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Editor

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Five new taxa of Ptilotus (Amaranthaceae) from Western Australia

By G. Benl[1]

Abstract

Benl, G. Five new taxa of Ptilotus (Amaranthaceae) from Western Australia. Nuytsia 3, 2: 157–172 (1980).

Three species and two varieties are described as new, *viz P. marduguru* sp. nov., *P. aphyllus* sp. nov., *P. stipitatus* sp. nov., *P. divaricatus* var. *rubescens* var. nov., *P. drummondii* var. *elongatus* var. nov. Their relationships are discussed. The new species are illustrated by analytical drawings of the flowers; photos of all type specimens are provided. In addition a key to the *P. drummondii* complex is given.

1. Ptilotus marduguru Benl sp. nov. (Figures 1 to 3)

Diagnosis: Planta perennis robusta ex fissuris rupis oriens, caulibus ramosis ad 70 cm altis per totam longitudinem foliatis. Folia carnosa ad 12 cm et ultra longa, tomento albo-lanuginoso permanente vestita, pilis ut in caulibus ramisque crispis. Spicae amplae solitariae, elongati-cylindraceae ad 30 cm longae et 2 cm diametro, caules ramosque terminantes (Fig. 1A). Bractea bracteolaeque chartaceae, acuminatae, persistentes. Tepala straminea cum areola mediana viridula, venosi-nervosa, extus dense pilosa, interiora intus lana barbata induta. 5 stamina fertilia, filamenta indurescentia albescentia; cupula anulo libero. Gynoecium glaberrimum breviter stipitatum; stylo centrali tenui.

Species nova ad *P. rotundifolium* (F. Muell.) F. Muell. appropinquans, sed ob staturam coloremque spicarum, ob structuram androecei unica.

Perennial herb to 70 cm tall and 50 cm across, several upright branches forming open bushes (Figure 1B). Shoots, foliage and outer floral organs woolly-pubescent throughout. Bract and bracteoles chartaceous, acuminate, persistent. Tepals straw-yellow with a greenish centre and obscurely anastomosing veins, externally densely hairy; the inner ones woolly inside. Stamens all fertile; the filaments becoming hard and white (Figure 3A); staminal cup with a free ring. Pistil glabrous, shortly stipitate; style central, slender.

The greenish-white spikes up to about 30 x 2 cm and the different androecium render the new plant quite distinct from *P. rotundifolius* to which it bears some resemblance.

Type: Godfreys Tank, Southesk Tablelands, 20°15′S, 126°34′E, W.Aust.; coll. *A. S. George* 15451, 29 April 1979 (holotype: PERTH; isotypes: AD, CANB, K, M, MEL, NT, PERTH).

Description: Rootstock woody, producing several radical leaves and an erect rigid central shoot (Figure 2B), the latter dividing near base into arcuate-ascending main branches. Main branches usually simple, 15–40 cm long, 3–4·5 mm thick, leafy, rarely with one or two side branches to 10 cm long (Figure 2A), each terminating in a pedunculate spike. Shoots brownish-green, striate with ribs concealed by a continuous white tomentum of curled, jointed interwoven hairs ca 2·5 mm long.

Leaves up to 40 or more (Figure 2B), lamina often undulate or obscurely crenate, apex obtuse, shortly mucronate with a dark pungent mucro ca 2 mm long, base attenuate into a slightly winged petiole or ± decurrent; indumentum flannel-textured on both

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surfaces, the hairs regularly curled, loosely appressed, venation evident below, pale grey (Figure 2B). Radical leaves crowded, spathulate, up to about 8 cm long and 3 cm wide, petiolate, soon withering without becoming glabrous, finally brown and recurved. Lower cauline leaves crowded, upper 2–5 cm apart, patent to erect-spreading, hoary when young, later pale green; lower ones spathulate, long-petioled, up to 12 cm or more long (a slightly winged decurrent petiole of ca 4 cm included), to 6 cm wide, upper ones gradually smaller (to 1·5 x 1 cm), broadly subspathulate to ovate or elliptical.

Flower spikes candle-like, dense, greenish-white to creamy-green, narrow-cylindrical, 5 to 30 cm long, 1·8 to 2·2 cm wide, conical at the apex before fully grown, erect or slightly curved at times, lower perianths deciduous as spikes elongate.

Rachis brown, densely white-tomentose, the crisped hairlets mixed with substraight, obscurely septate ones of ca 2·5 mm long, passing into pubescence of pedicels and bracts. Pedicels 0·6–0·8 x 0·4–0·5 mm, jointed above bracteoles, less crowded towards the base of the spike, lowest up to 5 mm apart.

Bracts and bracteoles scarious, very inconspicuous in flowering stage but visible after falling of perianth, puberulous on back with straight nodose hairs 1·8–2·2 mm long, slightly keeled, acuminate; unequal. Bract narrowly ovate, (4·0–) 4·3–5·0 (–5·5) x (1·0–) 1·3–1·6 (–1·8) mm, subentire, a brownish median area with three, five or more basal stripes (Figure 3B), only the central one reaching apex, densely villous throughout except usually at apex. Bracteoles subcordate, concave, (3·7–) 4·2–4·5 (–4·8) x (2·1–) 2·5–2·8 (–3·0) mm, appressed to perianth, transparent, shining, entire, 0·8–1·2 mm long (Figure 3C); hirsute along midrib with hairs hardly reaching apex and finally evanescent.

Perianth rigid, erect, later subcampanulately diverging, 9 mm long, the base constricted and connected to a short hardened cup scarcely 0·8 mm high, pubescent outside with bristle-like weakly septate hairs ± 1 mm long.

Tepals pale straw-coloured with a light green median areole, later fading, 3-nerved inside (Figure 3D), only the midnerve reaching apex; outside hirsute throughout except glabrous apex with fine erect to spreading hairs, the lower ones indistinctly septate, the upper longer ones short-jointed.

Two outer tepals lanceolate-oblong, broadest at or below middle, (7·4–) 7·7–8·3 (–9·0) mm long, up to (1·2–) 1·4 (–1·8) mm wide, faintly keeled in lower half, glabrous within; margins dilated upwards, then more or less abruptly contracted (Figure 3D) ca 0·8 mm below the mucronate or serrulate apex.

Inner tepals lanceolate-linear, (6·7–) 7·1–7·8 (–8·5) mm long, (0·8–) 1·0 (–1·2) mm broad, apex more or less acuminate, glabrous, ca 0·6–0·8 mm long, mostly obscured by hairs inserted below, margins hardly inrolled; woolly inside, with nodose hairs 4–5 mm long, mostly along lower margins (usually the outer of the three segments sparsely woolly on one side only) at and up to 2·5 mm above the edge of the perianth cup.

Stamens 5, all perfect. Filaments (2·8–) 3·6–4·3 mm long, dilated to 0·7 (–0·9) mm at base, tapering upwards, diaphanous and flat when very young, soon becoming thick, hard, opaquely and chalky white except for apical and basal parts (Figure 3E), later contrasting with the black fruit (Figure 3A); upper halves sometimes breaking off, the lower portions persisting for some time, united with acute to broad sinuses in a membranous staminal cup 1·0–1·4 mm high, brownish, attached to perianth cup at base, with a free ring (0·5–0·7 mm) irregularly pubescent outside with crisped nodose hairs 1·5–2 mm long; pseudostaminodial lobes absent. Anthers oblong ellipsoid, to 0·9 x 0·4 mm.

Pistil glabrous. Ovary subclavate 2–2·3 x 1·0–1·1 mm including the 0·6–0·8 mm long stipe, becoming sub-globose (ca 2·4 x 2·0 mm) when mature. Style central, straight or slightly bent in upper part (Figure 3A), slender almost to base, 3·2–3·8 mm long by 0·06–0·08 mm wide in middle, ca 0·12 mm at base. Stigma inconspicuous.

Specimens examined: Western Australia: Godfreys Tank, Southesk Tablelands, 20°15′S, 126°34′E, *A. S. George* 15451 (typus), 29 April 1979 (AD, CANB, K, M, MEL, NT, PERTH).

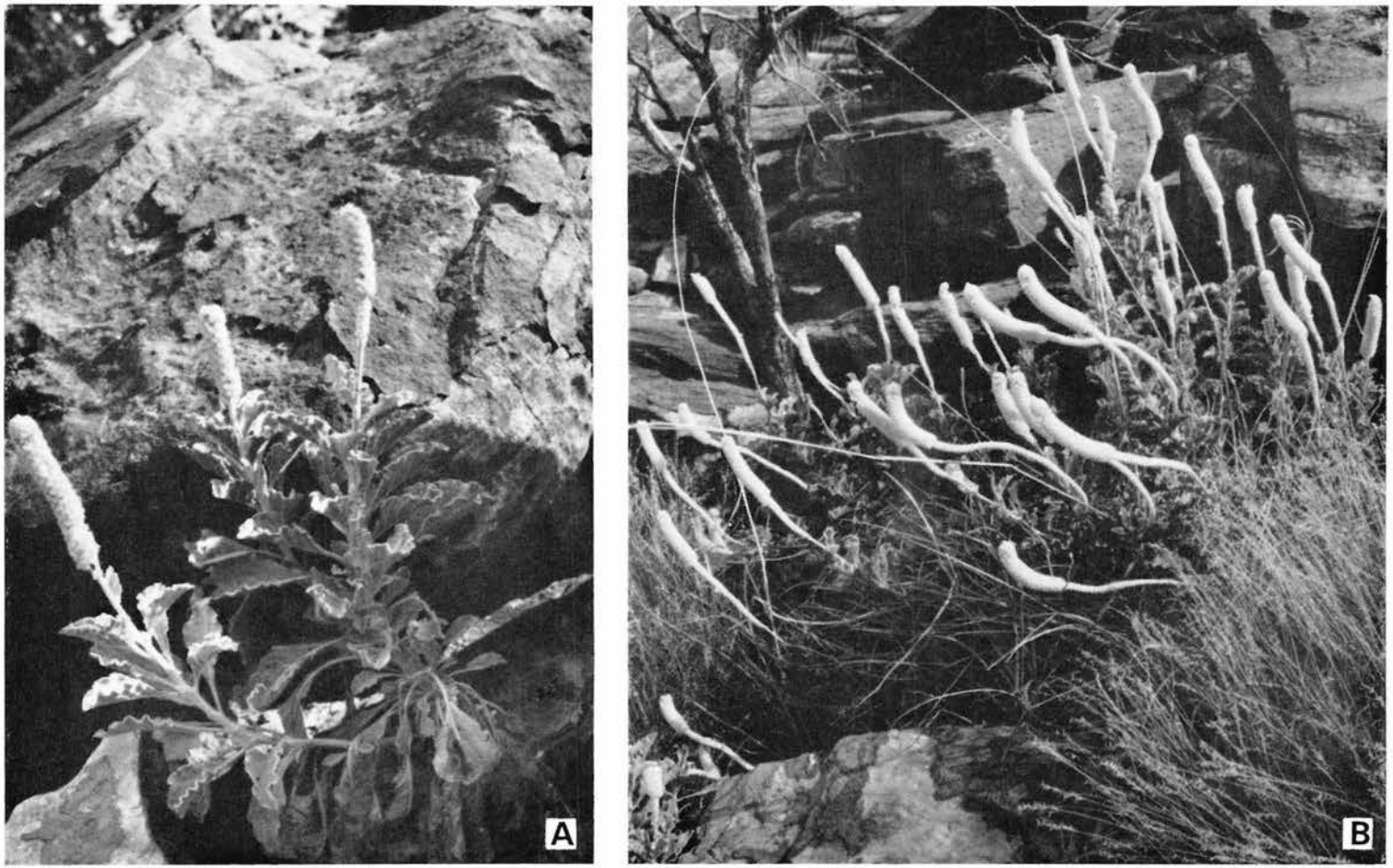

Figure 1. *Ptilotus marduguru* Benl. Photographs showing the habitat of George 15451 in the Southesk Tablelands, Great Sandy Desert, Western Australia. A—Young plant growing from rock fissure. B—On softer slopes the plants form large clumps. (phot. A. S. George).

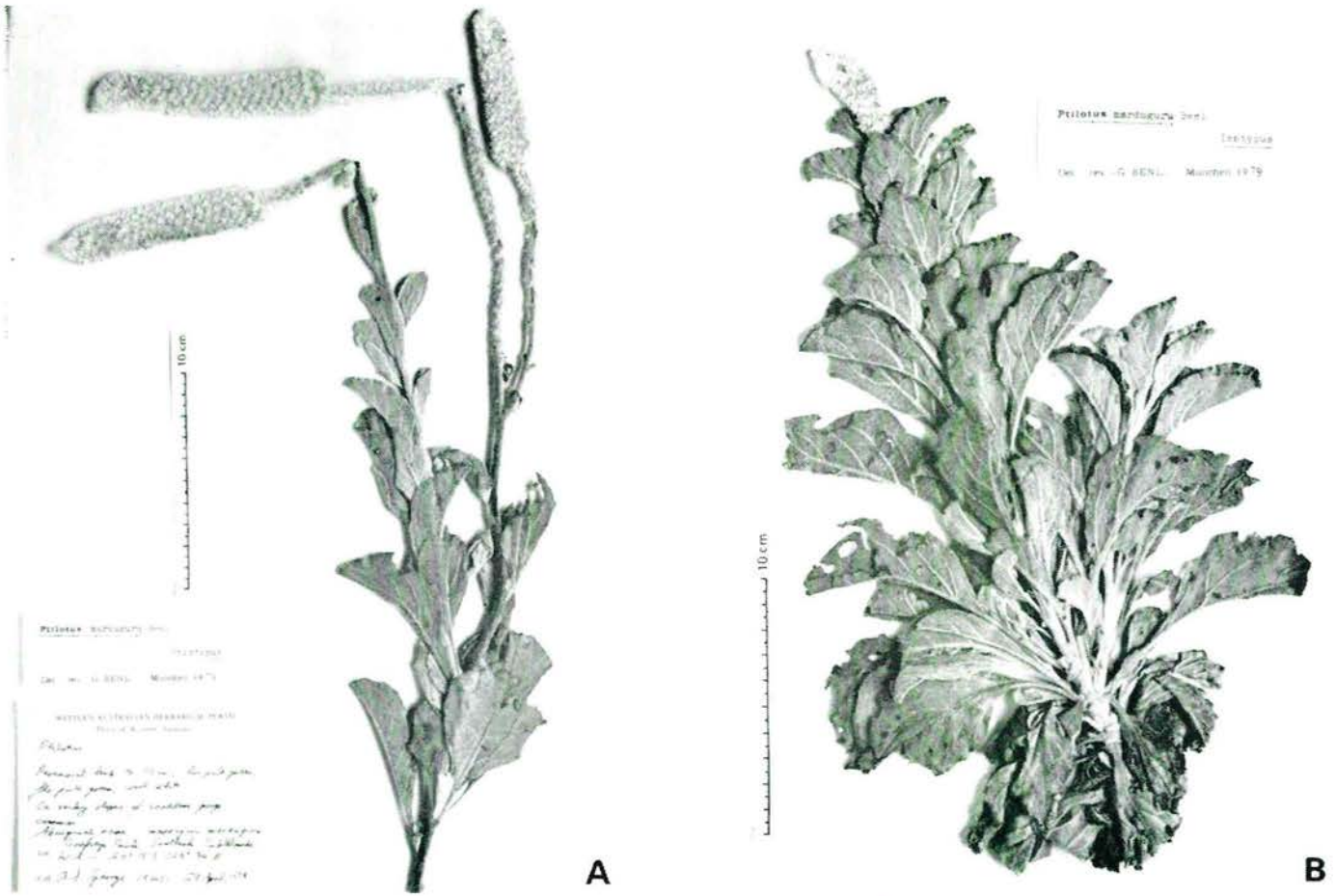

Figure 2. *Ptilotus marduguru* Benl. A—holotype specimen (PERTH). B—An isotype (PERTH) with the crowded foliage of a young plant. (phot. K. Liedl).

The above description is based on eleven specimens of the type material comprising complete young plants of 25 cm and 30 cm tall (Figure 2B), as well as parts of main stems and main branches up to 55 cm long including the spike.

Distribution and ecology: Mr. A. S. George reported the plant as 'common on rocky slopes of sandstone gorge'. 'Like P. *royceanus* the species grows only on steep rock faces'. There is no other collection of this interesting novelty.

Discussion: There is a number of *Ptilotus* species remarkable for their candle-like inflorescences, i.e. *P. exaltatus* Nees var. *exaltatus* (largest spikes recorded 30 x 5 cm), *P. nobilis* (Lindley ex Mitch.) F. Muell. var. *nobilis* (22 x 5 cm), *P. macrocephalus* (R.Br.) Poiret (27 x 6 cm), *P. polystachyus* (Gaud.) F. Muell. emend. Benl var. *polystachyus* (25 x 1·5–4 cm), *P. pullenii* Benl (29 x 2·3 cm), *P. rotundifolius* (F. Muell.) F. Muell. (20 x 4 cm). The closest relative to the new species is *P. rotundifolius*, yet in this species the soft and thick leaves are nearly orbicular (up to 7 x 6 cm) and shortly petiolate, never spathulate (up to 12 x 6 cm) as in *P. marduguru*, which is readily recognizable even in vegetative condition. The purple-pink to rose-pink spikes of *P. rotundifolius* are sometimes divided basally into one or two (rarely more) lateral subsessile inflorescences, and the bracts are considerably shorter than the bracteoles. Moreover in *P. rotundifolius*, which appears to be confined to the north-west of Western Australia, the perianth is up to 20 mm long, compared to 9 mm for *P. marduguru*, including a tube of 2 mm, 0·8 mm for *P. marduguru*, and there is no trace of hardened, incrusted filaments. Consequently the specific status of the new *Ptilotus* is beyond any doubt although a close relationship to *P. rotundifolius* must be assumed.

Name: The specific epithet refers to the aboriginal name for the plant 'marduguru marduguru', which means 'down' in the sense of fine short hairs as on the feathers of young birds (A. S. George, personal communication, 20 June 1979).

2 Ptilotus aphyllus Benl sp. nov. (Figures 4 and 5)

Diagnosis: Herba perennis frutescens ad 1 m alta, caulibus tenuibus strictis glaberrimis multiramosis; juvenilis inferne paucifolia, ceterum visu aphylla, foliis superne ad squamulas minutas reductis. Cupula staminalis cum lobulis fissis ut in *P. drummondii* (Moq.) F. Muell. et *P. schwartzii* F. Muell. ex Tate; species nova adulta autem ramis pseudodichotomis aphyllis et structura inflorescentiarum diversa manifeste recedit.

Much-branched perennial to 1 m tall, bearing leaflets only when young. Stems slender, glabrous, pseudodichotomously branched, each terminating in a spike (Figure 4). Bract and bracteoles unequal. Perianth rigid, outer tepals not entirely glabrous inside, inner tepals with internal beard-like wool. Stamens all fertile; staminal cup with conspicuous intervening fringed lobes reminiscent of *P. drummondii* and *P. schwartzii* which, however, differ markedly from the new taxon in other characters.

Type: 46 mls N. of (New) Mundiwindi, W. Aust., *A. S. George* 3609, 5 March 1962 (holotype: PERTH).

Description: Shrubby, slender branched herb up to 1 m tall, spreading to more than 45 cm across. Young flowering plants ca 20 cm high (type specimen) arising from an erect woody stock 3 mm diameter. Stems greyish-green, striate to ribbed, pruinose between ribs. In larger plants the 'stems leafless . . . rush-like' (R. D. Royce in sched.); branchlets stiff, ascending to divaricate, up to 15 cm long.

Leaves obovate to linear, 6–13 x 1·5–2 mm, tapered at both ends, shortly mucronate, subsessile, decurrent, with a few tiny (up to 0·7 mm long) crisped scabrous hairlets in the axils; replaced in upper portions of stems by minute, more or less appressed scales 1 to 4 cm apart, up to 2 mm long, bearing some tiny hairlets inside.

Spikes terminal, varying in shape and size, 7–16 mm wide, depressed hemispheric and 4–8-flowered, or elongate (up to 22 mm) with up to 15 flowers.

Rachis densely woolly with crisped, weakly septate hairs about 2 mm long, obscuring the pedicels of ca 1 mm long and distinctly jointed above bracteoles.

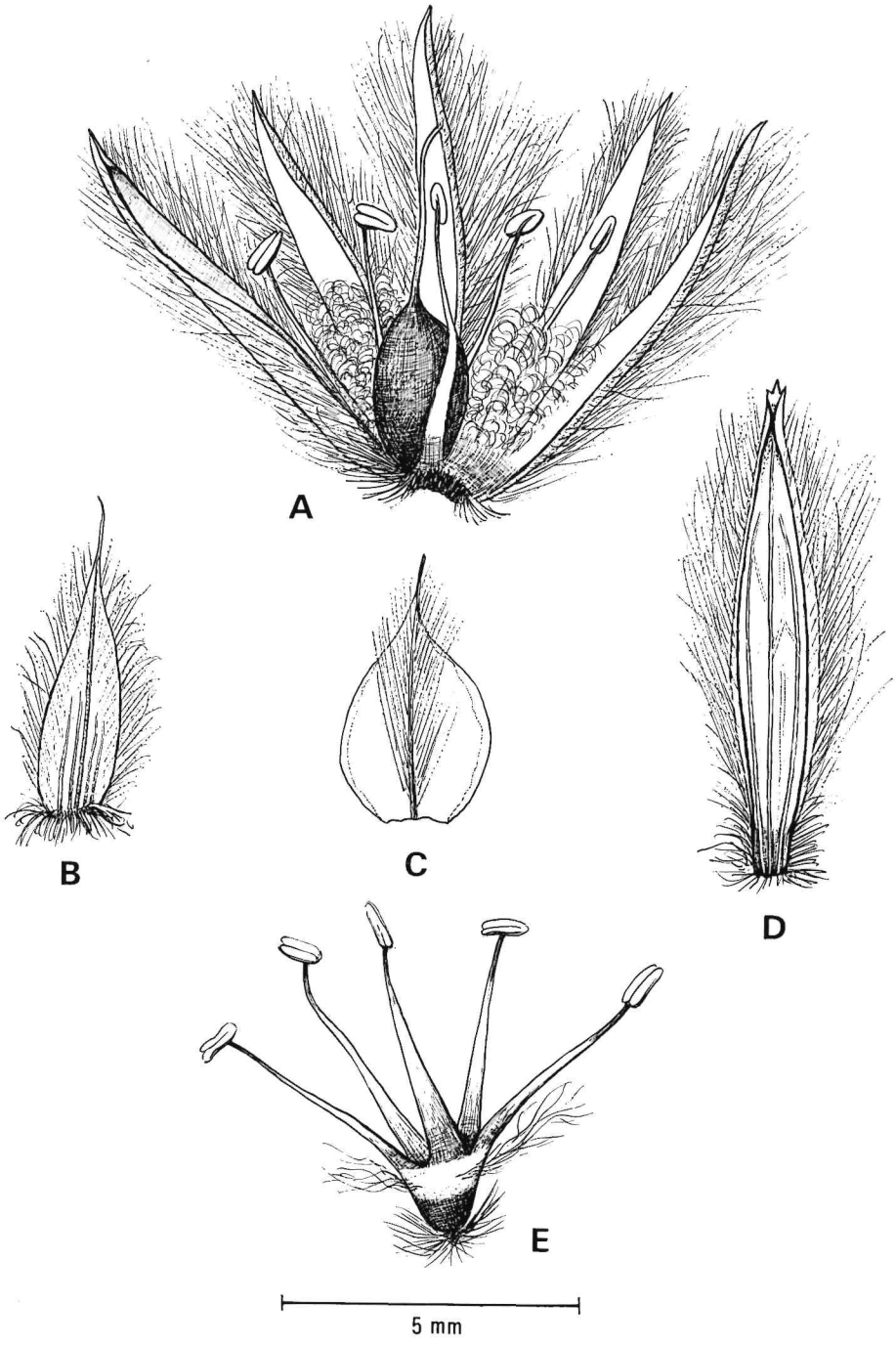

Figure 3. *Ptilotus marduguru* Benl. A—Expanded flower, inner view, B—Bract, inner face, C—Bracteole, outer face, D—Outer tepal, inner view, E—Androecium. (Drawn by A. Böhm from holotype).

Bract and bracteoles scarious, entire, concave, acute, more or less keeled by a finally reddish-brown midrib, persistent, unequal. Bract ovate-lanceolate, 3·2–4 x 2–2·2 mm, tapering to a point about 0·3 mm long, initially densely pubescent all over (Figure 5A) with fine dorsal hairlets obscurely articulate, more or less straight, ca 1 mm long; midrib becoming crest-like towards apex. Larger bracteoles with colourless, thin, membranous, translucent, lustrous margins, broadly ovate to subcordate-orbicular, 3·8–5 x 2·5–3·3 mm, closely appressed to perianth, the evident midrib excurrent in a short arista of ca 0·4 mm (Figure 5B); in young flowers hirsute especially along a yellowish-tinged midrib, at length glabrous all over and golden like the bract.

Perianth feathery, rigid, at first erect, afterwards divergent, not exceeding 8·2 mm long, thickened towards indurated base, concave below due to sunken attachment of pedicel; forming with lowest dark-coloured parts of segments a turbinate tube ca 0·7 mm long densely enveloped by a long-haired dorsal vestiture.

Tepals purple when fresh, fading to pink and pale orange, finally straw-coloured (the red tinge kept longest at margins and apex), narrowly elliptical to lanceolate-linear, internally opaque almost throughout and conspicuously 3-nerved in lower half, the scarious margins of varying width obvious in young flowers; apices of tepal glabrous, not or slightly exceeding the copious dorsal vestiture consisting of long (up to 5–6 mm), stiffly erect trichomes covering the back, and of shorter (ca 0·6–1·5 mm), more or less patent hairs chiefly at the margins, all simple, obscurely septate.

Outer tepals 6·7–8·2 x 1·5–1·8 mm, widest in middle, obtuse and minutely serrate, margins scarcely or weakly inrolled; glabrous within except for sparse more or less straight hairs (to 2 mm long, nodose) marking pilose upper edge of tube (Figure 5C). Inner tepals slightly shorter, 6·2–7·6 x 0·8–1·2 mm, widest below middle, distinctly acute, margins infolded; inside strongly beard-like, woolly (Figure 5D), the curly entangled hairs up to 4 mm long and obscurely nodose, borne above the tube ca 3 mm along both margins (occasionally on one side only), as well as on inner surface (edge of tube).

Stamens all perfect. Filaments slightly flattened, 2·3–4·8 mm long, 0·15–0·2 mm broad in middle, subulate above, scarcely widened below, fused with rounded sinuses into a turbinate cupule more or less firmly adnate to perianth base, a narrow free ring with conspicuous ligulate interstaminal lobes, 0·9–1·8 mm long, ca 0·35 mm broad, regularly or unequally fringed (Figure 5E); more or less straight hairs (ca 3·5 mm long) developed mostly on edge of perianth tube, some also on outer face of low staminal ring. Anthers ellipsoid 0·8–0·9 x 0·5 mm.

Ovary (Figure 5F) at first subclavate-stipitate, ca 2·6 mm long (the stipe of 0·8 mm included) and 1·2–1·4 mm wide, more or less pilose at apex (hairlets to 0·4 mm long) or completely glabrous, later subglobose. Style central, straight, 2·7 mm long, ca 0·12 mm across, hardly dilated to ca 0·2 mm at its very base. Stigma somewhat conspicuous to 0·2 mm diameter.

Specimens examined: Western Australia: 73·6 km N. of (New) Mundiwindi, 'in red sand on burnt spinifex plain', *A. S. George* 3609 (typus), 5 March 1962 (PERTH); 754 mile peg N. from Mundiwindi, 'leafless shrub', *F. Lullfitz & A. R. Fairall* L 2675, 16 Oct 1963 (PERTH); 29 km N. of Sandy Creek, 'in red sandy soil along No. 1 Rabbit Proof Fence', *R. D. Royce* 1673, 15 May 1947 (PERTH).

Distribution: The collections have been made in a comparatively small area along the western edge of the Little Sandy Desert.

Discussion: Superficially the new taxon bears some resemblance to *P. schwartzii* in its common f. *schwartzii* which has pruinose stems often pseudodichotomously divided. However, in the latter plant the branches bear linear to acicular leaves mostly up to the apices. The subglobose spikes consist of ca 20 or more flowers softer and smaller in all parts. Further manifest floral differences of *P. schwartzii* are: bract and bracteoles subequal, dorsal pubescence of tepals finer, shorter and still more homogenous, outer perianth segments entirely glabrous within, staminal cup flatter, etc.

In contrast to the spreading *P. aphyllus* with its regular pseudodichotomous branching, the infraspecific taxa of *P. drummondii* are characterized by stems leafy almost throughout (var. *drummondii*, var. *scaposus*, var. *elongatus*) or with leaves more or less reduced upwards in var. *minor*, the latter being distinguished by its dense-flowered, creamy-white, subglobose spikes terminating the often broom-like stems.

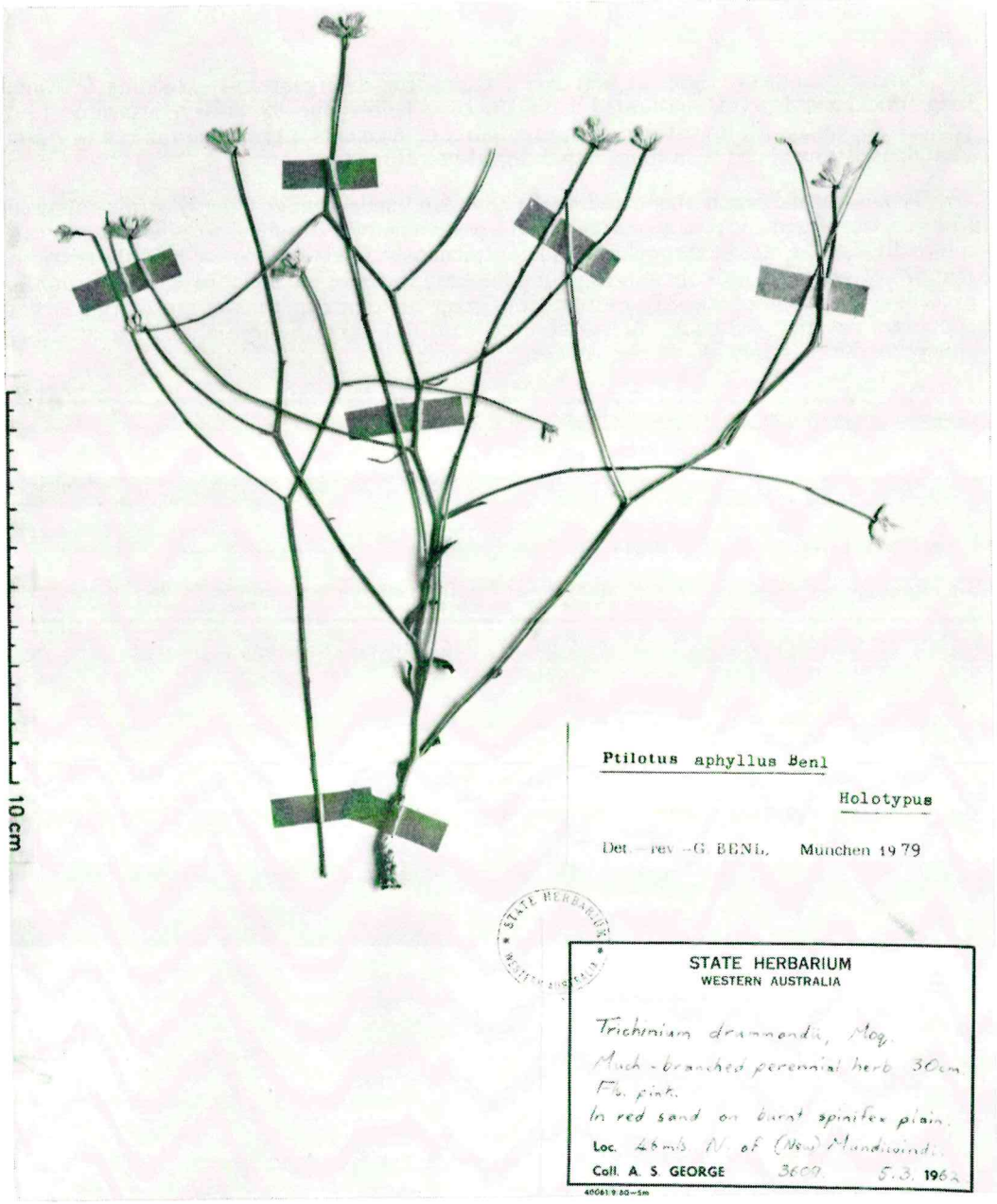

Figure 4. *Ptilotus aphyllus* Benl. Holotype sheet. Coll. A. S. George No. 3609, 5 March 1962, 73·6 km N. of (New) Mundiwindi, Western Australia. PERTH. (phot. K. Liedl).

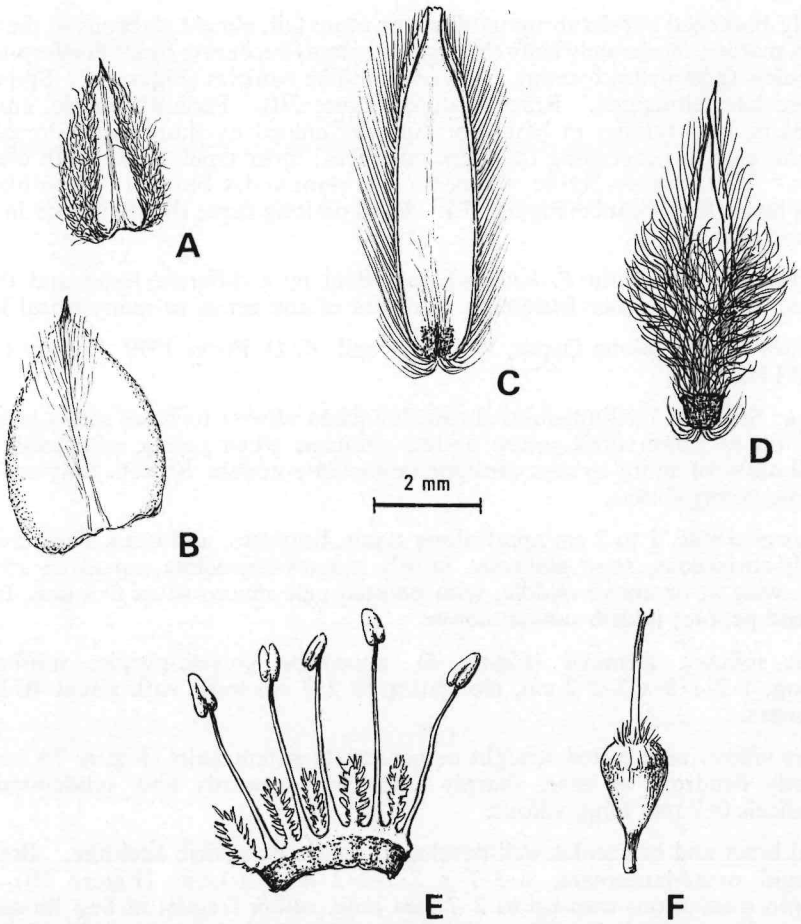

Figure 5. *Ptilotus aphyllus* Benl. A—Bract, inner face, B—Bracteole, outer face, C—Outer tepal, inner view, D—Inner tepal, inner view, E—Androecium, opened, F—Gynoecium. (Drawn by A. Böhm from holotype).

The new taxon is quite dissimilar in general habit to *P. schwartzii* and *P. drummondii* but the flower morphology suggests a close relationship with both species. Together with *P. beckeranus* (F. Muell.) F. Meull., *P. calostachyus* (F. Muell.) F. Muell., *P. clementii* (Farmar) Benl, *P. fraseri* (A. Cunn. ex Moq.) F. Muell., *P. gardneri* Benl, *P. helipteroides* (F. Muell.) F. Muell. these species form a series with tongue-like, ciliate or fringed pseudostaminodia. Yet, 'as a sectional character . . . the presence or absence of teeth is valueless as it brings together species totally dissimilar in other respects' (L. Farmar, Bull. Herb. Boiss. **5**: 1086; 1905).

3. **Ptilotus stipitatus** Benl sp. nov. (Figures 6 and 7)

Diagnosis: Fruticulus caulibus (curvati-)erectis ramosis, 20–30 cm et ultra longis, glabris, per totam longitudinem modice foliatis, pluristachyis (Fig. 6). Spicae pedunculati-erectae, primo hemisphaericae demum oblongae. Bractea longitudine aristae notabilis (Fig. 7B). Perianthium purpureum dense pilosum, basi indurata tubum cylindraceum longum extus hirsutum formans; pili pubescentiae dorsalis apices truncatos tepalorum paulo superantes; tepala interiora pilis crispis marginalibus, plus minusve copiosis, introflexis munita. Stamina in floribus examinatis 2 fertilia, 3 minora abortiva; filamenta late taeniata (Fig. 7E). Ovarium apice biserialiter pilosiusculum, longe stipitatum.

A *Ptiloto kenneallyano* Benl imprimis ob habitum et pubescentiam deficientem, ab aliis speciebus fruticulosis praeterea structura florum distinctus.

