

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

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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, \pm 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 \pm 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. elliotii* (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. fimbriepala* (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 \pm 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 \pm 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 \pm 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 \pm 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

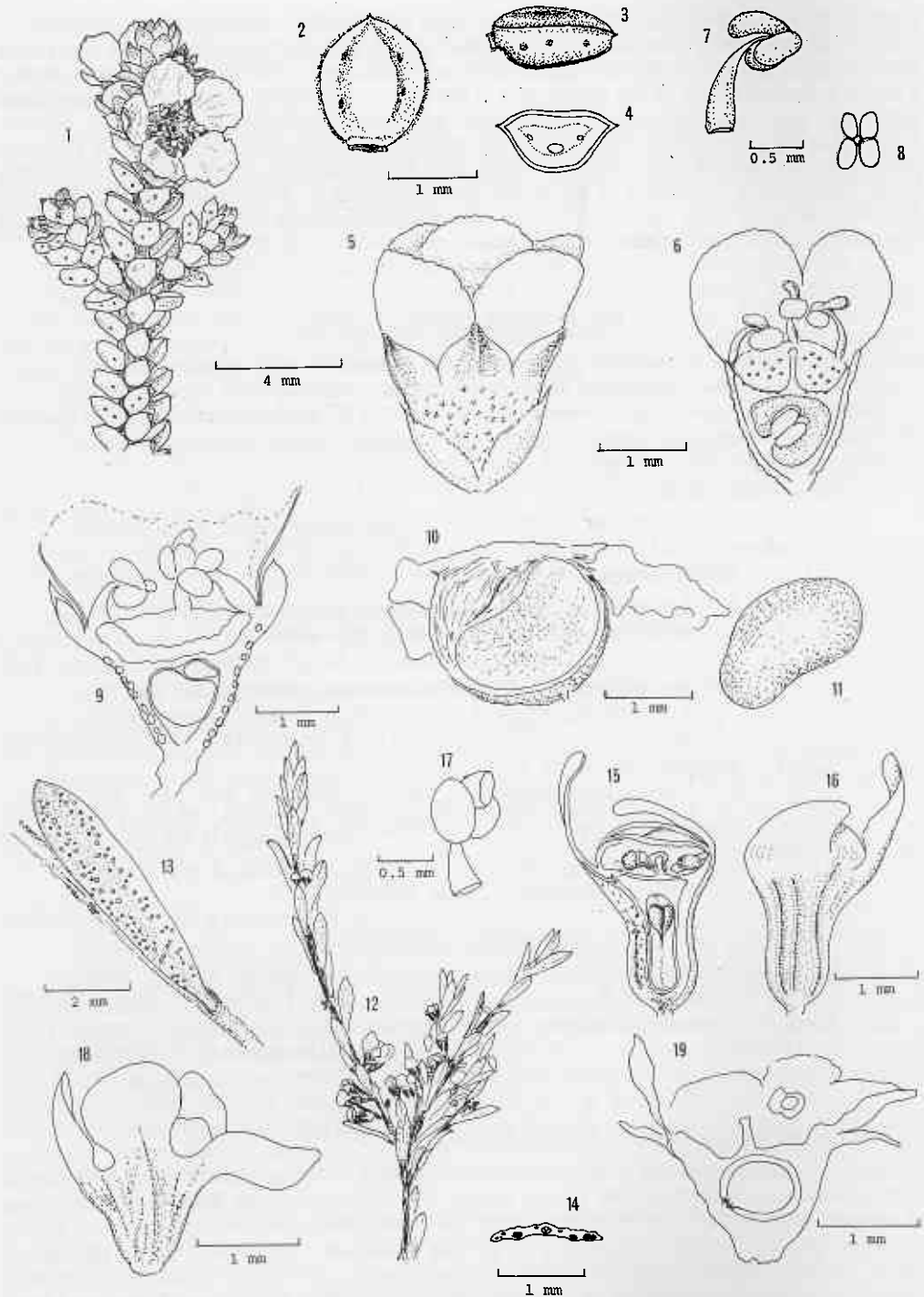
1. Ovules 4 in two superposed pairs; connective gland clavate; sepals membranous with a fleshy, green tip; floral tube rugose. Widespread central W.A., southern N.T. and north-western S.A. 1. *T. maisonneuvei* F. Muell. (p. 185)
- 1*. Ovules 2; connective gland urceolate or truncate; sepals petaline to membranous; floral tube \pm ribbed
 2. Sepals and petals 5.
 3. Floral tube circular in transverse section; leaves linear, thin, concave above.
 4. Sepals clawed.
 5. Leaves thin, \pm 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, \pm flat, 6–8 mm long; peduncles up to 1.5 mm long. Mt. Augustus, W.A., Palm Valley, N.T. 4. *T. wittveri* 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. elliotii* 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, antesealous, occasionally alternating with as many staminodia which resemble the filaments; filaments about 0.8 mm long; anthers about 0.2 mm long, dehiscent 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 \pm 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, \pm 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, antesealous; filaments terete, 0.1 mm long; anthers 0.15 mm broad, purplish-black, dehiscent 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*.

