



New taxa and a key for *Thryptomene* (Myrtaceae: Chamelaucieae: Thryptomeninae)

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Abstract

Rye, B.L. New taxa and a key for *Thryptomene* (Myrtaceae: Chamelaucieae: Thryptomeninae). *Nuytsia* 35: 101–135 (2024). A description is given for *Thryptomene* Endl. together with a key to all species and subspecies. Nine new Western Australian taxa are described as *T. butleri* Rye, *T. caduca* subsp. *incurva* Rye, *T. conica* Rye, *T. dampieri* subsp. *capensis* Rye, *T. interzonensis* Rye, *T. jilbadji* Rye, *T. maritima* Rye, *T. maritima* subsp. *freycinetensis* Rye and *T. pieroniae* Rye. Updated descriptions are given for *T. caduca* Rye & Trudgen, *T. dampieri* Rye and *T. salina* Rye & Trudgen and brief descriptions are given for three phrase-named taxa to inform future research. *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) is synonymised under *T. decussata* (W.Fitzg.) J.W.Green. Most of the new taxa are conservation-listed.

Introduction

Thryptomene Endl. is an endemic Australian genus of the Myrtaceae tribe Chamelaucieae DC. and is now the sole genus in subtribe Thryptomeninae Benth. (Rye *et al.* 2020). About 60 species and subspecies are now recognised, with representatives in all Australian States and Territories but with a large majority restricted to Western Australia, where ten phrase-named taxa were current prior to this study (Western Australian Herbarium 1998–). One additional undescribed species, *T.* sp. Missionary Plain (A. Schubert 267), is known from central Australia (Northern Territory Herbarium 2013).

Three issues have delayed the publication of new names for the species and subspecies treated herein: i) insufficient material for some taxa to be adequately described; ii) uncertainty as to the status of taxa belonging to difficult species complexes; and iii) uncertainty regarding the circumscription of *Thryptomene*, as Stapf (1924) had suggested that *Paryphantha* Schauer might need to be reinstated. Although species of *Paryphantha* s. str. are distinguished by having a curved-urceolate connective gland on their anthers, this genus is nested within *Thryptomene* s. lat. in unpublished molecular data (Peter Wilson pers. comm.). Recent collections of the rare taxa have assisted in the resolution of the other issues.

The aims of this paper are to describe a number of unnamed members of the genus so that they can be included in a treatment for *Flora of Australia*, to present an up-to-date, Australia-wide key to the species and subspecies, and to provide information on the remaining phrase-named taxa. George and Sharr (2021) was consulted for the etymology of plant names. Methods used in obtaining descriptions are as given in Rye (2013).

Generic description

Thryptomene Endl., *Stirp. Herb. Hügel.* 192 (1838); *Thryptomene* Endl. sect. *Thryptomene*; *Thryptomene* F.Muell., *Fragm.* 1(1): 11 (1858), *orth. var. Type: Thryptomene australis* Endl., *nom. cons.*

Gomphotis Raf., *Sylva Tellur.* 103 (1838), *nom. rej.* Type: *Gomphotis saxicola* (A.Cunn. ex Hook.) Raf. [= *Thryptomene saxicola* (A.Cunn. ex Hook.) Schauer].

Paryphantha Schauer, *Linnaea* 17: 235–236 (1843); *Thryptomene* sect. *Paryphantha* (Schauer) Kuntze in T. Post & O. Kuntze, *Lex. Gen. Phan.* 559 (1903). Type: *Paryphantha mitchelliana* Schauer, *nom. illeg.* [= *Thryptomene calycina* (Lindl.) Stapf].

Astraea Schauer, *Linnaea* 17: 238–239 (1843), *nom. illeg.*, *nom. superfl.*; *Thryptomene* sect. *Astraea* Stapf, *Bot. Mag.* 149: t. 8995 (1924). Type: *Astraea saxicola* (A.Cunn. ex Hook.) Schauer [= *Thryptomene saxicola* (A.Cunn. ex Hook.) Schauer].

Bucheria Heynh., *Alph. Aufz. Gew.* 80 (1846), *nom. illeg.*, *nom. superfl.* Type: *Bucheria saxicola* (Hook.) Heynh., *nom. illeg.* [= *Thryptomene saxicola* (A.Cunn. ex Hook.) Schauer].

Thryptomene sect. *Euthryptomene* Kuntze in T. Post & O. Kuntze, *Lex. Gen. Phan.* 559 (1903), *nom. inval.*

Thryptomene sect. *Oligandron* Stapf, *Bot. Mag.* 149: t. 8995 (1924). Type: *Thryptomene oligandra* F.Muell.