Erectly branched subshrub up to 30 cm or more tall, almost glabrous in the vegetative parts when mature, moderately leafy throughout; stems becoming rigid; floriferous branches and branchlets (peduncles) forming loose corymb-like panicles (Figure 6). Spikes initially semiglobose later elongated. Bract aristate (Figure 7B). Perianth purple, enveloped in plumose hairs, long-tubular in basal portion, surrounded by short hairs; dorsal vestiture of tepals more or less exceeding the truncate apices; inner tepals inside with crisped marginal hairs. Two stamens fertile; filaments and staminodes broadly ribbon-like in lower half, fused into a high cupula (Figure 7E). Pistil on long stipe, slightly pilose in two rows toward apex of ovary.

Sharply separated from *P. kenneallyanus* Benl by a different habit and the lack of pubescence, and from other frutescent members of the genus in many floral features.

Type: 5 miles N. of Jigalong Depot, W. Aust.; coll. *R. D. Royce* 1592, 13 May 1947 (holotype: PERTH).

Description: Small to medium-sized shrub, branched almost to base, stems and branches spreading, up to 3 mm thick, more or less pruinose when young, practically glabrous, with small tufts of more or less straight denticulate-nodose hairlets only in older leaf axils bearing young shoots.

Leaves alternate, 1 to 2 cm apart along stems, branches, and branchlets, erect-spreading, thickly-coriaceous, soon glabrous, mostly narrow-lanceolate, up to ca 25 mm long and 4 mm wide at or above middle, with pointed pale mucro of ca 0·8 mm, tapering to an undefined petiole; midrib sunken above.

Spikes solitary, terminal (Figure 6), appearing greyish-purple, sub-hemispheric when young, 1·2–1·8 x 2–2·2 cm, elongating to 2·7 cm long, with about 40 loosely arranged flowers.

Rachis villous with tufted straight or geniculate patent hairs (Figure 7A) ca 1·5 mm long, mostly dendroid at base, sharply verticillate upwards and subdenticulate near apices; pedicels 0·7 mm long, villous.

Floral bract and bracteoles well-developed, scarious; midrib keel-like. Bract brownish semirigid ovate-lanceolate, 6·3–7 x 2·7–3·2 mm, aristate (Figure 7B), gradually tapering into a setaceous awn up to 2·7 mm long, rather fragile; at first hirsute all over the surface. Bracteoles light amber, shortly acuminate, (4·5–) 4·8 (–5·3) x 3·3–3·8 mm, broadly subovate with membranaceous hyaline shining wings, concave, appressed to perianth, more or less abruptly acuminate, the rigid point (0·5–) 0·8 (–1·2) mm long; midrib villous, hairs exceeding apex (Figure 7C), evanescent with age.

Perianth purple but with a dense, fine plumose dorsal indumentum, thickened at base to a cylindrical tube 1·7 to 2·3 mm long with hairs obscurely denticulate-nodose, up to 1·5 mm long, intermingled with obviously dendroid to verticillate ones.

Tepals sublanceolate-linear, unequally marginate, 3-ribbed, the median vein engraved in a ridge-like keel above tube, the fainter lateral ones somewhat raised externally near the narrow thinner margins; outside unevenly pubescent all over, chiefly with copious patent denticulate-nodose or subverticillate trichomes, the hairs longer towards base up to 8 mm (Figure 7D); also with underlying hairlets up to 0·8 mm long, dendroid at their base, especially visible near margins (not shown in Figure 7D).

Outer tepals about 9·5–11 mm long, ca 1·0 mm broad near the middle, glabrous inside throughout. Inner tepals about 9–10·3 mm long, ca 0·8 mm broad in middle, woolly inside above the tube mainly near the margins or on one margin only, the hairs incurved, crispy, more or less entangled, to 3 mm long, indistinctly nodose.

Stamens 5, only two adjacent ones consistently fertile in the flowers examined. Free filaments 4·8–5·8 mm long, subulate, gradually widened downwards to ca 0·5–0·7 mm (Figure 7E); staminodes of varying length, 2·2–4·5 mm long, 0·4–0·6 mm wide, the longer ones bearing a minute button-like rudimentary anther. Filaments of stamens and

staminodes united with acute sinuses in a cupule up to 2·7 mm tall, strongly adnate to perianth tube, with a narrow, somewhat oblique free ring ca 0·3–0·4 mm high, almost glabrous; occasionally some small fascicles of curved hairs (ca 5 mm long) between filaments, rising chiefly outside at edge of perianth tube; pseudostaminodes absent. Anthers (oblong-)ellipsoid ca 0·8 x 0·4 mm.

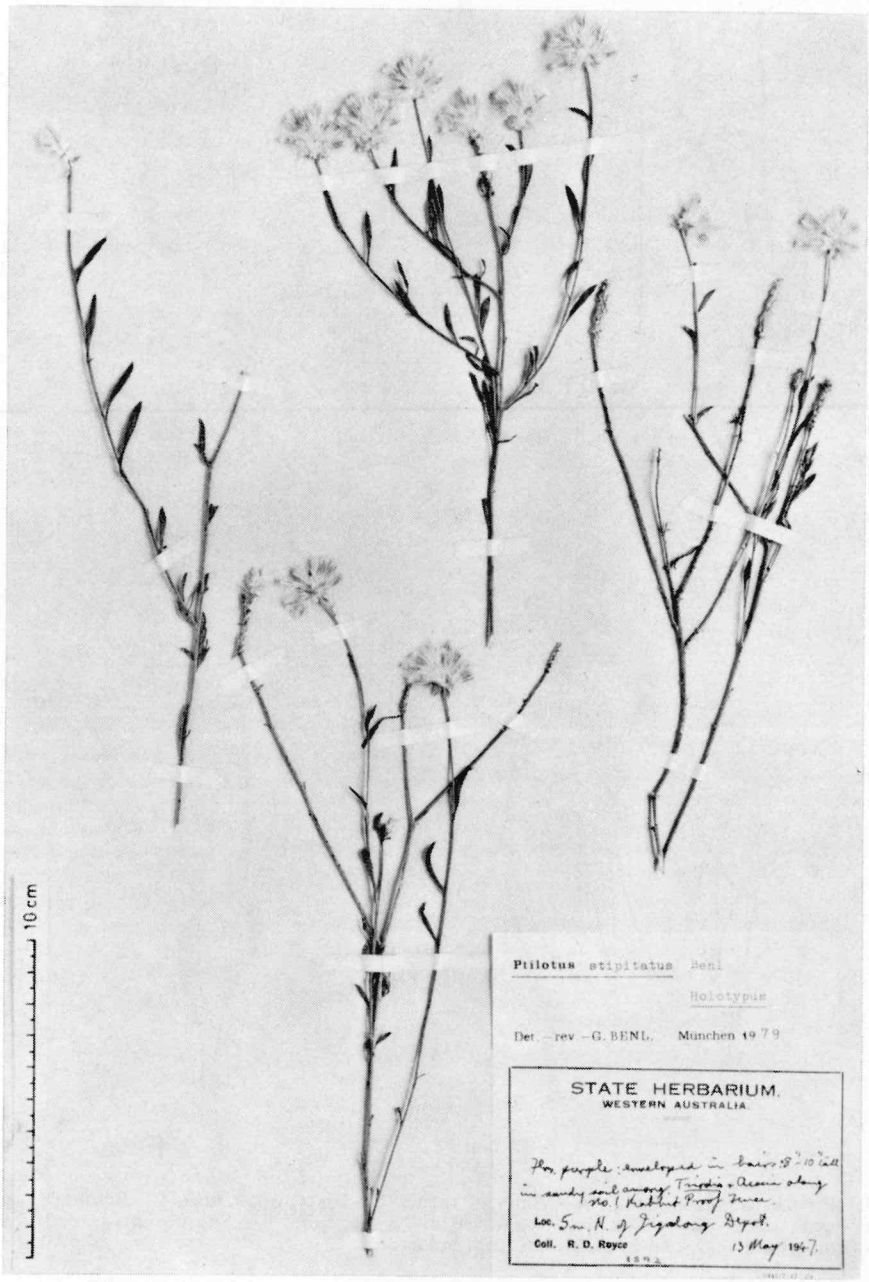

Figure 6. *Ptilotus stipitatus* Benl. Holotype sheet. Coll. R. D. Royce No. 1592, 13 May 1947, 8 km N. of Jigalong Depot, Western Australia. PERTH. (phot. K. Liedl).

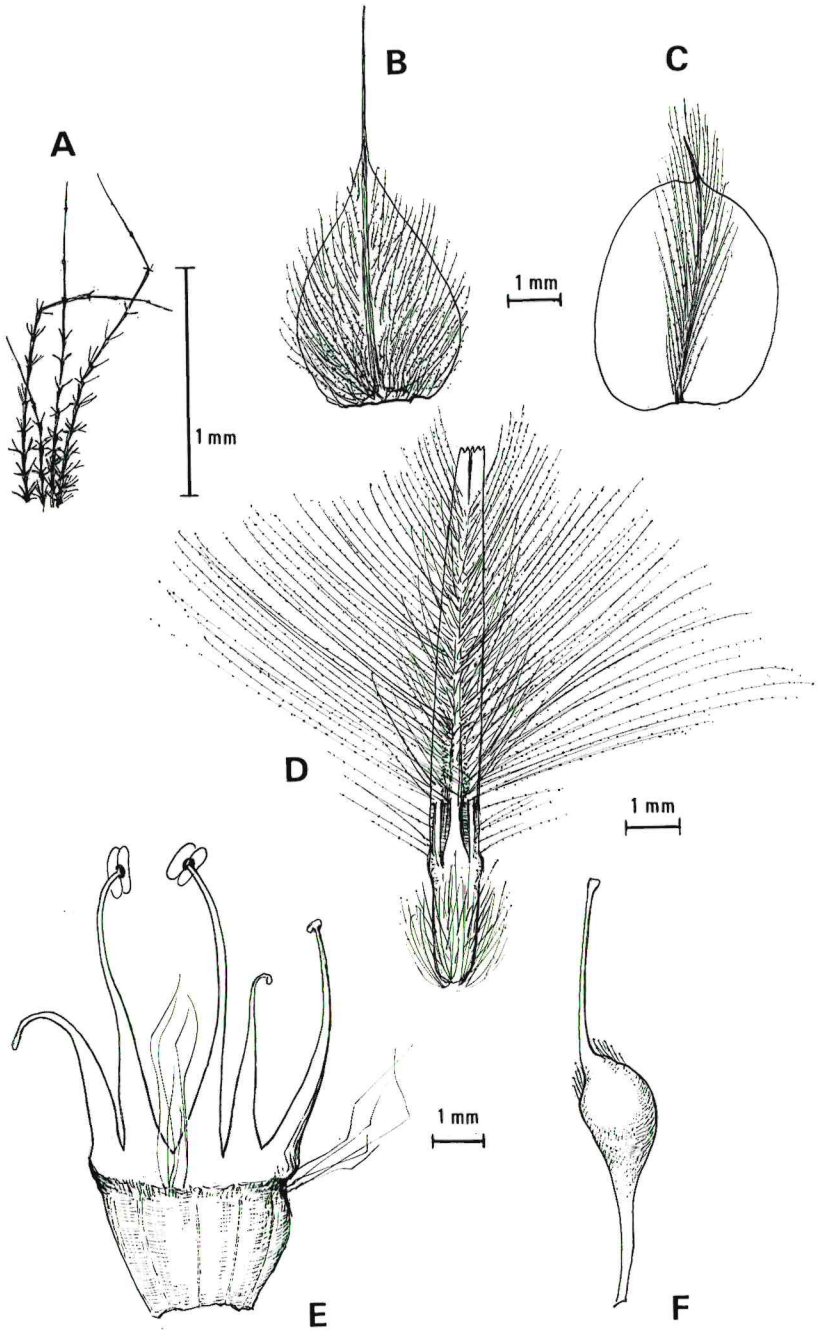

Figure 7. *Ptilotus stipitatus* Benl. A—Hairs of rachis, B—Bract, outer face, C—Bracteole, outer face, D—Outer tepal, outer view, hairs partly removed above the tube, E—Androecium spread open, outer face, F—Gynoecium. (Drawn by A. Böhm from holotype).

Pistil remarkably long-stipitate (Figure 7F). Ovary clavate 3·0–4·7 mm long including stipe of 1·7 to 3·0 mm, 0·8–1·3 mm wide, very sparsely pilose towards apex on opposite sides, with rigid subverticillate hairlets rarely up to 0·8 mm long. Style eccentric, more or less filiform, 2·7–3·4 mm long, ca 0·07 mm diam. in middle and 0·13 mm at the thickened base. Stigma level with the anthers, inconspicuous, often dark red.

Specimens examined: Western Australia: 8 km N. of Jigalong Depot, 'in sandy soil among *Triodia* and *Acacia* along No. 1 Rabbit Proof Fence', *R. D. Royce* 1592 (typus), 13 May 1947 (PERTH); ca 64 km S. of Mt Archie (= 32 km N. of NMF-21), 'in sandhills', *M. de Graaf* K 200, 30 Jan. 1969—(PERTH).

The very scanty material of de Graaf's collection has not been fully respected in the above description. In this the apices of the outer tepals are more mucronate than serrate and not exceeded by dorsal vestiture; the inner tepals are acute by more infolded margins. de Graaf's plant may represent a distinct infraspecific taxon, but clarification must await further gatherings.

Discussion: Basally widely dilated filaments as well as constantly two fertile stamens also occur in *P. aristatus* Benl, *P. chippendalei* Benl, and *P. kenneallyanus*, only the last species being shrubby. The others are herbaceous with numerous tufted more or less rod-like shoots (*P. aristatus*) or with prostrate stems from a rosette (*P. chippendalei*). The very bushy *P. kenneallyanus*, however, has a well-developed though evanescent pubescence on stems and foliage, subrhombic to spathulate leaves, copious axillary and terminal flower heads which are more compact, bracts with markedly shorter awns, a different kind of perianth indumentum, a pistil with decidedly shorter stipe and style, etc. The new species is clearly distinct from this, presumably its closest relative.

4. Ptilotus divaricatus (Gaud.) F. Muell. var. **rubescens** Benl, var. nov. (Figure 8)

Differt a varietate typica spicis rubescentibus, primo conoideis demum ovoideis vel subglobosis.

Diverging from the type variety of *P. divaricatus* in having red flower heads, initially cone-shaped (Figure 8), turning ovoid or subspherical.

Type: ± 1 km NE. of Bore Camp, Dirk Hartog Island, W. Aust. (± 25°37′S, 112°57′E); coll. *A. S. George* 11578, 6 Sept. 1972 (holotype: PERTH; isotype: CANB). 'Straggling perennial herb; flowers pink. In sand, in low open-heath.'

Except at the short glabrous tips, the purplish-red colour of the tepals is brightened to pink or mauve by a white silky pubescence and obscured by the comparatively large bracteoles in young spikes. In this stage the inflorescences (in the type material) are acutely coniform, their length and breadth averaging in the ratio of 1 to 0·8; spikes of about the same stage in var. *divaricatus* are usually subhemispherical with a ratio of 1 to 1·3.

Specimens examined: Western Australia: ± 1 km NE. of Bore Camp, Dirk Hartog Is., ± 25°37′S, 112°57′E, *A. S. George* 11578 (typus), 6 Sept. 1972 (CANB, PERTH); between Tamala and Carrarang in heath, *J. S. Beard* 6808, 11 Oct. 1973 (NSW, PERTH). 'Scandent semi-woody plant, flowers mauve.'

Discussion: This taxon is not merely a red flowering 'forma' of the typical white-flowered plant, as is found in *Ptilotus polystachyus* (Gaud.) F. Muell. f. *rubriflorus* (J. M. Black) Benl, which often occurs together with the typical form. There are no known collections of red-flowering specimens of *P. divaricatus* earlier than in 1972. The pink-flowered specimens gathered by A. S. George were not mingled with normal plants: 'As far as I recall *P. divaricatus* was not common on Dirk Hartog Island, and those plants I saw had the pink flowers. Had there been the normal white-flowered plants as well I would have collected them also', the collector in a letter dated 3 July, 1979.

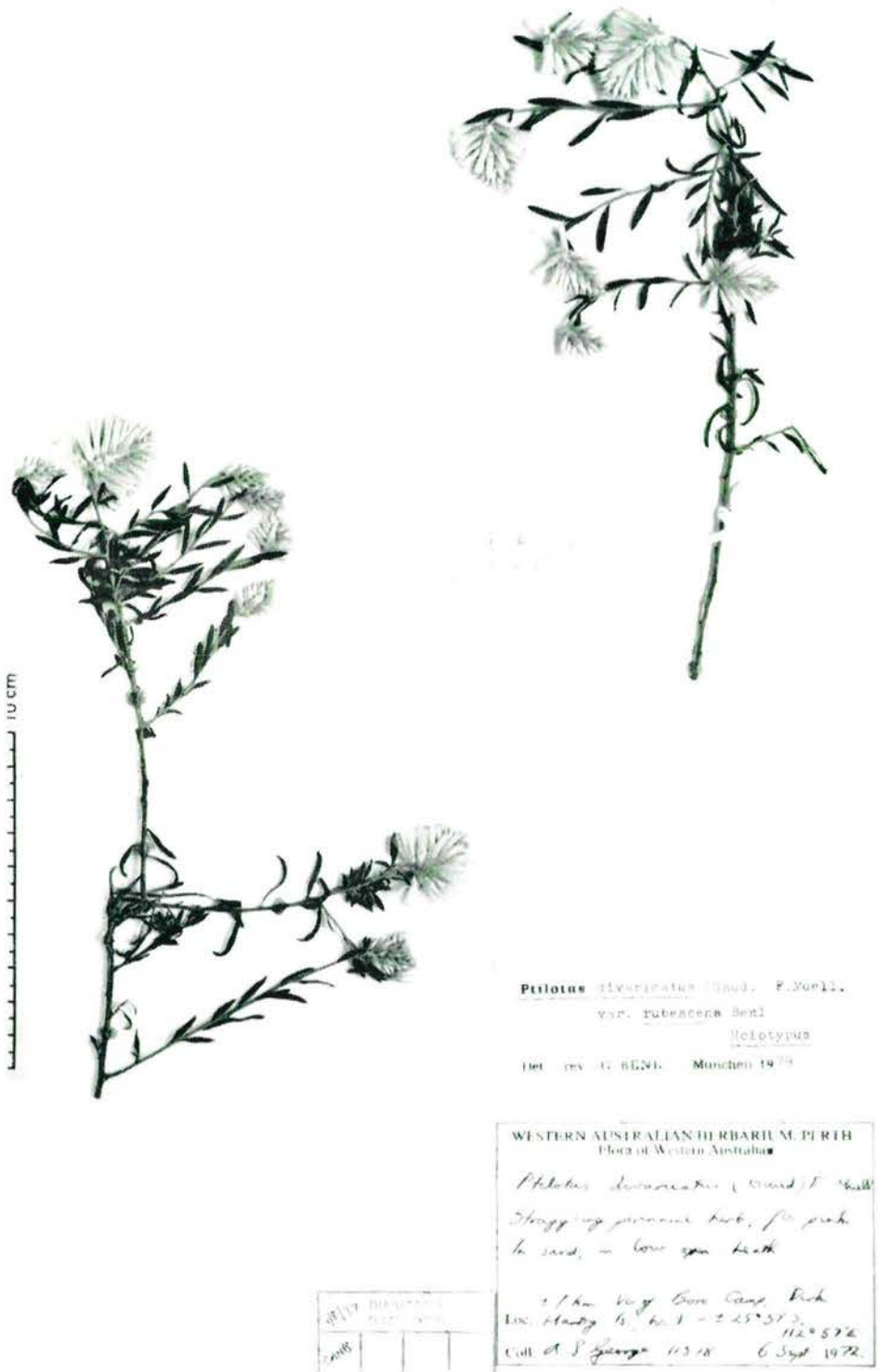

Figure 8. *Ptilotus divaricatus* (Gaud.) F. Muell. var. *rubescens* Benl. (J. S. Beard 6808) (phot. K. Liedl).

5. Ptilotus drummondii (Moq.) F. Muell. var. **elongatus** Benl, var. nov. (Figure 9)

A varietate *drummondii* ob habitum humiliorem caespitosum atque caules partim decumbentes (Fig. 9), a var. *minore* (Nees) Benl ob bracteam bracteolis minorem et perianthium pilis dorsalibus paucioribus apices tepalorum haud superantibus obsessum, a var. *scaposo* Benl ob caules conspicue ramosos et ob folia basalia distincta deficientia, a formis omnibus speciei ob spicas 1·6–2 cm latas ad 4·5 cm elongatas distinguitur.

Type: Fitzgerald River just above Twertup Creek, Fitzgerald River National Park, W. Aust.; coll. *A. S. George* 11266, 16 March 1972 (holotype: PERTH). 'Herb with perennial stock; flowers pink. In loam, in mallee-scrub close to river.'

Low bushy herb ca 18 cm across with numerous very slender stems from a weakly divided stock, up to about 15 cm tall. Ca 40 erect, ascending or prostrate stems and branches with terminal spikes, those of horizontal stems vertical (Figure 9). Spikes resembling those of *P. drummondii* var. *drummondii* in colour, but finally elongating up to 4·5 x 1·6–2 cm. Bracts and bracteoles strongly keeled, the smaller bracts at first pubescent. Gynoecium quite glabrous, densely enveloped by woolly hairs arising from inner tepals, outer face of staminal ring and fimbriate pseudostaminodes.

Discussion: Usually *P. drummondii* var. *drummondii* has 'erect simple rigid . . . stems' (Bentham **5**: 235; 1870) rarely branched: 'Caules semper stricti nunc non nisi basi parce ramosi nunc (praesertim ramis primariis pecore destructis) ramosissimi virgati caespitosi' (Diels & Pritzel, Bot. Jb. **35**: 191; 1904).

In large-headed forms of var. *drummondii* the inflorescences may also reach a length of 4·5 cm, but then the spikes are ca 3·6 cm across, thus having a broadly ovoid, not narrow-cylindrical, aspect.

The principal points of distinction within the *P. drummondii* complex may be summarized as follows:

1a. Basal leaves persistent, narrowly spathulate, long-petiolate, markedly different from cauline ones. Stems up to ca 15 cm tall, unbranched or divided at ground-level ..... var. *scaposus*

b. No conspicuous basal leaves in mature plants; all leaves (sub)linear-lanceolate to filiform, mostly sessile or nearly so 2

2a. Spikes subglobose up to 2 cm long, soon becoming (yellowish-) white. Bract larger than bracteoles. Apices of tepals obscured by copious dorsal hairs var. *minor*

b. Spikes up to 4·5 cm long, dull purple fading to light pinkish, finally becoming dirty whitish-green to stramineous. Bracts not larger than bracteoles. Apices of outer tepals glabrous, exceeding pubescence 3

3a. Stems to ca 15 cm long, partly decumbent, conspicuously branched. Spikes 1·6–2 cm across, ovoid to narrow-cylindrical. Bract smaller than bracteoles var. *elongatus*

b. Stems to 80 cm tall, usually stiffly erect and simple. Spikes subglobose to (broadly) ovoid up to 3·6 cm across. Bract more or less equalling bracteoles var. *drummondii*

(There may be some justification for separating the large-headed and the small-headed variants of this taxon at the level of 'formae', although there are intermediates between plants with subglobose inflorescences of less than 2 cm diameter and those with broadly ovoid ones of up to 3·6 x 4·5 cm; on the other hand in large-spiked specimens the tepals have a more copious pubescence.)

Figure 9. *Ptilotus drummondii* (Moq.) F. Muell. var. *elongatus* Benl. (A. S. George 11266) (phot. K. Liedl).

A new species of Eucalyptus from the margins of salt lakes in Western Australia

By S. G. M. and D. J. Carr[1]

Abstract

Carr, S. G. M. and D. J. A new species of Eucalyptus from the margins of salt lakes in Western Australia. Nuytsia 3, 2: 173–178 (1980).

A new species (*Eucalyptus halophila*) is described. It is included in the informal series "Bisectae" but appears to have no close affinity with any other species. It is characterized by persistent spiral phyllotaxis and stomata with anterior chambers occluded by cutinised polar wall ingrowths.

Eucalyptus halophila D. J. Carr et S. G. M. Carr sp. nov.

Frutex parvus affinitatis incertae qui ab speciebus Eucalypti omnibus ut sequente differt: cotyledones bisectae; medulla sine glandibus oleosis; cubiculum anticum stomatale incementis intrusis cutinalibus parietis polaris ornatum; phyllotaxis semper (2, 3) spiralis; staminodia externa; valvarum apices in fructu nulla; testa brunnea, favosa, ordinatione cellularum indistincta.

Type: 12·5 km NNW of Dalyup, Western Australia, near small salt pan (131°32′E, 34°37′S), 25 February 1966 *A. S. George* and *S. G. M. Carr* 7661. (holotype: PERTH).

A small shrub of uncertain affinity which differs from all other known species in the possession of the following constellation of characters viz: bisected cotyledons; pith without oil glands; anterior stomatal chamber ornamented with cutinised polar wall ingrowths; phyllotaxis persistently (2, 3) spiral; external staminodes; tips of valves lacking in fruit; testa brown, honeycombed, cell pattern indistinct.

Description

A lignotuberous *shrub* up to 2 m tall; bark deciduous, pale-grey or brown, both it and the pith without oil glands. *Leaves* green, concolorous, held more-or-less erect, triplinerved, the lateral nerves distant from the margin, minor veins obscure; seedling and juvenile leaves narrow-linear to narrow-obovate, blunt, phyllotaxis (2, 3) spiral (Fig. 2E); intermediate (Fig. 1B) and adult leaves (Fig. 1A) (2, 3) spiral or sub-decussate (Fig. 2F), narrowly elliptical, symmetrical or slightly falcate. *Unit inflorescences* axillary (3–) 7-flowered, the upper ones subtended by leaves, the lower by prophylls, peduncle slightly flattened with acute margins. *Flower buds* obpyriform, stalked, pedicel slender, shorter than the hypanthium. Sepaline *operculum* shed early, petaline operculum conical or rounded, much wider than long, usually with a small umbo. *Staminophore* projecting over the tube of the flower; outer filaments anantherous or with abortive anthers, not all inflexed, zig-zag before anthesis; filaments of fertile stamens very short, inflexed. *Anthers* broader than long, lobes globular, dehiscence by introrse oblique slits, filament inserted at the mid-point or below it. *Nectary* lining the tube of the flower; upper surface of ovary

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slightly domed and with small ridges indicating the mid-lines of the loculi. *Style* straight, slightly tapered, as long as the cone of stamens in bud; stigma inconspicuous, domed, as wide as the style. *Fruit* (Fig. 2C) sharply contracted into the pedicel, globular-truncate or ovate-truncate, 5–8 mm diameter, contracted at the orifice; valves truncate, projecting

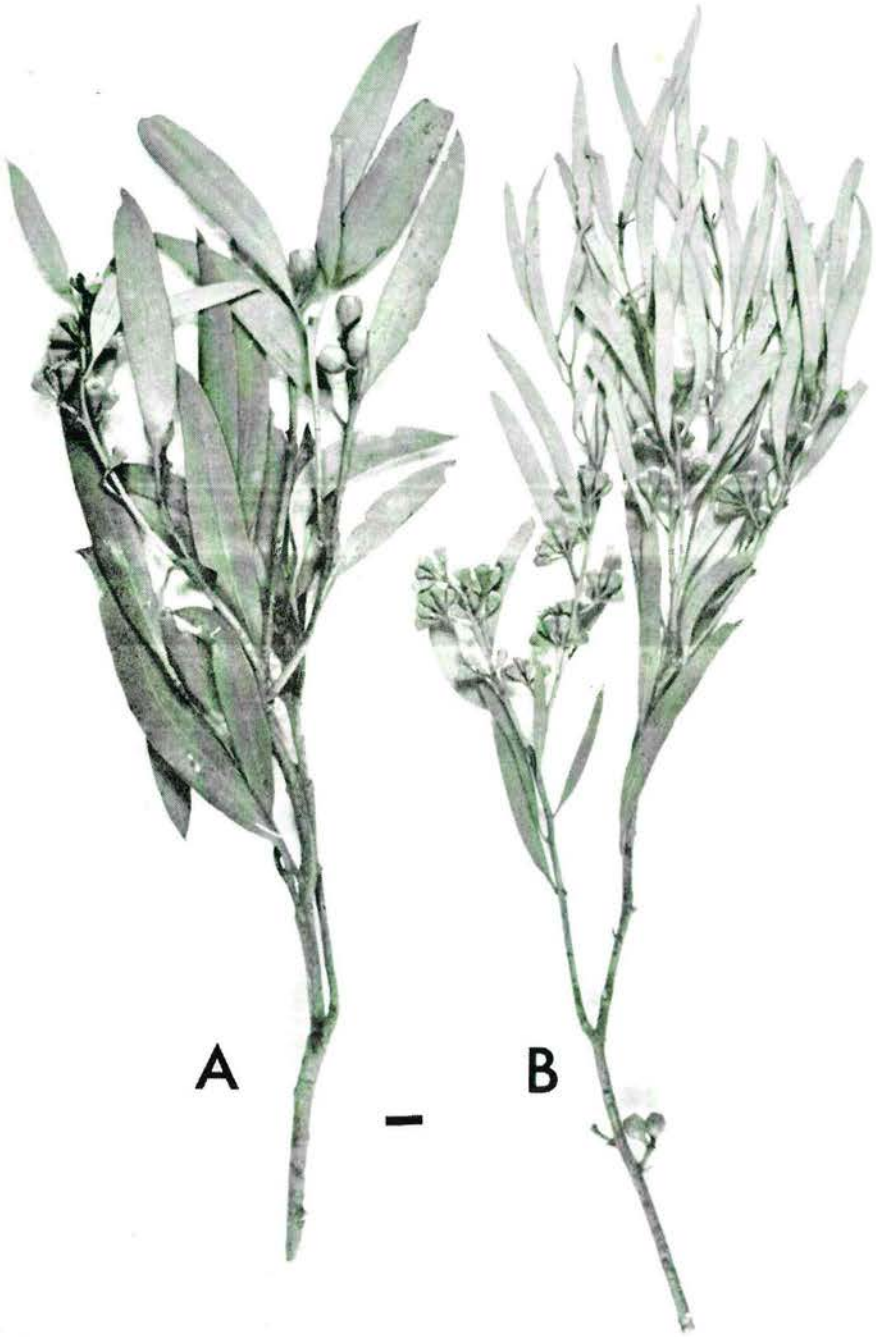

Figure 1. *Eucalyptus halophila* sp. nov. Scale marker 1 cm. A—Fragment of S. G. M. Carr 646, adult foliage. B—Fragment of A. S. George and S. G. M. Carr 7661; intermediate foliage.

only a short distance beyond the base of the nectary. *Seeds* hemitropous, testa brown, honey-combed, cell pattern not distinct (Fig. 2D) hilum more or less central. Cotyledons bisected.

Specimens examined: 12·5 km NNW of Dalyup, 25 February 1966, A. S. George and S. G. M. Carr 7660, 7662, 7663; W of Norseman-Esperance Rd, 6 km NNW of Scaddan, 1 April 1968, on sand at edge of salt lake, S. G. M. Carr 646 (PERTH).

Habitat: near the margins of salt lakes.

The species is known only from the localities cited above, both of which are in the catchment of the Dalyup River. It should be looked for in similar environments in the area. It is inconspicuous in the field and at first glance could be passed over as a species of *Acacia*. It appears to be very tolerant of wind-pruning and in Canberra has survived prolonged frosts down to —5°C without damage.

Affinities

It appears to have no close affinities with any other species in the informal group 'Bisectae' to which it belongs. The ornamentation of the anterior stomatal chamber (Fig. 3) is unique. On the other hand, *E. halophila* has features shown individually (but not in combination) by other species of 'Bisectae'. Its seeds match those of *E. salubris* F. Muell. and allied species, but *E. halophila* differs from the members of this group in so many other features that a relationship to it is unlikely. *E. angustissima* F. Muell. is a species similar in habit which has been collected at the edge of salt lakes, but it differs in having internal staminodes, inflexed filaments and the tips of the valves persisting in fruit. *E. gracilis* F. Muell., *E. calycogona* Turcz. and *E. celastroides* Turcz. have external staminodes arranged as in *E. halophila* but in those species the tips of the valves persist in fruit and the pattern of the testa is distinct and of low relief.

Notes on morphological characters

1. Fruit

The seeds mature within twelve months of flowering. Dehiscence of the fruit may follow or it may be postponed for at least a further year during which time the fruit increases in size. This means that mature fruit of two sizes (diameter 5 mm and 8 mm) may be present on the same plant (Fig. 2C). The surface of first year fruits is smooth, that of second year fruits wrinkled. Dehiscence of the capsule may involve a single process or require two stages for its completion. In the first an irregular disc of ovary tissue crowned by the base of the style is shed (Fig. 2A, B). The truncate valves then separate loculicidally. In the second case dehiscence begins at the midlines of the loculi and extends into the base of the style. Initially, each valve is then tipped by a segment of the style base. The fragility of the valves, for which no definite structural reason can be advanced, is indicated by the fact that if their tips are still present in an open fruit even a light touch with a needle detaches them.

2. Venation

The venation is extremely obscure in living material but the triplinerved pattern becomes clearer on drying.

3. Intermediate and adult foliage

Flowering and fruiting occurs on shoots with either intermediate or adult foliage. Some apparently fully-grown plants in the natural habitat appear to lack adult foliage. Other plants of the same size in the same area possess it. A specimen raised from seed and grown for 12 years in Canberra has not yet produced adult foliage although it has flowered and set fruit. However, it occasionally produces a shoot with sub-decussate leaves.

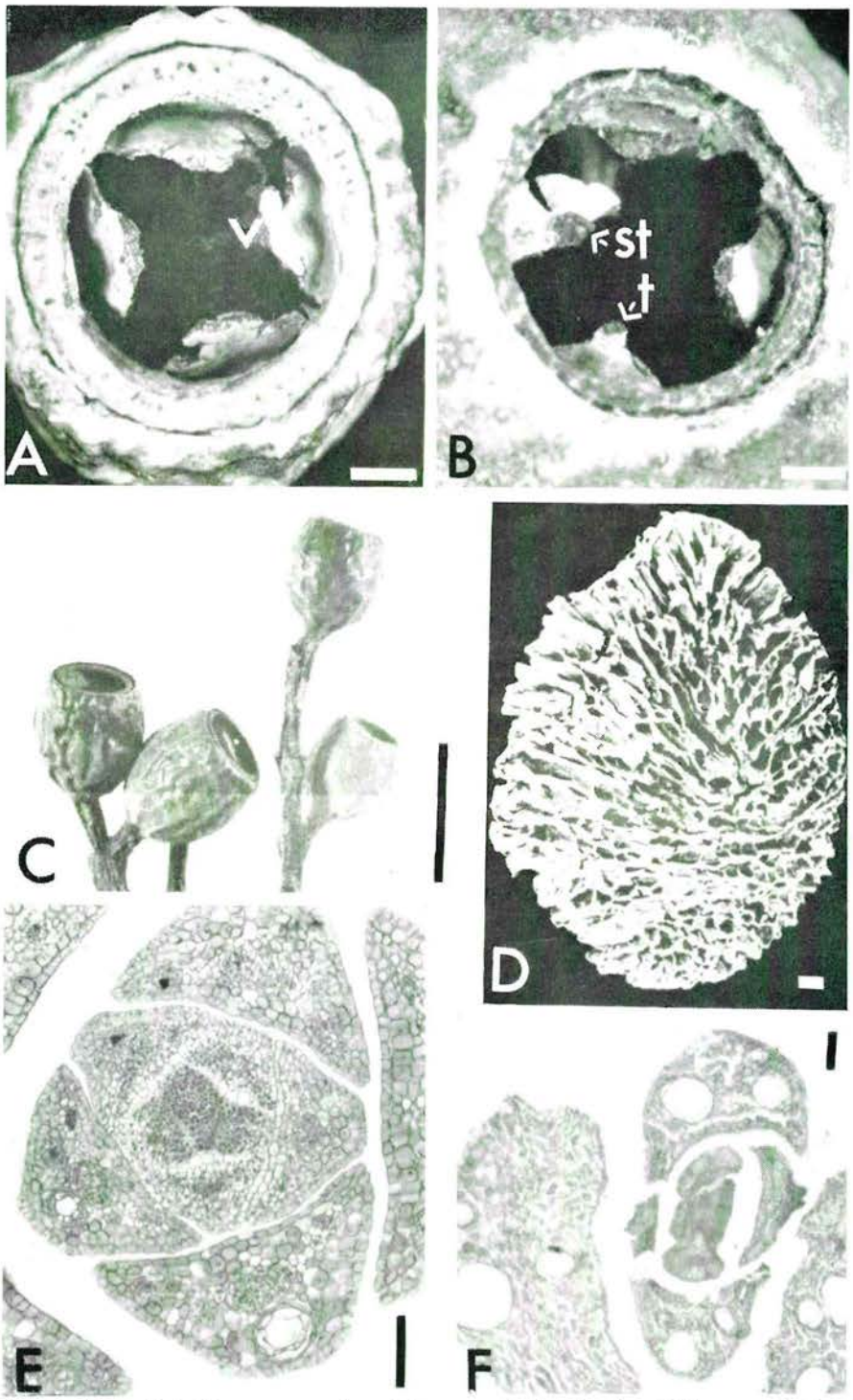

Figure 2. *Eucalyptus halophila* sp. nov. A and B, mature fruits, showing dehiscence of valves (v); st, base of style; t, tip of valve. Scale marker, 1 mm. C—two sizes of mature fruits of S. G. M. Carr 646. Scale marker, 1 cm. D—seed of A. S. George and S. G. M. Carr 7661. Scanning electron micrograph. Scale marker 0·1 mm. E and F—transverse sections of vegetative buds. E, from plant grown in Canberra with intermediate foliage and (2, 3) spiral phyllotaxis. F, from herbarium material of S. G. M. Carr 646 with adult sub-decussate foliage. Note: other buds of the same material with adult foliage are (2, 3) spiral. Scale markers, 0·1 mm.