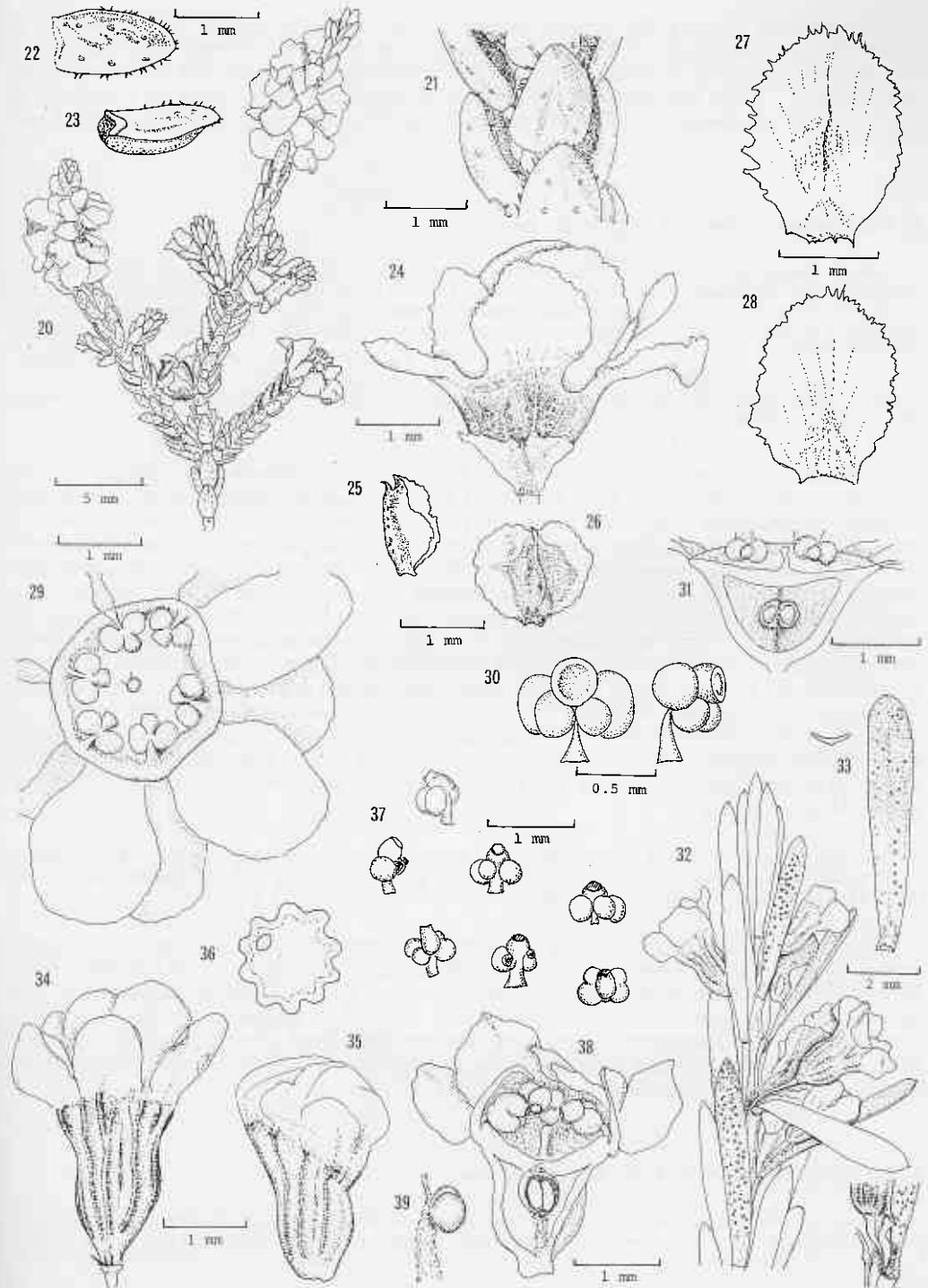
3. *Thryptomene naviculata*, J. W. Green, sp. nov.

Frutex rotundatus; *folia* 4-seriata, elliptico-obovata, \pm 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 roseo 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-tinted, 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, dehiscent 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 \pm 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 wittveri*: 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. elliotii* 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 \pm constrictus, manifeste 10-costatus; *sepala petalaeque* 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, \pm 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, antesealous, 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.

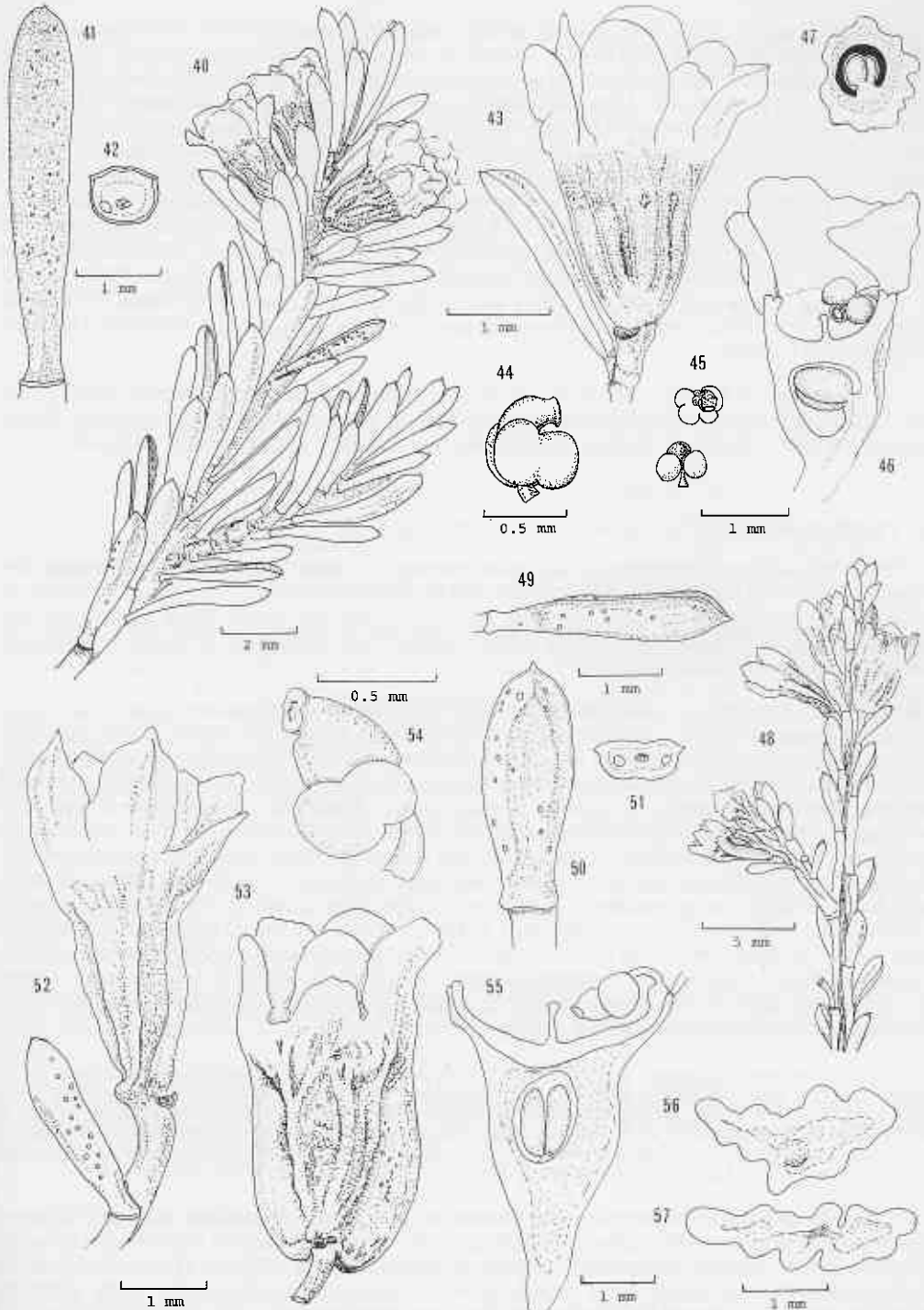
Specimens examined: WESTERN AUSTRALIA: *Type*. NORTHERN TERRITORY: Palm Valley, G. Chippendale 2678, 25 Aug. 1956 (CANB, NT); Palm Valley, R. Hill & T. R. N. Lothian 934, 15 July 1958 (AD, NT); Palm Valley, A. C. Beaglehole 27508, 24 July 1968 (AD, CANB).