Thryptomene sect. *Thryptocalpe* Stapf, *Bot. Mag.* 149: t. 8995 (1924). Lectotype, designated by B.L. Rye, *Nuytsia* 24: 273 (2014): *Thryptomene urceolaris* F.Muell.

Prostrate to tall shrubs, rarely trees, glabrous. *Young stems* smooth (not tuberculate), usually white or pale grey and dotted with oil glands, sometimes reddish at first. *Leaves* opposite, decussate, small, shortly petiolate or (in *T. naviculata*) sessile. *Peduncles* 1–3 per axil, 1–3-flowered, but with most species having just a single 1-flowered peduncle per axil. *Bracteoles* keeled. *Pedicels* ± absent in most species. *Flowers* primarily 5-merous or (in 2 species) 6- or 7-merous, actinomorphic. *Hypanthium* with a greater diameter than length in most species, longer than wide and/or dorsiventrally compressed in some species, longitudinally ribbed in about half the species, with varied other kinds of ornamentation less common; free part usually much shorter than the adnate part (but up to *c.* half as long in *T. decussata*). *Sepals* much shorter than to slightly longer than the petals, persistent in fruit. *Petals* 5(–7), broad, usually widely spreading in flower, white or pink to purplish or (in 1 species) yellow, in most species closing inwards in fruit to a somewhat erect position or to a more horizontal position over top of fruit, in a few species widely spreading in fruit or shed well before fruit matures; antipetalous colleter absent or minute. *Staminodes* rare or absent. *Stamens* inflexed in bud, 5–40, variously arranged but when 5 then all antisealous and when numerous then in 2 series with outer series longer, much shorter than the petals. *Filaments* free. *Anthers* dorsifixed, versatile, commonly becoming mid to dark brown; thecae divergent at base, compact; connective gland free, dorsal-subterminal, broad-truncate or curved-urceolate, large. *Ovary* inferior, 1-locular; placenta near-basal or lateral; ovules erect (not pendulous), 2 and collateral or 4–10 in 2 rows. *Style* central and terminal (base not inset); stigma small, capitate. *Fertile fruits* indehiscent, inferior (but often with a convex summit protruding upwards), all or mostly 1-seeded. *Seeds* transversely reniform or of other depressed shapes in most species, erect and longer than wide in a few species, 1.2–2.1 mm long or across; testa membranous. *Sterile fruits* similar in shape to or more spherical than the fertile fruits, very hard.

Diagnostic characters. Distinctive in its anther morphology, which includes two basally divergent, compact thecae and a large, free connective gland. Other important characters: ovary inferior, 1-locular, with ovules on a near-basal or lateral placenta; style terminal; fruits indehiscent.

Size and distribution. *Thryptomene* is an endemic Australian genus with 54 formally named species, several subspecies and three phrase-named taxa currently recognised. More than 80% of the species are restricted to Western Australia, with most of those occurring in the south-west, but the genus also extends to north-east Queensland and to Tasmania.

Chromosome numbers. $n = 9-11$, with tetraploid numbers of $n = 18$ and $n = 22$ also recorded (Rye 1979).

Notes. Some floral and fruiting characters in *Thryptomene* are shown in Figure 1, including the typical shape and colour of the anthers (Figure 1A). One character of importance in identifying Western Australian species groups or individual species is the shape of their flower buds, with a summit that ranges from concave to conic (Figure 1B, C, E). The ornamentation of the hypanthium in both fruit (Figure 1D) and flower is also diagnostic.