4. Stomata

Paradermal sections (Fig. 3D) or scanning electron micrographs of the leaf surfaces (Fig. 3A) show the stomata to be occluded, leaving only a narrow H-shaped passage. Occlusion is by grooved tongues of cutinized wall material which descend into the anterior chamber from its walls above the poles of the guard cells (Fig. 3 B, C). These tongues are developed in relation to the unusual upturned poles of the guard cells (Carr and Carr, 1980) in both intermediate and adult foliage. The stomata of intermediate (Fig. 3B) and of adult leaves lack stomatal bars (Carr and Carr, 1979).

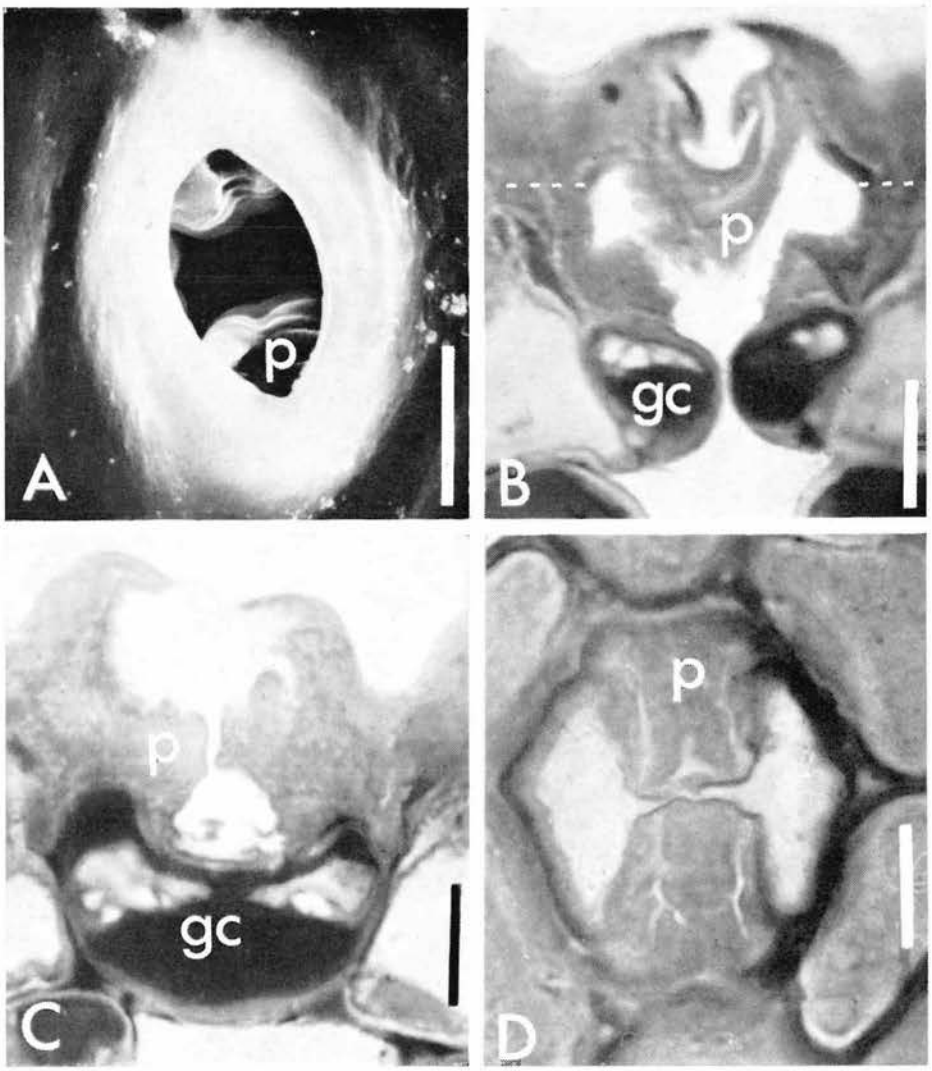

Figure 3. Stomata of *E. halophila*. Scale marker, 0·01 mm. A—scanning electron micrograph of prepared leaf cuticle from type material. P, polar flap. B and C—thin sections of leaf from plant grown in Canberra, embedded in glycol methacrylate and stained according to Carr and Carr, 1978. Gc, guard cell; p, polar wall ingrowth. B, t.s. stoma, C. l.s. stoma. D—paradermal section through a stoma at the level indicated by dotted lines in Fig. 3B.

Acknowledgements

We thank Mr A. S. George for the Latin diagnosis and for assistance with field collections over many years.

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A new species and a new combination in Darwinia (Myrtaceae) from Western Australia

By N. G. Marchant[1] and G. J. Keighery[2]

Abstract

Marchant, N. G. and Keighery, G. J. A new species and a new combination in *Darwinia* (Myrtaceae) from Western Australia. Nuytsia 3, 2: 179–182 (1980).

Darwinia wittwerorum sp. nov. is described and illustrated and a new combination, *Darwinia oxylepis* (Turcz.) comb. nov. is made. Both species occur in the Stirling Range National Park, south western Australia.

Introduction

Before publishing the results of a detailed study of relationships and variation in Stirling Range species of *Darwinia* it is necessary to describe a new species and make a new combination.

Quantitative data of the new species were obtained from measurements on a leaf, bract and flower sampled from each of forty individual plants. The term "floral tube" is used here rather than the term "calyx tube" adopted by Bentham (1867). In addition, the terms "calyx lobes" and "corolla lobes" are used in preference to "sepals" and "petals".

1. **Darwinia wittwerorum** Marchant et Keighery sp. nov.

Frutex 30–80 cm altus. *Folia* linearia-triquetra, 5–10 mm longa, acuta. *Capitulum* terminale, magnum, nutans; bracteae exteriores involucrorum pluri-seriales; bracteae interiores elliptico-obovatae, 18–21 mm longae, 6–9 mm latae. *Bracteolae* lineares, ad apicem concavo-spathulatae, acutae, 6–9 mm longae. *Tubus floralis* cylindricus, durus, 4–6 mm longus. *Calycis lobi* minuti, triangulares. *Lobi corollae* ovati, cremei, 3–4 mm longi. *Stamina* 10. *Staminodia* 10, linearia, ± 1 mm longa. *Stylus* falcatus, 8–10 mm longus. *Ovula* 2.

Type: Erect plant to 75 cm tall, on red clayey sand with shrubs of *Eucalyptus cornuta*, near Talyuberlup, Stirling Range National Park, *N. G. Marchant* 77/305, 17 October 1977 (holo: PERTH, iso: MEL).

Erect, single-stemmed *shrub* 30–80 cm tall. *Leaves* scattered, linear-triquetrous, 5–10 mm long, less than 0·5 mm wide, apex acute; leaf scars persistent. *Inflorescence* ovoid, pendulous; *outer bracts* elliptic in lower half, linear above, cream; *inner bracts* elliptic-obovate, 18–21 mm long, 6–9 mm wide, cream in lower half, pink or rose pink in upper part. *Flowers* 5–9. *Bracteoles* 4, linear in lower half, concave spathulate in upper half, 6–9 mm long, 1–2 mm wide. *Floral tube* narrow, circular in cross section, with faint ribbing, 4–6 mm long. *Calyx lobes* minute, triangular, less than 0·25 mm long. *Corolla lobes* cream coloured, ovate, entire, 3–4 mm long. *Stamens* 10; filaments less than 1 mm long. *Style* falcate, bent towards centre of inflorescence, terete, 8–10 mm long. *Stigma* globose, minute, subtended by a 1–2 mm wide band of rigid hairs forming a cone-shaped brush. *Ovules* 2.

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[2] Kings Park and Botanic Garden, Perth, Western Australia 6000.

Chromosome number n = 6 Rye (1979).

Distribution: Restricted to low-elevation sites in the central part of the Stirling Range National Park, Western Australia.

Other Collections: (all from same general locality near Talyuberlup, Stirling Range National Park; collection number and date cited only) all at PERTH: *T. Hales* 5, 11 Sept. 1976; *T. Hales* 1, 22 Dec. 1974; *N. Marchant* 77/307, 17 Oct. 1977; *E. Wittwer* 2027, 11 Oct. 1977; *G. Keighery* 1821, 20 Oct. 1977.

Etymology: Named in honour of Magda Wittwer (28 August 1922–16 October 1977) and Ernst Wittwer, Superintendent of Kings Park and Botanic Garden, Perth.

Darwinia wittwerorum sp. nov. is distinguished from the other so-called "Mountain Bells" by its linear-triquetrous leaves, ovoid inflorescences, small inner bracts and shorter style length. It is similar to *Darwinia lejostyla* (Turcz.) Domin from which it is separated by the following characters. Quantitative characters are based on 80 samples of *D. wittwerorum* and 200 of *D. lejostyla*.

	D. lejostyla	*D. wittwerorum*
inflorescence	campanulate	ovoid
inner bract colour	pink or red	cream and pale pink
inner bract length	19–31 mm, ... mean = 24·6 mm	18–21 mm, mean = 19·8 mm
number of flowers/inflorescence	7–12, ... mean = 9·1	5–9, mean = 6·5
style length	15·5–22 mm, ... mean = 17·7 mm	8–10 mm, mean = 9·3 mm

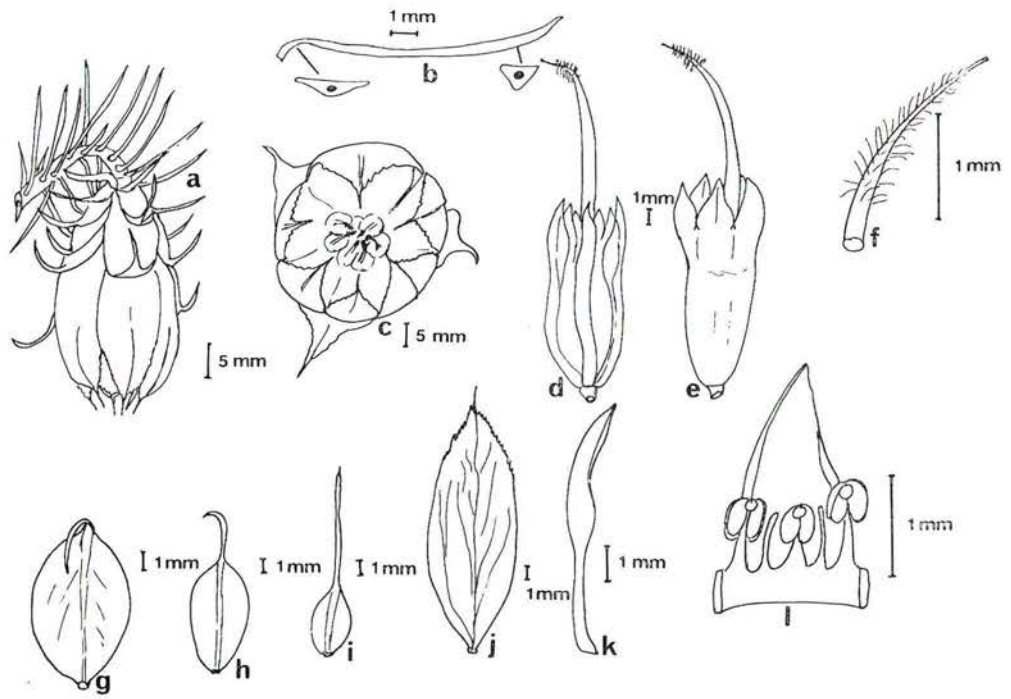

Figure 1. *Darwinia wittwerorum* sp. nov. a—Inflorescence, side view. b—Leaf, side view with proximal and distal transverse sections. c—Inflorescence from below. d—Flower with bracteoles. e—Flower with bracteoles removed. f—Distal part of style. g—Bract from inner part of involucre. h—Bract from outer part of involucre. i—Outermost involucral bract. j—Innermost involucral bract. k—Bracteole. l—Stamens and staminodia. All from N. G. Marchant 77/305.

The two species are allopatric. Some populations of *D. lejostyla* are known to be only 15 km away from recorded localities of *D. wittwerorum.*

2. Darwinia oxylepis (Turcz.) Marchant et Keighery comb. nov.

Basionym: Genetyllis oxylepis Turcz., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg. 10: 324 (1852). *Type: J. Drummond* 5th collection no. 100 (holo: KW n.v., iso: K, MEL).

Genetyllis meisneri Kipp., J. Linn. Soc. (Bot.) 1: 49 (1856) pro parte as to Drummond 5: 100, nom. illeg. *Darwinia meisneri* Benth., J. Linn. Soc. (Bot.) 9: 179 (1865) '*meissneri*', nom. illeg.—based on *G. meisneri* Kipp.

Drummond's 5th collection number 100 cited by Kippist under *G. meisneri* is the same number as the type collection of *G. oxylepis;* the former name is therefore illegitimate. The additional Drummond collection cited by Kippist (5th collection no. 101) was commented on by him; he stated that it ". . . seems to be merely a less luxuriant state of the same plant, with more thinly scattered leaves, and paler bracts and flowers; but I have been unable to detect any difference of structure sufficiently important to justify its separation as a distinct species". (Kippist 1856). In his 1852 paper Turczaninow described *Genetyllis lejostyla* (the original spelling has been retained in accordance with Article 73·5, 1978 International Code of Botanical Nomenclature), based on J. Drummond's 5th collection no. 101. This species was transferred to *Darwinia* by Domin in 1923 as *Darwinia leiostyla* (Turcz.) Domin. The present authors regard *D. lejostyla* and *D. oxylepis* as distinct species.

Neither Kippist nor Bentham appears to have seen the paper published by Turczaninow in 1852 which included descriptions of several species of *Genetyllis.* Even in 1865 and 1867 Bentham did not make reference to *G. oxylepis* or, in fact, to any other species described by Turczaninow in that paper.

The distinction between *D. lejostyla* and *D. oxylepis* was recognised by Drummond himself in a letter reporting his explorations in the Stirling Range area, published by Hooker, (Drummond 1849):

"Along with it[1] on Mongerup[2], I found a species with heath-like leaves, a bright scarlet involucre inclosing dark purple flowers[3]. On Congineerup[4] I found two large-bracted species of the genus; one with thyme-like, ciliated leaves and the bracts which form the involucre ciliated[5]; the other with heath-like leaves and bracts, without ciliae[6]; the bracts of both are rose-coloured".

Darwinia oxylepis and *D. lejostyla* can be distinguished on a number of characters. *Darwinia oxylepis* is a taller shrub with longer leaves, larger, acute-tipped, scarlet outer bracts, larger bracteoles as well as larger flowers; it is recorded only from a small area near Mondurup in the western part of the Stirling Range. *D. lejostyla* is more widespread in the eastern part of the range from Warrungup and Tolls Peak to Ellen Peak.

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[1] *D. macrostegia.*

[2] Mondurup, which Drummond climbed from the N.W. side, where *D. oxylepis* is now known to occur.

[3] *D. oxylepis* (J. Drummond 5th coll., n. 100).

[4] Bluff Knoll.

[5] *D. squarrosa* (presumably J. Drummond 5th coll., n. 99).

[6] *D. lejostyla* (presumably J. Drummond 5th coll., n. 101).

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Thryptomene and Micromyrtus (Myrtaceae) in arid and semi-arid Australia

By J. W. Green

Western Australian Herbarium

Abstract

Green, J. W. Thryptomene and Micromyrtus (Myrtaceae) in arid and semi-arid Australia. Nuytsia 3, 2: 183–205 (1980).

Seven species of *Thryptomene* and eight of *Micromyrtus* from arid and semi-arid regions of inland Australia are described and illustrated. Notes on the species and maps of their distribution are given and keys to their identity provided. Six are described as new (*T. naviculata, T. wittweri. T. nealensis, M. barbata, M. fimbrisepala* and *M. serrulata*) and new combinations (*M. helmsii* and *M. stenocalyx*) are made for two others.

This paper describes and illustrates all species of *Thryptomene* and *Micromyrtus* occurring within the geographic range of the forthcoming Flora of Central Australia, as well as some from nearby regions. The species dealt with here occur chiefly in the Central Bioclimatic Region (Austin and Nix 1978), except *T. parviflora, T. hexandra* and *M. hexamera* which are distributed principally in the Eastern Bioclimatic Region. Altogether fifteen species are known from the area—seven of *Thryptomene* (including three new species) and eight of *Micromyrtus* (including three new species and two new combinations).

Specimens from the following herbaria were examined: AD, ADW, BRI, CANB, MEL, NSW, NT and PERTH. Descriptions were drawn up using the type specimen and a sample of other collections. The number of specimens cited was reduced where necessary to a selection of those examined based on their morphological variability, historical importance, geographic origin, representation among herbaria, and the range of habitats cited on their labels. Recourse was made to European collections only when Australian material proved inadequate to solve problems of nomenclature and typification.

Thryptomene and *Micromyrtus* are generally distinguished from related genera by having stamens 5 or 10, regularly alternate with or opposite the sepals, quite distinct and without staminodia (Bentham 1867). Even though exceptions may be found to some of these characters in certain species, provided the majority of characters is considered these species clearly belong to *Thryptomene* or *Micromyrtus*. The recently-described genus *Corynanthera* (Green 1979) has many of the same characters but is distinguished by its unique androecium; it occurs outside central Australia.

Thryptomene and *Micromyrtus* are distinguished from each other by characters of the androecium and ovary: the stamens of the 5-stamened species of *Thryptomene* are opposite the sepals while those of *Micromyrtus* are opposite the petals; *Thryptomene* has ascending or laterally-attached ovules while *Micromyrtus* has pendulous ovules. Again exceptions to some of these characteristics occur, making generic determination sometimes difficult without complete material. The character of ovule number, used by Bentham to distinguish between them, is not diagnostic at the generic level.

It must be emphasised that the key to genera given here is designed to apply only to the inland Australian region; complications present elsewhere have been deliberately ignored. Some indication of the variation outside the present area is given in the generic descriptions.

Specialised terminology relating to the androecium and gynoecium follows Green (1979) and Green (1980). The term *floral tube* is preferred to *calyx-tube*, used by Bentham (1867) for the reasons stated by Parkin (1955) and Douglas (1957). The use of *stomium* for a region of dehiscence in the anther is explained by Esau (1965) and illustrated by Fahn (1974).

The morphology of the gland on the connective requires some explanation, as it does not appear to have been previously used as a diagnostic character in this group: it may vary from a near-globular, ± featureless structure, as in *M. helmsii* (Fig. 112) through a series having an increasingly prominent *neck*, with an apparently porate, terminal orifice. In *T. parviflora* (Fig. 17) and *T. naviculata* (Fig. 30) the gland usually protrudes only shortly between the microsporangia and is termed *truncate* or *compressed-urceolate*; when it is ± contracted below the apex, as in *T. wittweri* (Fig. 37) and *T. hexandra* (Fig. 63), it is termed *urceolate*, while at the extreme, when the neck is long and curved, as in *T. elliottii* (Fig. 54), it is termed *urceolate-falcate*. The shape of the gland may also be *clavate*, as in *T. maisonneuvei* (Figs. 6–7) or *compound*, with smaller lateral bulges, as in *M. fimbrisepala* (Fig. 100).

The flower stalk is here interpreted as a peduncle as it appears homologous with the structure bearing two or three flowers with pedicels in related genera.

Only for unusually variable parameters are dimensions qualified as approximate. Characters omitted from some descriptions can be assumed to be unknown.

Key to the genera, based on inland Australian species

1. Stamens less than 10, usually opposite the sepals; ovules 2 or 2 + 2 superposed, ascending or lateral; anther connective gland prominent, often equalling or exceeding the anther, clavate or ± urceolate .... **Thryptomene** Endl. (p.184)

1*. Stamens 10, or 5 opposite the petals; ovules 2 or 6–10, collateral, apical; anther connective gland less than half as large as the anther, subglobular .... **Micromyrtus** Benth. (p. 195)

THRYPTOMENE Endl.

Glabrous *shrubs*, slender or spreading, mostly 0·5–2 m high (one species outside the area arborescent); bark usually smooth, dark grey to brown, occasionally fibrous. *Leaves* small, entire, opposite, mostly ± flat above and convex below, with several to many immersed glands especially visible on the lower surface. *Flowers* sessile, subtended by a pair of complicate bracteoles, at least in the bud stage, inflorescence mostly solitary with a very short to long peduncle, borne singly in the upper leaf axils; some species with inflorescences paired in the axils. *Floral tube* mostly less than 3 mm long, cylindrical, turbinate, hemispherical or rarely laterally flattened, smooth, ribbed or rugose, adnate to the ovary, sometimes produced beyond it making the disc surrounding the style ± concave. *Sepals* and *petals* 5 or rarely 6, borne on the rim of the tube; sepals as long as the tube to very short, scarious, petaloid or petaloid with scarious margins, entire or denticulate; petals about as long as the tube or shorter, mostly rounded, entire, mostly pink, white or the two suffused. *Stamens* usually either 5 (antesepalous) or 10 (in a single whorl, not always regularly opposite the perianth parts), rarely 6 (antesepalous, *T. hexandra*), variable between 6 and 9, or between 15 and 30 (in one species outside the area); filament filiform, usually at least twice as long as the anther at maturity; connective bearing a prominent gland which may be globular, truncate, urceolate or falcate with a porate orifice, and sometimes protruding between the two microsporangia; anther tetraspor-

angiate, and bilocular (see Green 1980). *Ovary* unilocular, style and stigma solitary; ovary wall 3-layered, comprising outer, hard layer, middle, aerenchymatous zone and inner, fragile, sometimes fugitive membrane (see also Green 1979, p. 373); loculus either a small, spherical cavity in the upper part of the tube or appearing to occupy a larger space because of the breakdown of the middle zone and inner membrane in some older flowers. *Vascular trace* (here called the *stylar vein*) between the pedicel and the base of the style passing next to the smaller cavity where present and branching to the placenta. *Placenta* basal, subbasal or ± lateral in the ovary cavity, bearing 2, 4 or (outside the area) up to 8 ovules, collateral or in superposed pairs. *Fruit* an indehiscent nut, the floral tube scarcely enlarged in most species; seed usually single, ellipsoidal-reniform, rarely 2.

Key to inland Australian species

1. Ovules 4 in two superposed pairs; connective gland clavate; sepals membranous with a fleshy, green tip; floral tube rugose. Widespread central W.A., southern N.T. and north-western S.A. .... 1. **T. maisonneuvei** F. Muell. (p. 185)

1*. Ovules 2; connective gland urceolate or truncate; sepals petaline to membranous; floral tube ± ribbed

2. Sepals and petals 5.

3. Floral tube circular in transverse section; leaves linear, thin, concave above.

4. Sepals clawed.

5. Leaves thin, ± flat, narrow-obovate, mostly 3–4 mm long, margins entire. Central to south-eastern Q. 2. **T. parviflora** (F. Muell. ex Benth.) Domin (p. 187)

5*. Leaves broadly elliptical or obovate, thick, keeled, less than 2 mm long, margins ciliate. Near Lake Disappointment, W.A. .... 3. **T. naviculata** J. W. Green (p. 188)

4*. Sepals broad-based.

6. Leaves narrow-obovate, thin, ± flat, 6–8 mm long; peduncles up to 1·5 mm long. Mt. Augustus, W.A., Palm Valley, N.T. .... 4. **T. wittweri** J. W. Green (p. 190)

6*. Leaves linear-obovate, convex above, about 4 mm long; flowers subsessile. Neale Junction, W.A. 5. **T. nealensis** J. W. Green (p. 190)

3*. Floral tube laterally flattened, saccate near the peduncle; leaves obovate, thick, convex above. From Port Augusta, S.A. to north of Loongana, W.A. .... 6. **T. elliottii** F. Muell. (p. 192)

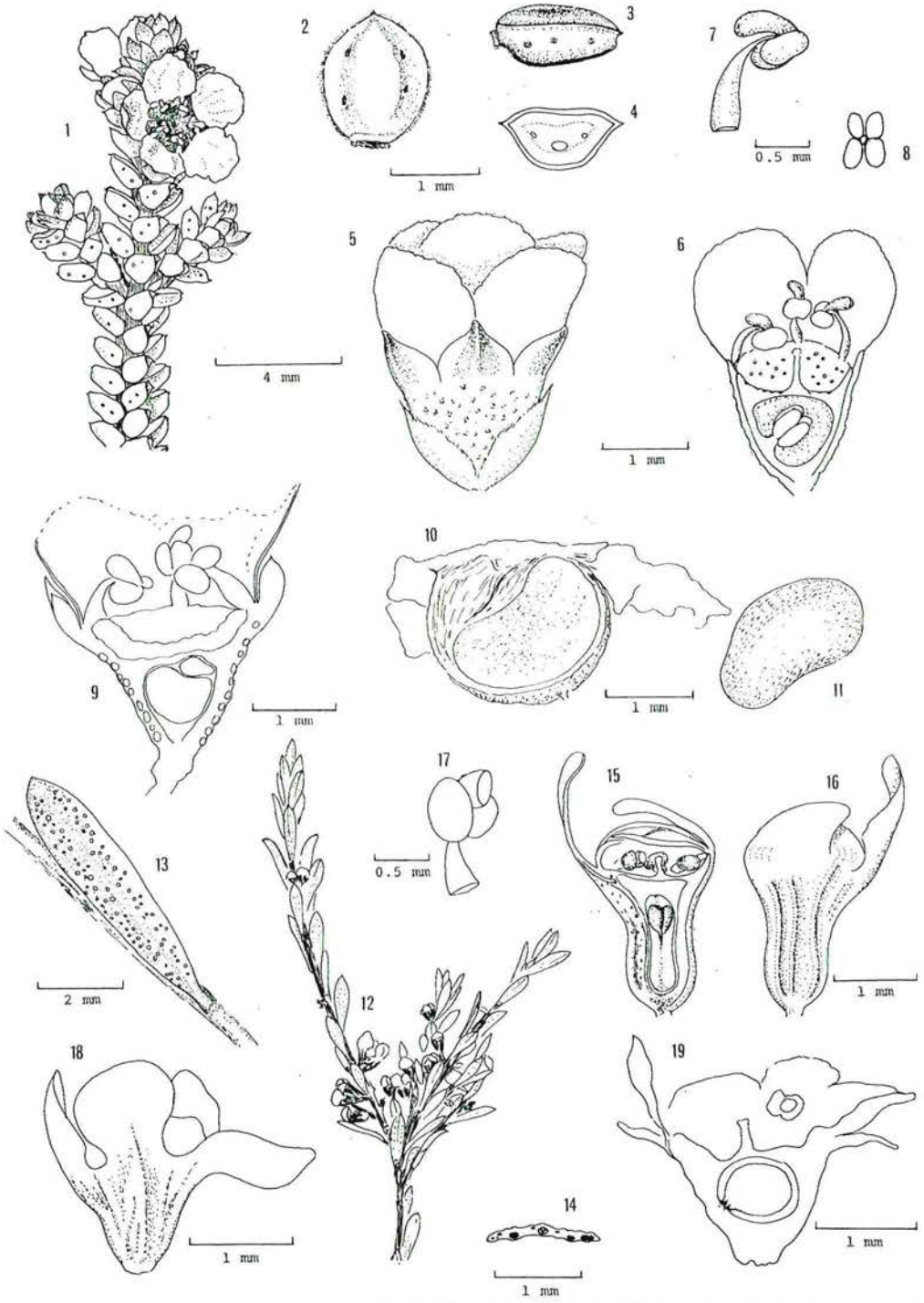
2*. Sepals and petals 6; stamens 6–8. Central-western border area between Q.-N.S.W. .... 7. **T. hexandra** C. T. White (p. 193)

1. Thryptomene maisonneuvei F. Muell., Fragm. 4: 64–5 (1864).

"Maisonneuvii". *Type:* "Ad flumen Finke Australiae centralis. J. Macd. Stuart" (holo: MEL 70712).

Thryptomene auriculata F. Muell., Fragm. 10: 24. *Type:* "Prope stationes Youldeh et Ouldabinna, nec non montes Musgrave's Range versus; Tietkens et Young" (holo: MEL 70713).

Erect *shrub* 0·3–1·5 m high and up to 2·4 m broad. *Stems* with softly fibrous or papery, reddish-brown bark. *Leaves* decussate, imbricate, clearly in 4 rows, sessile, 1–2 mm long, broadly elliptical or orbicular, thick, somewhat convex above, with a deep broad, flat-bottomed keel below, oil glands several. *Flowers* sessile, solitary in the upper axils. *Bracteoles* 2, persistent, broadly lanceolate, about 1 mm long, acute, the margins scarious, the midrib area fleshy-tipped. *Floral tube* broadly turbinate, about 1·5 mm long, minutely glandular-rugose or scabrid, without longitudinal ribs. *Sepals* about



Figures 1–11. *Thryptomene maisonneuvei:* 1—Habit, 2–4—Leaf abaxial, lateral and TS. 5—Bracteoles and flower. 6—Flower, LS, stamens, pitted disc, superposed ovules. 7—Stamen. 8—Superposed ovules. 9—Flower, LS. 10—Fruit, LS. 11—Seed. 1–5 from George 15626; 6–9 from Royce 1580; 10–11 from Cleland s.n., Between Musgrave and Everard Ranges, Sep. 1945. Figures 12–19. *Thryptomene parviflora:* 12—Habit. 13—Leaf. 14—Leaf, TS. 15–16—Flower, LS, external. 17—Stamen. 18—Clawed sepals. 19—Fruit, LS. 12 from Clemens s.n., Charleville, Oct. 1945; 13–17 from Johnson, R. W. 1251; 18–19 from Trapnell, Injune, Jan. 1968.

0·8 mm long, with hyaline, auriculate margins, a broadly triangular, petaloid centre and a thick, fleshy, obtuse tip. *Petals* orbicular, about 1·5–2 mm diameter, white or pink. *Disc* shallow, pitted, deep pink or red. *Stamens* 5, antesepalous, occasionally alternating with as many staminodia which resemble the filaments; filaments about 0·8 mm long; anthers about 0·2 mm long, dehiscing by two longitudinal stomia; gland on the connective clavate, prominently protruding towards the corolla. *Style* thin, about 0·5 mm long. *Ovules* 4, arising in two superposed pairs from a ± lateral placenta near the base of the ovary. *Fruit* not enlarged. *Seed* not seen. Flowering recorded February, May-November. Figures 1–11; Map 1; 2n = 22 (B.L. Powell 73097—see Rye 1979, p. 570).

Selection of specimens examined: WESTERN AUSTRALIA: Tobin Lake, Great Sandy Desert (21°45′S, 125°40′E) *A. S. George* 15626, 5 May 1979 (PERTH); 3 miles (5 km) N of Jigalong Depot, *R. D. Royce* 1580, 13 May 1947 (PERTH); Babbagoola Rock Hole (26°26′S, 126°11′E), *N. B. Tindale*, 26 Aug. 1935 (AD); Lorna Glen Station, *B. L. Powell* 73097, 10 July 1973 (PERTH); 185 miles NE of Cosmo Newberry (Mission), *A. S. George* 2887, 25 Aug. 1961 (PERTH). NORTHERN TERRITORY: 40 miles (64 km) NNW of Meyer's Hill, *G. F. Hill* 240, 2 May 1911 (MEL, NT); Simpson Desert, 24 km N of Andado HS, *A. E. Orchard* 748, 11 July 1968 (AD, NT); Between Musgrave Range and Everard Ranges, *J. B. Cleland*, Sep. 1945. (AD). SOUTH AUSTRALIA: Ca 300 miles (480 km) NW of Woomera, *F. L. Hill* 210, 13 Oct. 1953 (AD).

Widely distributed through the interior of Western Australia, western South Australia and the south-west of the Northern Territory, *T. maisonneuvei* is often recorded on red sand dunes, being locally abundant both on the crests and between sand ridges, in association with a wide variety of genera, the following having been recorded on specimen labels: *Triodia, Acacia, Grevillea, Casuarina, Codonocarpus* and *Eucalyptus*. Only scanty details of community structure have been recorded but photographs indicate an open shrubland having pure, sparse *T. maisonneuvei* as the tallest stratum, interspersed with tufts of *Triodia*.

In the Central Australian region, *T. maisonneuvei* is easily distinguished by the fleshy-tipped sepals, clavate connective glands and turbinate, rugose floral tube, without ribs. The occurrence of staminodia, a hitherto unrecorded character of the genus, seems limited to the northern extreme of the range of this species (A. S. George 15626).

2. Thryptomene parviflora (F. Muell. ex Benth.) Domin, Biblioth. Bot. 89: 449 (1928).

Thryptomene oligandra F. Muell. var. *parviflora* F. Muell. ex Benth., Fl. Austral. 3: 63 (1867). *Type:* Sandy tableland on the Suttor, Q., [cited as "Barren places, Gilbert river, Gulf of Carpentaria"] F. Mueller (holo: MEL 70776—bearing the incorrect label "Gilbert River" erroneously exchanged with that of MEL 70768 (the type of *Thryptomene oligandra* F. Muell.); iso: K of which photo PERTH—correctly labelled).

Slender, erect *shrub* 0·3–2·1 m high. *Leaves* decussate, ± imbricate, not obviously 4-rowed, linear-obovate, thin, flat or concave above, 1·5–7 mm long, about 1 mm broad, obtuse or with a minute mucro, somewhat recurved at the apex. *Flowers* solitary, axillary, up to 2 mm long and broad, forming loose, subterminal racemes. *Peduncle* 0·4 mm long. *Bracteoles* 2, 0·5 mm long, midrib fleshy and somewhat glandular, margins scarious. *Floral tube* broadly turbinate or obconical, 0·7 mm long, somewhat irregularly 10-ribbed. *Sepals* petaloid or somewhat scarious, white, clawed, 0·7 mm long, 1·3 mm broad. *Petals* similar, sometimes slightly smaller. *Disc* concave, shallow. *Stamens* 5 or occasionally 6, 0·2 mm long, antesepalous; filaments terete, 0·1 mm long; anthers 0·15 mm broad, purplish-black, dehiscing by two longitudinal stomia; connective gland prominent, obscurely urceolate-truncate. *Style* 0·8 mm long, stout; stigma level with the anthers of the incurved stamens. *Placentation* subbasal. *Ovules* 2. *Fruit* scarcely enlarged. *Seed* solitary, 0·8 mm diameter. Flowering recorded all months. Figures 12–19; Map 2.

Selection of specimens examined: QUEENSLAND: W of Pentland, *S. T. Blake* 9927, 19 Oct. 1935 (BRI); 5 miles (8 km) E of Jericho, *L. S. Smith & S. L. Everist* 974, 24 Oct. 1940 (BRI, MEL); 21 miles (34 km) NE of Tara, *R. W. Johnson* 1251, 1 Dec. 1959 (BRI, CANB); 44 miles (70 km) N of Injune, Carnarvon Range, *G. Trapnell*, Jan 1968 (BRI); Charleville, *M. S. Clemens*, 8 Oct. 1945 (BRI); 8·5 km E of Kogan, *J. W. Green* 4678, 13 Oct. 1977 (PERTH); 50 miles (80 km) W of Dalby, *S. L. Everist* 2160, 2 Aug. 1940 (BRI).

This species is recorded as occurring on a variety of soil types including laterite, red sand, white sand, sandy clay and hard-setting red earth associated with shrubby woodland or forest country containing species of *Eucalyptus*, *Callitris*, *Grevillea*, *Dodonaea*, *Acacia*, *Eremophila* or *Melaleuca*.

A good deal of confusion over localities seems to have originated in a mix-up in Bentham's (1867) notes under *Thryptomene oligandra*. His descriptions correctly distinguish between the arborescent *T. oligandra*, which has broad leaves and large flowers, and the shrubby *T. parviflora* (treated by Bentham as a variety of *T. oligandra*), which has narrow leaves and small flowers, but he has confused the geographical ranges of the two species which are quite distinct, *T. oligandra* occurring on Cape York Peninsula while *T. parviflora* is restricted to an area in central and south-eastern Queensland. Because Bentham apparently drew his published citation from the incorrectly-labelled MEL 70768, which is marked as seen by him, this specimen is assumed to be the holotype rather than the duplicate at K.

The population at Palm Valley, N.T., previously referred to as *T. parviflora* by Chippendale (1971), is included here in *Thryptomene wittweri*. Thus *T. parviflora* is considered to be restricted to Queensland and occurs outside the area covered by the Flora of Central Australia.

T. parviflora is very closely related to a Western Australian species, *T. naviculata*, of which the only known localities, both near Lake Disappointment, are within the latitudinal range of *T. parviflora*.