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 petalaeque* 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 elliotii*: 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, \pm flat above, rounded or keeled below, \pm 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 \pm obvious constriction above the ovary. *Sepals* orbicular, 1 mm long, \pm 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, dehiscent 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 \pm 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 elliotii* 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, \pm 4-ranked, shortly petiolate, obovate-clavate, thick, 2–3 mm long, 1 mm broad, flat or somewhat convex above, rounded, \pm 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, dehiscent 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 Youldeh, 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. elliotii* 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 iso-neotype respectively.

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

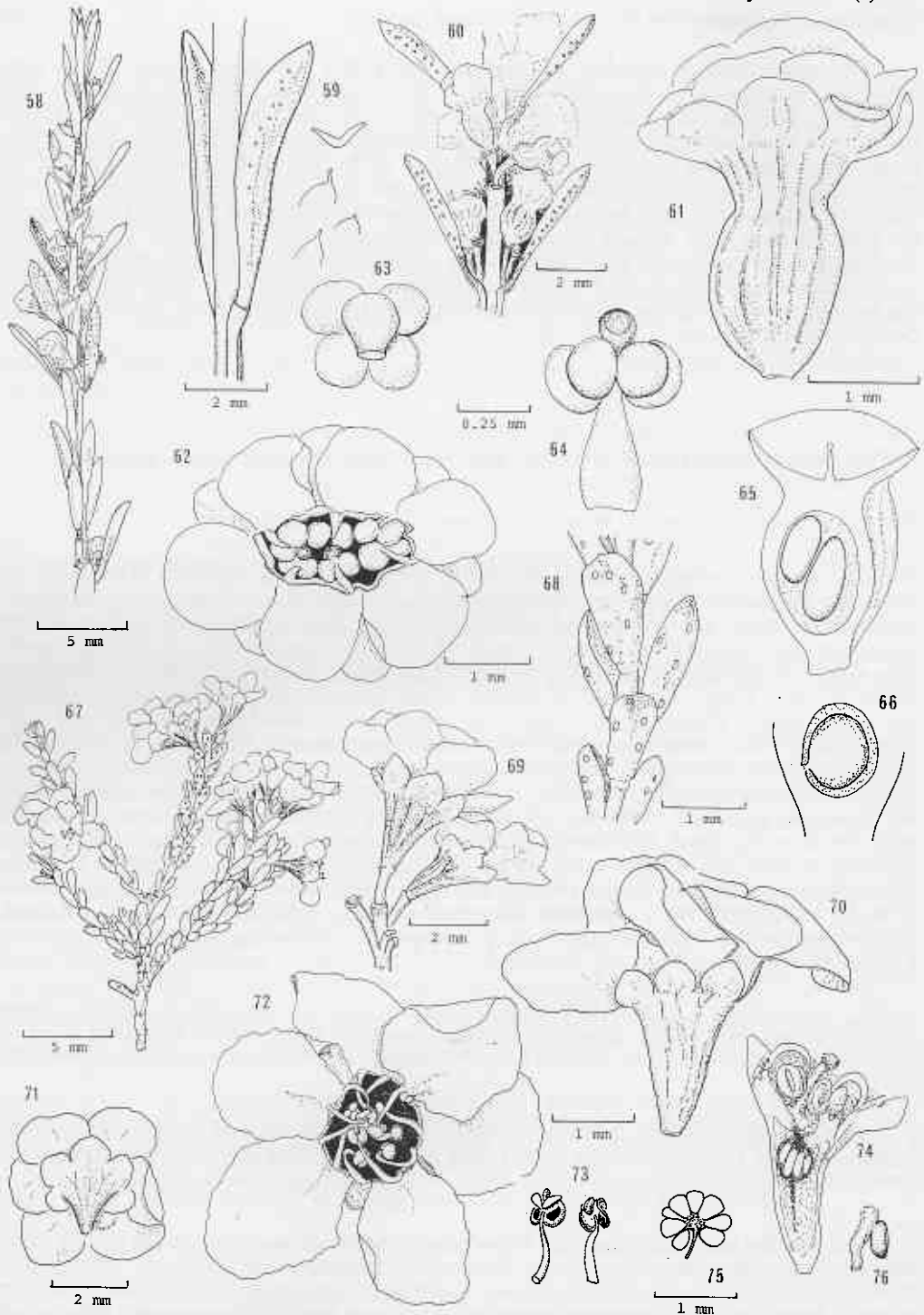
Type: Dynevor Downs, Q., C. T. White 11871, 2 Apr. 1941 (holo: BRI 011119).

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 \pm 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 styler 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 \pm 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 Barrington, 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, \pm 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 \pm 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* \pm flat, often somewhat oblique. *Stamens* 12, 1 mm long; filaments \pm 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: Kerribee-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.