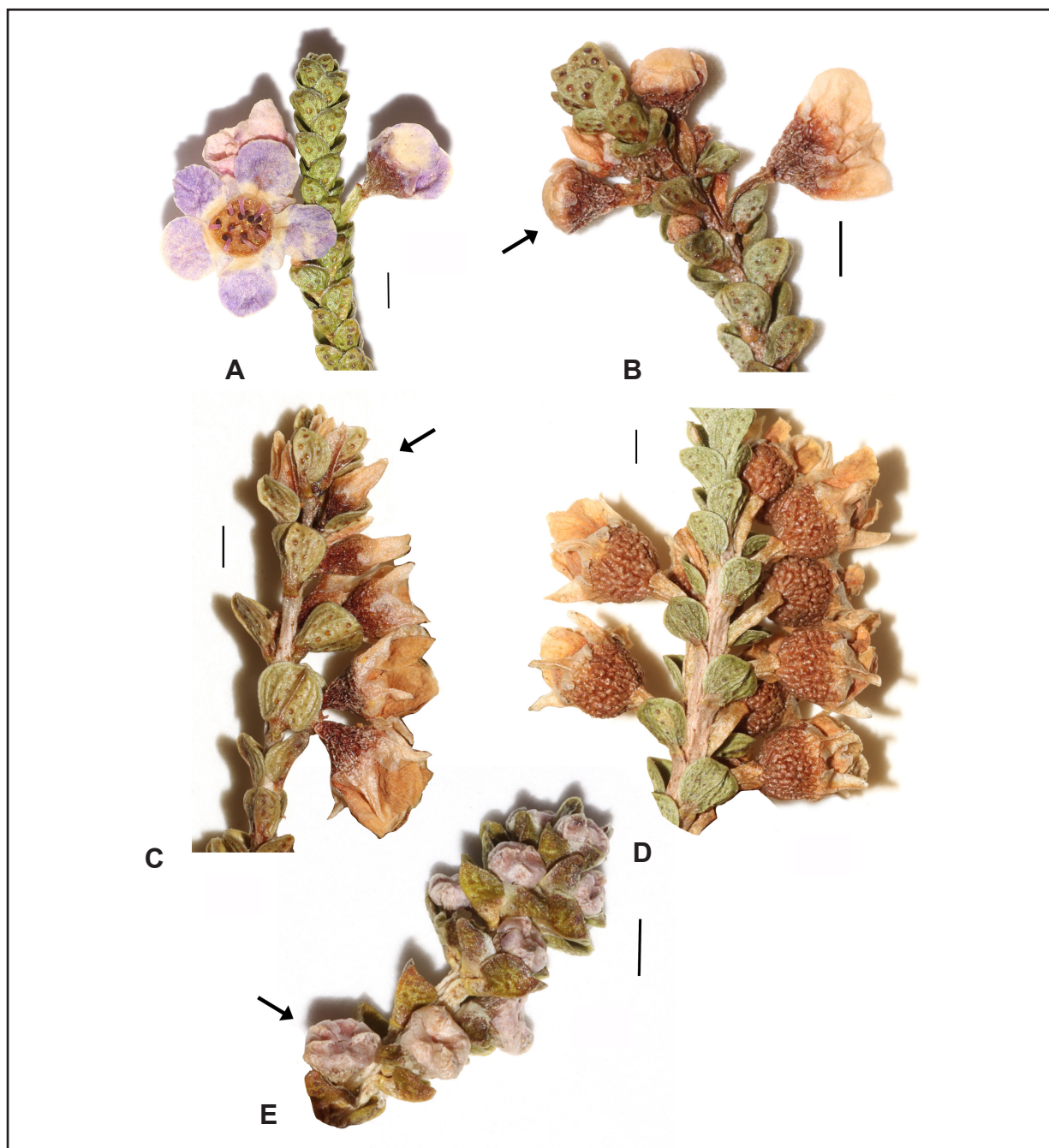


Figure 1. Flowering and fruiting branchlets in the *Thryptomene caduca* (A–D) and *T. dampieri* (E) complexes. A – *T. caduca* subsp. *caduca* top view of flower and side view of bud just starting to open, showing the blistered appearance of the hypanthium and almost triangular sepals; B – *T. caduca* subsp. *incurva* obtuse buds (one arrowed) with depressed ovate sepals; C – *T. conica* acute buds (one arrowed); D – *T. conica* fruits with sepal sides closed together distally and a rugose-tuberculate hypanthium; E – *T. butleri* flower buds with concave apex (one arrowed). Images by Juliet Wege from L.S.J. Sweedman 9549 (A), H. Demarz 11302 (B), B. Dell s.n., PERTH 04499131 (C), A.G. Gunness AG 2360 (D), M.E. Trudgen, B. Moyle & C. Wilkins MET 21853 (E). Scale bars = 1 mm.

Stapf(1924) published an infrageneric classification for *Thryptomene*, dividing the genus into five sections. Prior to his paper, only the typical section and sect. *Paryphantha* (Schauer) Kuntze had been recognised. A molecular framework and re-assessment of morphological characters are needed to determine how many of the previously named sections of *Thryptomene* should be recognised and whether any additional sections are needed.

