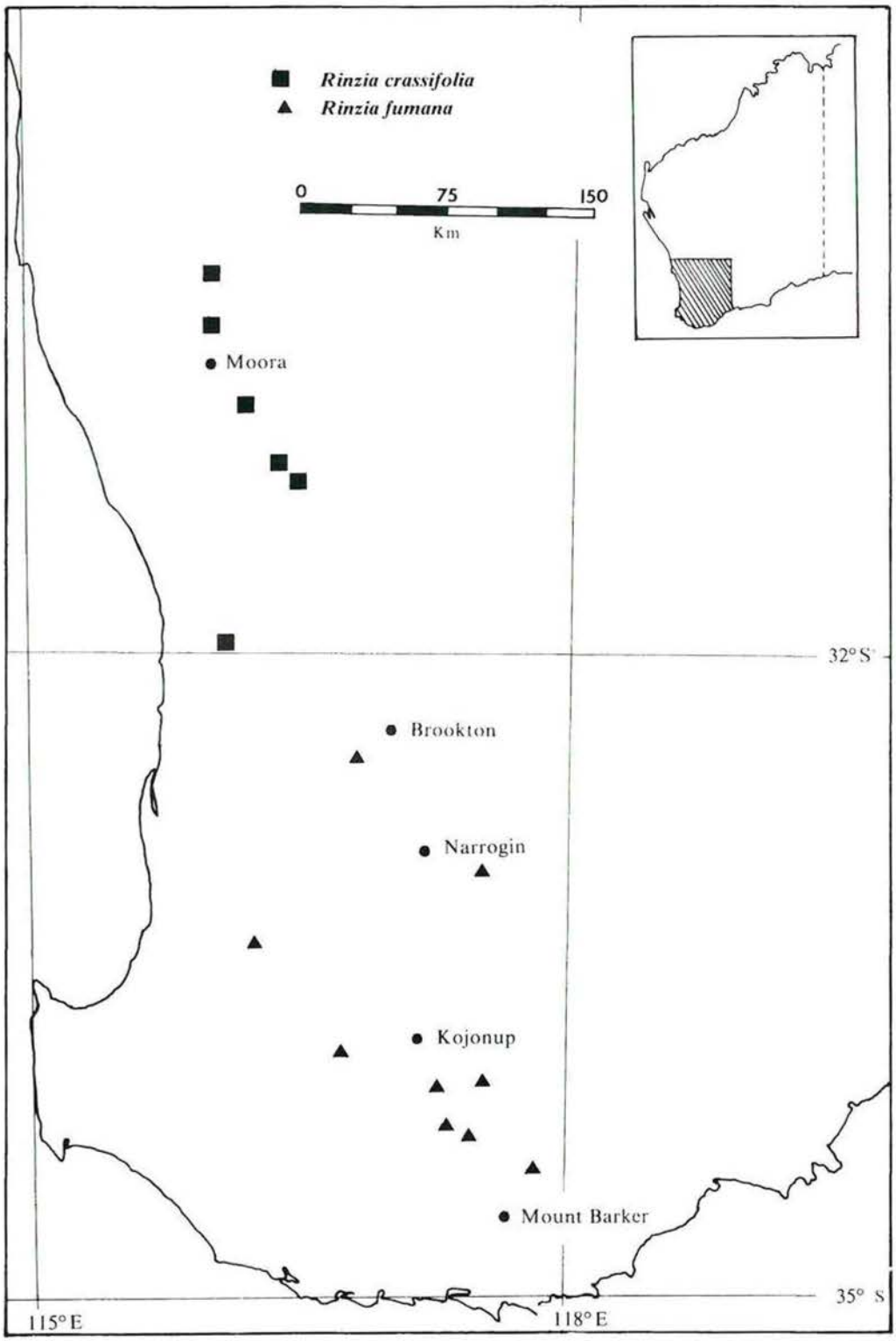
A prostrate or sprawling subshrub, less commonly erect, to 25 cm tall and 60 cm across, *major stems* of prostrate individuals sinuous. *Leaves* usually crowded but occasionally not overlapping, slightly spreading or rarely appressed or widely spreading, in opposite pairs but attitude to stem very variable (i.e. not quadrifarious); lamina narrowly oblong to narrowly elliptic, 2.0-8.2 mm long, 0.5-1.0 mm wide, shallowly concave above or rarely flat, shallowly convex below to semi-circular or rarely thicker, acute to obtuse; petioles 0.3-0.4 mm long. *Flowers* 1-4 on a shoot, solitary in axils of upper leaves, erect; anthopodia 1.5-4.0 mm long; peduncle c. 0.2 mm long or less; bracteoles cymbiform, 1.0-1.6 mm long, green or reddish. *Hypanthium* very shortly cylindrical, about half length of calyx lobes, base truncate, 1.7-2.5 mm diameter, calyx lobes slightly spreading, triangular to semi-circular, 0.8-1.5 mm long with a narrow petaline edge and a maroon or green centre. *Corolla* pink, less commonly white, spreading, 6.0-7.5 mm diameter; petals sub-orbicular to broadly elliptic or obovate, outlines irregular and often angular, claws stout. *Stamens* five to ten, the antesepalous sometimes missing; antepetalous filaments oblong to triangular, fused to antesepalous filaments for up to half their length, 1.0-1.8 mm long, 0.8-1.0 mm broad, apex broadly and shallowly to narrowly and deeply emarginate; antesepalous filaments flattened at base only, tapering from base, 0.9-1.0 mm long, 0.4-0.5 mm wide, apex acute; anthers not or scarcely exceeding filaments (rarely absent from one of the antesepalous filaments); connective gland small, globular. *Ovary* 3-locular, globular to shortly cylindrical, exceeding staminophore, fused at base to hypanthium; style stout; stigma prominently capitate, equalling the anthers of the antepetalous stamens. Placentas oval; ovules 2 per loculus, collateral. *Undehisced fruit:* hypanthium saucer-shaped, *capsule* exceeding the erect calyx lobes, stamens persistent. *Seeds* reniform with somewhat pointed ends, arillate, 1.1-1.4 mm long; testa smooth to colliculate, dark brown, shiny.