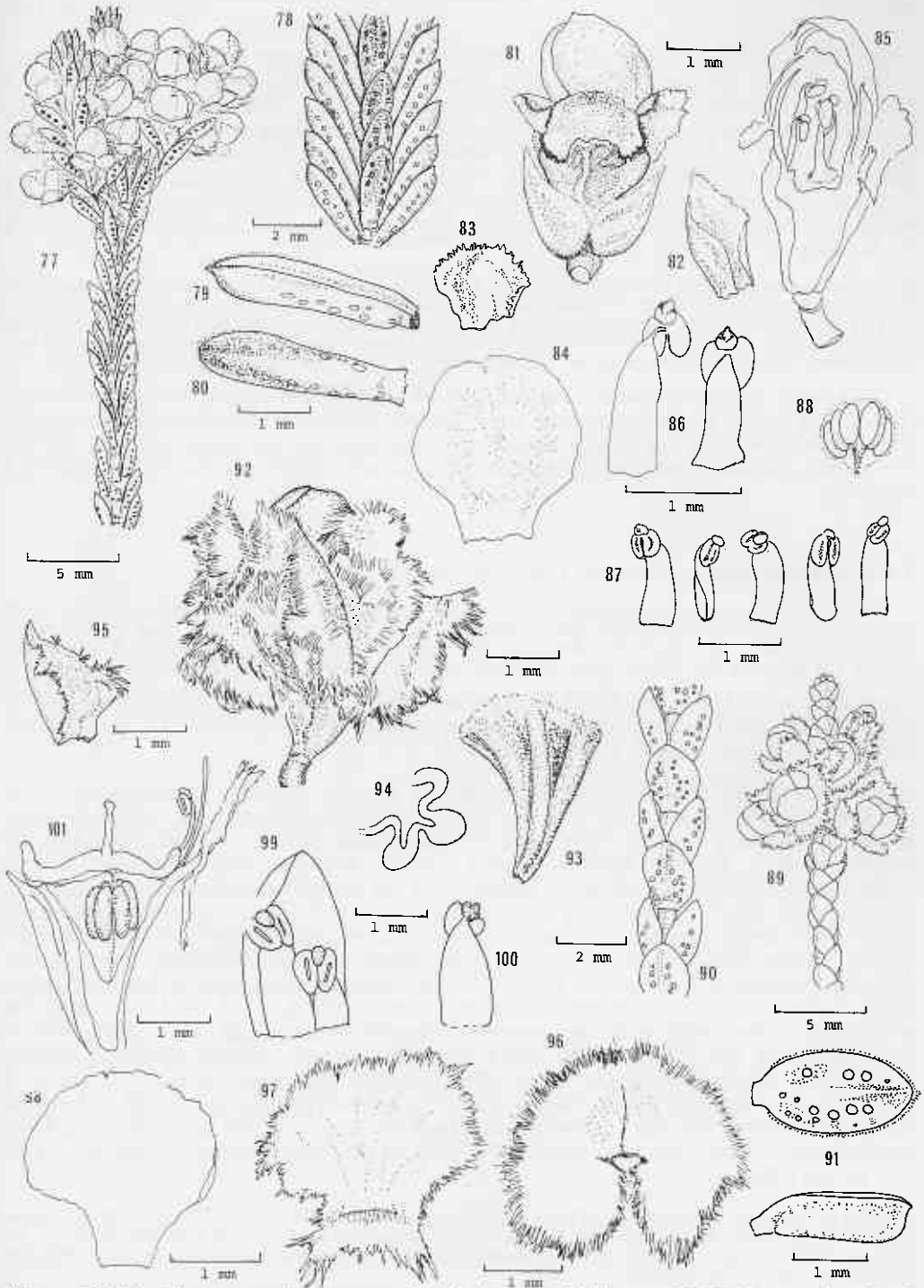
Ovule number seems to be remarkably constant in this species, though it could not be determined with certainty in NSW 143901 which might have had 6 or 7.

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, \pm 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 fimbrispala*: 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, \pm auriculate at the base. *Petals* pink, exceeding the sepals, entire, \pm orbicular, 2.7 mm long. *Disc* flat or slightly convex. *Stamens* 10, \pm 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, dehiscent 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 Cundelee, 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. fimbrisejala*, which also has broad, flattened filaments.

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

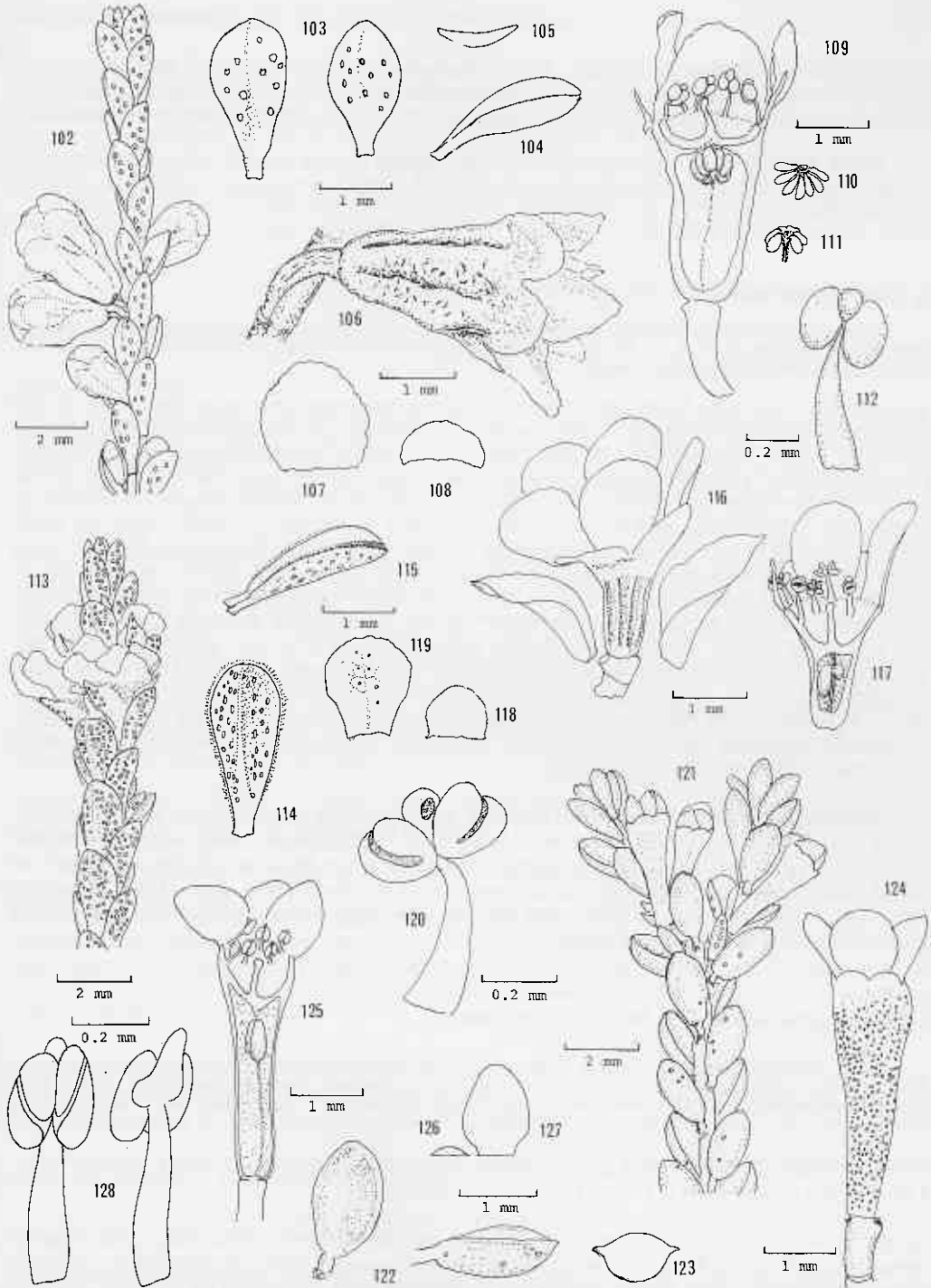
Frutex; *folia* late elliptica ad orbicularia, 1.5–2.2 mm longa, marginibus minute ciliolatis, supra concava, infra prope apicem carinata; *flores* solitarii, axillares, breviter pedunculati; *tubus* floris profunde 5-plicatus, a sepalis valde fimbriatis auriculatis fere celatus; *petala* rosea, orbicularia, 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, \pm 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 \pm flattened, 0.5–1 mm long. *Floral tube* turbinate, 2 mm long, deeply 5-ridged, somewhat curved, almost entirely obscured by the sepals. *Sepals* \pm 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, \pm 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, dehiscent 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 styler 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 styler 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 antepetalous 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.