Key to species and subspecies

1. Ovules 4–10, in 2 rows. Hypanthium with 8–16 closely packed ribs extending for its full length
 2. Stamens 15–40 in 2 series
 3. Mature peduncles 0–0.3 mm long. Sepals 2–3.3 mm long. Ovules 5–10. Mature style 2.5–3.5 mm long (Yaringa Stn–near Congo Creek–Lee Steere Range–Leonora area, W.A.)..... **T. decussata**
 - 3: Mature peduncles 0.7–1.4 mm long. Sepals *c.* 1.4 mm long. Ovules 4. Mature style *c.* 0.7 mm long (Binnu area, W.A.)..... **T. duplicata**
 - 2: Stamens 5–13 in 1 series
 4. Stamens 10 in most flowers, with one \pm opposite each sepal and each petal, sometimes up to 12 in a few flowers
 5. Leaf apical point (0.7–)1–2 mm long (where best developed). Ovules 6–9. Mature style 0.3–0.6 mm long. Occurs on granite outcrops and in other rocky habitats (N of Cue–Wongan Hills area–Tallering Peak–near Menzies, W.A.) **T. costata**
 - 5: Leaf apical point absent or to 0.5 mm long. Ovules 4–6. Mature style 0.6–0.8 mm long. Occurs around low-lying winter-wet sites (2 species), the habitat of *T. sp.* Coolgardie not recorded
 6. Rapidly growing young stems not winged. Hypanthium ribs flattened and closely pressed together giving a striate appearance. Occurring north of Geraldton (Kalbarri NP–W of Binnu, W.A.) **T. striata**
 - 6: Rapidly growing young stems narrowly 4-winged. Hypanthium ribs rounded to almost acute and separated by v-shaped sinuses. Occurring south of Geraldton
 7. Leaf blades narrowly to broadly obovate, 2–7 \times 0.9–2.1 mm; apical point absent or to 0.3(–0.5) mm long. Occurring less than 200 km from the coast (Wilroy–Gingin–Ejanding, W.A.) **T. mucronulata**
 - 7: Leaf blades very broadly obovate, 2–3 \times 1.8–2.3 mm; apical point 0.4–0.5 mm long. Occurring more than 500 km inland (Coolgardie area, W.A.)..... **T. sp. Coolgardie**
- 4: Stamens 5–13, all opposite sepals or irregularly arranged (never regularly 10 opposite the sepals and petals)
 8. Leaf apical point absent or rarely to 0.1 mm long. Stamens 5–7, not consistently 7 (Mt Holland area–Emu Rock area, W.A.) **T. salina**
 - 8: Leaf apical (or subapical) point 0.2–1.5 mm long. Stamens 7–13, not consistently 7
 9. Leaves fairly flat, obovate to almost circular; apical point 0.2–0.5 mm long. Bracteoles persistent in fruit. Ovules 4 (Kalbarri NP, W.A.) **T. johnsonii**
 - 9: Leaves thick, linear to obovate in outline; apical point 0.5–1.5 mm long. Bracteoles shed in bud or flower. Ovules 5–8
 10. Leaves almost terete with an adaxial groove, 2.5–4 mm long, with a subterminal point 0.8–1.5 mm long (Menzies–Pinjin Stn, W.A.)..... **T. eremaea**
 - 10: Leaves triangular or indented-triangular in TS towards the apex and tending to be more flattened below, 3–9 mm long, tapered at apex to a terminal point 0.5–1 mm long
 11. Stamens almost reaching style when pressed inwards; filament 0.7–1.1 mm long. Mature style 0.6–0.8 mm long (Near Kalannie–Darling Range–Frank Hann NP–Lort River, W.A.) **T. australis**
subsp. **australis**