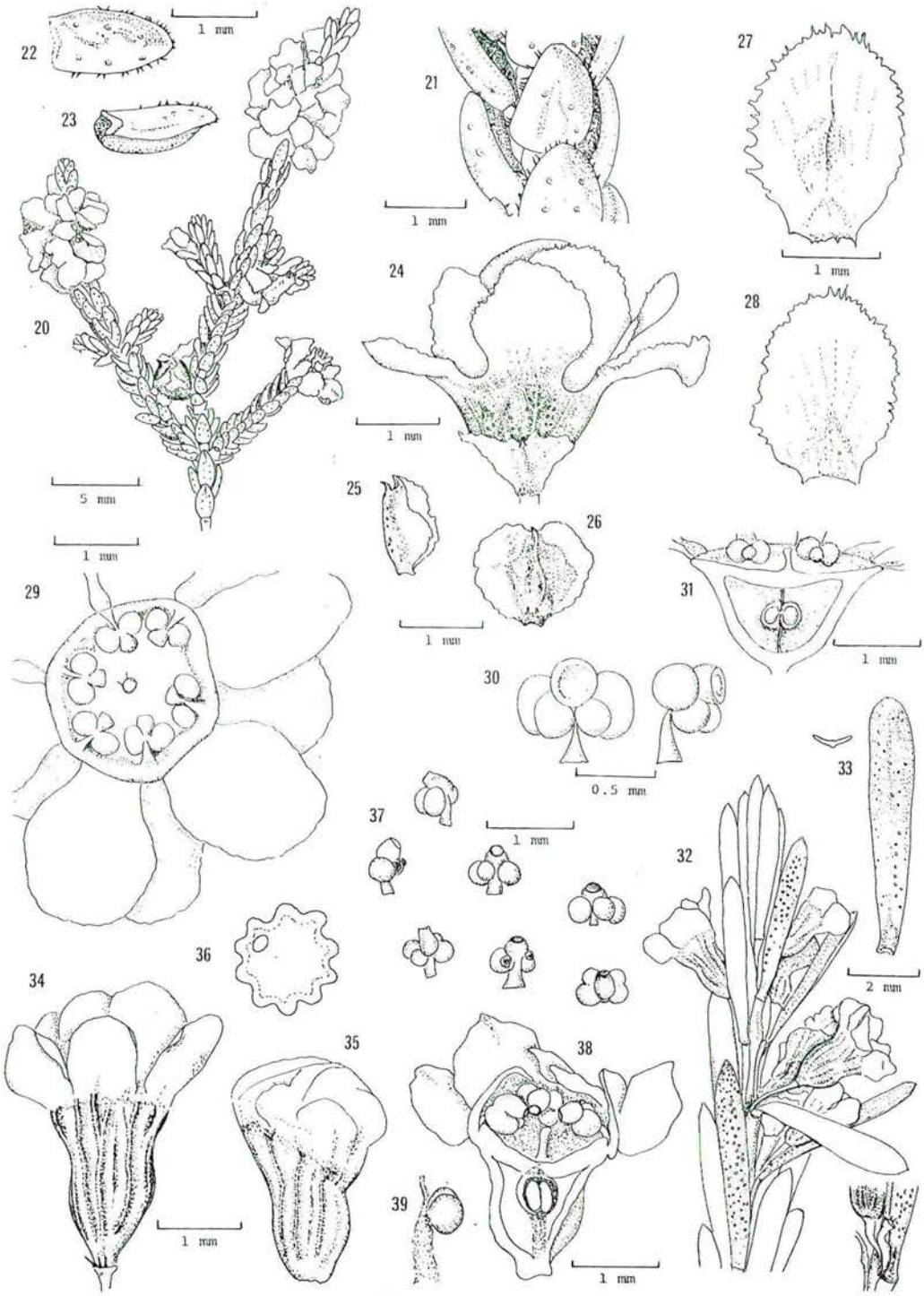
3. Thryptomene naviculata, J. W. Green, sp. nov.

Frutex rotundatus; *folia* 4-seriata, elliptico-obovata, ± 1·6 mm longa, supra concava, infra rotundata vel carinata, marginibus in dimidio supero minute denticulatis; *flores* sessiles, solitarii, axillares; *tubus* interdum leviter 5-costatus; *sepala* unguiculata, 1·8 mm longa, petaloidea, alba vel rosco tincta; *petala* sepalorum similia sed aliquantum majora; *stamina* 5, ante sepala posita; connectivum glandem prominentem compresso-urceolatam ferens; *ovula* 2 in placenta subbasali posita.

Type: Near Karara Well, Canning Stock Route NE of Lake Disappointment, W.A., 23°05′S, 123°22′E, *A. S. Mitchell* 914, 2 May 1979 (holo: PERTH; iso: CANB, K, PERTH).

Rounded *shrub* up to 1 m high and broad. *Leaves* closely imbricate, decussate, 4-rowed, broadly elliptical or obovate, 1·3–1·8 mm long, concave above, rounded or keeled below, margin minutely denticulate in the upper half. *Leaf bases* decurrent, white, covering the surface of the leafy branches. *Flowers* sessile, about 2 mm long and 4–6 mm broad, solitary in the upper axils of most leafy branches, forming numerous condensed, capitate or spike-like racemes. *Bracteoles* 2, about 1 mm long, broadly scarious with a narrow, raised, fleshy midrib ending in a minute, acute point; margins ciliate. *Floral tube* campanulate to broadly obconical, smooth and faintly 10-nerved or with 5 faint longitudinal ribs. *Sepals* spreading, broadly elliptical, ciliate, clawed, petaloid, white or faintly pink-tinged, especially the mid vein, 1·8 mm long, the margins ciliate. *Petals* similar to the sepals but slightly longer and the claw less pronounced. *Disc* concave, pale yellow-brown. *Stamens* 5, antesepalous, 0·5 mm long; filaments short, about 0·3 mm long, flat and 0·1 mm broad at the base, tapering to a point at the connective; anthers about 0·6 mm broad, pale pink, dehiscing by two longitudinal stomia, connective gland compressed-urceolate, prominent, pinkish-brown. *Style* short, stout, about 0·5 mm long, the stigma level with the anthers. *Ovary* cavity in the upper half of the tube, the placenta ± basal. *Ovules* 2, elliptical, collaterally attached near their midpoint. *Fruit* and *seed* not seen. Flowering recorded April, August-September. Figures 20–31; Map 3.

Additional specimen examined: WESTERN AUSTRALIA: Below hill with Canning's Cairn (probably Durba Hill, SW of Lake Disappointment) *M. K. Morcombe* 133–4, Aug.-Sep. 1978 (PERTH).



Figures 20–31. *Thryptomene naviculata:* 20—Habit. 21–33—Leaf, phyllotaxy, abaxial, lateral. 24—Bracteoles and flower. 25–26—Bracteole. 27—Petal. 28—Sepal. 29—Flower from above. 30—Stamen, inside, lateral. 31—Floral tube, LS. All from Mitchell 914. Figures 32–39. *Thryptomene wittweri:* 32—Habit. 33—Leaf, abaxial. 34–35—Flower external. 36—TS Floral tube below ovary. 37—Stamens. 38—Flower LS, showing stamens, ovary and ovules. 39—Ovules on stylar vein. 32, 34, 37–39 from Wittwer 1109; 33, 36 from Hill and Lothian 934; 35 from Chippendale s.n., Palm Valley, Aug. 1956.

At the type locality the species formed a low, open shrubland, associated with a grass, perhaps *Triodia* sp. or *Plectrachne schinzii*, on red sand. *Thryptomene naviculata* is very closely related to *T. parviflora*, which is restricted to Queensland, but differs markedly in the leaves. These two species bear connective glands similar to those of *T. hexandra*, *T. wittweri*, *T. nealensis* and *T. elliottii* but differ in the absence of a strongly ribbed floral tube.

4. Thryptomene wittweri J. W. Green, sp. nov.

Frutex patens vel rotundatus; *folia* lineari-obovata, 7–8 mm longa, tenuia, supra concava; *flores* solitarii vel interdum binati, axillares in pedunculo ad 1·5 mm longo, *tubus* campanulato-urceolatus, supra ovarium ± constrictus, manifeste 10-costatus; *sepala petalaque* petaloidea, alba, ca 1 mm longa; *stamina* 5; ante sepala posita; connectivum glandem distinctam urceolato-truncatam ferens; *ovula* 2 in placenta subbasali posita.

Type: Upper [parts of] Mount Augustus, W.A., *E. Wittwer* 1109, 20 Aug. 1973 (holo: PERTH; iso: PERTH).

Spreading or rounded *shrub* 1·5–2·1 m high. *Leaves* linear-obovate, obtuse or with a minute, acute tip, 4–16 mm long and 1–1·5 mm broad, thin, weakly concave above and rounded below, with numerous small oil glands. *Flowers* solitary or occasionally in pairs, 2·5–5 mm long, axillary along the upper few cm of the leafy branches. *Peduncle* up to 1·5 mm long, narrow and slightly flattened. *Bracteoles* deciduous, sometimes leaving several short, hair-like vascular strands sub-tending the flower. *Floral tube* campanulate-urceolate, ± constricted above the ovary, strongly 10-ribbed. *Sepals* orbicular, petaloid, white or creamy, 0·8–1·2 mm diameter with several pale oil glands near the centre. *Petals* similar, somewhat exceeding the sepals. *Disc* concave. *Stamens* 5, antesepalous, 0·7 mm long; filaments short, dilated and flattened at the base; anthers 0·7 mm broad, pink-red, dehiscing by two longitudinal stomia; gland on the connective urceolate, yellow, the neck short of truncate. *Style* 0·7 mm long, slender, the stigma level with the anthers. *Ovary* cavity in the upper half of the tube, the placenta almost basal. *Ovules* 2. *Fruit* and *seed* not seen. Flowering recorded July, August. Figures 32–39; Map 2.

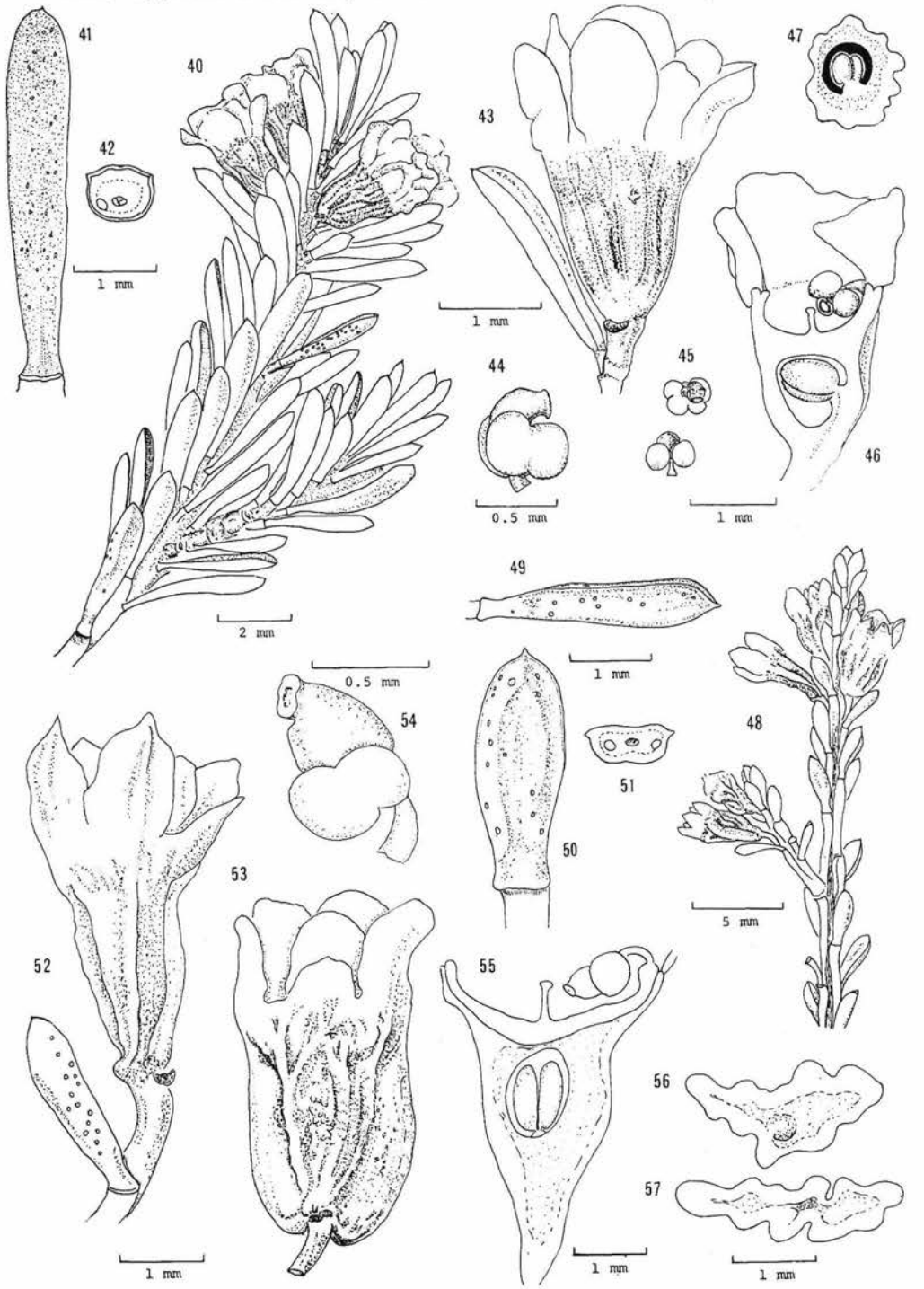
Specimens examined: WESTERN AUSTRALIA: Type. NORTHERN TERRITORY: Palm Valley, *G. Chippendale* 2678, 25 Aug. 1956 (CANB, NT); Palm Valley, *R. Hill & T. R. N. Lothian* 934, 15 July 1958 (AD, NT); Palm Valley, *A. C. Beauglehole* 27508, 24 July 1968 (AD, CANB).

Recorded as occurring in a stony creek bed or in water channels, this species is known only from two disjunct populations over 1 500 km apart yet within 15′ of latitude (about 28 km). It is named in honour of Ernst Wittwer, Superintendent of Kings Park and Botanic Garden, who discovered the Western Australian population. The species is closely related to *Thryptomene nealensis*, known only from Neale Junction, Western Australia but differs in the longer peduncles and leaves. It is also related to the eastern hexamerous species *T. hexandra*.

5. Thryptomene nealensis J. W. Green, sp. nov.

Frutex humilis; *folia* linearia, crassa, 3–5 mm longa; *flores* solitarii, axillares, breviter pedunculati; *tubus* late obconico-turbinatus, obscure costatus; *sepala petalaque* petaloidea, rosea, ca 1 mm longa; *stamina* 5, ante sepala posita; connectivum glandem urceolatam collo brevi ferens; *ovula* 2 in placenta subbasali posita.

Type: 14 miles (22 km) E of Neale Junction, Great Victoria Desert, W.A., approx. 28°20′S, 125°53′E, *A. S. George* 8426, 11 Oct. 1966 (holo: PERTH; iso: K, CANB, PERTH).



Figures 40–47. *Thryptomene nealensis:* 40—Habit. 41–42—Leaf, abaxial, TS. 43—Flower, bracteole scar and subtending leaf. 44–45—Stamens. 46—Flower LS, showing ovary and ovules. 47—TS Floral tube through placenta. All from George 8426. Figures 48–57. *Thryptomene elliottii:* 48—Habit. 49–51—Leaf, lateral, abaxial, TS. 52—Flower, bracteole scar and subtending leaf. 53—Flower, adaxial view showing flattened floral tube. 54—Stamen. 55—Flower LS, showing ovary and ovules. 56–57—Floral tube, TS through and below ovary, respectively. 48–52, 54 from Main s.n., Eeldoun, Aug. 1960; 53, 55–57 from Between Ouldabinna and the Musgrave Range.

Shrub 0·3 m high. *Leaves* decussate, closely imbricate, not obviously in 4 rows, linear, thick, 2–5 mm long. 0·6 mm broad, ± flat above, rounded or keeled below, ± sulcate when dry, covered with numerous oil glands, obtuse or with a minute, acute tip. *Flowers* solitary, axillary, 3–4 mm long, scattered along the upper leafy branches. *Peduncle* 0·3–0·7 mm long, somewhat flattened. *Bracteoles* deciduous, leaving several short, hair-like strands subtending the flower. *Floral tube* broadly obconical or turbinate, flaring above a ± obvious constriction above the ovary. *Sepals* orbicular, 1 mm long, ± entire, petaloid, pink. *Petals* similar, somewhat larger. *Disc* concave, shallow. *Stamens* 5, antesepalous, or occasionally 6, about 0·6 mm long; filaments very short, flattened and dilated at the base; anthers versatile, rounded, 0·8 mm broad, pink, dehiscing by two longitudinal stomia; connective gland urceolate, the neck short. *Style* short, about 0·5 mm long. *Ovary* cavity in the upper half of the tube, the placenta ± basal. *Ovules* 2, elliptical or somewhat angular. *Fruit* and *seed* not seen. Flowering recorded October. Figures 40–47; Map 2.

This species is known only from the type collection, found on a lateritic breakaway. No further details as to habitat or associated species are recorded. It differs from *Thryptomene wittweri* chiefly in having smaller, narrower leaves and a shorter peduncle.

6. Thryptomene elliottii F. Muell., Fragm. 9:62 (1875).

Type: "In eremo inter Youldeh et Bettanam (Beltana); E. Giles." (neo: "Between Youldeh and Charlotte Waters, E. Giles" MEL 70684; isoneo: AD 97137326), neo. nov.

Thryptomene whiteae J. M. Black, Trans. & Proc. Roy. Soc. S. Austral. 41: 384–5 (1917). *Type:* "On the East-West Railway, 60 miles (96 km) NW of Port Augusta.", S.A. White, Jan. 1917 (holo: AD 97534332; iso: MEL 70815, NSW 136171).

Shrub 0·3–1·5 m high. *Leaves* decussate, scarcely imbricate, ± 4-ranked, shortly petiolate, obovate-clavate, thick, 2–3 mm long, 1 mm broad, flat or somewhat convex above, rounded, ± keeled (or sometimes sulcate on drying) below, obtuse or very shortly acute-tipped. *Flowers* solitary or occasionally in pairs, axillary, 4–5 mm long, 1 mm broad, crowded among the upper leaves. *Peduncle* 1 mm long. *Bracteoles* deciduous. *Floral tube* oblong, 3–4 mm long, somewhat irregularly 10-ribbed often saccate at the base, tangentially to the axis flattened at the level of the ovary cavity, on one side or both, sometimes minutely papillose on the abaxial surface. *Sepals* and *petals* orbicular, 1 mm long, petaloid, pink or white. *Disc* concave, shallow. *Stamens* 5, antesepalous, nearly 1 mm long, filaments short, about 0·3 mm long, flattened and dilated towards the base; anthers rounded, 0·5 mm broad, versatile, dehiscing by two longitudinal stomia; connective gland very prominent, almost as large as the anther, urceolate-falcate. *Style* short, about 0·6 mm long. *Ovary* in the upper half of the tube. *Placenta* basal. *Ovules* 2. *Fruit* and *seed* not seen. Flowering recorded April-October. Figures 48–57; Map 3.

Selection of specimens examined: WESTERN AUSTRALIA: Eeldoun (Iltoon), N of Loongana, *A. R. Main*, 17 Aug. 1960 (PERTH); SOUTH AUSTRALIA: "Between the Elizabeth and Youlden, Giles Exped. 1875, *Young*" (AD, MEL); Between Ouldabinna and the Musgrave Range (MEL); ca 100 km S of Vokes Hill, N of Cook, *T. R. N. Lothian* 5691, 20 July 1972 (AD); N of Fowler's Bay, *Giles* (MEL); ca 22 km N of Watson on Maralinga road, *T. R. N. Lothian* 5521, 14 July 1972 (AD); Barton, *E. H. Ising* 1312, 17 Sep. 1920 (AD, PERTH); Wynbring, Herb. *J. M. Black*, 22 Sep. 1920 (AD, MEL).

This species is widespread in the vicinity of the Trans-Australian railway, between Loongana in Western Australia and Wynbring in South Australia, and northwards towards the Musgrave Ranges. Recorded only from sandy soils, usually on red sand dunes or ridges. The few available label details indicate that mallee (*Eucalyptus* spp.), spinifex (*Triodia* spp.) and *Acacia linophylla* may be associated species.

Although closely related to *Thryptomene nealensis*, *T. elliottii* is distinguished by having almost always some flattening of the floral tube, as well as a very prominent connective gland.

I have been unable to locate Mueller's holotype of *T. elliottii* in MEL. As he published the description in June 1875, the type must have been collected on Giles' third expedition, between March and April of that year. The only specimens seen by Mueller which have been located bear locality inscriptions differing from those in the protologue. One label refers to the Elizabeth River which was on the route of the fourth but not the third expedition and was collected by Young who was not on the third expedition; therefore the specimen must have been collected on the fourth expedition which left Port Augusta for Perth in May 1875, passing through the possible collecting area too late for it to have reached Mueller in time for publication. The others, collected by Giles, appear to belong to a single collection made on the third expedition. It is possible that they could include the holotype; in the absence of proof, however, they are here designated neotype and isoneotype respectively.

7. Thryptomene hexandra C. T. White, Proc. Roy. Soc. Queensl. 55: 67–8 (1944).

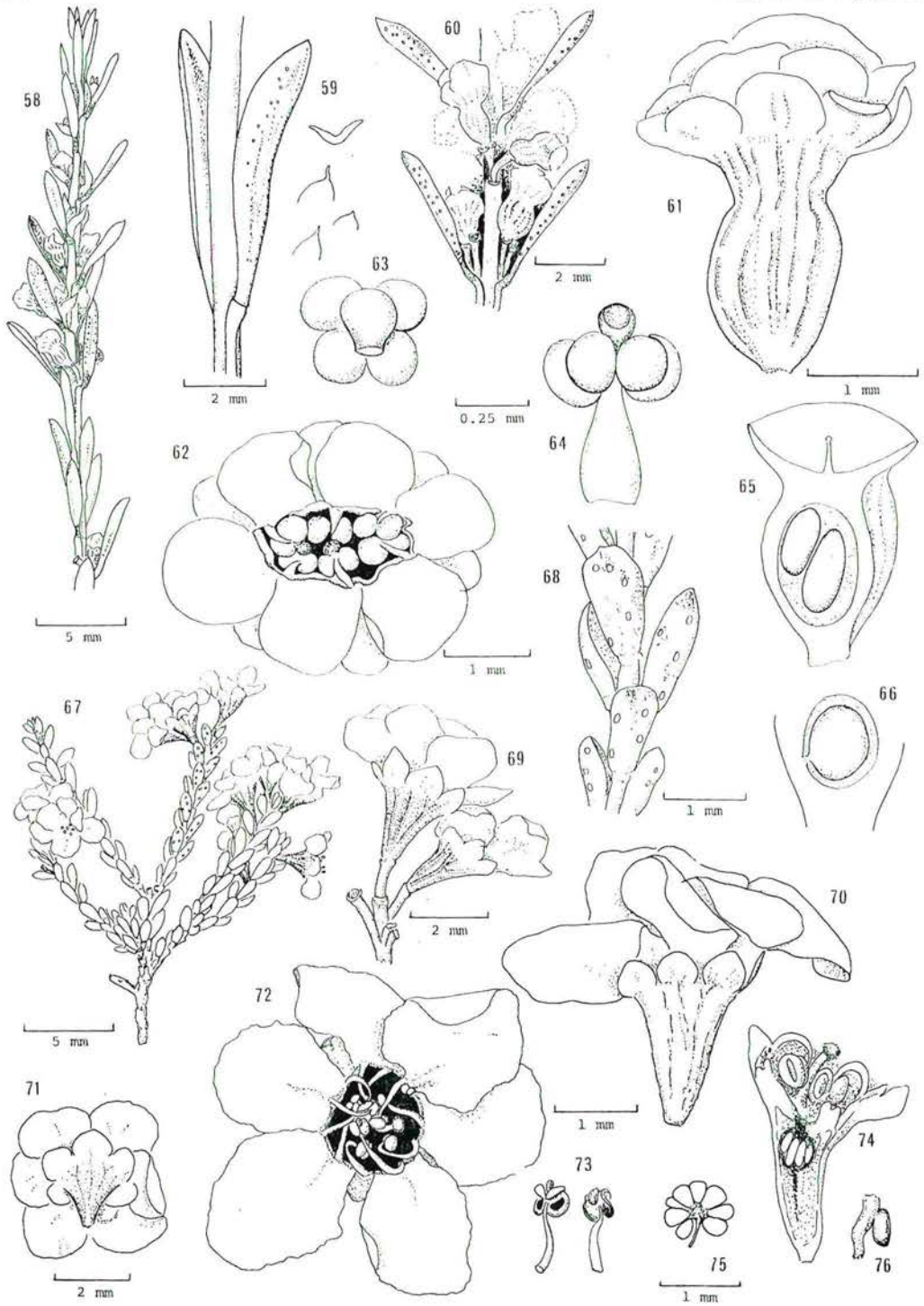
Type: Dynevor Downs, Q., C. T. White 11871, 2 Apr. 1941 (holo: BRI 011119).

Diffuse, much-branched, spreading *shrub* 1–2 m high. *Leaves* opposite, decussate, not obviously 4-rowed, linear or very narrow-obovate, 5–6 mm long and up to 1·4 mm broad, shallowly concave above, rounded or slightly keeled below, obtuse or with a minute mucro, dotted with several to many small oil glands. *Flowers* solitary or occasionally 2 or even 3 in the axils of the leaves within 1–2 cm of the end of each branch. *Peduncles* up to 0·7 mm long. *Bracteoles* 2, lateral, linear, membranous, deciduous at maturity, 1–1·5 mm long. *Flowers* about 3 mm long and up to 1·2 mm broad. *Floral tube* urceolate-campanulate, contracted above the ovary, prominently 10-ribbed, or some ribs branching below the sepals, about 2·3 mm long at maturity. *Disc* concave, shallow. *Sepals* and *petals* 6, similar, orbicular, 0·8 mm diameter, petaloid, white or creamy-white, not obviously glandular. *Stamens* 6, antesepalous, or up to 8 by the addition of ± antepetalous stamens, about 0·7 mm long; filaments filiform, about 0·4 mm long; anthers versatile, ca 0·4 mm across, dehiscing by two longitudinal stomia. *Gland* on the connective shortly urceolate, the pore facing the style. *Style* slender, 0·5 mm long. *Ovules* 2, borne collaterally on a subbasal placenta. Fruiting floral tube somewhat enlarged. *Seeds* apparently 2 but fruit seen not quite mature. Flowering recorded all months. Figures 58–65; Map 3.

Selection of specimens examined: QUEENSLAND: Near Adavale, *W. MacGillivray* 955, 29 Aug. 1923 (AD, ADW, BRI, MEL); Near Quilpie, *K. Emmerson*, Sep. 1956 (BRI). NEW SOUTH WALES: 40 miles (64 km) N of Bourke, *G. W. Althofer*, Nov. 1968 (NSW); Brookesville, Enngonia, *V. Lidden*, 1967 (NSW).

Habitats recorded for this species include stony hillsides and ridges, sandy loam and shallow soil overlying laterite on the edge of a scarp. The only associated vegetation recorded is "mulga scrub".

This species belongs to a group of pentamerous species which share the ribbed floral tube and urceolate connective gland. It is closely related to *Thryptomene wittweri* and *T. nealensis*, and is also related to *T. ericaea* F. Muell., *T. micrantha* Hook.f. and *T. calycina* (Lindl.) Stapf. Like *T. hexandra*, some of these also exhibit the unusual character of occasionally having more than one flower in the leaf axil. Hexamery appears to have evolved in *T. hexandra* as a uniform and stable population character, as it has in the unrelated partially sympatric species *Micromyrtus hexamera*. It seems extraordinary that a single species of each genus should have developed hexamery in the same general geographic area.



Figures 58–66. *Thryptomene hexandra:* 58—Habit. 59—Leaf pair, leaf TS, leaf tips. 60—Inflorescence showing flowers in pairs. 61–62—Flower, external longitudinal and oblique from above. 63–64—Stamens from above and inside. 65–66—Fruit, showing twin, single seeded fruits. 58–61, 63–65 from Althofer s.n., 40 miles (64 km) N of Bourke, Nov. 1968; 62 from Lidden s.n., Brookesville, Enngonia, 1967. Figures 67–76. *Micromyrtus hexamera:* 67—Habit. 68—Phyllotaxy. 69—Flower and peduncle. 70–72—Flower, external and from above. 73—Stamens. 74—Floral tube, LS showing ovary. 75—Ovules and placenta. 76—Ovule and stylar vein. 75 from E. Betche, Warrego R. district, Sep. 1900; all others from Silcock s.n., 30 miles (48 km) SW of Charleville, Aug. 1969.

MICROMYRTUS Benth.

Differs from *Thryptomene* (as here defined) in the following characters. *Shrubs*, none arborescent. *Inflorescence* up to 3-flowered (i.e., on a single peduncle, solitary in the axils), in several species outside the area. *Petals* in several species yellow, pale yellow or creamy white. *Stamens* usually either 5 (antepetalous) or 10 (obdiplostemonous or apparently in a single whorl, regularly opposite the perianth parts), rarely 12 (*M. hexamera*); filament lorate in two species (*M. hymenonema* and *M. fimbrisepala*); connective gland usually simpler and less prominent than in *Thryptomene*. *Placenta* apical, subapical or tending lateral; ovules 2–10, not in superposed pairs.

Key to inland Australian species

1. Stamens 10–12.
   2. Flowers hexamerous; stamens 12; ovules 6–10. Southern Q.-northern N.S.W. .... 1. **M. hexamera** (Maid. et Betche) Maid. et Betche (p. 195)
   2*. Flowers pentamerous; stamens 10; ovules 2, 6 or 8.
      3. Filaments lorate, over 0·3 mm broad; ovules 6.
         4. Sepals with small, minutely denticulate auricles scarcely obscuring the tube; leaves linear-obovate, 3–4 mm long. Queen Victoria Spring, Laverton, Rawlinson Ra., W.A. 2. **M. hymenonema** (F. Muell.) C. A. Gardner (p. 196)
         4*. Sepals with large fringed auricles, or peltate, obscuring the tube; leaves broadly elliptical to orbicular, 1–2 mm long. Warburton, W.A., Vokes Hill, S.A. 3. **M. fimbrisepala** J. W. Green (p. 198)
      3*. Filaments terete, less than 0·1 mm thick; ovules 2 or 8.
         5. Ovules 8; floral tube turbinate to obconical, 5-ribbed. Near Mt. Squires, 27°S, 127°E, W.A. 4. **M. helmsii** (F. Muell. et Tate) J. W. Green (p. 200)
         5*. Ovules 2; floral tube narrow-campanulate to cylindrical.
            6. Floral tube 10-ribbed, 2–3 mm long; bracteoles persistent; leaves thin, concave above. Karonie, W.A. 5. **M. serrulata** J. W. Green (p. 200)
            6*. Floral tube smooth or faintly granulate, not ribbed, 4 mm long; bracteoles deciduous; leaves thick, convex above. Queen Victoria Spring and 200 km to NE, in the Victoria Desert, W.A. 6. **M. stenocalyx** (F. Muell.) J. W. Green (p. 201)

1*. Stamens 5.
   7. Ovules 7–10; floral tube granular-muricate; petals denticulate to entire, yellow or (in the extreme west) pink to purple. Widespread in Central W.A., south-western N.T. and north-western S.A. 7. **M. flaviflora** (F. Muell.) F. Muell. ex J. M. Black (p. 201)
   7*. Ovules 2: floral tube densely bearded with golden-brown spreading hairs; petals ± entire, creamy white. S.W. of Warburton to near Carnegie, W.A. .... 8. **M. barbata** J. W. Green (p. 203)

1. Micromyrtus hexamera (Maid. et Betche) Maid. et Betche, Census N.S.Wales Plants 157 (1916).

Thryptomene hexamera Maid. et Betche, Proc. Linn. Soc. N.S. Wales 26: 82 (1901). *Lectotype* (designated here): Warrego River district [cited as "Road from Bourke to Goombalie, Warrego River"], E. Betche, Sep. 1900 (holo: NSW 143900; iso: MEL 71340, 71341). *Lectoparatypes:* Road from Bourke to Barringun, W. S. Campbell, Sep. 1893 (NSW 143901); Between Darling and Warrego River [cited as "Road from Bourke to Ford's Bridge, Warrego River"], E. Betche, Sep. 1885 (MEL 70879, 70881, 71339; NSW 136196).

Shrub 0·6–2·5 m high; branchlets slender; bark loose, fibrous, pale yellow. *Leaves* decussate, ± imbricate, somewhat spreading, 1–3 mm long, obovate-oblong, thick, concave above, keeled or somewhat flattened near the base, minutely ciliolate on the margins or entire, very shortly petiolate, with several large oil glands below. *Flowers* solitary, axillary, often clustered near the ends of the upper branches, about 4 mm long. *Peduncle* 0·7–1·2 mm long, shorter than or ± as long as the subtending leaf. *Bracteoles* scarious, about 1 mm long, deciduous in most specimens, leaving short, hair-like traces subtending most flowers. *Floral tube* narrow-obconical or turbinate, 2 mm long, angled or fluted with 6 ridges, branching into several more below the sepals, the interstices with numerous oil glands. *Sepals* 6, semi-orbicular, 0·5 mm long, membranous. *Petals* 6, much larger than the sepals, broadly elliptical, up to 1·8 mm long, white, turning pink or on some individuals either pink or purple, minutely denticulate. *Disc* ± flat, often somewhat oblique. *Stamens* 12, 1 mm long; filaments ± terete, 0·9 mm long; anthers rounded, 0·2 mm broad, versatile, dark brown, dehiscing by two longitudinal stomia; connective gland smaller than the anther halves, yellow. *Style* slender, almost 1 mm long. *Ovary* in the upper quarter of the floral tube. *Placenta* apical. *Ovules* 8 (–10?—fide Maiden & Betche). *Fruit* scarcely enlarged. Mature *seeds* not seen. Flowering recorded January, April-November. Figures 66–76; Map 4.

Selection of specimens examined: QUEENSLAND: Near Alpha Station, *L. S. Smith* 6414, 16 June 1955 (BRI); Calabah, 55 miles (88 km) NW of Charleville, *A. Murray*, 18 Sep. 1967 (BRI); Between Beechal Creek and 30 miles (48 km) SW of Charleville on Quilpie road, *R. G. Silcock*, 6–7 Aug. 1969 (BRI, CANB, MEL, NSW); Boatman Station, *S. L. Everist* 3098, 18 July 1947 (BRI, CANB, NSW); 48 km W of Cunnamulla, *L. S. Smith* 6004, 8 Nov. 1954 (BRI); St. George-Bollon road, *G. W. Althofer* 48, July 1949 (BRI). NEW SOUTH WALES: Kerribree-Lauradale, *J. L. Boorman*, Nov. 1912 (NSW); 63 miles (101) km from (N of) Bourke on Enngonia road, *G. W. Althofer* 204, Oct. 1972 (BRI); 30 miles (48 km) N of Bourke, *R. Roe*, 8 July 1940 (CANB); 30 miles (48 km) W of Bourke, *H. C. Dorman*, Aug. 1967 (NSW, PERTH).

Apparently fairly plentiful within its restricted distribution, *Micromyrtus hexamera* has been recorded mainly on red, brown or grey-brown sand or sandy loam, sometimes on sandridges or in rocky places. The few notes on record list *Triodia*, *Acacia aneura*, *Eucalyptus melanophloia* or "mulga box" as associated vegetation.

I have found no evidence for more than 8 ovules in any of the specimens examined, including the three syntypes, despite the description "Ovules 8 to 10" in the protologue.