Selected specimens. WESTERN AUSTRALIA: Just south of Broomehill towards Cranbrook, *E.M. Canning,* WA68/6137 (BRI, CBG); N side of Ualling Bk., on Moodiarup-Kulikup Road, *A.S. George* 15058 (NSW, PERTH); North West Plantagenet, *E. Pritzel* 694 (AD, NSW, PERTH); Albany Highway just S of Gordon River, *M.E. Trudgen* 1883 (AD, B, BRI, CANB, CBG, K, MEL, NSW, PERTH).

Distribution. Endemic to Western Australia. *Rinzia fumana* is found from Brookton south to between the Stirling and Porongurup Ranges and then west to Collie in the south and near Boyagarring Hill in the north. Map 4.

Habitat: Rinzia fumana has been collected from *Eucalyptus drummondii* low open woodland, *Eucalyptus wandoo* ("Wandoo") low woodland, and *Eucalyptus marginata* ("Jarrah") woodland with *Dryandra, Casuarina,* and *Daviesia* spp. on soils including light brown loams with lateritic gravel, lateritic clay, loamy soil at the edge of granite, sandy loam and gravel (lateritic).

Conservation status. Though not commonly collected, *Rinzia fumana* appears to occur in fairly extensive areas of State Forest (the Northern Jarrah Forest) and has been recorded recently from the Mt Westdale Nature Reserve north-east of Brookton. Its conservation status is probably fairly secure. There is one old record from the Stirling Range National Park.



Map 4. Distribution of *Rinzia crassifolia* and *R. fumana*.

10. **Rinzia communis** M.E. Trudgen, sp. nov.

Fruticulus effusus. Folia quadrifaria, imbricata, patentia vel interdum appressa, linearia vel anguste oblonga, interdum lanceolata vel oblanceolata, semiteretia vel profunde planoconvexa, obtusa; lamina 0.8-5.3 mm longa, 0.5-0.9 mm lata. Flores solitarii, 1-5 versus apices ramulorum aggregati; anthopodium 1.5-4.0 mm longum. Hypanthium breviter cylindraceum vel late hemisphaericum, 2.0-2.6 mm diam. Corolla pallide rosea vel alba, 5.8-9.0 mm diam. Stamina 10, petala nec superantia; filamenta breviter connnata vel usque ad altitudinis filamentorum antesepalorum connata; filamenta antepetalina anguste oblonga, 1.4-2.0 mm longa, apice emarginata. Ovarium 3-loculare, parte inferiore ad hypanthium connatum; ovula 2 per loculum. Fructus: hypanthium breviter cylindraceum, basi profunde excavato, ovario calyce-lobum leviter superanti. Semina reniformia, arillata, 1.5-1.7 mm longa; testa minute colliculata, fusca.

Typus: Mount Madden, SE of Lake King, W.A., 29 July 1976, *M.E. Trudgen* 1700 (holo: PERTH; iso: CANB, K, MEL, NSW).