- 11: Stamens well separated from style when pressed inwards; filament 0.4–0.6 mm long. Mature style 0.35–0.6 mm long (SE Coolgardie–Cape Arid NP, W.A.) **T. australis**
subsp. **brachyandra**
- 1: Ovules 2, collateral. Hypanthium with a rugose to almost smooth surface or with 5 or 10 more widely spaced, full-length ribs or (when 6-merous) sometimes 12-ribbed
12. Flowers all or mostly 6- or 7-merous, with 6–8 stamens
13. Leaves with a petiole 0.6–0.8 mm long. Sepals 1–1.3 mm long, ± entire. Occurring in central and eastern Australia (Palm Valley, N.T. & N of Charleville, Qld–near Dubbo, N.S.W.) **T. hexandra**
- 13: Leaves sessile. Sepals 1.8–2.5 mm long, deeply denticulate-lacinate. Occurring in W.A. (near Jigalong–Karlamilyi NP–near Gibson Desert NR, W.A.)..... **T. naviculata**
- 12: Flowers all or mostly 5-merous, with 5–16 stamens, but most species primarily with either 5 or 10 stamens
14. Stamens 5 in all or most flowers. Sepals slightly shorter than to distinctly longer than the petals. Mature style 0.25–0.5(–0.6) mm long
15. Sepals and petals yellow. Leaf blades as broad as or broader than long (1.5–2.2 mm long, 1.5–2.5 mm wide); apical point recurved, to 0.2 mm long. Occurring in N.T. (Missionary Plain, N.T.)..... **T. sp. Missionary Plain**
- 15: Sepals and petals white or pink. Leaf blades narrower than long in most species, always differing in some respects from above choice. Occurring in W.A., S.A. or eastern Australia
16. Hypanthium broad at the base and usually becoming saccate (pouched on each side of the peduncle). Outermost sepal strongly ridged, sometimes shortly horned (Great Victoria Desert, W.A.–Wynbring, S.A.)..... **T. elliotii**
- 16: Hypanthium narrow where the peduncle is attached, not saccate. Outermost sepal not strongly ridged
17. Sepals somewhat longer than the petals
18. Leaves narrowly obovate-elliptic to linear in outline, 0.7–1.2 mm wide, 0.3–0.5 mm thick, i.e. more than 1/3 as thick as wide (Kangaroo Island & Eyre Peninsula, S.A.)..... **T. ericaea**
- 18: Leaves narrowly elliptic or narrowly obovate to broadly obcordate, 1–4 mm wide, not noticeably thickened
19. Petals 0.5–0.8 mm long
20. Petioles 0.8–1.7 mm long. Leaf blades 1–1.3 mm wide. Hypanthium 1.7–2.5 mm long (Eyre Peninsula, S.A.–eastern Tas.)..... **T. micrantha**
- 20: Petioles 0.4–0.7 mm long. Leaf blades 1.8–2.6 mm wide. Hypanthium 0.7–1 mm long (Suttor River, Qld–near N.S.W. border) **T. parviflora**
- 19: Petals 0.9–1.4 mm long
21. Leaf blades 5–12 mm long. Peduncles 1–3 per axil, 1.3–2.5 mm long, 1–3-flowered. Occurring in Victoria (Grampians area, Vic.)..... **T. calycina**
- 21: Leaf blades 1.7–4.5 mm long. Peduncles 1 per axil, 0.4–0.8 mm long, 1-flowered. Occurring in W.A.
22. Leaves broadly or very broadly obovate, 1.7–3 mm long; apical point absent or fairly erect. Sepals and petals erect in fruit (Eurardy Stn–Yuna area & Mt Singleton, W.A.)..... **T. pieroniae**
- 22: Leaves narrowly obovate, 3.5–4.5 mm long; apical point strongly recurved. Sepals widely spreading and petals closed inwards in fruit (Jaurdi Stn–Parker Range, W.A.) **T. interzonensis**
- 17: Sepals somewhat shorter than, or rarely as long as, the petals

23. Shrub or tree to 10 m high. Hypanthium 1–1.5 mm long. Fruits broader than long (Cape York Peninsula & Lizard Island, Qld)..... **T. oligandra**
- 23: Shrubs with maximum heights of 1–2.6 m. Hypanthium 1.5–2.6 mm long. Fruits longer than broad
24. Leaves very thick, almost terete, with a prominent apical point 0.2–1.5 mm long. Occurring in south-eastern W.A. and western S.A.
25. Leaves almost globular, 1.5–2.3 mm long. Flowers solitary, with a pedicel 0.5–3 mm long as well as a peduncle (Queen Victoria Spring NR, W.A.–near Wyola Lake & Maralinga, S.A.) **T. biseriata**
- 25: Leaves almost narrowly oblong in outline, 3–4 mm long. Flowers 1–3 per peduncle, if solitary then sessile but secondary axes bearing lateral flowers sometimes present (Talleringa area, S.A.) **T. longifolia**
- 24: Leaves flat to very thick but not terete, apical point absent or not more than 0.2 mm long. Occurring from central inland W.A. to the Pilbara and south-west
26. Peduncles 1–3 per axil, very dorsiventrally compressed. Anthers dehiscent by pores or short slits that are much shorter than thecae; connective gland curved-urceolate
27. Leaf blades obovate, 2–3.5 mm wide (E of Warburton, W.A.)..... **T. sp. Warburton**
- 27: Leaf blades narrowly obovate to linear in outline, 0.6–1.3 mm wide
28. Leaves not clustered, 3–5 mm long, 0.4–0.5 mm thick (Leinster–Neale Junction, W.A.)..... **T. nealensis**
- 28: Leaves tending to be densely clustered near the ends of branchlets, 6–16 mm long, not more than 0.3 mm thick (Karijini NP–Carnarvon Range–Mt Augustus, W.A.)..... **T. wittweri**
- 26: Peduncles 1 per axil, somewhat compressed. Anthers dehiscent by slits that are about as long as the thecae; connective gland broad-truncate
29. Leaves broadly or very broadly obovate, wider than thick; apical point minute or absent. Hypanthium tending to develop a whitish bloom (Queen Victoria Rocks–Kambalda area, W.A.)..... **T. planiflora**
- 29: Leaves obovate to linear in outline or clavate, about as thick as wide or thicker than wide; apical point usually 0.2–1.4 mm long but often \pm absent in *T. urceolaris*. Hypanthium lacking a bloom
30. Leaves 4–11 mm long. Hypanthium distally free for 0.2–0.35 mm
31. Leaves with an apical point 0.7–1.4 mm long. Petals 1–1.3 mm long. Flowers 3–4.5 mm diam. (Mullewa–Beacon–Merredin–Kondinin, W.A.)..... **T. cuspidata**
- 31: Leaves with an apical point 0.4–0.6 mm long. Petals 1.5–2.3 mm long. Flowers 5–7 mm diam. (N of Hyden–near Jilbadji NP, W.A.)..... **T. jilbadji**
- 30: Leaves 1.4–3.5(–4) mm long. Hypanthium distally free for 0.5–0.8 mm
32. Mature leaves with abaxial and adaxial surfaces distinctly delimited, 2–4 mm long; apical point recurved, 0.3–1 mm long. Peduncles 0.5–1.5 mm long. Flowers 2.5–4 mm diam. (Cadoux–Coolgardie–Frank Hann NP, W.A.)..... **T. kochii**
- 32: Mature leaves clavate, without a clear separation of the abaxial and adaxial surfaces, 1.4–2.5 mm long; apical point erect or absent, to 0.2 mm long. Peduncles 0.3–0.5 mm long. Flowers 4–5.5 mm diam. (Diemals Stn–Yindi Stn, W.A.)..... **T. urceolaris**
- 14: Stamens 7–14(–16) in all or most flowers, except sometimes 5 or 6 in *T. denticulata* (which has sepals much shorter than the petals). Sepals much shorter than the petals in most species, but similar in size to the petals in *T. orbiculata* and *T. racemulosa*. Mature style (0.4–)0.5–1.7 mm long