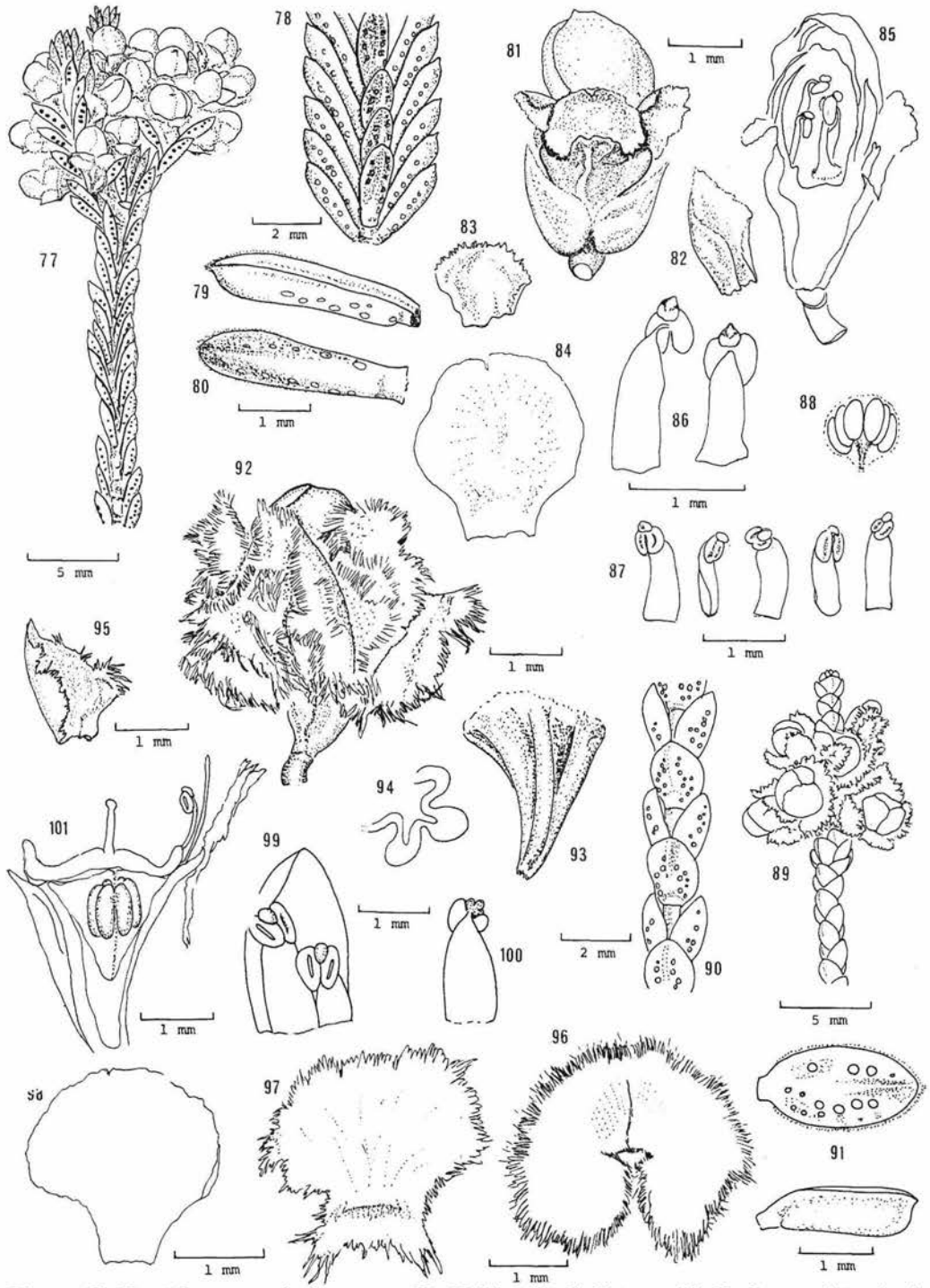
Ovule number seems to be remarkably constant in this species, though it could not be determined with certainty in NSW 143901 which might have had 6 or 7.

Micromyrtus hexamera belongs to a group of species, some as yet undescribed, including *M. ciliata* (Sm.) Druce, which occurs widely in south-eastern Australia. It is very like a Queensland species of this group, *M. leptocalyx* (F. Muell.) Benth., in floral tube, peduncle and leaf, but is distinguished by its hexamery, style and stamens. A note on the occurrence of hexamery in the same area of distribution is included under *Thryptomene hexandra*.

2. Micromyrtus hymenonema (F. Muell.) C. A. Gardn., Enum. Pl. Austral. Occ. 96 (1931).

Thryptomene hymenonema F. Muell., Fragm. 10: 26(1876). *Type:* Victoria Springs, Young, 30 Sep. 1875 (holo: MEL 71345).

Shrub 0·4–0·7 m high. *Leaves* closely to loosely imbricate, decussate, linear-obovate, 2–4 mm long, 1–1·5 mm broad, ± sessile, minutely ciliolate-membranous, concave above, rounded below and keeled where broadest, the apex with a minute hyaline mucro 0·1 mm long, the surface dull or glossy, oil glands several each side of the midrib. *Flowers* solitary in the upper axils, 3–4 mm long, subtended by two complicate, petaloid bracteoles 1·2–1·8 mm long, slightly fleshy along the midrib, and with membranous margins; peduncle flattened, 0·7 mm long. *Floral tube* turbinate, 1–1·5 mm long, deeply 5-ridged, at least when dry, otherwise without sculpture, bulging slightly below the sepals. *Sepals*



Figures 77–88. *Micromyrtus hymenonema:* 77—Habit. 78—Phyllotaxy. 79–80—Leaves, lateral, abaxial. 81—Flower and bracteoles. 82—Bracteole. 83—Sepal. 84—Petal. 85—Flower, LS showing stamens and style. 86–87, Stamens, from outside and inside. 88—Ovules, membranous endocarp and stylar vein. All from George 5846. Figures 89–101. *Micromyrtus fimbrisepala:* 89—Habit. 90—Phyllotaxy. 91—Leaf, abaxial and lateral. 92—Flower, external. 93–94—Floral tube, external and TS. 95—Bracteole. 96–97—Sepals. 98—Petal. 99—Petal and stamens. 100—Stamen from outside. 101—Floral tube, LS showing ovules and stylar vein. 89–90, 92–98, 101 from George 8375; 91, 99–100 from Williams 10762.

ovate-oblong, 1–1·8 mm long and 1·4 mm broad, petaloid except near the ciliate margins, ± auriculate at the base. *Petals* pink, exceeding the sepals, entire, ± orbicular, 2·7 mm long. *Disc* flat or slightly convex. *Stamens* 10, ± 1 mm long, the antepetalous alternating with the somewhat shorter antesepalous in a single whorl; filaments lorate, 0·5–1 mm long, 0·4 mm broad; anthers versatile, dehiscing by two longitudinal stomia; gland often 3-lobed, orange-red and red. *Style* 0·8 mm long, not exceeding the stamens. *Ovules* 6, collaterally attached to the stylar vein near the summit of the ovary and contained within a fine membrane. *Fruit* unknown. Flowering recorded June-October. Figures 77–88; Map 5.

Specimens examined: WESTERN AUSTRALIA: Rawlinson Range, herb. *C. A. Gardner*, Aug-Sep. 1962 (PERTH); 70 miles (113 km) W of Neale Junction, *A. S. George* 8411, 10 Oct. 1966 (PERTH); 27 miles (43 km) NE of Laverton on Warburton road, *A. S. George* 2841, 24 Aug. 1961 (PERTH); N of Cundeelee, *A. S. George* 5846, 21 Sep. 1963 (PERTH); Victoria Desert Camp 59 (ca 200 km E of Kalgoorlie), *R. Helms*, 20 Sep. 1891 (AD, MEL, NSW); Queen Victoria Spring, *R. D. Royce* 5517, 1 Oct. 1956 (PERTH).

This very distinctive species, inhabits red (and yellow) sand-dune country with spinifex (*Triodia* spp.), over an elongated tract some 750 km long, to the north-east of Kalgoorlie. Only three collections are known outside the type area around Queen Victoria Spring. The species has only one close relative, *M. fimbrisepala*, which also has broad, flattened filaments.

3. **Micromyrtus fimbrisepala** J. W. Green, sp. nov.

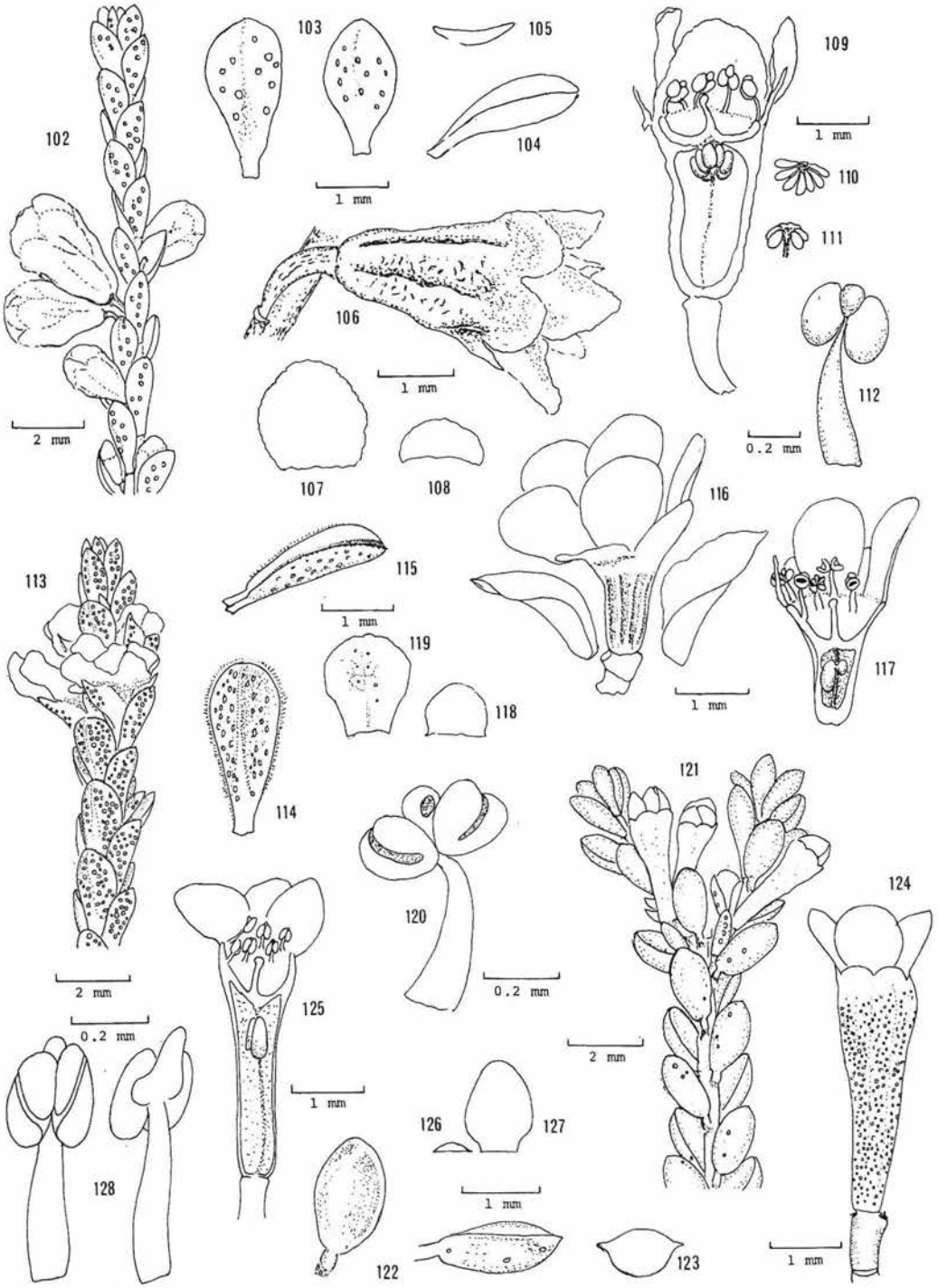
Frutex; *folia* late elliptica ad orbicularia, 1·5–2·2 mm longa, marginibus minute ciliolatis, supra concava, infra prope apicem carinata; *flores* solitarii, axillares, breviter pedunculati; *tubus* floris profunde 5-plicatus, a sepalis valde fimbriatis auriculatis fere celatus; *petala* rosea, orbicularia, ca 2 mm diam.; *stamina* 10; filamenta late lorata; glans connectivi composita, rubra; *ovula* 6, collateralia.

Type: 21·6 miles (34·8 km) W of Warburton, Gibson Desert, W.A. Shrub 0·7 m; fls. pink. In red sand among spinifex, between dunes. *A. S. George* 8375, 9 Oct. 1966 (holo: PERTH; iso: CANB, K, PERTH).

Shrub 0·7 m high. *Leaves* imbricate, decussate, broadly elliptical to orbicular, 1–2·2 mm long, up to 1·5 mm broad, ± sessile, minutely ciliolate-membranous, obtuse, concave above, keeled below near the apex, lustrous, with several prominent oil glands. *Flowers* solitary, axillary, clustered near the branch endings, 4–5 mm long, subtended by two complicate bracteoles petaloid in the middle, with the margins membranous and minutely fimbriate, 1·8 mm long; peduncle ± flattened, 0·5–1 mm long. *Floral tube* turbinate, 2 mm long, deeply 5-ridged, somewhat curved, almost entirely obscured by the sepals. *Sepals* ± orbicular, auriculate or sometimes peltate, strongly fimbriate, about 2 mm diameter, parchment-like. *Petals* pink, orbicular, clawed, scarcely exceeding the sepals, about 2 mm diameter. *Disc* flat or slightly convex. *Stamens* 10, ± 1 mm long, the antepetalous alternating with the somewhat shorter antesepalous, in a single whorl; filaments lorate, 0·4 mm broad, 0·5–0·8 mm long; anthers versatile, dehiscing by two longitudinal stomia; connective gland often 3-lobed, orange-red and red. *Style* 0·8 mm long, not exceeding the stamens. *Ovules* 6, collaterally attached to the stylar vein near the summit of the ovary. *Ovary* small, near the summit of the floral tube, endocarp membranous. *Seeds* not seen mature. Flowering recorded February, October. Figures 89–101; Map 5.

Selection of specimens examined: WESTERN AUSTRALIA: Type. SOUTH AUSTRALIA: SE of Cheeseman's Peak, *S. Barker* 31, 15 Aug. 1979 (AD, PERTH); Serpentine Lakes, 54 km E of WA border, *L. D. Williams* 10702, 30 Jul. 1979 (AD, PERTH); Vokes Hill road junction, 228 km N of Cook, *L. D. Williams* 10796, 6 Aug. 1979 (AD, PERTH).

Until recently this species was known only from the sand dunes of the Gibson Desert west of Warburton, W.A.; discoveries of several occurrences in the far west of South Australia have now shown its range to extend over a distance of some 500 km. Mr L. D. Williams, who first discovered the species in South Australia, thought that it appeared to proliferate after burning (pers. comm.).



Figures 102–112. *Micromyrtus helmsii:* 102—Habit. 103–105—Leaf abaxial, lateral and TS. 106—Flower and peduncle. 107—Petal. 108—Sepal. 109—Floral tube, LS showing stamens, style, ovules and stylar vein. 110–111—Ovules and placenta, from above and lateral. 112—Stamen, from inside. All from Helms s.n., Victoria Desert Camps 38 and 39. Figures 113–120. *Micromyrtus serrulata:* 113—Habit. 114–115—Leaf abaxial, lateral. 116—Exploded view of flower and bracteoles. 117—Flower, LS showing developing seed. 118—Sepal. 119—Petal. 120—Stamen from inside. All from George 5951. Figures 121–128. *Micromyrtus stenocalyx:* 121—Habit. 122–123—Leaf, abaxial, lateral and TS. 124—Flower, external. 125—Flower, LS showing ovules and stylar vein. 126—Sepal. 127—Petal. 128—Stamen, from inside, outside. All from George 5879.

Because *M. fimbrisepala* is the first 10-stamened species of either *Thryptomene* or *Micromyrtus* to be recorded in South Australia, it will no longer be possible to distinguish between the genera there solely on the character of stamens antesepalous or antepetalous.

While related to *M. hymenonema*, as is evidenced by the broad, strap-like filaments, the new species is distinguished by its most unusual, fimbriate sepals, as well as the smaller, rounded leaves.

4. Micromyrtus helmsii (F. Muell. et Tate) J. W. Green, comb. nov.

Thryptomene helmsii F. Muell. et Tate, Trans. Roy. Soc. S. Austral. 16: 356 (1896). *Type:* Victoria Desert Camps 38 and 39, W.A., R. Helms, 2 Sep. 1891 (holo: MEL 70695; iso: AD 97448028, AD 97534340, NSW 136161, PERTH [ex NSW 136242]).

Shrub 0·9–1·5 m high, branchlets slender. *Leaves* decussate, imbricate, appressed to the branchlets, obovate-oblong, 1·5–3·5 mm long, 1 mm broad, concave above, keeled near the apex below, obtuse, shortly petiolate, with several conspicuous oil glands below. *Flowers* solitary, axillary, sparse along the upper leafy branchlets, 3–4 mm long, 2 mm broad. *Peduncle* up to 1·5 mm long. *Bracteoles* deciduous, rarely present on herbarium specimens. *Floral tube* turbinate to obconical, 2·5 mm long, 5-ribbed near the base, the ribs tending to branch above, interstices rugose. *Sepals* semi-orbicular, 0·8 mm long and 1 mm broad, margins membranous. *Petals* much larger, orbicular, 1·5 mm diameter, margins minutely denticulate. *Disc* concave, shallow. *Stamens* 10 in the bud, sometimes some shed at anthesis ("about seven" in the protologue), 0·8 mm long; filaments 0·5 mm long, terete, somewhat thickened below; anthers 0·5 mm broad, rounded, dehiscing by two longitudinal stomia; connective gland small, about 0·1 mm diameter, irregularly globular. *Style* about 0·5 mm long. *Ovary* in the upper 1/5 of the floral tube. *Placenta* apical but on one side, adjacent to the stylar vein. *Ovules* 7–8, dependent, collaterally arranged about the placenta. *Fruit* and *seed* not seen. Flowering recorded September. Figures 102–112; Map 6.

This species is known only from the type locality which, according to Eardley (1950), lies in lat. 27°S, long. 127°E (near Mount Squires). Its habitat is not recorded with the specimens. The species clearly belongs to *Micromyrtus* because of the character of apical placentation of the ovules which was not noted by Mueller and Tate. It has no very close relatives within *Micromyrtus* but has the same number of stamens and ovules as *M. hymenonema* and *M. fimbrisepala.*

5. Micromyrtus serrulata J. W. Green, sp. nov.

Frutex; folia ovato-oblonga, 1–2 mm longa, marginibus minute ciliolatis, supra concava, infra carinata; *flores* solitarii, axillares, subsessiles, ad apices ramulorum aggregati; bracteoli persistentes; *tubus* floris angusto-campanulatus, obscure 10-costatus; *sepala* membranacea, 0·6 mm longa; *petala* sepalis duplo longiora, erminea; *stamina* 10; filamenta filiformia; glans connectivi parva; *ovula* 2, collateralia.

Type: 32 miles (51 km) E of Karonie, Trans-Australia railway, W.A., *A. S. George* 5951, 9 Nov. 1963 (holo: PERTH; iso: CANB, K, PERTH).

Shrub up to 0·8 m high. *Leaves* appressed on the flowering branches, otherwise ± spreading, obovate-oblong, 1–2 mm long, shallowly concave above, keeled below, margins minutely serrulate, apex obtuse, surface dull, covered with numerous oil glands. *Flowers* solitary, in the upper axils, aggregated at or near the branch endings in pseudo-corymbs 3–4 mm long, sessile, each subtended by two conspicuous, persistent, cymbiform-complicate bracteoles with a petaloid, glandular centre and membranous edges. *Floral tube* about 2 mm long, narrow-campanulate, somewhat indistinctly 10-ribbed. *Sepals* 0·6 mm long, ± orbicular, broadly clawed, membranous. *Petals* twice as large as the sepals, orbicular to broadly elliptical, creamy-white, with a few inconspicuous oil glands. *Disc*

concave to deeply sunken. *Stamens* 0·7 mm long, obdiplostemonous, the outer whorl marginal and the inner submarginal; filaments filiform, 0·5 mm long; anthers globular, 0·2 mm across, dehiscing by two horizontal or oblique stomia; gland globular. *Ovules* 2, collaterally attached to the stylar vein near the summit of the ovary. *Fruit* unknown. Flowering recorded November. Figures 113–120; Map 6.

This species is known only from the type collection. It is related to *Micromyrtus racemosa* Benth. but differs in the serrulate leaf margins, persistent bracteoles and larger sepals.

6. Micromyrtus stenocalyx (F. Muell.) J. W. Green, comb. nov.

Thryptomene stenocalyx F. Muell., Fragm. 10: 23–4 (1876). *Type:* "Ad scaturigines victoriae; Young" (holo: MEL 70798).

Shrub, erect or spreading, 0·8–1 m high. *Leaves* ± appressed, oblong-obovate or clavate, 1–3·5 mm long, ± flat or convex above, rounded below, oil glands few, petiole 0·3 mm long. *Flowers* solitary, axillary, spreading, 4–5 mm long, dispersed or somewhat concentrated below the branch endings; young buds subtended by a pair of deciduous, lanceolate, complicate, ± petaloid bracteoles, about 1 mm long, glandular in the centre, and scarious on the margins. *Peduncle* 0·7 mm long. *Floral tube* 3 mm long, narrow, ± cylindrical, faintly glandular, smooth or faintly ribbed, with several indistinct, inconspicuous nerves, slightly expanded in the free part above the ovary. *Sepals* scarious, not quite 0·3 mm long, 0·5 mm broad. *Petals* cream-coloured to yellow, ovate, about 1 mm long, sessile, with several oil glands. *Disc* deeply sunken. *Stamens* 10, 0·5 mm long, obdiplostemonous, the outer stamens equalling or exceeding the sepals; filaments ± terete, 0·3 mm long; anthers 0·2 mm across, dehiscing by two oblique stomia; connective gland small, erect. *Style* 0·5 mm long. *Ovules* 2, collaterally attached to the stylar vein near the summit of the ovary. *Fruit* unknown. Flowering recorded July-November. Figures 121–128; Map 4.

Specimens examined: WESTERN AUSTRALIA: Victoria Desert Camp 54, *R. Helms*, 17 Sep. 1891 (AD, MEL, NSW); 18 miles (29 km) N of Cundeelee, *A. S. George* 5879, 21 Sep. 1963 (PERTH); 10 km NE of Cundeelee, *D. W. Goodall* 2995, 2 July 1966 (PERTH).

Only fragmentary details are available on the occurrence of this rarely-collected species. It is known only from two areas some 230 km apart, near Queen Victoria Spring and Camp 54 of the Elder Expedition (lat. 29°S, long. 125°E—see Eardley 1950); in the former it has been recorded on red sand and on yellow sand with *Triodia* and mallee eucalypts. It is distinguished from other species in the group having 2 ovules and 10 stamens by having a narrow, cylindrical, almost ribless floral tube and the flowers far exceeding the leaves.

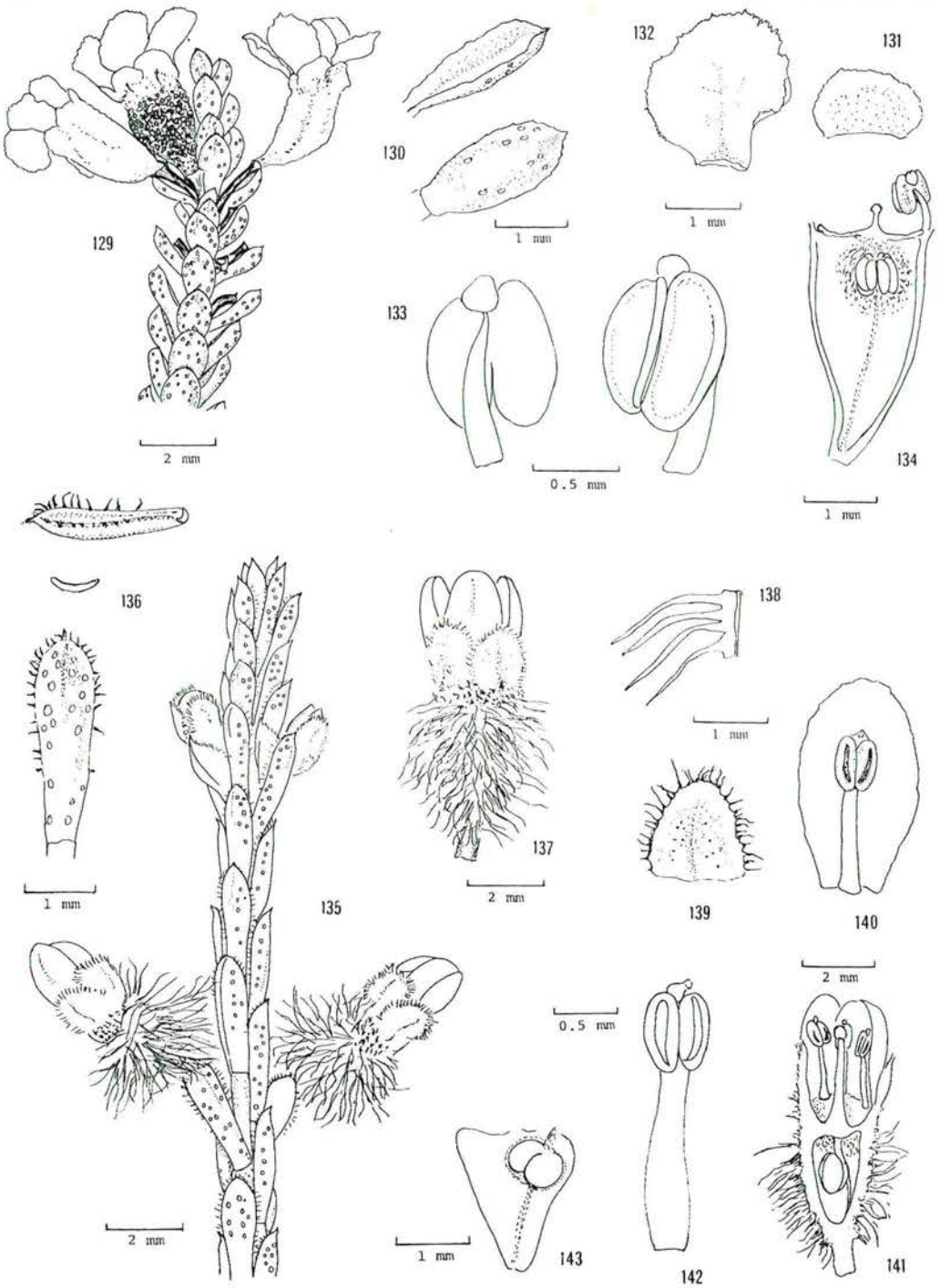
7. Micromyrtus flaviflora (F. Muell.) F. Muell. ex J. M. Black, Flora of South Australia 424 (1926).

Thryptomene flaviflora F. Muell., Fragm. 8: 13 (1873). *Type:* "In montibus McDonnell's Ranges Australiae centralis; E. Giles" (holo: MEL 71329).

Thryptomene trachycalyx F. Muell., Fragm. 10: 25 (1876). *Type:* "Inter Ularing et Mount Jackson; Young." (lecto: MEL 70810; iso: MEL 71366), syn. nov.

Micromyrtus trachycalyx (F. Muell.) C. A. Gardner, Enum. Pl. Austral. Occ. 96 (1931).

Shrub, erect, loose or spreading, 0·3–1·5 m high; stems with reddish-brown, papery bark. *Leaves* imbricate, decussate, oblong-obovate, plano-convex, ± keeled, 1–2 mm long, 0·5–1 mm broad, somewhat glaucous with several oil glands, margins usually minutely denticulate. *Flowers* solitary, axillary, typically 4 mm long, often appearing clustered, subterminal on the branches. *Bracteoles* complicate, 2 mm long, deciduous. *Peduncle* usually 1·5–2·5 mm long, exceeding the leaves. *Floral tube* 2·5 mm long, 1·5 mm broad,



Figures 129–134. *Micromyrtus flaviflora:* 129—Habit. 130—Leaf, lateral-adaxial, abaxial. 131—Sepal. 132—Petal. 133—Stamen, from outside, inside. 134—Floral tube, LS showing ovules, spongy mesocarp and stylar vein. 129–132 from Latz 882; 133–134 from Cleland s.n., Between Musgrave and Mann Ranges, Aug 1954. Figures 135–143. *Micromyrtus barbata*: 135—Habit. 136—Leaf, lateral, TS and abaxial. 137—Flower, external. 138—Segment of floral tube wall with hairs. 139—Sepal. 140—Petal and stamen from inside. 141—Flower, LS showing ovules and hairs of the floral tube. 142—Stamen from inside showing connective gland. 135–136, 138, 143 from George 12179; 137, 139, 140–142 from Fairall 2090.

obconical to urceolate, often becoming excentrically swollen, strongly granular-muricate, often obscurely 5-angled opposite the sepals. *Sepals* 0·9 mm long, 1·2 mm broad, semi-orbicular, obtuse, sometimes minutely serrulate, petaloid, often complicate when dry. *Petals* ± orbicular, 2 mm diameter, yellow (sometimes becoming brick red), white or purple; margin denticulate to almost entire. *Disc* shallowly concave. *Stamens* 5, on the margin of the disc, 1 mm long; filaments filiform, 0·8 mm long; anthers versatile, 0·8 mm long, dehiscing by two longitudinal, parallel stomia; connective gland globular, simple, 0·2 mm diameter. *Style* 0·4 mm long. *Ovules* 7–10, collaterally attached to the stylar vein near the summit of the ovary, contained within a fine membrane or enveloped in dense spongy tissue. *Seed* single, 2 mm long. Flowering recorded January, April-November. Figures 129–134; Map 7.

Selection of specimens examined: WESTERN AUSTRALIA: Victoria Desert Camp 54, *R. Helms* 16 Sep. 1891 (AD, MEL); E of Laverton, *E. de C. Clarke* 149, July 1916 (PERTH); W of Pollock Hills ± 22°46′S, 127°30′E, *A. S. George* 9059, 28 July 1967 (NT, PERTH); near Lakes Percival and Wooloomba, 21°33′S, 123°50′E, *H. A. Johnson* 9768, 15 Aug. 1962 (AD, MEL, NSW, NT, PERTH); 6 miles (10 km) W Boorabie Soak, *D. L. Serventy*, 18 Aug. 1960 (PERTH); 12 miles (19 km) S Cunyu, *N. H. Speck* 1203, 12 Aug. 1958 (CANB, PERTH); Cue, near Mt. Farmer, *K. F. Kenneally* 70A, 4 Oct. 1965 (UWA); Gunbarrel Highway, 10 miles (16 km) W of junction N of Warburton, *A. S. George* 8195, 1 Oct. 1966 (PERTH); 20 miles (32 km) NE Laverton, *A. S. George* 8090, 28 Sep. 1966 (NT, PERTH); N of Lake Barlee, *C. A. Gardner* 19039, 10 Oct. 1966 (PERTH); Wialki, *F. H. Uther Baker* n.d. (PERTH); 11 miles (18 km) E of Notabilis Hill, Gunbarrel Highway, *A. S. George* 5372, 24 July 1963 (PERTH); 13 miles (21 km) NE Wiluna, *A. S. George* 5608, 28 July 1963 (NSW, PERTH); 40 miles (64 km) E of Sandstone, *W. E. Blackall* 456, 14 Aug. 1931 (PERTH); 11 miles (18 km) NE Cosmo Newberry, *A. S. George* 2861, 24 Aug. 1961 (PERTH); 5–6 miles (8–10 km) N Menzies, *C. A. Gardner* 2153, 16 Sep. 1927 (PERTH); 35 miles (56 km) W of Sandstone, *R. D. Royce* 10479, 17 Oct. 1972 (PERTH); 75 miles (120 km) N of Paynes Find, *C. A. Gardner* 14375, 26 Aug. 1963 (PERTH). NORTHERN TERRITORY: S side of Gills Range, *R. Tate* 1894 (AD); 20 miles (32 km) NW of Docker River settlement, *P. K. Latz* 882, 29 Oct. 1970 (NT); Tempe Downs, *R. H. Thornton* 1896 (MEL); Ayer's Rock, *N. F. Learmonth*, Oct. 1952 (MEL); Glen Edith, *H. H. Finlayson* Jan. 1930 (AD); W extremity of MacDonnell Ranges, prob. S of Haast Bluff, *E. Rieschieck*, ca Oct. 1956 (MEL, NT). SOUTH AUSTRALIA: Elder Exploring Exped., Camp 4 (27°S, 132°E), *R. Helms*, 12 June 1891 (AD, MEL, PERTH); ca 25 km W of Cheeseman's Peak, *R. B. Major* 127, 1966 (AD).

This widespread and common desert species occurs principally in Western Australia but also in adjacent areas of Northern Territory and South Australia, occurring characteristically on red, sandy dunes and plains, in association with species of *Triodia*, *Eucalyptus* (mallees), *Casuarina*, *Eremophila*, *Acacia* or *Atriplex*. Considerable variation of leaf and perianth morphology, as well as perianth colour, occurs over the geographic range of the species. To the east, sepals, petals and leaf margins tend to be denticulate and petals uniformly yellow; progressing westwards, denticulation becomes less pronounced; north of Warburton, petals have been described by one collector as becoming reddish with age; white petals are common in the area bounded by Carnegie, Sandstone, Menzies and Laverton; near the south-western limit of distribution purple or pink petals have been commonly recorded, together with entire petals and sepals; and at Wialki, specimens with very small leaves occur. The taxonomic status of flower-colour variants, such as that referable to *M. trachycalyx*, remains unresolved for want of detailed information on the field populations.

8. Micromyrtus barbata J. W. Green, sp. nov.

Frutex; folia anguste obovato-oblonga, plano-convexa, minute ciliolata, infra prope apicem carinata; *flores* solitarii, axillares, breviter pedunculati, saepe aliquot aggregati subterminaliter; *tubus* floris obconicus, pilis usque ad 1·5 mm longis flavis patentibus vel reflexis dense barbatus, infra papillatus, sine costis; *sepala* ± orbicularia, 1·5 m diam., marginibus fimbriatis; *petala* elliptica sepalis duplo longiora, alba, marginibus integris; *stamina* 5, 2 mm longa; filamenta filiformia; glans connectivi subglobularis apice porato; *ovula* 2, collateralia.

Type: 104 km SW of Warburton, Gibson Desert, W.A., *A. S. George* 12179, 27 July 1974 (holo: PERTH; iso: AD, CANB, K, MEL, NT, PERTH).

Shrub 0·25–0·7 m high. *Leaves* imbricate, decussate, narrowly obovate-oblong, plano-convex, ± keeled below towards the apex, 1–3 mm long, 0·7 mm broad, obtuse or with a minute, terminal mucro, somewhat glaucous, with several oil glands; margins minutely ciliate. *Flowers* solitary in the upper axils, often several clustered together subterminally, at maturity 7 mm long, enclosed in the bud by two folded bracteoles with ciliate margins. *Peduncle* 1–1·5 mm long. *Floral tube* obconical, densely bearded with yellow, spreading or reflexed hairs up to 1·5 mm long. *Sepals* semi-elliptical 1·5 mm diameter, the margins fimbriate. *Petals* elliptical, twice as long as the sepals, creamy-white or white, the margins entire. *Disc* deeply concave. *Stamens* 5, 2 mm long; filaments filiform, 1·6 mm long; anthers versatile, dehiscing by two longitudinal, parallel stomia; gland subglobular, narrowing between the thecae to a truncate tip. *Ovules* 2, collaterally attached to the stylar vein in the upper quarter of the ovary and contained within a fine membrane. *Fruit* not seen. Flowering recorded July. Figures 135–143; Map 7.

Additional specimen examined: WESTERN AUSTRALIA: 28·5 miles (46 km) Carnegie to Mount Everard, *A. R. Fairall* 2090, 28 July 1966 (PERTH).

This very distinctive and apparently rare species is known only from the above localities, some 340 km apart, in red sand country of the Gibson Desert. The type was collected near a creekline, on a *Triodia* plain. The distribution is within the range of *Micromyrtus flaviflora*, to which *M. barbata* is related but from which it differs markedly in the bearded floral tube, fewer ovules and longer stamens.

Acknowledgements

I acknowledge with pleasure the advice and assistance given by my colleague Mr. P. G. Wilson, particularly in matters of typification and nomenclature. I also thank my other colleagues and my wife for helping me with discussions on many occasions. The Latin descriptions were supplied by Mr. A. S. George, while the manuscript was read by Mr. R. J. Henderson, Dr. N. G. Marchant and Mr. P. G. Wilson, all of whom made many helpful suggestions for improvement. Mrs Wendy Lee-Frampton is thanked for drawing the maps and for other technical assistance. Miss V. L. Hamley is thanked for typing the manuscript.