Subshrub to 30 cm tall and 40 cm across rounded to rather spreading and straggly. *Leaves* quadrifarious, overlapping, spreading (c. 30 degrees from stem) or rarely appressed; lamina linear to narrow oblong or rarely lanceolate or oblanceolate, obtuse, 0.5-5.3 mm long, 0.5-0.9 mm wide, flat or occasionally shallowly concave or grooved above, deeply convex to very deeply convex below. *Flowers* erect, solitary in axils of upper leaves, 1-5 on a shoot; anthopodia 1.5-4.0 mm long; peduncles 0.1-0.3 mm long; bracteoles elliptic to narrowly obovate, shallowly concave to cymbiform, 0.5-1.4 mm long. *Hypanthium* shortly cylindrical with a flat base to broadly hemispherical, 2.0-2.6 mm diameter, surface smooth; calyx lobes erect, deltoid, acute to obtuse (even on one flower), keeled and with a narrow petaline edge. *Corolla* white to pale pink, 5.8-9.0 mm diameter; petals rhomboidal to oblong to irregularly orbicular, spreading. *Stamens* 10, one opposite each petal and calyx lobe; antepetalous filaments slightly exceeding to twice length of calyx lobes, narrowly oblong, or sides concave, 1.4-2.0 mm long, apex emarginate and equalling top of anthers; antesepalous filaments flattened but scarcely wider than thick, 0.9-1.6 mm long, shortly or almost whole length fused to filaments of antepetalous stamens, acute; connective gland globular to obovoid. *Ovary* 3-locular, globular, equalling or slightly exceeding staminophore but not filling hypanthium, lower 1/4 fused to hyanthium. Style stout, subulate with the stigma as a rounded tip, reaching to between anthers of antepetalous and antesepalous stamens. Placentas oval, attached to axis for much of their area, slit down centre. Ovules 2 per loculus, collateral, reniform, 0.5-0.6 mm long. *Undehisced fruit:* hypanthium shortly cylindrical, capsule slightly exceeding calyx lobes, stamens persistent. *Dehisced fruit:* valves obtuse, opening very widely, base of hypanthium sunken. *Seeds* reniform, 1.5-1.7 mm long, arillate; testa minutely colliculate, dark brown; *embryo* filling seed, radicle massive, cotyledons small on a slender neck, twisted around radicle.

Selected specimens. WESTERN AUSTRALIA: Stirling Range, September 1927, *C.A. Gardner* (PERTH); 18 miles (28.9 km) E of Lake King post office on road to Salmon Gums, *M.E. Trudgen* 1463 (AD, BRI, CANB, K, NSW, PERTH); 30.4 km E of Ravensthorpe *M.E. Trudgen* 707 (MEL, PERTH); 9.7 km N of Ongerup on Fosters Road, *M.E. Trudgen* 736 (NSW, PERTH); Fitzgerald R. below Roes Rock 33° 59′ S, 119° 25′ E *A.S. George* 10017 (PERTH); Mt. Madden, SE of Lake King, *M.E. Trudgen* 1700 (AD, K, MEL, PERTH); 2 miles West of Jerramungup, *K. Newby* 1350 (PERTH); Mt. Short, N of Ravensthorpe, *A.S. George* 5202 (PERTH, CANB); about 22 km SE of Nyabing along Rabbit Proof Fence, 33° 41′S 118° 23′E, *A.S. George* 14288 (PERTH).

Distribution. Found from the Stirling Range E to Ravensthorpe, N to Katanning and NE to the Johnston Lakes, Western Australia. Map 2.

Habitat. Rinzia communis is known from a wide range of habitats, including open (?*Eucalyptus*) woodland, low mallee heath, mallee scrub with *Melaleuca uncinata, Eucalyptus redunca* low mallee heath and tall shrubland, on soils including orange-brown sand, light brown sand, sandy loam, sandy gravel (lateritic) and laterite.

Conservation status. Rinzia communis is the most widespread and common species in the genus and would appear to have a reasonably secure conservation status as it has been recorded from Frank Hann, Fitzgerald River and Stirling Range National Parks. However, it is not common in either of the latter two National Parks and extensive clearing of native vegetation is occurring, or is proposed, within its range.

Etymology. The specific name refers to the widespread and common occurrence of the species.

11. **Rinzia sessilis** Trudgen, sp. nov.

Fruticulus humilis, effusus, vel interdum rotundatus. Folia quadrifaria, imbricata vel interdum distantia appressaque, oblonga, elliptica, vel suborbicularia, raro lanceolata, supra concava, infra convexa, obtusa vel interdum acuta, sessilia; lamina 0.6-3.2 mm longa, 0.4-0.8 mm lata, glabra, vel margine gossypina. Flores solitarii, 1-5 versus apices ramulorum aggregati; anthopodium 0.8-2.2 mm longum. Hypanthium hemisphericum, 1.7-2.6 mm diam. Corolla pallide rosea vel fere alba, 5-9 mm diam. Stamina 10, petalis longiora; filamenta versus basim connata; filamenta antepetalina oblonga, versus apicem gradatim angustata vel leviter dilatata, apicibus truncatis emarginatis vel obtusis. Ovarium 3-loculare, parte inferiore ad hypanthium connatum; ovula 2 per loculum. Fructus: hypanthium hemisphaericum, ovario calyce-lobum superanti. Semina reniformia, arillata, c.1.5 mm longa; testa minute colliculata, brunnea.