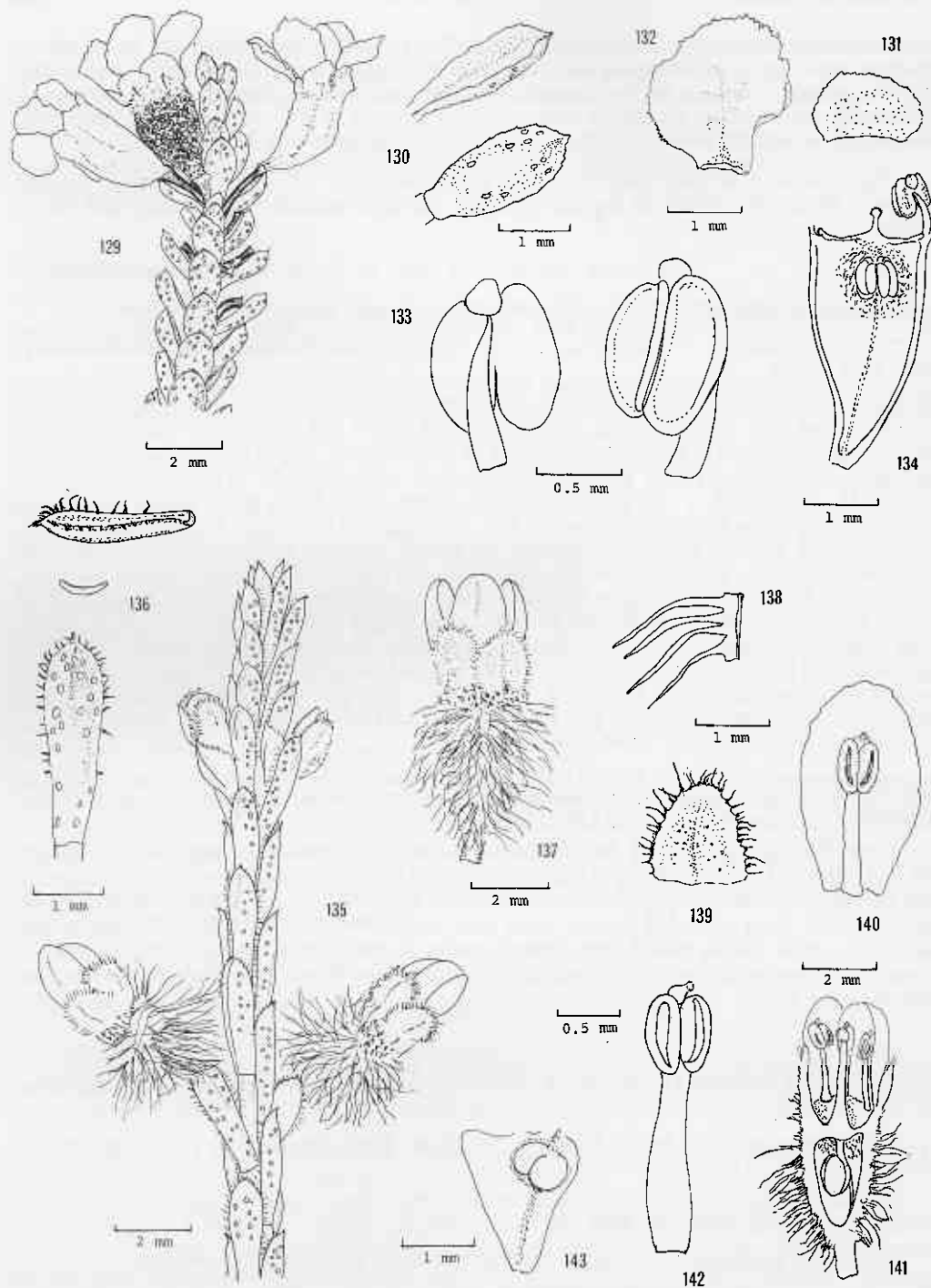
7. *Micromyrtus flaviflora* (F. Muell.) F. Muell. ex J. M. Black, *Flora of South Australia* 424 (1926).