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Index to numbered collections seen
(Species numbers in brackets)

Thryptomene

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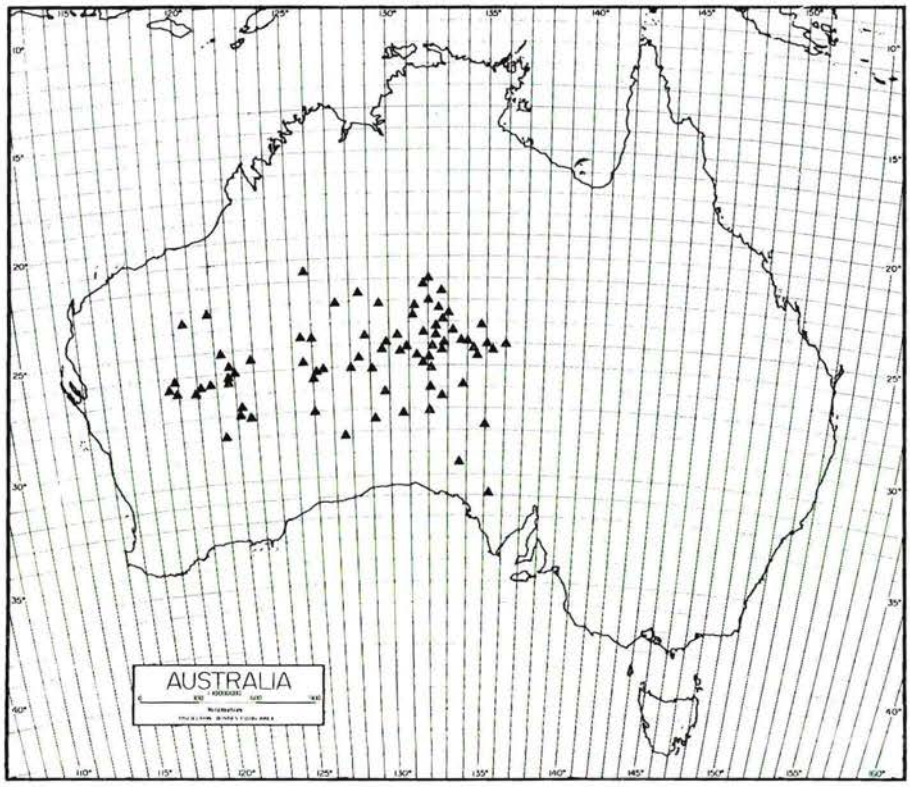
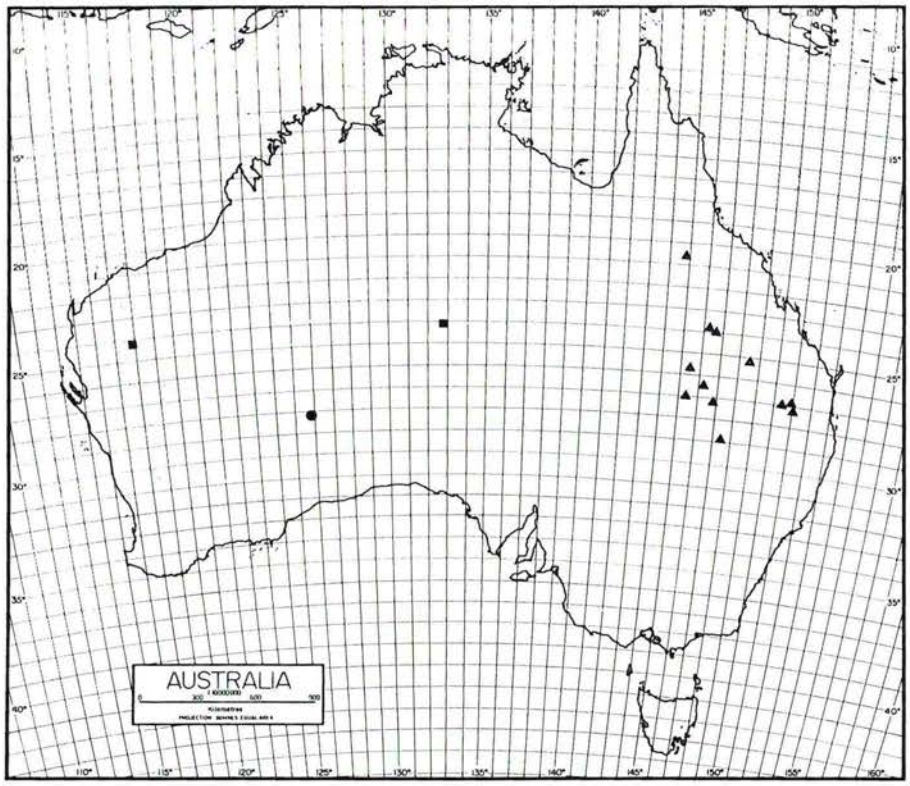
Micromyrtus

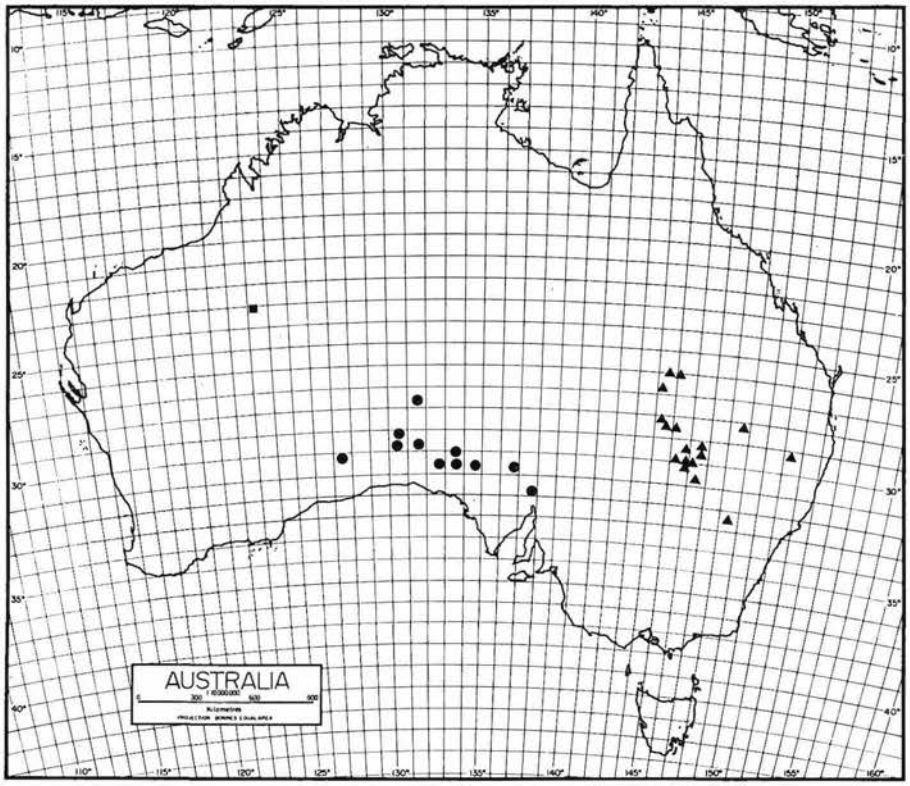
Aitken & Hutchinson HA58 (7); Alright 20 (7); Althofer 48 (1), 204 (1); Aplin 2397 (7); Beard 4895 (7), 6544 (7); Beauglehole 26895 (7); Bennett 70 (7); de Beuzeville 147 (1); Blackall 456 (7), 4164 (7), 4223 (7); Boswell C40 (2); Chinnock 541 (7), 629 (7); Chippendale 2918 (7); Clarke 149 (7); Cockburn 22 (1); Crisp 364 (7); Donner 4398 (7), 4462 (7); Ebersohn E72 (1); Everist 3098 (1); Everist & White 44 (1); Fairall 2035 (7), 2090 (8); Gardner 2153 (7), 14375 (7), 19039 (7); George 2841 (2), 2861 (7), 2964 (7), 4853 (7), 5372 (7), 5459 (7), 5608 (7), 5846 (2), 5879 (6), 5951 (5), 6006 (6), 8006 (7), 8090 (7), 8195 (7), 8375 (3), 8411 (2), 9059 (7), 9122 (7), 12179 (8); Goodall 2995 (6); Gordon 36 (1); de Graaf 136 (7); Harper 2 (7); Hill & Lothian 812 (7); Hockings 4 (1); Johnson, H. A. 5099 (7), 9768 (7); Kenneally 70A (7); Latz 882 (7); Lazarides 6136 (7); 8299 (7), 8310 (7); Maconochie 679 (7), 805 (7), 1393 (7), 1806 (7), 1868 (7); Main 552 (2); Major 127 (7); Martensz 48 (1); McKee 10346 (1); Moore 3586 (1), 3854 (1); Pedley 2428 (1); Regan 7 (1); Royce 5517 (2); 10479 (7), 10481 (7), Serventy (7); Smith, L. S. 6004 (1), 6414 (1); Speck 1203 (7), 1499 (7); Symon 2414 (7); White 11872 (1); Williams 10762 (3); Wilson, H. M. 2 (7); Wilson, P. G. 7457 (7).



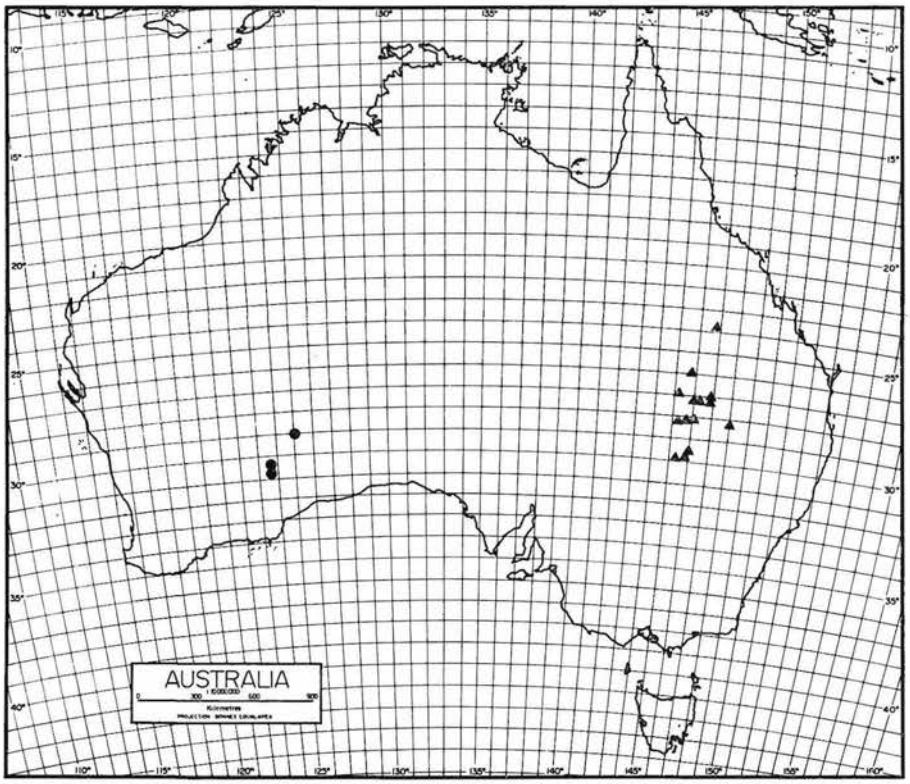
Map 1. Distribution of *Thryptomene maisonneuvei*.



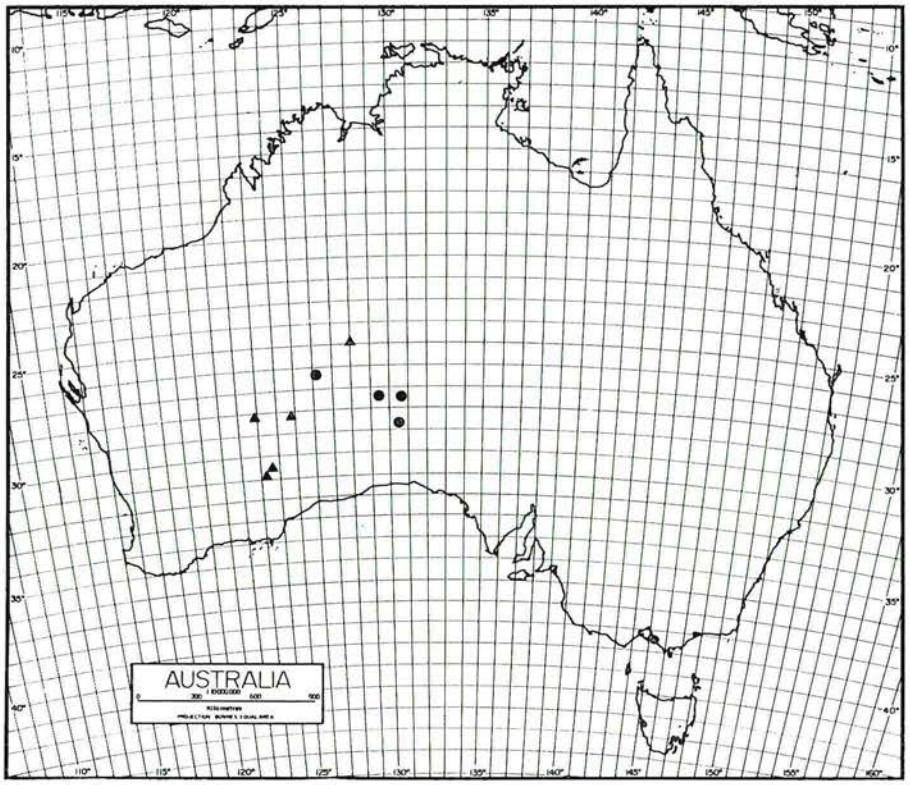
Map 2. Distribution of *Thryptomene parviflora* (▲), *Thryptomene wittweri* (■) and *Thryptomene nealensis* (●).



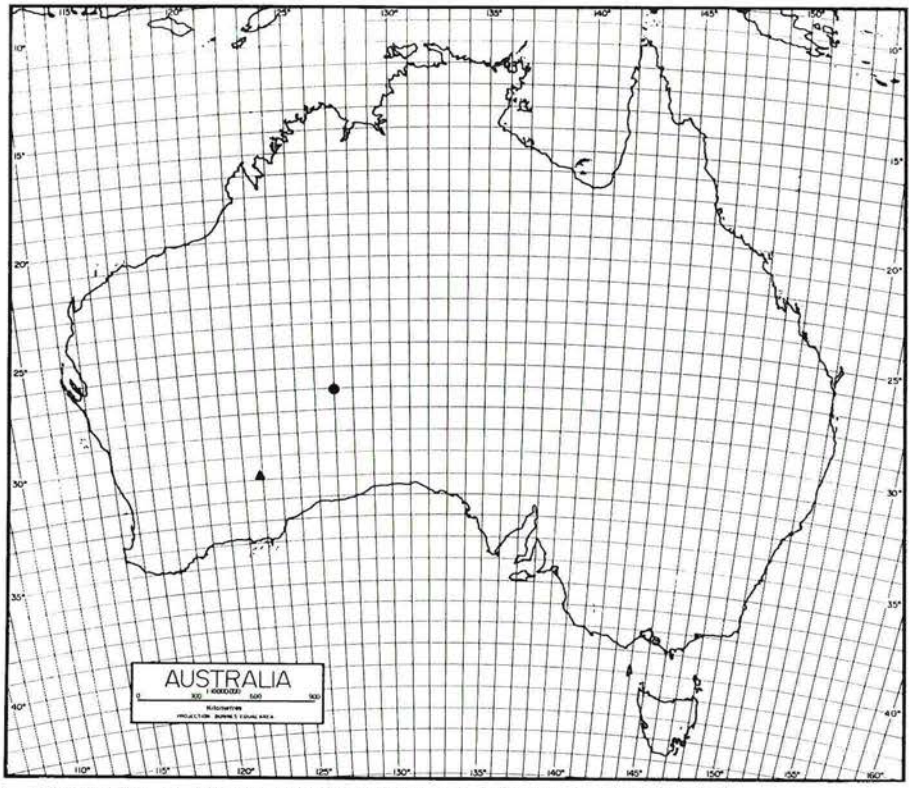
Map 3. Distribution of *Thryptomene naviculata* (■), *Thryptomene elliottii* (●) and *Thryptomene hexandra* (▲).



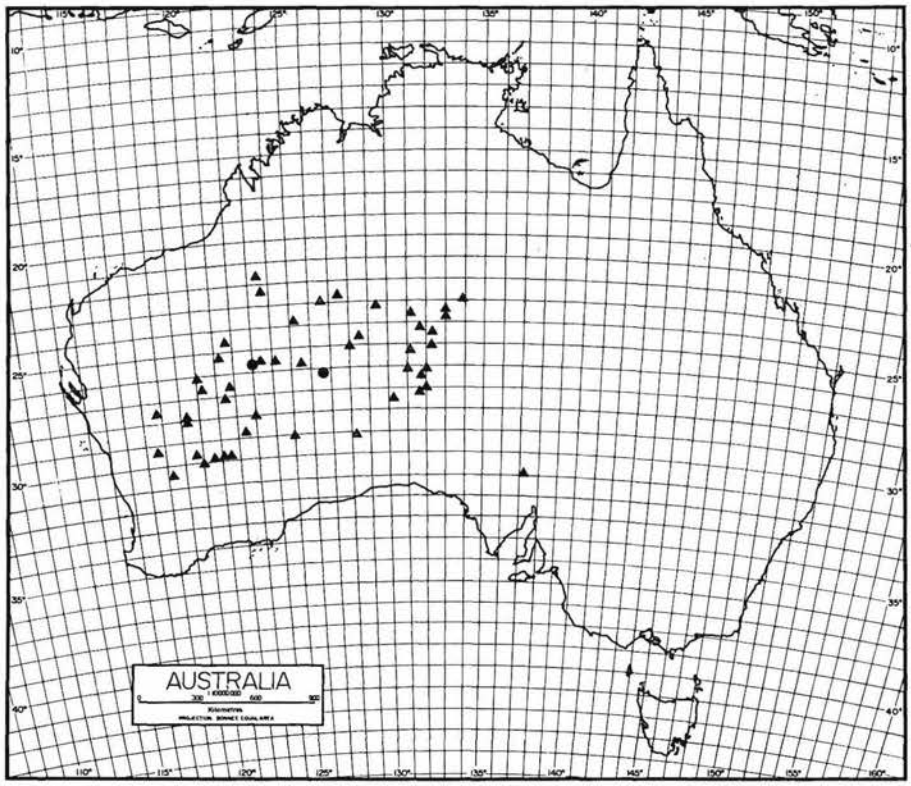
Map 4. Distribution of *Micromyrtus hexamera* (▲) and *Micromyrtus stenocalyx* (●).



Map 5. Distribution of *Micromyrtus hymenonema* (▲) and *Micromyrtus fimbrisepala* (●)



Map 6. Distribution of *Micromyrtus helmsii* (●) and *Micromyrtus serrulata* (▲).



Map 7. Distribution of *Micromyrtus flaviflora* (▲) and *Micromyrtus barbata* (●).

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Species currently recognised and principal page references are in **bold** type.

A new species of Urocarpus (Rutaceae) from Western Australia

By Paul G. Wilson

Western Australian Herbarium

Abstract

Wilson, Paul G. A new species of Urocarpus (Rutaceae) from Western Australia. Nuytsia 3, 2: 211–213 (1980).

A new species of *Urocarpus* Drumm. ex Harv. (Rutaceae) is described from near Bindoon, Western Australia. It differs from *U. grandiflorus* (Hook.) P. G. Wilson in having narrowly oblong leaves and smaller flowers which are white in colour. In carpel number it provides a link between *Urocarpus* s.str. and *Asterolasia* F. Muell., supporting the suggestion that the latter genus should not be maintained.

A new species of *Urocarpus* is described in order to validate its inclusion in the projected Flora of the Perth Region. It was, until recently known from only three collections, all received since my treatment of the genus in 1972, and all referred incorrectly to *U. pallidus* (Benth.) P. G. Wilson.

Urocarpus niveus P. G. Wilson, sp. nov. (Fig. 1)

Frutex dense ramosus ad 0·5 m altus. *Folia* breviter petiolata; lamina anguste oblonga ad oblonga, 6–12 x 1·5–4 mm. *Petala* alba, facie exteriore cum trichomatibus solidus minute echinatis ornata. *Stamina* 16–20.

Type: P. G. Wilson 11704, ca. 20 km N of Bindoon (ca. 31°12′S, 116°10′E) Western Australia, 19 Sept. 1979 (holo PERTH; iso CANB, K, NSW).

Weak, densely branched sub-shrub to 0·5 m high. *Branches* slender, sparsely stellate, pubescent. *Leaves* shortly petiolate; lamina narrowly oblong to oblong, 6–12 x 1·5–4 mm, somewhat coriaceous (chartaceous when in shade), entire, flat or with recurved margins, sparsely stellate-pubescent, becoming scabridulous above with age. *Umbels* when terminal 3–6 flowered (lateral umbels 1-flowered on very short axillary shoots), surrounded by 2–3 leaves and a few petaloid bracts 3–4 mm long. *Sepals* inconspicuous, broadly triangular, ca. 0·3 mm long. *Petals* induplicate-valvate in bud, spreading, white, elliptic, 8–10 mm long, glabrous within, covered outside with solid, sub-spherical, shortly echinate trichomes which, in the bud, form an armour-like covering. *Stamens* 16–20, somewhat shorter than and deciduous before the petals; filaments slender, glabrous; anthers yellow, oblong, 1·5 mm long, with a small terminal gland. *Disc* very small and inconspicuous. *Ovary* ellipsoidal, 2 mm long including the short solid carpel apices, stellate-hairy; carpels 3 or 4, free but united by the slender style; stigma with 3 or 4 short stout recurved lobes. *Fruiting cocci* ca. 5 mm long each with a slender beak ca. 3 mm long which becomes divaricate with age. *Seeds* oblong, 3 mm long; testa smooth, dull and dark brown; placental endocarp thin, deciduous from seed.

Distribution: Western Australia, Southwest Botanical Province: near Bindoon, ca 110 km N of Perth.

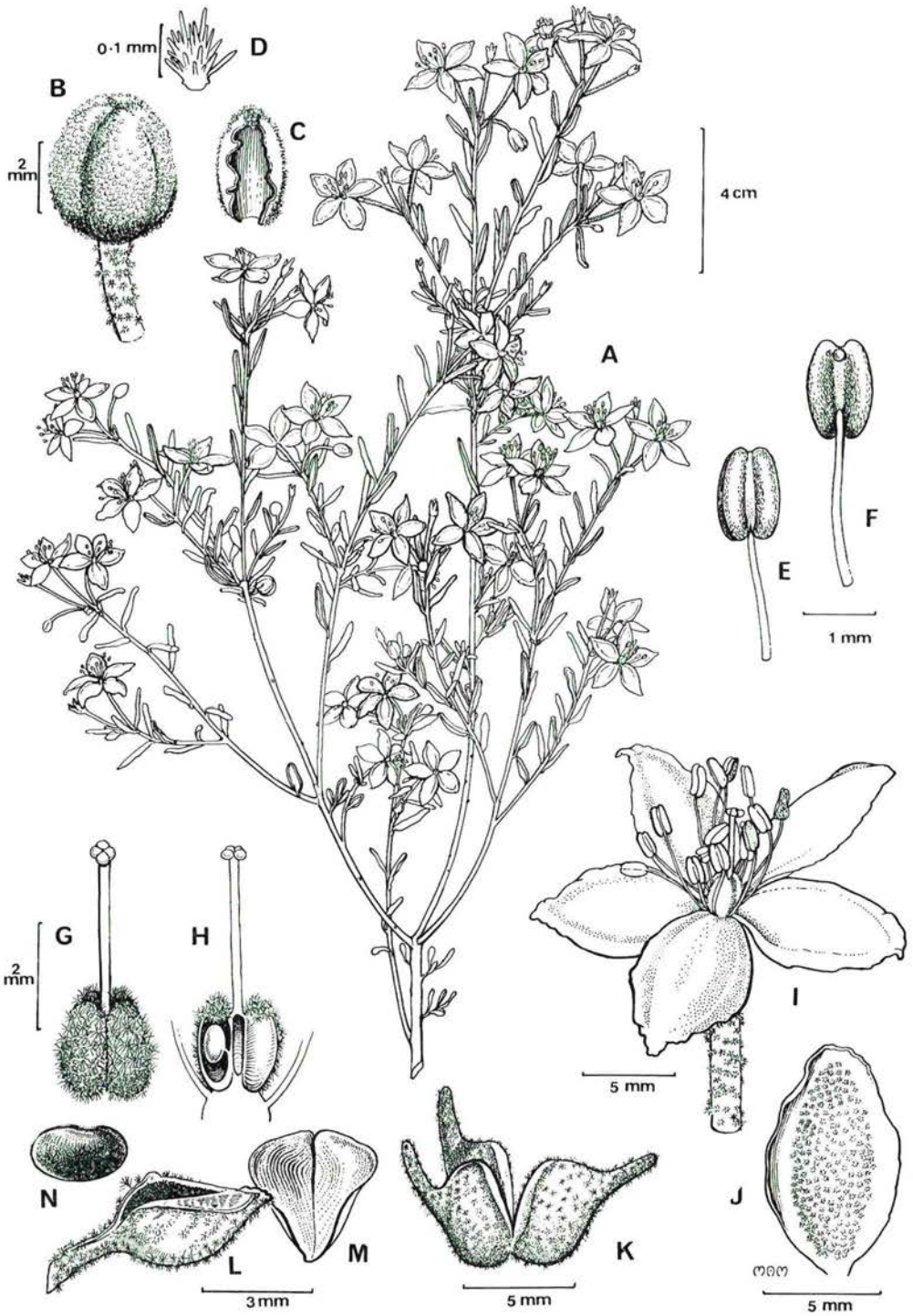

Figure 1. *Urocarpus niveus* P. G. Wilson. A—habit. B—flower bud. C—induplicate petal. D—stellate hair from petal. E—stamen (adaxial view). F—stamen (abaxial view). G—gynoecium. H—L.S. gynoecium. I—flower. J—petal (abaxial view). K—fruit. L—dehisced coccus. M—endocarp. N—seed. From P. G. Wilson 11704.

Western Australia: Near Bindoon, Great Northern Highway, Sep. 1963, *E. Duffield* (PERTH); Near Bindoon, 12 Sep. 1960, *C. A. Gardner* (PERTH); South of Moore River, Aug. 1966, *C. A. Gardner* (PERTH).

Habitat: Eucalyptus calophylla (Marri) woodland on clay with lateritic gravel.

Conservation Status (Specht 1974): Endangered.

Urocarpus niveus is superficially like *U. pallidus* (Benth.) P. G. Wilson since both species have white flowers. In *U. pallidus*, however, the hairs on the petals are stellate (not of a solid sub-spherical globule) and the leaves are broadly elliptic (not oblong). *Urocarpus niveus* is most closely related to *U. grandiflorus* (Hook.) P. G. Wilson; the latter species has similar petal hairs but differs in flower size and colour (larger, pink-mauve petals), and in leaf shape (ovate to elliptic), while it is restricted in its distribution to a small area near York. On plants growing in the open the leaves of *U. niveus* are somewhat coriaceous and their margins recurved; in the shade, however, the leaves are chartaceous and flat.

The genus *Urocarpus* Drumm. et Harvey (early 1855) I consider to include the genera *Asterolasia* F. Muell. (late 1855) and *Pleurandropsis* Baill. (1872) (see Wilson 1971). It may be distinguished from other members of the tribe *Boronieae* by the following association of characters:

(1) Flowers in umbels and maturing in succession.
(2) Virtual absence of disc.
(3) Inconspicuous calyx.
(4) Induplicate-valvate petals.

Bentham (1863) divided the genus (as *Asterolasia*) into two sections; the first, containing those species with five carpels, he called sect. *Euasterolasia* (= *Phebalium* sect. *Correoides* Endl., 1840), and the second, those with two to three carpels, he called sect. *Urocarpus* (Harv.) Benth. The species belonging to the first section are found in Victoria and New South Wales while those of the second occur in South Australia and Western Australia. The number of carpels varies in the Western Australian species; *U. phebalioides* Harv. has two carpels, *U. pallidus* (Benth.) P. G. Wilson, *U. grandiflorus*, and *U. squamuligerus* (Hook.) P. G. Wilson have either two or three carpels while the newly described species, *U. niveus*, has either three or four carpels. Since there is a transition between the 2- and 5- carpellary condition, a generic or infrageneric separation based on this character does not appear to be warranted. A transfer to the genus *Urocarpus*, of those species of *Asterolasia* found in New South Wales and Victoria, has still to be made. This step, however, should be taken only after the taxonomic complexities of that group have been cleared up.

The Conservation Status of "Endangered" has been given to this species since it is now only known in nature from a few wayside plants, although it is possible that other populations may be present in the remnants of forest near Bindoon.

Acknowledgement

The illustration of a plant from the type collection was prepared by Margaret A. Menadue.

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Reinstatement of the genus Kippistia F. Muell. (Asteraceae, Astereae)

Nicholas S. Lander[1] and Rhonda Barry[2]

Abstract

Lander, Nicholas S, and Barry, Rhonda. Reinstatement of the genus Kippistia F. Muell. (Asteraceae, Astereae). Nuytsia 3, 2: 215–219 (1980).

The Australian monotypic genus *Kippistia* F. Muell., previously included under *Minuria* DC., is reinstated. Distinguishing features are presented and the single species, *K. suaedifolia*, is redescribed; nomenclatural notes and a distribution map are provided.

Introduction

Mueller (1859) erected the monotypic genus *Kippistia* to accommodate specimens collected at Stuart Creek, South Australia on Babbage's Expedition. It was included under *Minuria* by Bentham (1867), a practice followed by all subsequent authors. Reconsideration of all available material of this taxon in connection with our recent study of *Minuria* (Lander & Barry, 1980) suggests that Mueller's genus *Kippistia* is deserving of reinstatement.

Discussion

Capitulum: In *Minuria* capitula are heterochromous with yellow disc florets but with ray florets ranging in colour from white, through violet, mauve, lilac, lavender to pink and often quite variable in one species though never yellow. The capitula of *Kippistia* are homochromous with ray and disc florets uniformly and constantly yellow.

Ray floret style: The ray floret stigma lobes of all species of *Minuria* are subulate with conspicuously papillose stigmatic lines. The stigma lobes of the sterile ray florets in *Kippistia* are smooth and completely lack stigmatic lines.

Ray achene: Whereas ray achenes are invariably fertile in all species of *Minuria*, those of *Kippistia* are often sterile being flattened, translucent and without ovules, a feature noted also by Black (1929).

Ray pappus: In *Minuria* the ray pappi usually consist of many free, barbellate bristles. *M. denticulata* and *M. gardneri* have 7–10 such bristles per pappus. *M. denticulata*, *M. integerrima* and *M. rigida* have bristles which are increasingly more densely barbed towards their tips; those of other species are uniformly barbellate. In *M. macrocephala* the pappus consists of c. 35 tapering, capillary bristles often united in clumps.

In *Kippistia* the ray pappus is variable, consisting of many barbellate bristles either free to their bases or connate into a cup surmounted by a few bristles; the cup is sometimes elongated to form a distinctive tube.

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Disc florets: Tetramerous disc florets are found in *Minuria integerrima* (Davis, 1964; Lander & Barry, 1980) and have been observed in other genera of Astereae (Gardner, 1977; Grau, 1977). This character can also be observed in *Kippistia suaedifolia.*

Disc achene: Whereas disc achenes are sterile in *Minuria* or even absent altogether in one apomictic species, *M. integerrima* (Davis, 1964; Lander & Barry, 1980), they are swollen, opaque, contain ovules and are probably fertile in *Kippistia.*

Disc pappus: In *Minuria* there is considerable variation in the structure of disc pappi which, in general, consist of a mixture of shorter and longer, more or less free, barbellate bristles. In *M. annua* these shorter bristles are often united into fimbriate scales. In *M. integerrima* and *M. chippendalei* the shorter bristles are absent altogether or reduced to inconspicuous scales, a condition approached by *M. denticulata* where these shorter bristles are minute.

Two species of *Minuria* are quite exceptional. In *M. gardneri* the pappus consists of a cup of connate scales occasionally surmounted by one, rarely more (up to eight) bristles. In *M. macrocephala* the shorter disc pappus bristles are variable, being either capillary or else broad, barbellate and branching towards the apices into finer tips.

The disc pappus of *Kippistia* consists of a cup of short, more or less connate bristles surmounted by up to eight longer, barbed bristles thus approaching the condition found in *M. gardneri.* Rarely, all the bristles are united to form a tube making disc and ray pappi indistinguishable.

Chemistry: Kippistia suaedifolia is remarkable for its peculiar and strongly aromatic odour not found in any species of *Minuria.* The ". . . volatile oil obtained by steam distillation of the whole flowering plant . . . contained, apart from very small amounts of other components, about 30% of limonene and 60% of perillyl acetate. The occurrence of limonene is unexceptional. However, perillyl acetate is a very uncommon natural product indeed. It occurs for instance in small amounts only in the oil of spearmint" (Lassak, pers. comm.). To date, the oils of *Minuria* species have not been examined.

Affinities: Despite the reliance placed on heterochromicity of the capitulum as a subtribal character by Bentham and Hooker (1873) and Hoffman (1889), *Kippistia* seems best placed in Asterinae (Heterochromeae Benth. & Hook.). We now know several genera which possess both homochromous and heterochromous heads including *Pentachaeta, Felicia, Mairia,* and *Machaeranthera* (Grau, 1977) and *Calotis* (Davis, 1952). Ray colour, therefore, while expressive of a trend within the tribe does not prevent us from retaining *Kippistia* in the Asterinae.

Kippistia is undoubtedly most closely related to *Minuria* and shares with it the woody perennial habit; the naked receptacle; two or more rows of ray florets; obtuse anther bases; dimorphic pappi—those of ray florets being markedly different in dimensions or morphology from those of the disc; and the single row of pappus hairs.

Further evidence to support the inclusion of *Kippistia* in the Asterinae comes from our observations on the disc styles which conform to those of the second type of sterile style described by Grau (1977) in which the disc stigma lobes are pubescent on their dorsal surfaces with patent or spreading uniseriate hairs which extend below the point of bifurcation. In the sub-tribe Asterinae these disc styles have previously been found only in the Australian genera *Calotis* and *Minuria.* The only other genus in the tribe Astereae in which such styles are found is another Australian genus, *Erodiophyllum,* in the subtribe Bellidinae Benth. & Hook.

Diagnostic key to Kippistia and Minuria

1. Capitula homochromous with disc and ray florets both yellow; ray achenes often sterile; ray pappus of many barbellate bristles free to their bases or connate into a cup surmounted by a few bristles, sometimes elongated to form a tube; disc achenes fertile; plant strongly aromatic .... **Kippistia** *F. Muell.*

1*. Capitula heterochromous with disc florets yellow and rays white, blue, pink, mauve, etc.; ray achenes always fertile; ray pappus bristles never united to form a cup or tube; disc achenes sterile or absent altogether; plants not aro- or only slightly so .... **Minuria** *DC.*

Taxonomy

The name *Kippistia* honours Richard Kippist, librarian of the Linnean Society of London from 1840 to 1880.

Kippistia F. Muell., Rep. Bab. Exped. 12 (1859)

Type: K. suaedifolia F. Muell.

K. suaedifolia F. Muell., l.c.; F. Mueller, Pl. Indig. Col. Victoria fig. 35 (1864–5).

Minuria suaedifolia (F. Muell.) F. Muell. ex Benth., Fl. Austral. 3: 499 (1867); J. M. Black, Fl. South Australia Ed., 2, 858 (1957).—*Minuria kippistiana* F. Muell., Pl. Indig. Col. Victoria fig. 35 (1864–5) nom. pro. syn.—*Therogeron suaedifolia* (F. Muell.) Kuntze, Rev. Gen. 368–9 (1891).

Neotype (here designated): Streaky Bay to Venus Bay, *Babbage* MEL 70481, undated (MEL).

It has not been possible to locate the specimen originally cited by Mueller collected by Babbage at Stuart Creek. Mueller stated that "only a small fragment occurs amongst the plants of the expedition."

A compact perennial shrub to 60 cm high, strongly aromatic. *Stems* woody, older ones sometimes gnarled, yellowish green to brown, glabrous. *Leaves* alternate, sessile, sometimes in clusters along old branches, linear, to 2·4 cm long, c. 0·5 mm wide, glabrous; apices apiculate to uncinate; margins entire. *Capitula* pedunculate, terminal, broadly conical, to 7 mm in diameter, homochromous. *Involucral bracts* in 3 rows, yellowish green, lanceolate, 2–3 mm long, c. 0·7 mm wide; margins of all rows membranous; apices acute, fimbriate, glabrous with a single prominent rib. *Receptacle* sharply convex, naked. *Ray florets* many in several rows, pistillate; ligules yellow, 0·8–1·8 mm long, 0·2–0·5 mm wide; floral tube 1·0–1·2 mm long; stigma lobes subulate, 0·3–0·7 mm long, glabrous; achenes both fertile and sterile, pale brown to yellow, linear in outline, 0·7–0·9 mm long, 0·2–0·3 mm wide, sparsely pubescent at base with notched twin-hairs; pappus of many barbellate bristles free to their bases or united to form a cup 1·2–1·4 mm long, surmounted by a few free hairs, rarely with all hairs united into a long tube. *Disc florets* hermaphrodite; floral tube 1·4–2·3 mm long; anthers 0·6–1·0 mm long, c. 0·2 mm wide with acute sterile apical appendages; stigma lobes subulate, 0·8–1·5 mm long, c. 0·2 mm wide, densely pubescent with adpressed, uniseriate hairs to just below the point of bifurcation; achene fertile, opaque, flattened, elliptical in outline, glabrous, 0·3–0·6 mm long, c. 0·3 mm wide; pappus consisting of a cup, of short more or less connate bristles 0·5–0·8 mm long, surmounted by up to 8 longer barbed bristles 1·5–1·8 long, rarely with all bristles united to form a tube.

Flowering Period: August to October.

Habitat: Occurs on a variety of soils usually around salt lakes and often in association with gypsum deposits.

Distribution: See map 1.