Typus: 10 km North of Lake Cronin, c. 84 km E of Hyden, W.A., 13 September 1981, *K. Newbey* 8798; (holo: PERTH; iso: CANB, K, MEL, NSW).

Low, spreading, or sometimes rounded, subshrub to 50 cm tall and 60 cm across; branchlets slender to thick, woody. *Leaves* sessile, quadrifarious, overlapping, or rarely distant and appressed; lamina oblong to elliptic or suborbicular, rarely lanceolate, obtuse or rarely acute, 0.6-3.2 mm long, 0.4-0.8 mm wide, shallowly concave above and convex to deeply convex (semi-circular) below, glabrous or with few to many white, short to long and tangled, hairs on margins. *Flowers* 1-5 near tips of branchlets, solitary in axils of upper leaves, erect; anthopodium 0.8-2.2 mm long; peduncle 0.1-0.4 mm long; bracteoles cymbiform 0.8-1.7 mm long, glabrous or margins produced into long tangled white hairs. *Hypanthium* hemispherical, 1.7-2.6 mm diameter; calyx lobes slightly spreading to spreading, triangular to semi-circular to obtuse, 0.7-1.2 mm long, glabrous or the margins produced into tangled white hairs. *Corolla* light pink to almost white, 5.0-9.0 mm across; petals suborbicular to broad-elliptic or almost square, clawed, spreading. *Stamens* 10, one opposite each petal and calyx lobe. Filaments of antepetalous stamens oblong or tapering, rarely dilated near apex, 1.2-1.7 mm long by 0.6-0.9 mm wide, apices emarginate, truncate or obtuse, not exceeding anthers; antesepalous filaments oblong to narrow oblong or tapering, 0.9-1.2 mm long by 0.4-0.5 mm wide, fused to antepetalous filaments for half to three quarters of their length, apices acute to obtuse; anthers c. 0.25-0.3 mm long, opening in parallel slits; connective gland globular to shortly cylindrical. *Ovary* 3-locular, top level with staminophore, lower quarter to half fused to hypanthium. Style stout, tapering, reaching to half way between antepetalous and antisepalous anthers, or rarely exceeding antepetalous anthers; stigma barely capitate to capitate. Placentas oval. Ovules 2 per loculus, collateral. *Undehisced fruit:* hypanthium hemispherical; capsule expanded, exceeding calyx lobes. *Dehisced fruit:* hypanthium becoming flat; valves opening widely.

Fruit pendent. *Seeds* reniform, c. 1.5 mm long, arillate; testa mid brown, shiny, minutely colliculate. Figure 1.

Selected specimens. WESTERN AUSTRALIA: 57 km S of Marvel Loch, *K. Newbey* 8793 (MEL, NSW, PERTH); 16 km E of Lake Cronin Crossroads, E of Hyden on Norseman Road, *N.G. Marchant* 72/747 (PERTH); 30 km NE of Swallow Rock, Frank Hann National Park, c. 73 km ENE of Lake King, *K. Newbey* 6836 (NSW, PERTH); 13 km SW of Mt. Day, c. 130 km W of Norseman, *K. Newbey* 5295 (AD, PERTH); 42 km W of Mt. Glasse, Bremer Range, *K. Newbey* 5573 (AD, PERTH); 31 km W of Ponier Rock, c. 75 km SSW of Balladonia Motel, Eyre Highway, *K. Newbey* 7323 (PERTH).

Distribution. Endemic to Western Australia, found from south and east of Marvel Loch to Mt Holland, the Johnston Lakes and Frank Hann National Park, and one record from near Ponier Rock, c. 75 km SSW of Balladonia Motel. Map 3.

Habitat. Rinzia sessilis has been collected in *Eucalyptus concinna* low open woodland, *Eucalyptus* spp. very open shrub mallee, *E. transcontinentalis* open shrub mallee, *Eucalyptus falcata* very open shrub mallee, *Acacia* scrub, *Callitris* open scrub, mixed low scrub and heathland with *Grevillea excelsior* and *Triodia*. The soils include white sands, granitic loamy sands, deep aeolian sands and gravelly loamy sand. The species has been collected in a variety of habitats, including a slight slope into a salt lake, gentle undulating plains, a low lateritic ridge, a colluvial flat and a slope above a freshwater claypan. The broad range of edaphic, topographic and vegetation types in which this species occurs is somewhat puzzling, given its fairly limited distribution.