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. 143—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* \pm 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 \pm 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 Gillis 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. Learmouth*, Oct. 1952 (MEL); Glen Edith, *H. H. Finlayson* Jan. 1930 (AD); W extremity of MacDonnell Ranges, prob. S of Haast Bluff, *E. Rieschick*, 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* \pm 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, \pm 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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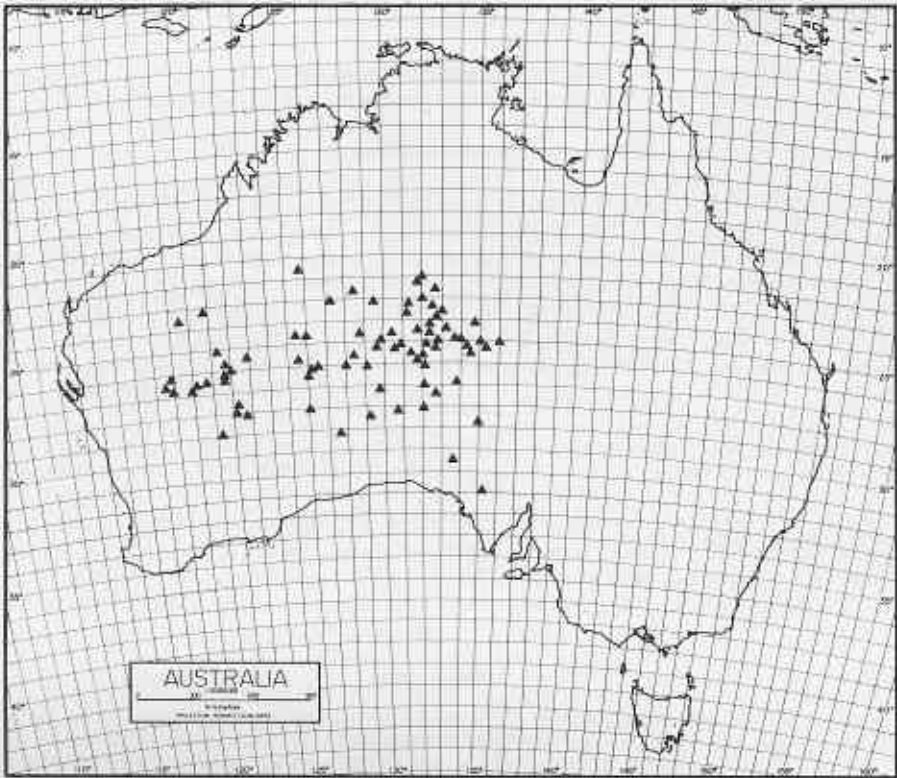
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(Species numbers in brackets)

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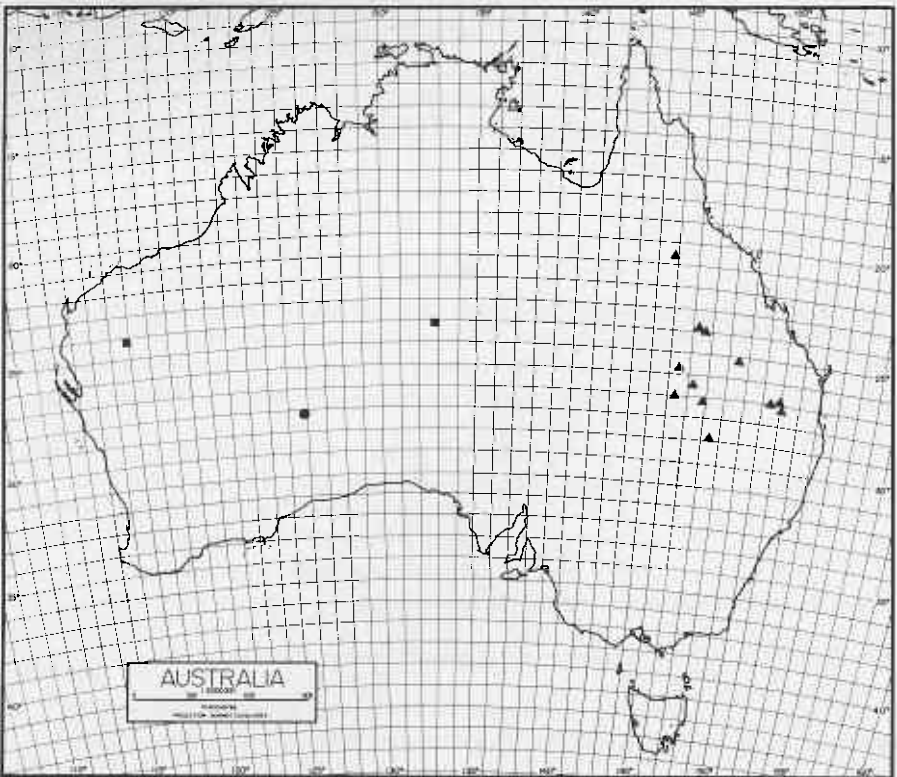
Allen 106 (1); Alright 26 (1), 27 (1); Althofer 205 (7); Armstrong 4 (1); Ashby 3568 (1), 4214 (1); Basedow 75 (1); Beard 4789 (1); Beaglehole 10221 (1), 20245 (1), 20508 (1), 22801 (1), 26475 (1), 26894 (1), 2750 (4); Bennett 84 (1); Blake 9927 (2); Broadbent 981 (1); Butler 109 (1), HA50 (1); Chippendale 1301 (1), 2917 (1); Chinnock 438 (1); Clarke 10 (1); Cleland 41 (1); Cockburn ? BPS38 (1); Cornwall 235 (1); Crisp 111 (6); 352 (1); Cunningham 513 (7); Davis 183 (6); Donner 4340 (1); Dunlop 1883 (1), 2367 (1); Everist 2160 (2); 2828 (2); Fairall 1905 (1), 1983 (1), 2010 (1); Forde 407 (1), 660 (6), 919 (1); George 2874 (1), 2887 (1), 2923 (1), 3903 (1), 3988 (1), 4563 (1), 4787 (1), 5266 (1), 5368 (1), 5625 (1), 8426 (5), 9053 (1), 15584 (1), 15626 (1); Gittins 1223 (7), 2053 (1); ? Gittins 375 (2); Gratte 3554 (1); Green 4678 (2); Hill 210 (1); 536 (6); Hill & Lothian 717 (1); 934 (4); Hubbard 7095 (2); 7826 (2), 8301 (6); Ising 1312 (6); Johnson, H. A., 5092 (1); Johnson, R. W. 1251 (2); Kuchel 64 (1); Latz 961 (1); Lay 76 (1); Lazarides 5739 (1), 6134 (1), 6171 (1), 8309 (1), 8333 (1); Lothian 716 (1), 3920 (1), 3923 (1), 3992 (1), 3993 (1), 4422 (1), 5616 (1), 5520 (6), 5521 (6), 5691 (6), 5692 (6); Maconochie 490 (1); Major 14 (1); MacGillivray 955 (7), 2957 (7); Mitchell 914 (3); Moore 3577 (7); Morcombe 133-4 (3); Munir 5131 (1); Must 84 (1); Nelson 968 (1); Nicholls 966 (1); Orchard 748 (1); Pedley 887 (2), 1741 (2), 2500 (7); Perry 5601 (1); Powell 73097 (1); Royce 1580 (1), 1753 (1); Schurcliff 8361 & Symon (1); Smith 10250 (2), 11351 (2); Smith & Everist 974 (2); Speck 863 (1), 1141 (1), 1233 (1), 1311 (1), 1424 (1); Spooner 131 (1); Symon 27 (1), 72 (1), 2415 (1), 8381 (1); Weber 208 (1); White, C. T. 11871 (7), 11873 (2); White, S. A., 15 (1), 153 (1); Williams 72017 (2); Wilson, H. M., 1 (1); Wilson, P. G. 7358 (1); Winkworth 55 (1), 843 (1), 1144 (1), 1229 (1); Wittwer 1109 (4); Yengoyan et al. 6 (1).