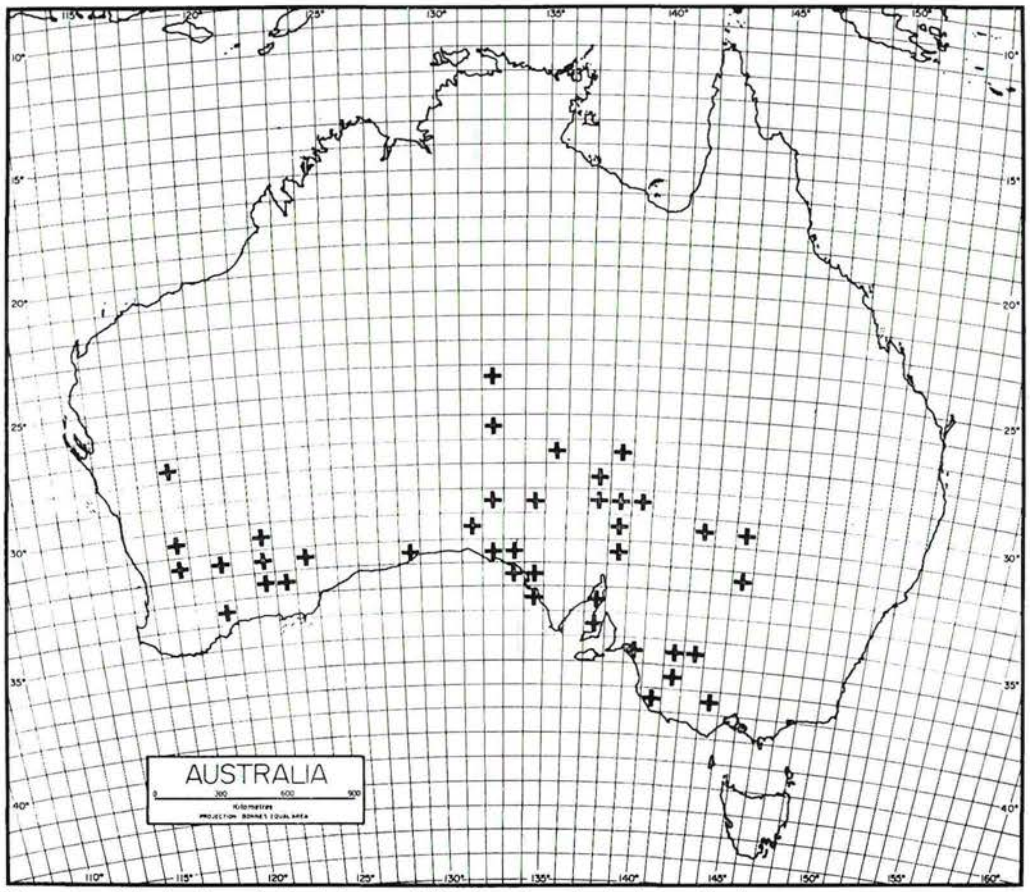

Figure 1. Distribution of *Kippistia suaedifolia* based on herbarium collections.

We have examined and annotated all available material of *Kippistia suaedifolia* from the following herbaria: AD, BRI, CANB, MEL, NSW, NT, and PERTH. The following list records only a few collections from each State. No attempt has been made to indicate the full range of variation by this list. All collections examined have been mapped by marking their occurrence in one degree squares superimposed on Bonnes Equal Area Projection of Australia.

Selected Specimens: NEW SOUTH WALES: Marlow Gypsum Mine, 22 km N of Conoble, *Pickard*, Aug. 1974 (NSW); NORTHERN TERRITORY: 13 km S of Wallera Range, *Latz* 4113, Aug. 1973 (AD); SOUTH AUSTRALIA: Mt Lyndhyrst, *Koch* 352, Oct. 1898 (BRI, MEL, NSW); VICTORIA: Sandhills N of Tempy, *Henshall* 596, Oct. 1967 (NT): WESTERN AUSTRALIA: Norseman, *Andrews*, Oct. 1903 (NSW, PERTH); 3 miles (5 km) N of Norseman on shore of Lake Cowan, *Phillips* CBG 015556, Sept. 1962 (CBG, NSW); Lake King, 33°05′S, 119°34′E, *Wilson* 7154, Aug. 1968 (NSW, PERTH).

The bulk of this work was completed while both authors were employed at the National Herbarium of New South Wales.

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(5)—96592

A review of the genus Minuria DC. (Asteraceae, Astereae)

Nicholas S. Lander[1] and Rhonda Barry[2]

Abstract

Lander, Nicholas S., and Barry, Rhonda. A review of the genus Minuria DC. (Asteraceae, Astereae). Nuytsia 3, 2: 221–237 (1980).

Three new species in the Australian genus *Minuria* are described: *M. chippendalei* from the Northern Botanical Province of Western Australia and the Darwin and Gulf District of the Northern Territory; *M. gardneri* from the Eremaean and South West Botanical Provinces of Western Australia and the North Western Botanical Region of South Australia; *M. macrocephala* from the Eremaean Botanical Province of Western Australia. A key to all nine species of *Minuria*, nomenclatural notes, descriptions and distribution maps are provided.

Introduction

De Candolle (1836) erected the genera *Elachothamnos*, *Minuria* and *Therogeron* to accommodate taxa collected on the Lachlan River by Allan Cunningham. In later years two new genera, *Kippistia* F. Muell. (1859) and *Minuriella* Tate (1899), were described based on single collections. The first four of these genera were united under *Minuria* by Bentham (1867), Bentham & Hooker (1873), Hoffman (1899) and Dalla Torre et Harms (1900–7). Tate's genus *Minuriella* was included in *Minuria* by Black (1929).

Seven described species make up the genus *Minuria* as it has been recognized to date of which one species, *Minuria suaedifolia* (F. Muell.) F. Muell. ex Benth., is returned to the monotypic genus *Kippistia* F. Muell. by us (Lander & Barry, 1980). In addition, three hitherto undescribed composites from Western Australia, South Australia and the Northern Territory belong here. Thus we recognize a total of nine species in the genus *Minuria*.

Minuria is in the tribe Astereae sub-tribe Asterinae, Australian members of which include *Calotis*, *Vittadinia*, *Podocoma*, *Celmisia*, *Olearia* and *Erigeron*. *Minuria* is easily distinguished from other genera in the Asterinae on the basis of the following combination of characters: (1) the naked receptacle; (2) the two or more rows of ray florets; (3) the obtuse anther bases; (4) the dimorphic pappi—those of the ray florets are markedly different in morphology or dimensions from those of the disc; (5) the single row of pappus hairs; and (6) the dimorphic achenes—those of the ray are fertile whilst those of the disc are sterile.

We have examined and annotated all available material of *Minuria* from the following herbaria: AD, NSW, CANB, MEL, BRI, NT and PERTH. The short lists of selected specimens given below record only a few collections from each State for which duplicates have been distributed, otherwise a single recent collection is cited. No attempt has been made to indicate the full range of variation of any species by such lists. For the three newly described taxa all specimens examined have been cited. For each species all collections have been mapped by marking their occurrence in one degree squares superimposed on Bonnes Equal Area Projection of Australia.

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MINURIA DC.

Minuria DC., Prod. 5: 298 (1836); Steudel, Nom. Bot. ed. 2: 150 (1840–1); Bentham, Fl. Austral. 3: 497–500 (1867); Bentham in Bentham & Hooker, Gen. Pl. 2: 267 (1873); F. Mueller, Syst. Census Austral. Pl. 77–8 (1882); Baillon, Hist. Pl. 8: 136 (1886); Durand, Index Gen. Phan. 195 (1888); Hoffman in Engl. & Prantl, Nat. Pflanzenfam. 4 (5): 159–60 (1889); F. Mueller, Sec. Syst. Census Austral. Pl. 131 (1889); Baillon, Dict. Bot. 362 (1891); Dalla Torre & Harms, Gen. Siph.: 532 (1900–7); Lemée, Dict. Gen. Phan. 4: 490–1 (1932).

Lectotype (here designated): *M. leptophylla* DC.

Therogeron DC., Prod. 5: 283 (1836); Steudel, Nom. Bot. ed. 2, 679 (1840–1); Kuntze, Rev. Gen. 368–9 (1891).

Lectotype (here designated): *T. denticulatum* DC. *Paratype: T. integerrimum* DC.

Elachothamnos DC., Prod. 5: 398 (1836); Steudel, Nom. Bot. ed. 2, 544 (1840–1).

Type: E. cunninghami DC.

Minuriella Tate, Trans. Roy. Soc. S. Austral. 23: 288–9 (1899); Dalla Torre & Harms, Gen. Siph. 636 (1900–7).—*Minuria* sect. *Minuriella* (Tate) Lemée, Dict. Gen. Phan. 4: 491 (1932).

Type: Minuriella annua Tate

After describing the monotypic genus *Minuriella*, Tate (l.c., 1899) noted ". . . the species typifies a new section or sub-genus, for which I propose the name *Minuriella* . . .". Thus there seems to have been considerable doubt in Tate's mind whether to treat the new entity as a genus, or as a section or sub-genus of *Minuria*. In the event he settled for the first of these alternatives and it would seem most expedient to treat the quotation above as a mere slip of the pen. Lemée (1932, l.c.) later validated the name *Minuria* sect. *Minuriella*. In our opinion little purpose would be served by recognizing sections in *Minuria*.

The name *Minuria* is derived from the Greek *minyros* meaning small, thin and weak, probably alluding to the leaves of the type species, *M. leptophylla*.

Annual or perennial herbs or dwarf shrubs, erect or prostrate. *Stems* herbaceous, suffrutescent or woody, glabrous or variously pubescent. *Leaves* alternate, sometimes clustered, sessile, linear, lanceolate, ovate, obovate or spathulate, sometimes falcate, glabrous or variously pubescent, sometimes with small floral leaves or with leaves overtopping the capitula; margin entire, undulating, finely serrulate or conspicuously dentate; apex obtuse, acute or acuminate. *Capitula* pedunculate, solitary or rarely clustered, terminal, heterochromous. *Peduncles* ± differentiated from main stems or branchlets, glabrous or variously pubescent. *Involucral bracts* in 3–4 rows, linear to lanceolate, uniform, grading in size or dimorphic, glabrous or variously pubescent, with 0–2 prominent ribs; margin ± membranous, entire or denticulate; apex acute to acuminate, entire or fimbriate, ± tinged pink. *Receptacle* naked, flat to noticeably convex. *Ray florets* many in 2 or more rows, estaminate; ligules white, violet, mauve, blue, lilac, lavender to pink, often quite variable in one species, ± conspicuous; floral tube glabrous; stigma lobes subulate to lanceolate, with conspicuous papillose stigmatic lines, achene fertile, brown, reddish-brown, red, orange or yellow, ± prominently ribbed, glabrous or variously pubescent, ± flattened, lanceolate, elliptical to obovate in outline; pappus of several to many free, barbellate bristles or of capillary bristles ± united in clumps. *Disc florets* staminate, yellow, pentamerous, rarely tetramerous; floral tube glabrous or variously pubescent with multicellular, biseriate hairs; anther bases obtuse; stigma lobes subulate or narrowly lanceolate, pubescent on dorsal surfaces to below point of bifurcation; achene sterile, glabrous or pubescent with notched twin-hairs, translucent or opaque, white, straw-coloured or reddish-brown, flattened, linear-lanceolate or elliptical in outline; pappus very variable, of dimorphic hairs, with both short and long ± free, barbellate bristles (shorter ones sometimes reduced to scales) capillary or branching towards apices, or else pappus a cup of connate scales surmounted by 1–8 bristles. A genus of nine species confined to Australia.

Key to the species of Minuria

1. Stems and peduncles entirely glabrous or with a few scattered hairs.
   2. Capitula large, to 35 mm in diameter when open; ray achenes densely pubescent with glochidial twin-hairs .... 8 **M. macrocephala** N. S. Lander & R. Barry
   2*. Capitula small, to 12 mm in diameter when open; ray achenes with notched or glochidial twin-hairs
      3. Uppermost leaves overtopping capitula .... 1 **M. annua** (Tate) Tate ex J. M. Black
      3*. Uppermost leaves not overtopping capitula
         4. Ray pappus longer than achene; disc pappus hairs uniform with 8–10 barbellate bristles 1·5–2·0 mm long; ray achene with notched twin-hairs .... 6 **M. integerrima** (DC.) Benth.
         4*. Ray pappus shorter or equal to achene; disc pappus hairs dimorphic with short barbellate bristles c. 0·8 mm long, and c. 8 longer bristles 2·5–3·0 mm long; ray achenes with glochidial twin-hairs .... 9 **M. rigida** J. M. Black

1*. Stems and peduncles weakly to densely pubescent
   5. Stems more or less wooly with multi-cellular stellate hairs; leaves somewhat pubescent with unicellular hairs; leaf apices and margins often conspicuously dentate .... 4 **M. denticulata** (DC.) Benth.
   5*. Stems pubescent with unicellular uniseriate hairs: leaves glabrous or pubescent with multicellular uniseriate hairs; leaf apices and margins entire
      6. Leaves entirely glabrous.
         7. Ray florets and conspicuous, ligules 5–7 mm long; ray achenes pubescent with glochidial twin-hairs; disc achenes glabrous .... 3 **M. cunninghamii** (DC.) Benth.
         7*. Ray florets very small and inconspicuous, ligules less than 1 mm long; ray achenes with a sparse cover of adpressed notched twin-hairs; disc achenes with multi-cellular biseriate hairs .... 5. **M. gardneri** N. S. Lander & R. Barry
      6*. Leaves sparsely to densely pubescent with multicellular uniseriate hairs
         8. Ray achenes densely pubescent with notched twin-hairs; innermost involucral bracts glabrous .... 7 **M. leptophylla** DC
         8*. Ray achenes only moderately pubescent with notched twin-hairs; innermost involucral bracts pubescent with multicellular uniseriate hairs .... 2. **M. chippendalei** N. S. Lander & R. Barry

1. Minuria annua (Tate) Tate ex Black, Fl. South Australia 589 (1929); J. M. Black, Fl. South Australia Ed. 2, 859 (1957).

Minuriella annua Tate, Trans. Roy. Soc. South Australia 23: 288 (1899).

Lectotype: ". . . Mount Lyndhurst Run near Farina, South Australia . . . discovered by Mr. Max Koch who has had the species under observation for two flowering seasons", *Koch* 407, Aug. 1899 (lecto: AD 97625312; isolecto: AD 97630576, AD 98027006, BRI, CANB, MEL, NSW). *Paratype*: *Koch* 407, March-June ?1900 as "1899" (AD 97625313).

Annual herb 6–12 cm high. *Stems* herbaceous, pale green to brown, glabrous. *Leaves* alternate, sessile, linear, glabrous, to 3·3 cm long, c. 1 mm wide; margin entire; apex acute-obtuse with uppermost leaves overtopping capitula. *Capitula* solitary, terminal, pedunculate, conical, to 8 mm in diameter. *Peduncles* pale green to brown, to 6 mm long, 0·5–1·0 mm wide, glabrous. *Involucral bracts* in 3 rows, pale green to yellow, lanceolate, glabrous, 3–4 mm long, c. 1 mm wide, with 2 prominent ribs on each bract; margin membranous; apex acute, fimbriate. *Receptacle* slightly convex. *Ray florets* many in several rows, estaminate; ligule white, 1·7–2·5 mm long, c. 0·2 mm wide; floral tube 1·8–2·3 mm long; stigma lobes lanceolate, 0·3–0·8 mm long; achene fertile, brown, 1·5–2·5 mm long, 0·3–0·6 mm wide, moderately pubescent with adpressed notched twin-hairs; pappus of many uniformly barbellate bristles 2–3 mm long. *Disc florets* staminate; floral tube 2·0–2·8 mm long, glabrous; anthers c. 1 mm long, c. 0·2 mm wide, with acute sterile apical appendages; stigma lobes subulate, 0·7–1·1 mm long, c. 0·1 mm wide; achene sterile, linear in outline, glabrous, 2–3 mm long, c. 0·3 mm wide; pappus of dimorphic bristles with short barbellate bristles free or united into fimbriate scales, c. 1 mm long, and 3–5 bristles 2·6–2·8 mm long with barbs longer and denser at tips.

Flowering Period: August to October.

Habitat: Low shrubland on calcareous soils.

Distribution: See Fig. 1.

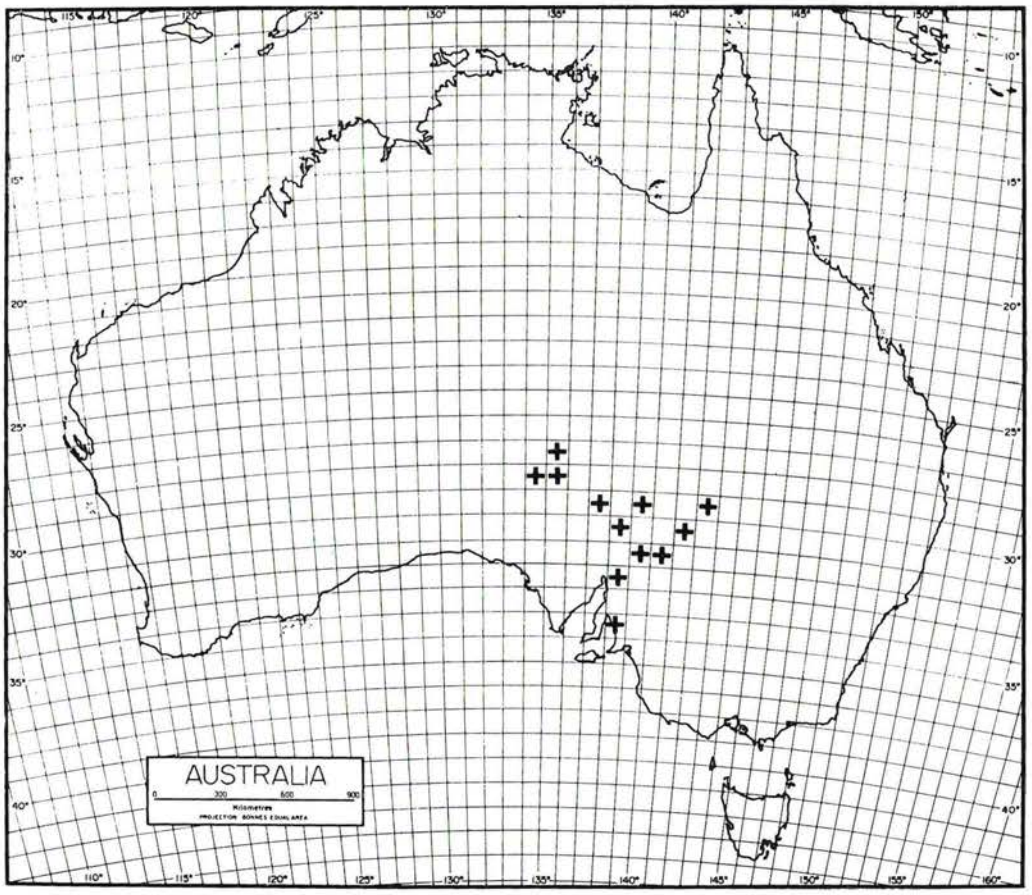

Figure 1. Distribution of *M. annua* based on herbarium material.

Selected Specimens: SOUTH AUSTRALIA: 15 miles (23 km) NE of Munday Creek on road to "Murnpeowie" Station, *Symon* 5604, Aug. 1968 (AD, CANB); NEW SOUTH WALES: 7 km NE of "McDougalls Well" homestead, 95 km NNW of Broken Hill, *Lander* 64, Sept. 1971 (NSW).

Affinities: M. annua bears an obvious resemblance to *M. gardneri* from which it can be distinguished by its glabrous stems, its annual habit and its leaves which overtop the capitula. The latter two characters are unique in the genus. Although Tate (1899) placed this species closest to *M. suaedifolia* (= *Kippistia suaedifolia*) its gross similarity to young plants of the latter species is superficial only.

Name: the specific epithet refers to the annual habit of this species which readily distinguishes it from other members of the genus.

2. Minuria chippendalei N. Lander et R. Barry sp. nov.

Species phyllaris pubescentibus a congeneribus diversa. Herba parva perennis. Achenia florum radiatorum fertilia, pilis furcatis geminis pubescentia etiam pappo setis multis liberis barbellatis ornata; achenia disci sterilia pilis ± emarginatis binatis pubescentia etiam pappo setis quam eis acheniorum radiatorum aliquantum longioribus ornata.

Type: Wade Creek, Vansittart Bay, Western Australia, *Gardner* 1537, Oct. 1921 (holo: PERTH).

Perennial herb 10–20 cm high. *Stems* suffrutescent, pale green, densely pubescent with patent, multicellular, uniseriate hairs becoming adpressed nearer the capitula. *Leaves* alternate, sessile, narrowly linear-lanceolate, to 11 mm long, to 1 mm wide, densely pubescent with multicellular, uniseriate hairs; margin entire; apex acute. Capitula solitary or in pairs terminating sparsely leafy branches, to 12 mm in diameter. *Involucral bracts* in 3 rows, lanceolate, 5–7 mm long, c. 1 mm wide; outer row moderately pubescent with multicellular, uniseriate hairs; apices acuminate; margins of inner row of bracts membranous. *Receptacle* slightly convex. *Ray florets* many in several row, estaminate; ligule white to lilac-pink, 5·6–6·3 mm long, 0·7–1·3 mm wide; floral tube 1·6–3·1 mm long; stigma lobes subulate, 0·5–0·7 mm long; achene fertile, lanceolate in outline, 1·7–2·3 mm long, 0·5–0·7 mm wide, moderately pubescent with notched twin-hairs; pappus of many free, uniformly barbellate bristles 3·5–4·2 mm long. *Disc florets* staminate; floral tube 3–4 mm long, glabrous; anthers 1·5–2·0 mm long, c. 0·3 mm wide, with sterile apical appendages; stigma lobes subulate, 0·2–0·3 mm long, c. 0·3 mm wide; achene sterile, opaque, linear in outline, 1·0–1·7 mm long, c. 0·5 mm wide, moderately pubescent with notched twin-hairs; pappus of uniform, barbellate bristles c. 4 mm long.

Flowering Period: October to June.

Habitat: In open forest on lateritic soils.

Distribution: See Fig. 2.

Other specimens: WESTERN AUSTRALIA: Mitchell Plateau, S of Amax campsite, 14°50′S, 125°50′E, *Hnatiuk* MP 103, Sept. 1976 (PERTH); NORTHERN TERRITORY: 22·4 miles (33·6 km) SE Darwin, *Chippendale* 4478, May 1958 (AD, BRI, MEL, NSW).

Affinities: M. chippendalei is very distinct from other members of the genus and its affinities are obscure. The pubescent inner involucral bracts are unique in the genus although *M. cunninghamii* has similar hairs on its outermost involucral bracts. The occurrence of paired capitula is worthy of note since they are otherwise found only in *M. integerrima.*

Name: The specific epithet is bestowed in honour of Mr. George M. Chippendale, one of the collectors of this plant, in recognition of his contribution to our knowledge of the flora of the Northern Territory by both collecting trips and publications.

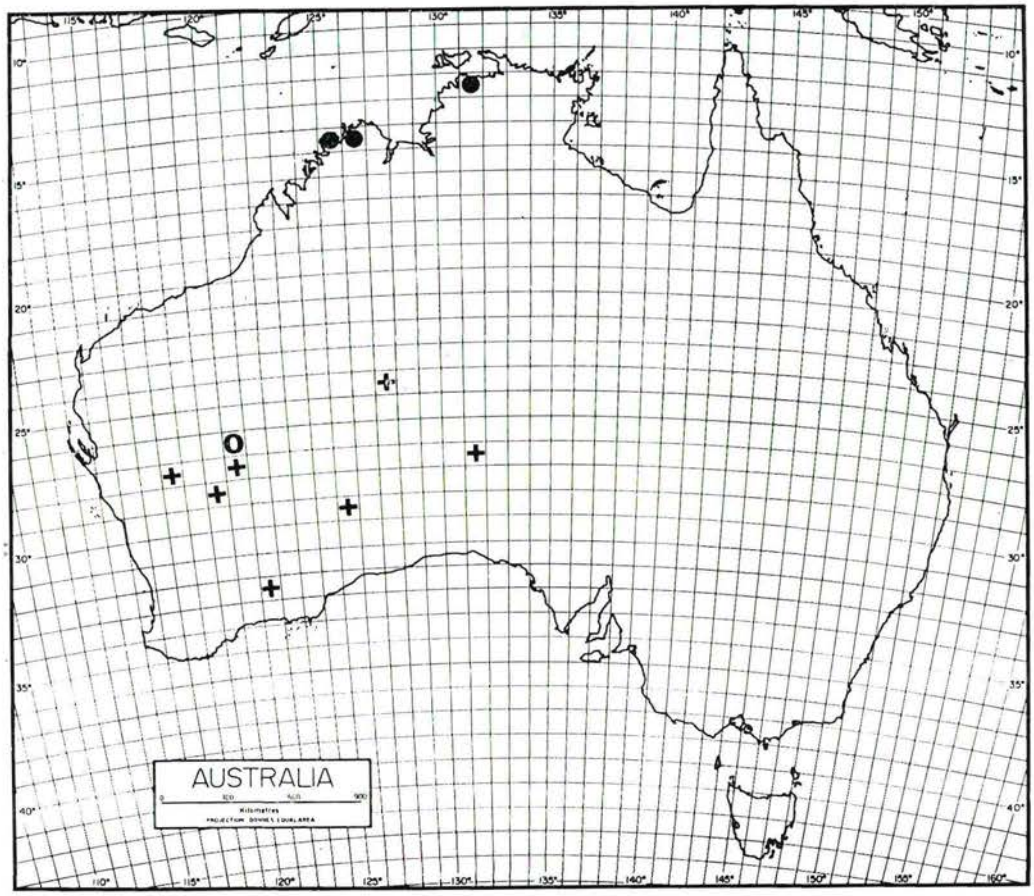

Figure 2. Distributions of (○) *M. macrocephala*, (●) *M. chippendalei* and (+) *M. gardneri* based on herbarium material.

3. Minuria cunninghamii (DC.) Benth., Fl. Austral. 3: 498-9 (1767).

F. Mueller, Key Vict. Pl. 2: fig. 79 (1885); J. M. Black, Fl. S. Austral, Ed. 2,857 (1957); Davis, Austral. J. Bot. 12: 152–6 (1964); Turner, Amer. J. Bot. 57: 383 (1970).

Elachothamnos cunninghamii DC., Prod. 5: 398 (1836); Steudel, Nom. Bot. Ed. 2, 544 (1840–1); F. Mueller, Pl. Indig. Col. Victoria fig. 34 (1864–5).—*Senecio othonnaeoides* A. Cunn. ex DC., Prod. 5: 398 (1836) nom. inval. pro syn.—*Therogeron cunninghamii* (DC.) Kuntze, Rev. Gen.: 368–9 (1891).

Type: ". . . in humidis depressis ad flumen Lachlan Nov.-Holland. julio flor, legit cl. All. Cunningham" (holo: G-DC; iso: K, BM).

Eurybiopsis intricata F. Muell., Linnaea 25: 394–396 (1852).—*Therogeron tenuifolius* Sonder, Linnaea 25: 467 (1852).

Type: "In clivulis petracis umbrosis ad Cudnaka Oct. 1851." *F. Mueller* (holo: MEL 70299; iso: MEL 70298).

Olearia glabra C. T. White, Proc. Roy. Soc. Queensland 55: 68 (1944).

Type: Dynevor Downs, Warrego District, Queensland, *C. T. White* 11829, 2/4/1941 (holo: BRI; iso: NSW).

Perennial spreading herb to 1 m high, grading from a fairly delicate to a robust plant. *Stems* woody, brown, sparsely pubescent with unicellular hairs. *Leaves* alternate, sessile, sometimes clustered along main stem, lanceolate, glabrous, to 4·0 cm long, 1–3 mm wide;

margins entire; apices acute-acuminate. *Capitula* solitary, pedunculate, terminating branches, conical, to 20 mm in diameter. *Peduncles* pale brown, sparsely pubescent with unicellular hairs increasing in density towards summit; floral leaves 1–3, pale brown. *Involucral bracts* in 4 rows, pale yellow, lanceolate, 2–7 mm long, c. 1 mm wide, those of outer 2 rows c. half the size of the inner 2 rows and moderately pubescent with multicellular, uniseriate hairs clumped at bases, midrib more prominent on inner two rows; margins of inner 2 rows membranous; apices all acute. *Receptacle* slightly convex. *Ray florets* many in several rows, estaminate; ligules white, pink or mauve, 4·7–7·1 mm long, 0·4–1·0 mm wide; floral tube 4–6 mm long; stigma lobes subulate, 1·5–2·5 mm long; achene fertile, lanceolate in outline, ribbed, 1·5–2·5 mm long, c. 0·4 mm wide, moderately pubescent with unicellular, glochidial hairs; pappus of many finely and uniformly barbellate bristles 7·6–9·0 mm long. *Disc florets* staminate; floral tube 4·6–6·9 mm long, glabrous; anthers 1·6–2·5 mm long, c. 0·4 mm wide with acuminate sterile apical appendages; stigma lobes subulate 1·0–1·4 mm long, c. 0·3 mm wide; achene sterile, opaque, linear in outline, glabrous, 4–6 mm long, c. 0·5 mm wide; pappus of dimorphic hairs, with shorter bristles 1·2–1·6 mm long, more or less united to form scales, and longer, barbellate bristle 4·0–4·5 mm long with barbs longer towards the apices.

Flowering Period: February to October.

Distribution: See Fig. 3.

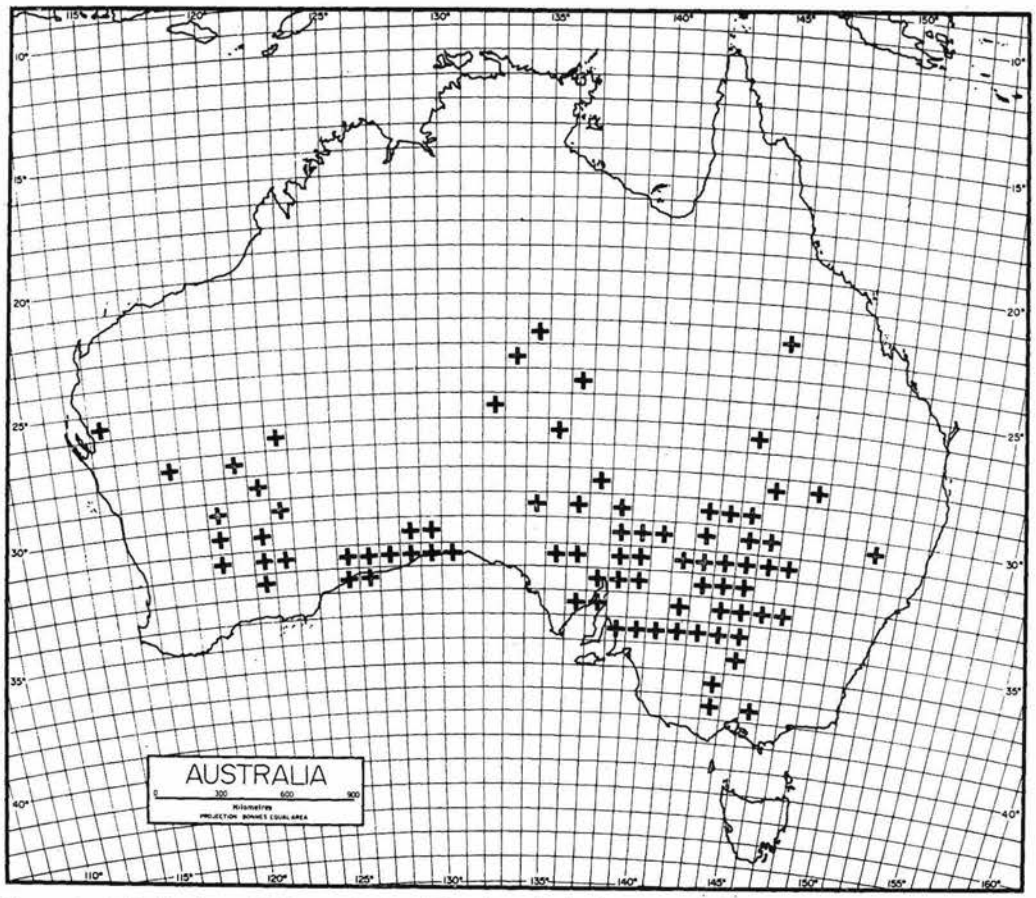

Figure 3. Distribution of *M. cunninghamii* based on herbarium material.

Selected Specimens: WESTERN AUSTRALIA: Bango Creek (14 km) W of Windidda, *Speck* 1273, Feb. 1959 (AD, CANB, MEL, NSW, PERTH); Nullarbor Plain, 80 km S of Rawlinna, *Wilson* 7674, Sept. 1968 (AD, MEL, NSW, PERTH); SOUTH AUSTRALIA: near Port Augusta, *Phillips* CBG 022660, Sept. 1962 (BRI, CBG); between Hawknest and Hallmark Dams, 16–20 km N of Overland Corner, *Symon* 3636 (AD, CANB); VICTORIA: Benetook, c. 25 km SW of Mildura, *Patton* MEL 70324, March 1949 (MEL); NEW SOUTH WALES: Fowlers Gap, *Jacobs* 2173, Oct. 1975 (AD, NSW); Caroonboon, between Wanganella and Moulamein, *Moore* 5665, July 1970 (CANB, NSW); QUEENSLAND: 20 miles (30 km) from Cunnamulla towards St. George at Charlotte Plains turn-off, *Phillips* CBG 036705, Sept. 1963 (CBG, NSW); NORTHERN TERRITORY: 30 miles (45 km) N of Alice Springs, *Chippendale* 9145, July, 1962 (BRI, NSW, NT); 46 km N of Alice Springs, *Swinbourne* 520, Oct. 1962 (AD, NSW, NT); E of Alice Springs, *Swinbourne* 335, July 1962 (AD, MEL, NSW, NT).

Chromosome Number: n = 9, 18 (Turner, 1970, l.c.)

Affinities: M. cunninghamii is similar to *M. macrocephala* from which it can be distinguished by its pubescent stems, glochidial ray achene hairs and uniformly barbellate ray pappus bristles. The unicellular stem hairs and dimorphic involucral bracts are found in no other species in the genus. Also unique to this species in the genus are the pubescent outer involucral bracts, although *M. chippendalei* has pubescent inner bracts.

Name: The specific epithet honours Allan Cunningham, the collector of the type of this species.

4. Minuria denticulata (DC.) Benth., Fl. Austral. 3: 499 (1867).

J. M. Black, Fl. S. Australia Ed. 2, 858 (1957); Davis, Proc. Linn. Soc. New South Wales 88: 35–40 (1963).

Therogeron denticulatum DC., Prod. 5: 283 (1836).—*Minuria candollei* var. *denticulata* (DC.) Maiden & Betche, Census New South Wales Pl. 195 (1916).

Type: "Molle's Plains, Lachlan River, July 1817", *Cunningham* 39 (holo: G-DC).

Minuria candollei F. Muell., Fragm. 9: 119 (1875) pro pte., nom. illeg.; F. Mueller, Fragm. 10:56 (1876); F. Mueller, Syst. Census Austral. Pl. 78 (1882); F. Mueller, Key Vict. Pl. 1: 297 (1887–8); F. Mueller, Second Syst. Census Austral. Pl. 131 (1889); Moore & Betche, Handb. Fl. New South Wales 265 (1893); Dixon, Pl. New South Wales 175 (1906).—*Erigeron candollei* Benth., Fl. Austral. 3: 499 (1867) nom. inval. pro syn.

Mueller (1875 l.c.) published the name *M. candollei* indicating that it was composed of *M. integerrima* and *M. denticulata.* Later, Mueller (1876 l.c.) published a description of *M. candollei*, again noting that it comprised the two species above, and also pointing out Bentham's error (1867 l.c.) in saying that he (Mueller) proposed to join the two species under *Erigeron candollei.* By Art. 63 of the International Code of Botanical Nomenclature the superfluous name *M. candollei* is untenable, for if it were acceptable to unite the two species one of the existing epithets would have to be adopted. However, the two species are easily separable.

The first use of the epithet *denticulata* as a varietal name appears to have been by Maiden & Betche (1916), and although they attribute it to Mueller there is no justification for this.

Perennial, spreading herb to c. 30 cm high. *Stems* suffrutescent, only slightly woody in older branches, grey-green, moderately pubescent with multicellular, stellate hairs. *Leaves* alternate, obovate-spathulate, to 4·5 cm long, 1–5 mm wide, almost glabrous or moderately covered with unicellular hairs; margin denticulate; apex often conspicuously denticulate, otherwise acute-obtuse. *Capitula* solitary, discoid, to 15 mm in diameter, pedunculate with floral leaves. *Involucral bracts* in 4 rows, yellow, lanceolate, 2–3 mm long, c. 1 mm wide, glabrous, with 1 prominent midrib; margin of inner 3 rows membranous, slightly fimbriate; *apex* acuminate, fimbriate, tinged pink. *Receptacle* convex. *Ray florets* many in several rows, estaminate; ligule white to pale lavender, 2·0–3·2 mm long, to 0·5 mm wide; floral tube 1·0–1·5 mm long; stigma lobes subulate c. 0·5 mm long; achene fertile, pale yellow, elliptical in outline, 0·5–1·0 mm long, 0·2–0·5 mm wide, glabrous; pappus of 7–10 free, barbellate bristles, c. 1·5 mm long, with barbs denser at tips. *Disc florets* staminate; floral tube 2·9–3·7 mm long, glabrous or sparsely pubes-

cent at lower end with multicellular, biseriate, patent hairs; anthers 1·0–1·8 mm long, c. 0·3 mm wide with acute sterile apical appendages; stigma lobes subulate, 0·5–1·2 mm long, c. 0·2 mm wide; achene sterile, opaque, flattened, linear in outline, glabrous, 0·8–1·5 mm long, c. 0·3 mm wide; pappus of dimorphic bristles, with a tuft of short, free bristles, c. 0·3 mm long, and 6–8 longer, barbellate bristles, 2·0–2·5 mm long, with barbs longer and denser at tips.