Notes. A number of specimens of this species have white hairs along the margins of the leaves, bracteoles and calyx lobes. These hairs are exceptional in the genus and the subtribe Baeckeinae, they are considered to represent a recent development rather than to indicate an affinity to species elsewhere in the Myrtaceae (i.e. outside the Baeckeinae) which have hairs.

Hair-like processes, which occur in small groups at the base of the adaxial surface of the antepetalous stamens, may be vestigial stamens.

The embryo has not been described since only one seed was seen and this was not dissected.

Conservation status. Known from only one National Park (Frank Hann National Park), at the southern end of its known distribution, where it seems to be not very common. Its conservation status is therefore unsatisfactory.

Etymology. The specific epithet refers to the sessile leaves, in which *R. sessilis* is unique in the genus.

12. **Rinzia crassifolia** Turcz., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg ser. 2, 10: 331 (1852). *Type: Drummond* 5th collection number 122, South West Australia (holo: KW (n. v.) iso: MEL, PERTH).-*Baeckea platystemona* Benth, Fl. Austral. 3: 74 (1867). *Type: Drummond* 5th colln. no. 122, (lecto (here selected): K (n. v.); isolecto: MEL, PERTH).

Prostrate or spreading to erect subshrub, to 20 cm tall and 40 cm across. *Leaves* slightly spreading to divaricate, rarely appressed, distant to crowded; lamina straight or slightly recurved, linear to narrow-oblong, occasionally oblong or narrow-elliptic, obtuse, 2.0-9.5 mm long, 0.5-1.5 mm wide, shallowly to deeply plano-convex, smooth; petiole c. 0.1 mm long. *Flowers* 1-6 (12) on a shoot, solitary in leaf axils; anthopodium 1.2-6.5 mm long;

peduncle 0.2-0.4 mm long; bracteoles narrow-elliptic to oblong; almost flat to cymbiform 1.6-3.8 mm long, green or reddish. *Hypanthium* hemispherical to shortly cylindrical, 2.2-3.5 mm diameter; calyx lobes erect, triangular to obtuse, 1.3-2.1 mm long (longer than hypanthium), green or reddish-brown with petaline margin. *Corolla* white, less commonly pink, 7.5-11.0 mm diameter; petals suborbicular to broadly ovate with a stout claw. *Stamens* 10, or rarely 12, in a cone around the style, one opposite each petal and calyx lobe, crowded, not to slightly exserted, shortly fused at the base; antepetalous filaments oblong, emarginate, 1.2-2.2 mm long, 0.8-1.2 mm wide; antesepalous filaments tapering, 0.9-1.3 mm long, 0.5-0.6 mm wide; anthers 0.3-0.5 mm long, equalling or exceeding filaments, opening in parallel slits; connective gland small, globular. *Ovary* 3-, or rarely 4-locular, globular to shortly cylindrical, equalling staminophore, lower quarter (or less) fused to hypanthium; style stout, equalling anthers; stigma capitate. Placentas oval; ovules 2 per loculus, collateral. *Undehisced fruit:* hypanthium saucer-shaped, ovary expanded and exceeding calyx lobes. *Dehisced fruit:* hypanthium almost flat; valves obtuse, opening very widely. *Seeds* reniform, 1.5-1.9 mm long, arillate; testa mid to dark brown, dull, verrucose. *Embryo* filling seed; radical massive, cotyledons on a slender neck and appressed to radicle.

Selected specimens. WESTERN AUSTRALIA: Gooseberry Hill, Kalamunda, *R.J. Cranfield* 1353/80 (PERTH); Youndegin, 1890, *Alice Eaton* (MEL 76194); 9 km SW of Calingiri, *M.E. Trudgen* 2195 (AD, CANB, MEL, NSW, PERTH); 3 miles N of Watheroo then 2 miles W, *M.E. Trudgen* 2199 (CANB, PERTH); Watheroo, *C.A. Gardner* 1948 (PERTH); Between Bolgart and Calingiri, *S. Paust* 1004 (PERTH).

Distribution. Endemic to Western Australia and found only from Watheroo south to the Darling Range near Perth and eastwards to near Meckering. Map 4

Habitat. Known from heaths, *Allocasuarina* thickets and Wandoo *(Eucalyptus wandoo)* woodland. Usually from areas with lateritic soils (sand or clay) but also from one location with sandy soil over chert.

Notes. The habit of *Rinzia crassifolia* is quite variable, ranging in form from totally prostrate to a small shrub.

The verrucose seeds are quite distinctive in the genus. Although somewhat similar testa surfaces are found in some species of related genera, these species differ in a range of characters including other seed characteristics and the number and type of stamen.