33. Stamens 10, with one opposite each sepal and petal. Sepals with a thick herbaceous midrib and a conspicuous white petaloid margin, the outer ones with a horn to 0.3 mm long (Arnhem Land, N.T.)..... **T. remota**
- 33: Stamens 5–16, when 10 then in pairs opposite the sepals or alternating with the sepals and petals. Sepals varied, sometimes with a less distinctively coloured petaloid margin than above choice, not horned except sometimes in *T. hubbardii*
34. Leaves long-linear in outline, *c.* as thick as wide; apical point *c.* 1 mm long. Stamens 7 or 8, almost equidistant, irregularly arranged in relation to the sepals and petals (Kalbarri NP, W.A.)..... **T. pinifolia**
- 34: Leaves depressed ovate or circular to linear, much wider than thick; apical point absent or to 0.2 mm long. Stamens 5–16, usually 10 in most species, often paired opposite the sepals or regularly alternating with the sepals and petals
35. Sepals widely spreading or with distal half widely spreading in fruit, more than half as long as to slightly exceeding the petals
36. Young leaves denticulate to ciliate on margins; apical point to 0.2 mm long. Sepals with a herbaceous, oil-dotted keel and scarios margins. Stamens *c.* 1/3 as long as the petals (East Yuna NR–Indarra Springs NR, W.A.)..... **T. hubbardii**
- 36: Young leaves entire to denticulate on margins; apical point \pm absent. Sepals without an obvious keel, rather petaloid. Stamens 1/2–2/3 as long as the petals
37. Mature peduncles 4–8 mm long. Hypanthium minutely papillose (East Yuna NR–Bindoo Hill NR, W.A.)..... **T. velutina**
- 37: Mature peduncles 1–3 mm long. Hypanthium not papillose
38. Leaves very narrowly to broadly obovate, rarely almost circular, the broadest ones 1–2.5 mm wide. Flowers 3.5–6 mm diam. Stamen filaments 0.7–1.3 mm long (N of Geraldton–Kulin, W.A.) **T. racemulosa**
- 38: Leaves broadly ovate to depressed-obovate, often \pm circular, the broadest ones 2.3–3.3 mm wide. Flowers 5–8 mm diam. Stamen filaments 1.2–1.6 mm long (East Yuna NR–E of Walkaway, W.A.)..... **T. orbiculata**
- 35: Sepals fairly erect to tightly closed inwards in fruit, much shorter than to somewhat more than half as long as the petals
39. Flower buds with apex concave to almost flat. Bracteoles mostly persistent in mature fruit and sepals closed in almost horizontally in fruit
40. Leaves 5–12 times longer than wide, not keeled. Hypanthium pitted in fruit
41. Leaves with 2 or 3 main rows of oil glands on each side of the midvein; glands 20–40 per row. Sepals glossy (Kalbarri NP, W.A.)..... **T. calcicola**
- 41: Leaves with 1 or 2 rows of oil glands on each side of the midvein; glands 8–15 per row. Sepals dull (Chapman River area, W.A.)..... **T. stenophylla**
- 40: Leaves ranging from slightly wider than long to 4 times longer than wide, often strongly keeled. Hypanthium smooth in fruit or rugose with irregular wrinkles and bumps, sometimes also with some pits
42. Hypanthium smooth in fruit (Near Irwin River–Mingenew–Arrino, W.A.)..... **T. nitida**
- 42: Hypanthium rugose in fruit
43. Hypanthium with numerous low rounded bumps at least distally. Occurring in hilly terrain on various rock types including laterite (Hutt River–Chapman River area, W.A.) **T. baeckeacea**
- 43: Hypanthium with longitudinal wrinkles. Occurring on limestone and coastal dunes
44. Mature leaves keeled only near the apex on abaxial surface (Baudin Island–Tamala Stn, W.A.) **T. maritima**
subsp. **freycinetensis**