Flowering Period: March to October.

Habitat: Low shrubland in places of ephemeral water.

Distribution: See Fig. 4.

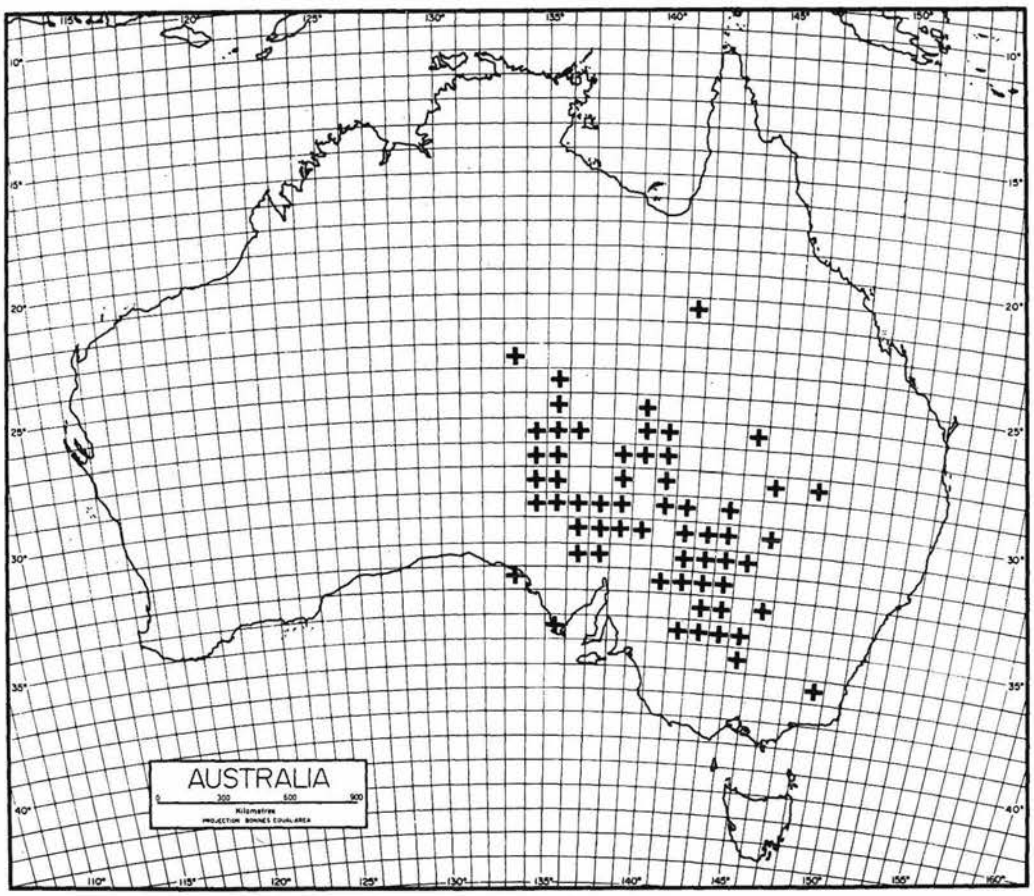

Figure 4. Distribution of *M. denticulata* based on herbarium material.

Selected Specimens: SOUTH AUSTRALIA: 5 miles (8 km) S of Tingatingana, *Carrick* 1971, Aug. 1968 (AD, MEL); Lake Eyre Basin, 9 miles (14 km) N of Warrina, *Lothian* 1368, Aug. 1963 (AD, MEL, NT); 5 miles (8 km) W of Cockburn, *Phillips* CBG 006726, Aug. 1964 (AD, CBG); VICTORIA: W side of Lake Walla-Walla, S. of Lindsay River, *Willis* MEL 70340, Aug. 1948 (MEL, NSW); NEW SOUTH WALES: 1·6 km S of Lake Cobham on Silver City Highway, *Lander* 98, Sept. 1971 (NSW); QUEENSLAND: Birdsville, *Boyland* 179, Sept. 1966 (BRI); NORTHERN TERRITORY: Old Andado Homestead, *Taylor* 3, Feb. 1971 (CANB, NT).

Affinities: M. denticulata is similar to *M. rigida* from which it can be distinguished by its pubescent stems and leaves. The multicellular, stellate stem hairs and the unicellular leaf hairs are both unique to this species in the genus as are the glabrous ray achenes.

Name: The specific epithet refers to the denticulate leaf margins.

5. Minuria gardneri N. S. Lander et R. Barry sp. nov.

Species affinis *M. annua* (Tate) Tate ex Black a qua caulibus sparsim pubescentibus habitu perenni et foliis capitula superentibus praecipue differt. Frutex nanus perennis. Achenia florum radiatorum fertilia, pilis adpressis furcatis geminis parce pubescentia etiam pappo setis 7–9 barbellatis ornata; achenia disci sterilia, glabra, pappo cupula setorum connatorum ab 1 (–8) setis longioribus superatorum ornata.

Type: Mount Sir Samuel, Western Australia, *Gardner* 2426, 26 July 1931 (holo: PERTH; iso: NSW).

Perennial, compact dwarf shrub to c. 20 cm high. *Stems* suffrutescent, green to green-brown, sparsely pubescent with multicellular, uniseriate hairs. *Leaves* alternate, sessile, linear, often falcate, glabrous, to 10 mm long, c. 1 mm wide; margin entire; apex obtuse-acute. *Capitula* solitary, conspicuously pedunculate, terminal, discoid, to c. 7 mm in diameter. *Peduncle* pale green, to 20 mm long, c. 0·5 mm wide, densely pubescent with multicellular, uniseriate hairs; floral leaves 3–5, 1·8–5·4 mm long, c. 0·5 mm wide. *Involucral bracts* in 3 rows, lanceolate, 2–3 mm long, c. 0·5 mm wide, glabrous, with 1 prominent rib; margins of inner two rows membranous; *apices* acute. *Receptacle* slightly convex. *Ray florets* many in several rows, estaminate; ligules white, 0·3–0·6 mm long, c. 0·1 mm wide; floral tube 0·5–1·5 mm long; stigma lobes subulate, 0·1–0·3 mm long; achene fertile, red-brown, elliptical in outline, c. 0·5 mm long, c. 0·1 cm wide, sparsely pubescent with adpressed twin-hairs notched at apices; pappus of 7–9 uniformly barbellate bristles 1–2 mm long. *Disc florets* staminate; floral tube 1·8–2·3 mm long, sparsely pubescent with multicellular, biseriate hairs; anthers 1·0–1·5 mm long, c. 0·3 mm wide, with acute, sterile apical appendages; stigma lobes subulate, c. 0·6 mm long, c. 0·1 mm wide; achene sterile, linear in outline, glabrous, 0·6–0·8 mm long, c. 0·2 mm wide; pappus of dimorphic bristles with short connate bristles c. 0·5 mm long surmounted by 1(–8) conspicuously and uniformly barbellate bristles 0·5–1·3 mm long.

Flowering Period: July to December.

Habitat: On margins of salt lakes in low shrubland and low open woodland on gypsum, loam and clay-loam soils.

Distribution: See Fig. 2.

Other specimens: WESTERN AUSTRALIA: Lake Miranda, near Mt. Sir Samuel, *Blackall* 330, July 1931 (PERTH); 6 miles (9 km) N of Bulga Downs, *Demarz* 5649, Sept. 1975 (PERTH); Lake Austin, *Demarz* 6951, Aug. 1978 (PERTH); Van der Linden Lakes, W of Giles, *George* 8235, Oct. 1966 (PERTH); 110 km N of Seemore Downs, 29°52′S, 125°40′E, *George* 11905, July 1974 (PERTH); near S end of Lake Cowan, c. 5 km N of Norseman, *Wilson* 6058, July 1967 (PERTH); SOUTH AUSTRALIA: Musgrave Range, c. 63 km W of Musgrave Park, *Whibley* 975, Sept. 1963 (AD); precise locality, collector and date unknown, BRI 219995 (BRI).

Affinities: Minuria gardneri bears an obvious resemblance to *M. annua* from which it can be distinguished by its perennial habit, its pubescent stems and the absence of leaves overtopping the capitula. This species also bears a gross superficial resemblance to *Kippistia suaedifolia* for which it has been mistaken in the past.

Name: The specific epithet is bestowed in honour of the late Mr. Charles Austin Gardner (1896–1970), Government Botanist of Western Australia and the collector of the type of this species.

6. Minuria integerrima (DC.) Benth., Fl. Austral. 3: 499 (1867).

J. M. Black, Fl. S. Austral. Ed. 2, 858 (1957); Davis, Phytomorphology 14: 231–239 (1964).
Therogeron integerrimum DC., Prod. 5: 283 (1836).

Type: "A rare plant on the wet plains of the Lachlan River, New South Wales, July 1817", *Cunningham* (holo: G-DC; possible iso: MEL 70345).

Minuria candollei F. Muell., Fragm. 9: 119 (1875) pro pte., nom. illeg.; F. Mueller, Fragm. 10: 56 (1876); F. Mueller, Syst. Census Austral. Pl. 78 (1882); F. Mueller, Key Vict. Pl. 1: 297 (1887–8); F. Mueller, Second Syst. Census Austral. Pl. 131 (1889); Moore & Betch, Handb. Fl. New South Wales 265 (1893); Dixon, Pl. New South Wales 175 (1906); Maiden & Betche, Census New South Wales Pl. 135 (1916).

Notes on the name *M. candollei* can be found under *M. denticulata.*

Erect, spreading, perennial herb to 60 cm high. *Stems* suffructescent, older ones more woody, green to brown, glabrous. *Leaves* alternate, sessile, dark grey to green, lanceolate-ovate, to 5·0 cm long, 1–9 mm wide, glabrous, midrib conspicuous; margin somewhat undulating, often slightly dentate; apex acute-acuminate. *Capitula* solitary or clustered, terminating branches, discoid, c. 12 mm in diameter, pedunculate. *Involucral bracts* in 4 rows, c. 0·5 mm wide, glabrous, 2–4 mm long, with 1 prominent midrib; margin entire; apices acute, tinged pink. *Receptacle* convex. *Ray florets* many in several rows, estaminate; ligule purple to lilac-blue, 3·2–4·4 mm long, c. 0·2 mm wide; floral tube 1·1–1·6 mm long; stigma lobes subulate 0·6–1·1 mm long; achene fertile, brown, lanceolate, 0·6–1·1 mm long, to 0·6 mm wide, moderately pubescent with notched twin-hairs; pappus of many, free, barbellate bristles, 1·5–2·0 mm long, with barbs denser at the tips. *Disc florets* staminate; floral tube c. 0·3 mm long, glabrous; anthers 0·8–1·2 mm long, c. 0·2 mm wide, with acute sterile apical appendages; stigma lobes 0·5–1·0 mm long, c. 0·2 mm wide; achene sterile, translucent, flattened, elliptical in outline, 0·4–1·0 mm long, to 0·3 mm wide, glabrous; pappus of c. 8–10 uniform, barbellate bristles, 1·5–2·0 mm long, with barbs longer and denser at tips.

Flowering Period: June to October.

Habitat: In a variety of habitats and soils near places of permanent or ephemeral water.

Distribution: See Fig. 5.

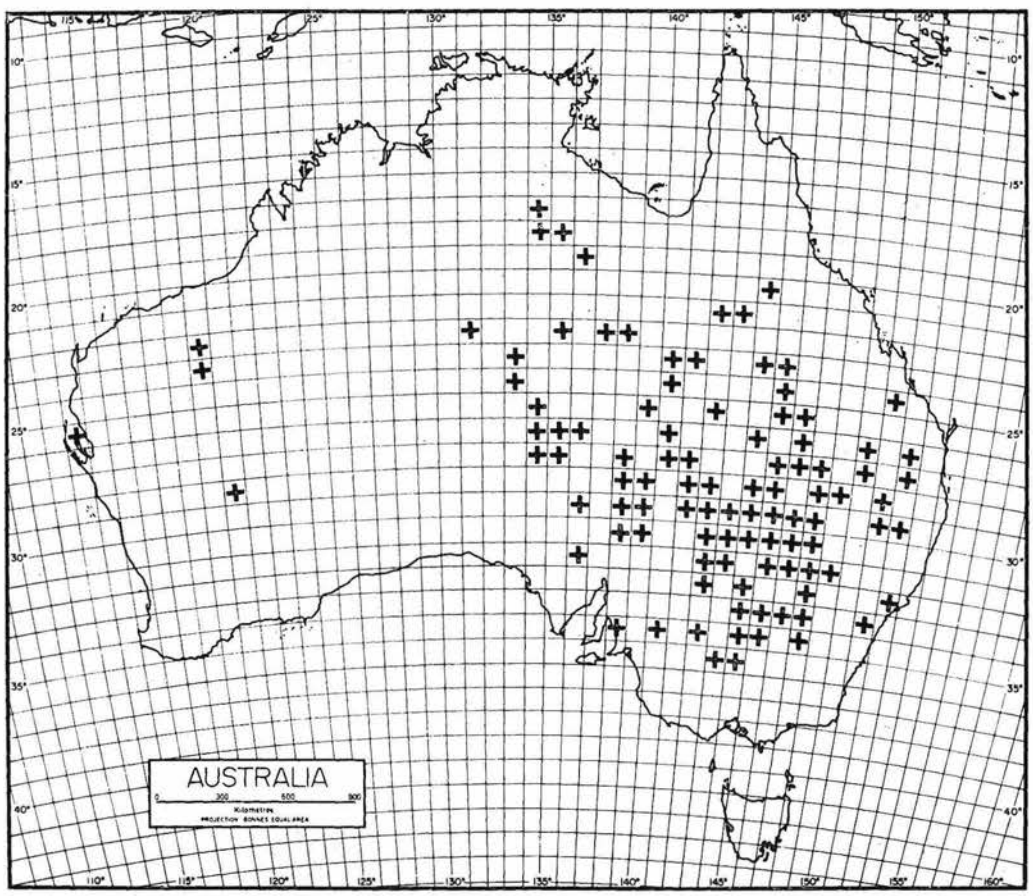

Figure 5. Distribution of *M. integerrima* based on herbarium material.

Selected specimens: WESTERN AUSTRALIA: Lawlers, *Fitzgerald*, July 1899 (NSW, PERTH); 49 miles (73 km) S of turn-off to Mt. Newman, *Mirrington* 710941, Sept. 1971 (NSW, PERTH); SOUTH AUSTRALIA: Coopers Creek, Innamincka Creek bed below crossing, *Johnson* NSW 128015, June 1972 (NSW): VICTORIA: Murray River, flats on Cowra Station, 19 km W of Merbein, *Henshall* NT 46860, Oct. 1969 (NT); NEW SOUTH WALES: 8 miles (12 km) W of Louth on Wanaaring Road, *Moore* 5592, June 1969 (BRI, CANB, MEL, NSW); QUEENSLAND: Gilruth Plains, Cunnamulla, *McKee* 10332, April, 1963 (CANB, NSW); NORTHERN TERRITORY: Charlotte Waters, *Chippendale* 1329 (BRI, CANB, NSW, NT); 40 miles (64 km) N of Helen Springs Station, *Perry* 1893, Aug. 1948 (AD, BRI, MEL, NSW).

Affinities: The affinities of *M. integerrima* are obscure. It appears to have many features in common with *M. gardneri* from which it can be distinguished by its glabrous stems and its disc pappus bristles which are barbellate, with barbs becoming longer and denser towards their tips. This species is remarkable for the occasional occurrence of tetramerous disc florets, a character also observed in *Kippistia suaedifolia*. The clustering of several capitula together is also worthy of note, although they are often paired in *M. chippendalei*.

Disc florets with four lobes and four anthers are often observed in *M. integerrima*. The presence of tetramerous disc florets in predominantly pentamerous capitula is possibly to be explained in terms of the crowding of floral primordia. This phenomenon is discussed by Gardner (1977) and Grau (1977). It should be noted that *M. integerrima* is a somatic apomict and can possess from 0–25+ disc florets per capitulum in which there is a total failure of male gametogenesis (Davis, 1964).

Name: The specific epithet refers to the usually entire leaf margins.

7. Minuria leptophylla DC., Prod. 5: 298 (1836); Benth., Fl. Austral. 3: 498 (1867).

J. M. Black, Fl. S. Australia Ed. 2, 857 (1957); Turner, Amer. J. Bot. 57 (4): 383 (1970).
Therogeron leptophyllum (DC.) Kuntze, Rev. Gen. 368–9 (1891) nom. illeg.

Type: "Summits of barren hills, Lachlan River, Interior of New South Wales, 27 April. 1817", *Cunningham* 23 (holo: G-DC).

Minuria tenuissima DC., Prod., 5: 298 (1836).

Lectotype (here designated): "Barren Hills on the Lachlan River, New South Wales, 15 Apr. 1817". *Cunningham* 50 (G-DC). *Paratype:* ditto, *Cunningham* 24 (G-DC).

Minuria leptophylla var. *hispida* Benth., Fl. Austral. 3: 498 (1867); F. M. Bailey, Syn. Queensland Fl. 240 (1883); F. M. Bailey, Queensland Fl. 3: 799 (1900); F. M. Bailey, Compr. Cat. Queensland Pl. 259 (1913).

Type: "Rockingham Bay, *Dallachy*, a single slender specimen in Herb. F. Mueller . . ." (holo: K).

Minuria asteroidea Sond., Linnaea 25: 467–8 (1852).—*Eurybia asteroidea* F. Muell. ex Sond., Linnaea 25: 468 (1852) nom. inval. pro syn.

Lectotype (here designated): Cudnaka, *Mueller*, Oct. 1851 (lecto: MEL 70416; isolecto: MEL 70419). *Paratypes*: Adelaide, *Mueller* MEL 70410 & 70411, undated, (MEL) between Saltcreek and Pfeiffer's Station, Behr MEL 70414 & 70410, Nov. 1849 (MEL); Holdfast Bay, *Mueller* MEL 70413–5, undated (MEL); Mount Remarkable, *Mueller* MEL 70412, undated (MEL); Cudnaka *Mueller* MEL 70420, undated (MEL).

Small, spreading, perennial herb to 50 cm high. *Stems* suffrutescent, pale brown to green, sparsely pubescent with adpressed, multicellular, uniseriate hairs. *Leaves* alternate, sessile, linear, to 4·0 cm long, c. 1 mm wide, sparsely to moderately pubescent with clumped, multicellular, uniseriate hairs; margin entire; apex acute to acuminate, sometimes apiculate. *Capitula* solitary, terminal, pedunculate, c. 1·5 cm in diameter. *Involucral bracts* in 4 rows, yellow to green, lanceolate, 2–6 mm long, c. 1 mm wide, glabrous, with 1 prominent midrib; margin of inner 3 rows membranous; apex acute, fimbriate, tinged pink. *Receptacle* slightly convex. *Ray florets* many in several rows, estaminate; lingule white to purple, 4·2–7·0 mm long, 0·7–2·1 mm wide; floral tube 1·7–3·4 mm long; stigma lobes subulate, 1·0–1·5 mm long; achene fertile, brown to orange, obovate in outline, 1·3–3·8 mm long, 0·5–1·2 mm wide, densely pubescent with notched twin-hairs; pappus

of many, free, uniformly barbellate bristles, 2·5–4·0 mm long. *Disc florets* staminate; floral tube 2·8–4·0 mm long, glabrous; anthers 1·1–1·6 mm long, c. 0·3 mm wide with acuminate sterile apical appendages; stigma lobes 1·2–2·0 mm long, 0·2–0·3 mm wide; achene sterile, translucent, linear in outline, glabrous, 1·6–3·0 mm long, c. 0·3–0·6 mm wide; pappus of dimorphic hairs, with short, free, uniformly barbellate bristles 0·6–1·2 mm long, and 2–6 longer, barbellate bristles, 2·2–3·1 mm long, with barbs denser at tips.

Flowering Period: Throughout the year.

Habitat: Low shrubland, open forest and woodland, on a variety of sub-strata including sandy loam, red gravel and shale.

Distribution: See Fig. 6.

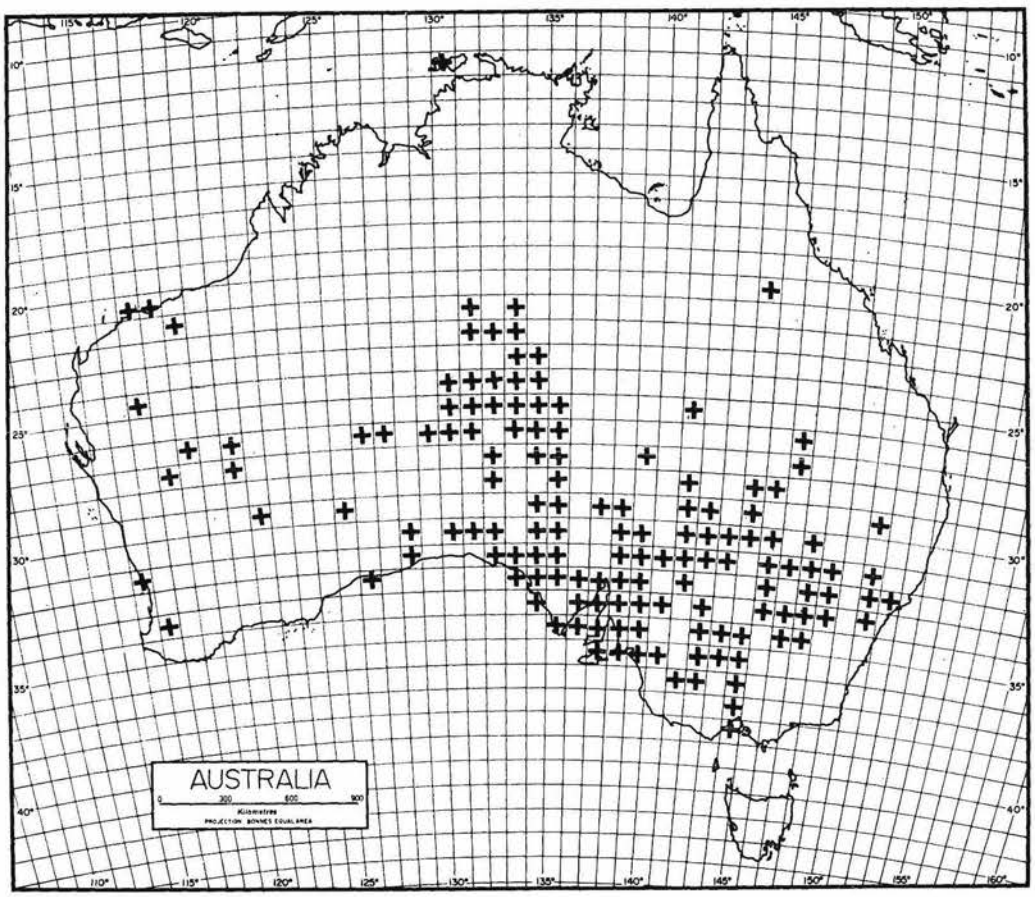

Figure 6. Distribution of *M. leptophylla* based on herbarium material.

Selected specimens: WESTERN AUSTRALIA: 70 miles (115 km) S of Wiluna, *Blackall* 2418, July 1931 (NSW, PERTH); SOUTH AUSTRALIA: 7 miles (11 km) S of Emu, *Forde* 399, Aug. 1956 (AD, CANB, MEL); 22 miles (33 km) S of De Rose Hills Station, *Perry* 5520, Sept. 1955 (AD, BRI, CANB, MEL, NSW, NT, PERTH): VICTORIA: between Nhill and Jeparrit, 0·8 miles (1·4 km) SW of Glenlee, *Aston* 1051, Oct. 1963 (AD, MEL); NEW SOUTH WALES: Fowlers Gap, near Broken Hill, *Jacobs* 2120, Oct. 1975 (AD, NSW); Balranald, *Phillips* CBG 025351, Aug. 1962 (CBG, NT); QUEENSLAND: West Covey, Gilruth Plains. *Roe* 142a, 2. 1941 (BRI, CANB); NORTHERN TERRITORY: 5 miles SSE of Undoolya Station, *Lazarides* 5751, 8. 1956 (AD, BRI, CANB, NSW, NT, PERTH); 23·5 miles (36 km) W of Alice Springs, *Chippendale* 2708, 8. 1956 (BRI, CANB, NSW, NT).

Chromosome Number: n = 9 (Turner, 1970, l.c.).

Affinities: M. leptophylla appears to have many characters in common with *M. annua* from which it can be distinguished by its perennial habit and pubescent stems and leaves.

Name: The specific epithet refers to the narrow leaves of this species.

Special Note: A single specimen collected 7·5 miles (11·3 km) N of Bulga Downs, Western Australia, *Demarz* 05651, Sept. 1975 (PERTH) included tentatively by us under *M. leptophylla* appears to be somwehat aberrant and, with further collection, may be found to represent a distinct taxon. It differs from other material of *M. leptophylla* in possessing short, fleshy, glabrous leaves.

8. Minuria macrocephala N. S. Lander et R. Barry sp. nov.

Species affinis *M. cunninghamii* (DC.) Benth. a qua caulibus glabris et capitulis grandibus praecipue differt. Frutex effusus nanus perennis. Achenia florum radiatorum fertilia, pilis glochidiatis geminis dense pubescentia etiam pappo setis multis minute barbellatis ornata; achenia disci sterilia, glabra, pappo c. 10 setis brevibus ramosis capillaribis et 7–10 setis longioribus barbellatis ornata.

Type: Barwidgee road, 10 miles (16 km) S of Yelma turn-off, Eremaean Province, Western Australia, *Speck* 1348, Oct., 1958 (holo: CANB; iso: NSW, PERTH).

Perennial, spreading dwarf shrub to c. 50 cm high. *Stems* woody, grey to light brown, glabrous. *Leaves* alternate, sessile, linear, mostly falcate, almost glabrous with a few multicellular, uniseriate hairs on the margins towards the apices, to 30 mm long, 1–2 mm wide grading into involucral bracts; margin entire; apex acuminate. *Capitula* solitary, terminal, broadly conical, to 35 mm in diameter. *Involucral bracts* in several rows, linear-lanceolate, 5–15 mm long, c. 3 mm wide, glabrous, with 1 prominent midrib; margin membranous, slightly fimbriate or entire; apex acute-acuminate. *Receptacle* convex. *Ray florets* many in 2–3 rows, estaminate; ligule (colour unknown), 7·4–11·2 mm long, 1–2 mm wide; floral tube 7–9 mm long; stigma lobes subulate, 5–6 mm long, c. 0·1 mm wide; achene fertile flattened, lanceolate in outline, c. 4 mm long, c. 1 mm wide, densely pubescent with glochidial twin-hairs; pappus of many tapering, minutely barbellate bristles, 12–19 mm long, free to their bases or united to form clumps. *Disc florets* staminate; floral tube 14–18 mm long; anthers 6–7 mm long, c. 0·8 mm wide, with acute, sterile apical appendages; stigma lobes subulate, 5–6 mm long, c. 0·8 mm wide; achene sterile, flattened, lanceolate in outline, glabrous, 11–14 mm long, 0·8–1·3 mm wide, with 2 prominent veins on each face; pappus of dimorphic bristles, with c. 10 short capillary bristles 3·5–5·7 mm long, free or united, conspicuously branching toward the apices, and 7–10 barbellate bristles 13–17 mm long, the barbs more conspicuous towards the apices.

Flowering Period: September to February.

Habitat: In low shrubland.

Distribution: Known only from the vicinity of "Barwidgee" Homestead which is 27°02′S, 120°55′E in the Austin District in the Eremaean Botanical Province of Western Australia. See Fig. 2.

Other specimen: WESTERN AUSTRALIA: SE of Wiluna on saltbush country, Barwidgee paddock on Lake Violet and Barwidgee Station Boundary, *Oliver* M44, Sept. 1966 (PERTH).

Affinities: M. macrocephala is closely allied to *M. cunninghamii* from which it can be distinguished by its much larger capitula and floral parts; its glabrous peduncles; its glabrous involucral bracts which are not tinged pink at their apices and which are not as conspicuously fimbriate; and the clumping of its ray pappus bristles. The latter feature is found only in this species of *Minuria*. *M. macrocephala* is considerably larger in all its floral parts than any other species in the genus. Specimens of it have been placed under *M. cunninghamii* in the past.

Name: The specific epithet refers to the particularly large capitula found in this species.

9. Minuria rigida J. M. Black, Trans. Roy. Soc. South Australia 42: 182 (1918).

J. M. Black, Fl. South Australia 278, fig. 25 (1926); J. M. Black, Fl. South Australia 588 (1929); J. M. Black, Fl. South Australia Ed. 2, 858 & Fig. 1158 (1957).

Lectotype: (here designated): Hergott (Maree), *J. M. Black* AD 97626285 (AD).

Isolectotypes: Hergott (Maree) *J. M. Black*, Oct. 1917 (AD 97826036; AD 97826039; MEL 70479; NSW 122725).

Perennial, prostrate or erect, dwarf shrub to 25 cm high. *Stems* suffrutescent, brownish-green to brown, glabrous. *Leaves* alternate, sessile, ovate-lanceolate, glabrous, to 1·3 cm long, 4 mm wide; margin finely serrulate; apex acuminate. *Capitula* solitary, pedunculate, terminating branches, broadly conical, to 12 mm in diameter. *Involucral bracts* in four rows, yellowish-green, lanceolate, 2–3 mm long, c. 1 mm wide, glabrous, with 1 prominent midrib; margins of inner 3 rows membranous; apex acuminate, fimbriate. *Receptacle* convex. *Ray florets* many in several rows, estaminate, ligule pale blue-mauve; 4·3–5·4 mm long, 0·5–0·7 mm wide; floral tube 0·9–1·5 mm long; stigma lobes 0·8–1·1 mm long; achene fertile, reddish-brown, lanceolate in outline, 0·8–1·5 mm long, 0·3–0·4 mm wide, densely pubescent with glochidial twin-hairs; pappus of many, barbellate bristles 0·7–1·0 mm long *Disc florets* staminate; floral tube 3·4–3·8 mm long; anthers 1·5–2·1 mm long, c. 0·4 mm wide; stigma lobes subulate 0·7–1·1 mm long, 0·2–0·3 mm wide; achene sterile, reddish-brown, lanceolate, glabrous, 0·6–0·7 mm long, c. 0·2 mm wide; pappus of dimorphic hairs, short barbellate bristles c. 0·8 mm long, with c. 8 longer barbellate bristles, 2·8–3·0 mm long.

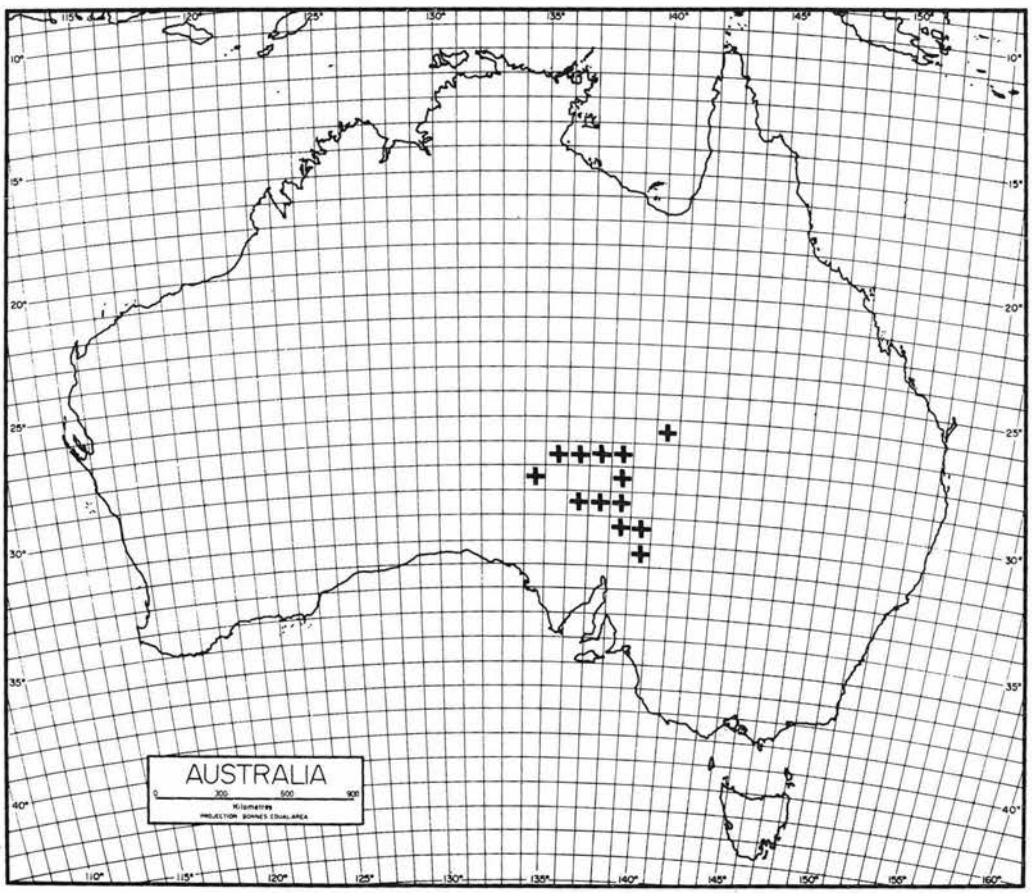

Figure 7. Distribution of *M. rigida* based on herbarium material.

(6)—96592

Flowering Period: October.

Habitat: Low shrublands near places of ephemeral water.

Distribution: See Fig. 7.

Selected specimens: SOUTH AUSTRALIA: 1·5 km E of Lyndhurst along Strezlecki Track, *Sikkes* 1076, Sept. 1973 (AD, CBG); Lake Frome, *Weber* 2089, July 1971 (AD, BRI).

Affinities: M. rigida is most similar to *M. denticulata.* See under that species for distinguishing features.

Name: The specific epithet probably refers to the stiff leaves found in this species.

The bulk of this work was completed while both authors were employed at the National Herbarium of New South Wales.

We wish to than Mr. Paul Wilson for reading the manuscript and Mr. Alex George for providing Latin diagnoses.

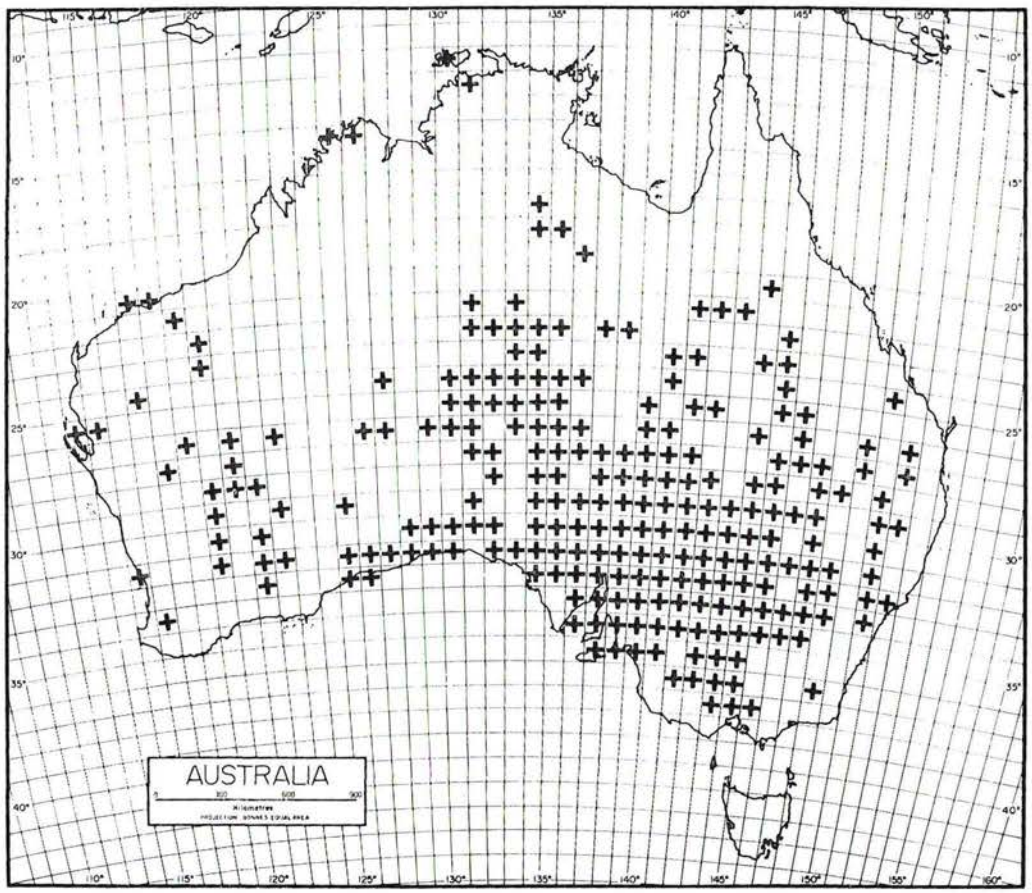

Figure 8. Distribution of *Minuria* based on herbarium material.

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