Occasional plants are 6-merous, their flowers having 6 petals, 6 calyx lobes, 12 stamens and 4 ovary loculi, otherwise these plants seem perfectly normal.

Conservation status. Rinzia crassifolia has not been recorded from any conservation reserve and is not a common plant, so its conservation status must be considered uncertain at this stage. There are areas of State Forest within its range where it may occur.

Acknowledgements

Access to the collections of the Western Australian Herbarium is gratefully acknowledged, loans of specimens were kindly made by the curators of AD, MEL, BRI, NSW, CANB and CBG. Latin descriptions were very kindly prepared by Mr Paul Wilson, who also read the manuscript making many constructive comments. The maps were prepared by Miss A. Napier. Financial support from the Australian Biological Resources Study program is gratefully acknowledged.

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Baeckea tuberculata Trudgen, a new species of Myrtaceae (Leptospermeae, Baeckeinae) from South Australia

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Abstract

Trudgen, Malcolm E. *Baeckea tuberculata* Trudgen, a new species of Myrtaceae (Leptospermeae, Baeckeinae) from South Australia. Nuytsia 5(3): 441-444 (1986). *Baeckea tuberculata* is described to facilitate its inclusion in the forthcoming edition of the Flora of South Australia. It is a poorly known but distinctive species from the north-west of South Australia, with its morphology typical of section *Babingtonia*.

Introduction

Baeckea tuberculata has been known for some years, but only from poor material, it has not previously been described because of this and because of a reluctance to describe species in isolation. However, it would be unfortunate if the species were not described prior to the publication of the new edition of the Flora of South Australia, which should appear in 1986. It is related to those species placed in section *Babingtonia* and, except for the prominent, tuberculate oil glands on the hypanthium, calyx-lobes, leaves, branchlets and bracteoles, its morphology is quite typical of that section.

The system of subdivision of the Myrtaceae used by Bentham (1867) is used here simply for convenience, the recent system of Briggs and Johnson (1979), is not used because it has only been proposed informally.

Baeckea tuberculata Trudgen, sp. nov.

Frutex; ramuli, hypanthium, bracteoli et folia glandibus oleacis prominenti. Folia opposita, linearia vel oblonga, 1.9-3.1 mm longa, 0.5-0.9 mm lata, semiteretia; petioli c. 0.3 mm longi. Flores per ramulosum1-4, solitarii in axilla foliorum superiorum positi, 5-meri; anthopodia c. 0.5 mm longa, bracteoliis paribus subtena; pedunculi c. 1.2 mm longi; bracteolae angustissime cymbiformes. Hypanthium hemisphaericum, c. 4.2 mm diam., glandibus oleaceis tuberculatis dense obtectum; calycis lobi erecti, deltoidei. Corolla c. 6-7 mm diam. Stamina c. 21, quaternae quinaque aggregata ante lobos caycis positae; filamenta geniculata, teretia, c. 0.5-0.9 mm longa; antherarum loculi connati, in rimis divergentibus dehiscentes; glans conectivi ad filamenti partem superiorem connata, in poro inter antheras dehiscens. Ovarium 2-3- loculare, hypanthio omnino connatum; stylus teres; stigma capitatum; placentatio axialis. Placentatae conicae, tantum in centro ad axim affixae, nec stipitatae; ovula in quoque loculo 6-7. Fructus ante dehiscentem: hypanthium hemisphaericum; capsula e hypanthio protrudens. Fructus post dehiscecenteam: hypanthium patelliforme vel hemispheraericum; capsula valvae osseae haud divergentes. Semina dorsis rotundatis latis planis; hilum parvum; testa crustacea crassa, pallide brunnea, laevis; ovula abortiva in ovulodium evolvulentes isdem semina in forma coloraque; embryo semen complens; cotyledones parvulae.

Typus: Dingo Claypan to Tallaringa road, South Australia, 6 July 1967, *W.S. Reid* s.n. (holo: ADW; iso: CANB).