- 44: Mature leaves mostly keeled for more than a quarter to the whole of their full length on abaxial surface
45. Leaves with a petiole 0.5–1.2 mm long; blade usually 3–6.5 mm long, with 6–12 oil glands in the two central rows, i.e. closest to the midvein on each side, on the abaxial surface. Petals 2–3 mm long
46. Peduncles borne at 1–8 consecutive nodes, 0.6–2 mm long. Recorded in crevices in sandstone or limestone and on sand dunes, usually in low coastal shrubland (N of Kalbarri–Yardanango NR, W.A.)..... **T. maritima**
subsp. **maritima**
- 46: Peduncles borne at 5–14 consecutive nodes, 0.1–0.7(–1) mm long. Recorded in gullies and gorges, usually with *Acacia* and spinifex (Cape Range, W.A.)..... **T. dampieri**
subsp. **capensis**
- 45: Leaves with a petiole 0.2–0.7 mm long; blade usually 1.5–3 mm long (rarely to 4.5 mm long in *T. dampieri* but still with a short petiole), usually with 2–6 oil glands in the two central rows, i.e. closest to the midvein on each side, on the abaxial surface. Petals 1.3–2(–2.3) mm long
47. Peduncles borne at 7–22 consecutive nodes. Petals 1.3–1.7 mm long (near Leeman–Lancelin, W.A.)..... **T. butleri**
- 47: Peduncles borne at 2–8 consecutive nodes. Petals 1.5–2(–2.3) mm long (Exmouth area–Dirk Hartog Island–Hamelin Pool, W.A.)..... **T. dampieri**
subsp. **dampieri**
- 39: Flower buds with apex usually shallowly convex to conic in most species, but flat to concave in *T. podantha*. Bracteoles caducous to persistent, if persistent then sepals fairly erect or only loosely closed inwards in fruit
48. Hypanthium ribbed in flower, becoming smooth or almost smooth in mature fruit, if not fully smooth then with a distinct pedicel, 1–1.4 mm long, as well as a peduncle
49. Bracteoles persistent after fruits fall. Petals 3–3.5 mm long. Stamen filaments c. 1.7 mm long. Fruits with a peduncle less than 0.3 mm long and no pedicel (S of Eneabba, W.A.) **T. spicata**
- 49: Bracteoles deciduous. Petals 2–2.5 mm long. Stamen filaments 0.6–1 mm long. Fruits with a peduncle 0.5–1.5 mm long and a pedicel 1–1.4 mm long (Meadow Stn–near Yuna, W.A.) **T. podantha**
- 48: Hypanthium variously ornamented in flower, not becoming smooth in fruit, the pedicel ± absent or less than 0.3 mm long
50. Bracteoles caducous or shed in flower. Sepals folded and with an acute apex
51. Sprawling coastal dune plant, rooting at nodes of prostrate stems. Mature style c. 1.3 mm long, almost as long as the petals (Dirk Hartog Island & Steep Point, W.A.) **T. repens**
- 51: Erect to widely spreading shrub, without adventitious roots, occurring inland or near the coast but not on dunes. Mature style 0.4–0.8 mm long, much shorter than the petals
52. Hypanthium somewhat ribbed at first, becoming smoother in fruit or the ribs more rounded (Cooloomia NR–Meadow Stn–Pindar, W.A.)..... **T. stronglyphylla**
- 52: Hypanthium densely blistered in bud, densely tuberculate in fruit
53. Longest sepals 1–1.5 mm long. Flowers with a conic apex in late bud, mostly with 10 stamens; hypanthium 1.1–1.6 mm long (Cooloomia NR–Meadow Stn–Pindar, W.A.)..... **T. conica**
- 53: Longest sepals 0.4–0.8 mm long. Flowers with a convex apex in late bud, mostly with 7–9 stamens; hypanthium 0.6–1.1(–1.3) mm long