Micromyrtus

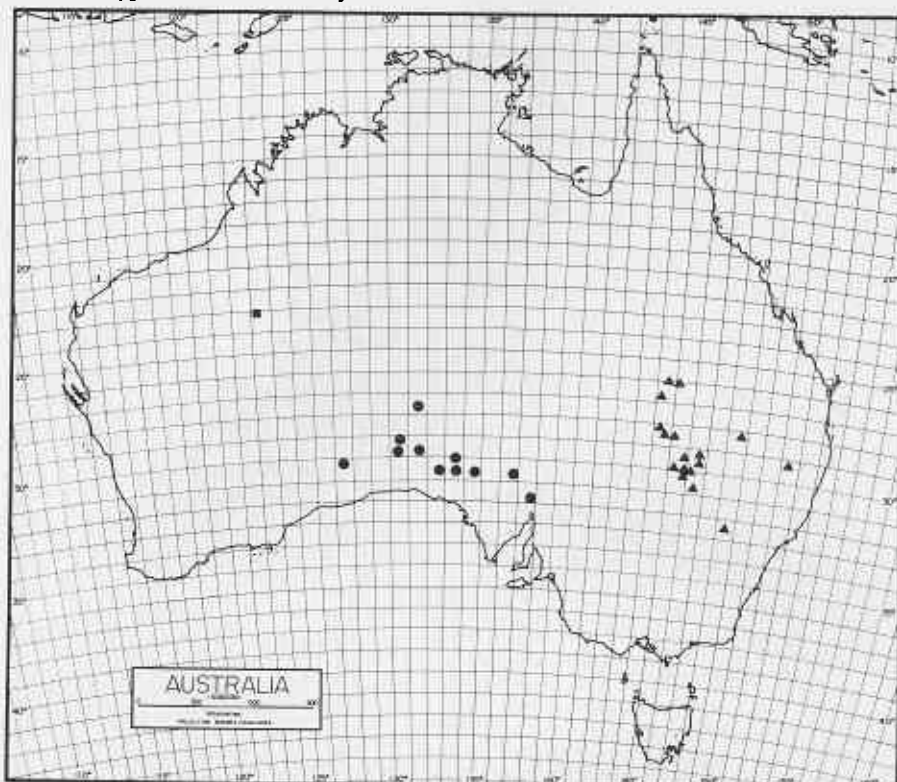
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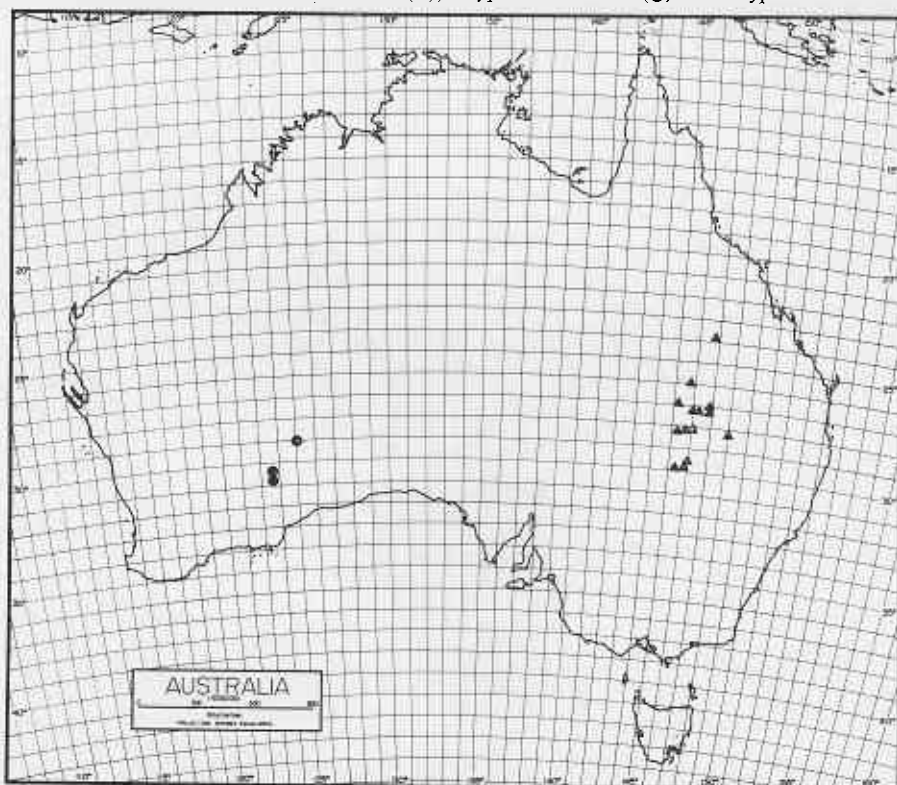
Map 1. Distribution of *Thryptomene maisonneuvei*.