Woody shrub. *Upper branchlets* white and with tuberculate oil glands, lower branchlets light brown, larger branches grey. *Leaves* opposite, appressed and not overlapping to slightly spreading and overlapping next pair for half their length, or rarely crowded, straight or slightly incurved; lamina linear to oblong, 1.9-3.1 mm long, 0.5-0.9 mm wide, semiterete, tip recurved with a small point; oil glands on abaxial surface tuberculate, prominent, absent from or only on tip of adaxial surface; petiole c. 0.3 mm long. *Flowers* 5-merous, solitary in axils of upper leaves, 1-4 on a branchlet; anthopodia c. 0.5 mm long, subtended by a pair of bracteoles; *peduncles* c. 1.2 mm long; *bracteoles* very narrowly cymbiform, c. 1.8 mm long, with small recurved points and tuberculate oil glands. *Hypanthium* hemispherical, c. 4.2 mm diameter, densely covered with tuberculate oil glands; *calyx lobes* erect, deltoid, c. 1 mm long, with tuberculate oil glands. *Corolla* c. 6-7 mm diameter; petals suborbicular, c. 2-2.5 mm diameter. *Stamens* c. 21, in groups opposite the calyx lobes, those near the insertion of the petals with longer filaments and shortly exceeding the calyx-lobes; filaments geniculate, terete, c. 0.5-0.9 mm long; anther loculi fused, facing downwards, opening in divergent slits; connective gland fused to upper part of the filament and opening in a pore between the loculi. *Ovary* 2- or less commonly 3-locular, completely fused to hypanthium; style terete; stigma capitate. *Placentation* axile; placentas conical, c. 0.5 mm diameter, attached to axis only in centre, but not stalked. *Ovules* 6-7 per loculus, arranged radially around placenta, outer surface convex, sides flat, inner edge angled. *Undehisced fruit:* hypanthium hemispherical, c. 5.5 mm diameter, thickened and hardened but not woody, surface tuberculate; calyx lobes persistent, but dry and shrunken; 1/4-1/2 capsule protruding from hypanthium. *Dehisced fruit:* hypanthium saucer shaped to hemispherical; capsule valves bony, not opening very widely. *Seeds* varying in shape, backs rounded, sides flat and converging to angled inner edge; hilum small; testa crustaceous, thick, light brown to red-brown, smooth; aborted ovules developing into ovulodes with the same shape and colour as the seeds; embryo filling seed, separated from testa by a fine membrane; cotyledons very small. Figure 1.

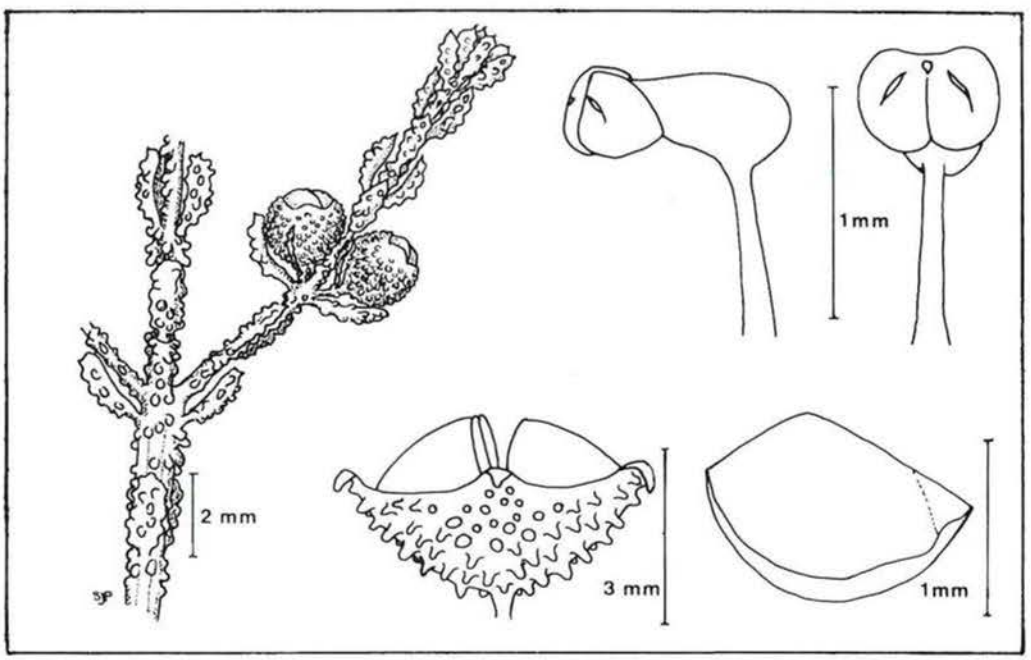

Figure 1. *Baeckea tuberculata*. A. Branchlet with buds. B. Stamen from side. C. Stamen from front. D. Fruit from the side. E. Seed from the side.
All from the type.

Specimens examined. SOUTH AUSTRALIA: c. 45 km west of Tallaringa Well (which is c. 140 km west of Coober Pedy), *T.R.N. Lothian* 2754 (AD); c. 45 km west of Tallaringa Well (which is c. 140 km west of Coober Pedy), *T.R.N. Lothian* 2759 (AD); Spanners Highway N of Emu, ± 132° E 28° S, *W.S. Reid* ADW33509 (ADW); c. 5 km south-east of Tallaringa Well (Tallaringa Well, c. 140 km west of Coober Pedy), *T.R.N. Lothian* 2726 (ADW, MEL, SYD).

Distribution. Known only from the Great Victoria desert in the north-west of South Australia. Figure 2.

Habitat. The only habitat information on herbarium sheets is that the species grows on red sand dunes, apparently with *Thryptomene maisonneuvei* F. Muell.

Flowering period. The type, which is in late bud, is the only flowering material known and was collected in early July. As the species is found in quite arid areas flowering may depend on the amount of rainfall in a given year as well as the season.

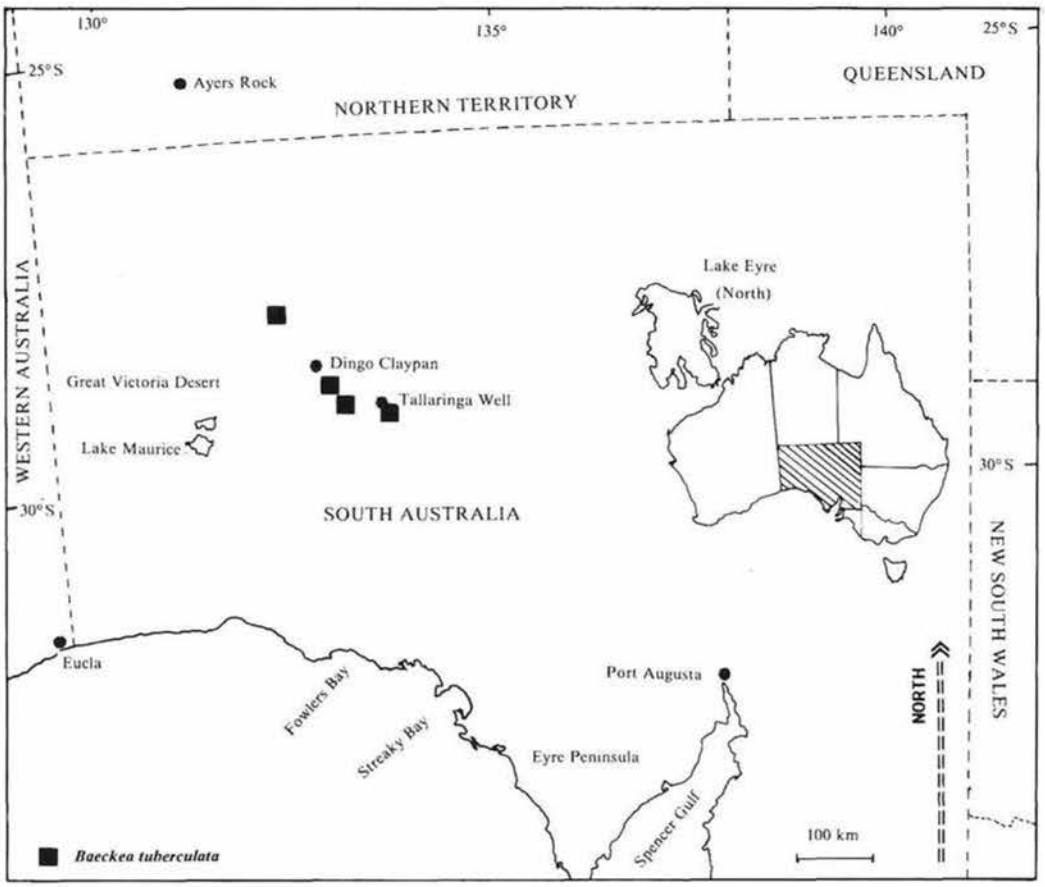

Figure 2. Distribution of *Baeckea tuberculata*.

Affinities. The closest species to *Baeckea tuberculata* is probably *Baeckea ochropetala* F. Muell., which is found in parts of the goldfields area of Western Australia (Comet Vale-Coolgardie-Peak Charles-Queen Victoria Rocks). It has similar leaves but with oil glands that while easily visible to the naked eye are not tuberculate, larger flowers (to 16 mm

diameter) with longer anthopodia (0.5-1.2 mm) and peduncles (2.5-5.5 mm), calyx lobes which are horned, and fruit which are woodier.

Comments. As *Baeckea tuberculata* is only known from a few specimens, only one of which is in flower, some caution should be used when comparing specimens to the description given, in case specimens turn up which significantly extend the known variation of the characters described. In particular the diameter of the flower could be somewhat larger on better material.

In the specimens of *Baeckea tuberculata* seen the oil glands have been consistently tuberculate, that is they are "wart like projections" (Stearn 1973) from the various organs that they occur on; this a distinct contrast to the more common spherical or subspherical oil glands as developed on *Baeckea ochropetala*. As no other species of *Baeckea* has such obviously tuberculate oil glands, this character is diagnostic for *Baeckea tuberculata*.

Acknowledgements

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