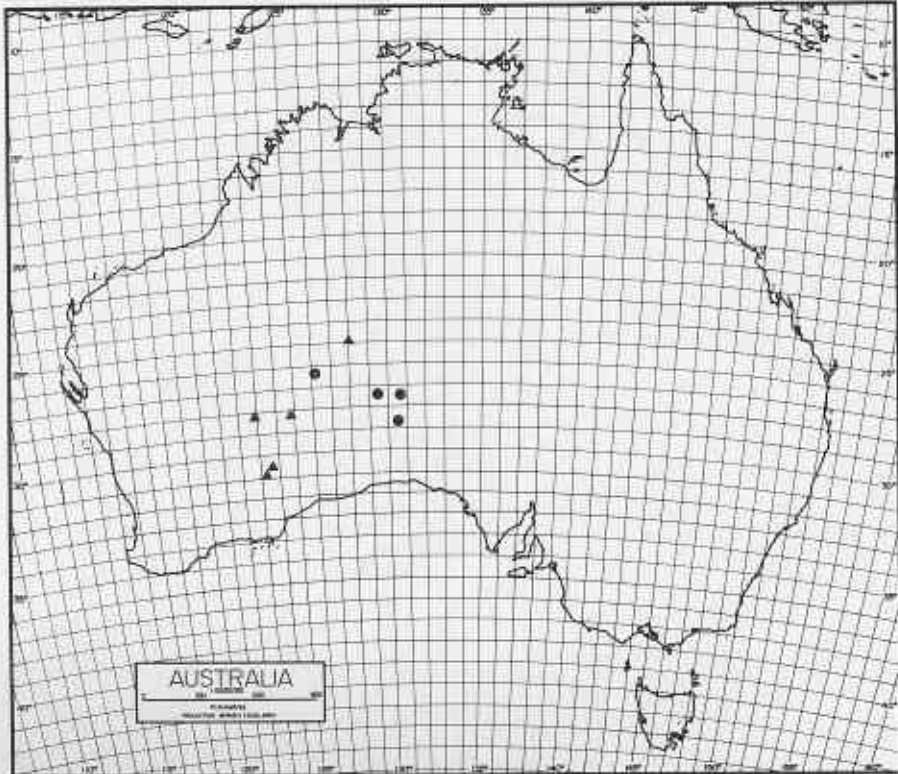
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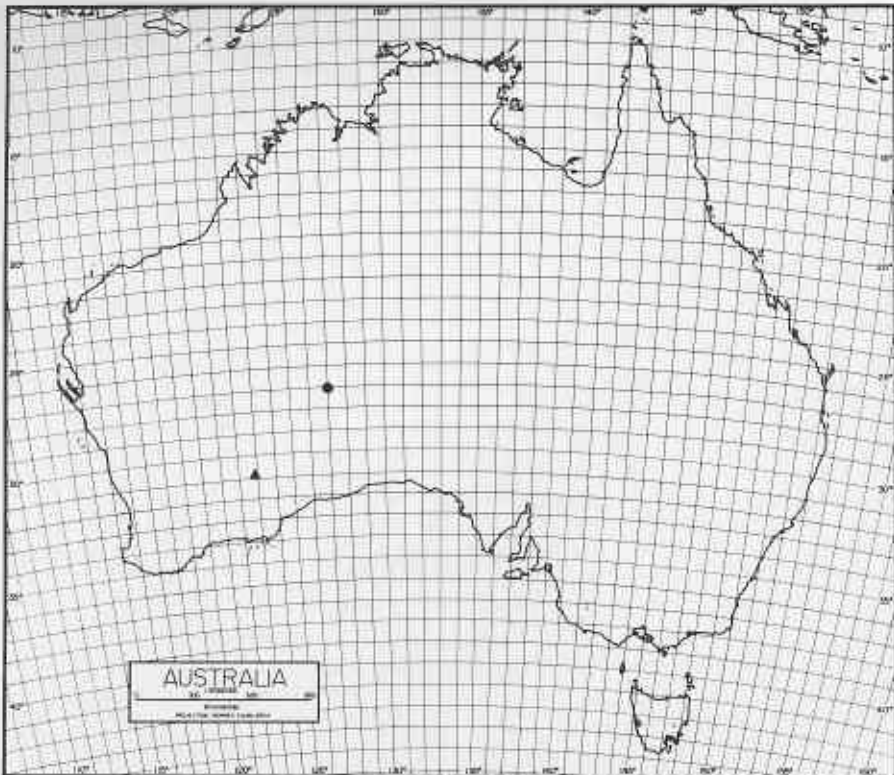
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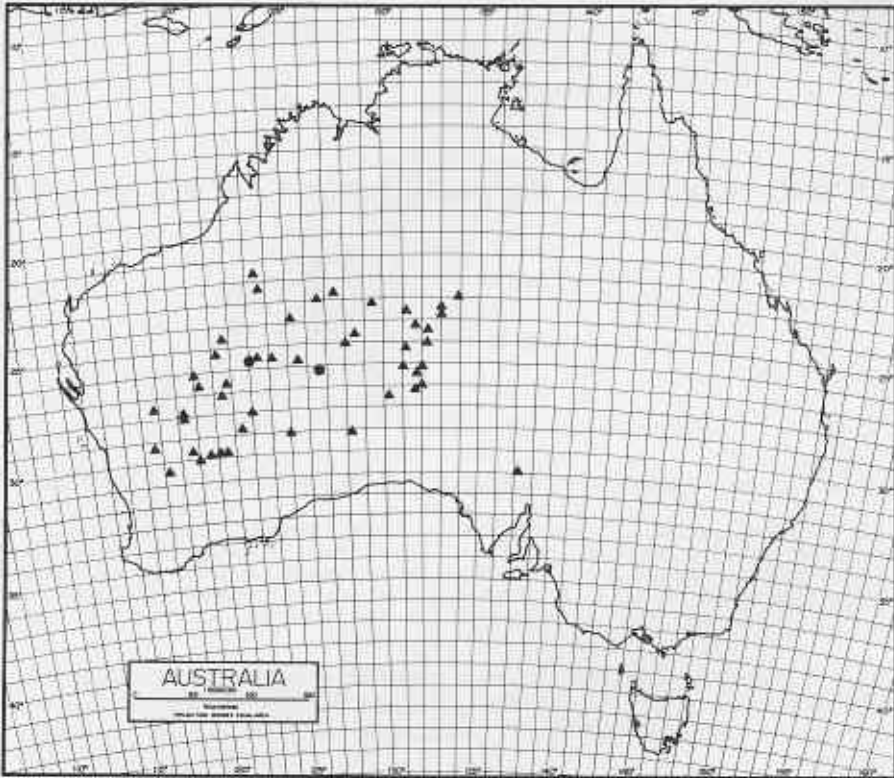
Map 4. Distribution of *Micromyrtus hexamera* (▲) and *Micromyrtus stenocalyx* (●).



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



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



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

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