54. Flowers deeply convex in late bud, 5–6 mm diam. when fully open.
Sepals (0.5–)0.6–0.8 mm long, fairly erect (near Hamelin Pool, W.A.)..... **T. caduca**
subsp. **caduca**
- 54: Flowers shallowly convex in late bud, 3.5–4 mm diam. when fully open.
Sepals 0.4–0.6 mm long, strongly incurved (Tamala Stn–Coburn Stn area–
Murchison House Stn, W.A.)..... **T. caduca**
subsp. **incurva**
- 50: Bracteoles mostly persistent in fruit, if caducous then sepals with a rounded
apex
55. Hypanthium (in flower) rugose with wrinkles or ridges as well as pits. Outer
sepals distinctly auriculate
56. Mature peduncles 0.5–2.5 mm long. Sepals keeled, distinctly denticulate to
lacinate; margins often recurved or flat, not markedly incurved
(Cooloomia NR–Wongan Hills, W.A.)..... **T. denticulata**
- 56: Mature peduncles ± absent or to 0.3 mm long. Sepals not keeled, ± entire;
margins incurved
57. Leaves mostly with the apex (including dorsal ridge) recurved. Bracteoles
with the midrib not very prominent (near Wannoo, W.A.) **T. wannoensis**
- 57: Leaves with the apex (of the dorsal ridge) incurved. Bracteoles with the
keel forming a prominent compressed ridge (near Eurardy Stn–
Mullewa, W.A.)..... **T. globifera**
- 55: Hypanthium pitted, lacking wrinkles or ridges. Outer sepals not or scarcely
auriculate
58. Peduncles solitary or 2 superposed in the axils, 1–3-flowered. Occurring
near the south coast, mainly on granite (Augusta–Bremer Bay;
Esperance area–Cape Arid NP–Middle Island, W.A.) **T. saxicola**
- 58: Peduncles solitary in the axils, all 1-flowered or rarely a few of them
2-flowered. Occurring north of Perth, mainly on sand or laterite
59. Leaf blades 1.2–2.2 mm long. Mature peduncles 0.8–3 mm long, shorter
than to about twice as long as the bracteoles. Bracteoles persistent
(Carnamah–Wubin area, W.A.)..... **T. shirleyae**
- 59: Leaf blades 3–12 mm long. Mature peduncles 3–11 mm long, much
longer than the bracteoles. Bracteoles usually caducous or shed in flower
60. Hypanthium (in mature fruit) with large deep pits, not papillose.
Occurring south of Geraldton (Arrowsmith River–
Mullering Brook, W.A.)..... **T. hyporhytis**
- 60: Hypanthium (in mature fruit) with numerous small shallow pits, sometimes also
papillose. Occurring north and east of Geraldton (Moresby Range, W.A.)..... **T. stapfii**

Species and subspecies descriptions

A. The *Thryptomene caduca* Rye & Trudgen complex

The *T. caduca* species complex belongs to the *T. denticulata* (F.Muell.) Benth. group, which is unusual in having the ovary summit pink in young flowers but fading when the flowers age; other species groups in the sect. *Astraea* have the ovary summit green or yellow at first but turning pink or red as the flowers age. *Thryptomene caduca* was formally named in 2014 but the closely related taxon known as *T. sp.* Eagle Gorge (A.G. Gunness 2360) was left undescribed pending further study (Rye 2014: 279). Examination of some additional collections and the previously available specimens in both taxa has enabled *T. sp.* Eagle Gorge to be resolved as a distinct species, described below as *T. conica* Rye, and a novel subspecies to

be recognised within *T. caduca*. Sepal length in the complex is particularly variable, ranging from just 0.4 mm to 1.5 mm.

Thryptomene strongylophylla Benth. is similar to *T. caduca* and *T. conica* in most respects but differs in having its hypanthium longitudinally ribbed in bud and smoother or with the ribs more rounded in fruit, rather than with a densely tuberculate or irregularly bumpy surface (see Rye 2014: Figure 1 for both kinds of patterning). It tends to have a shorter style than *T. conica* and more numerous stamens than *T. caduca*.

Thryptomene caduca Rye & Trudgen in B.L. Rye, *Nuytsia* 24: 277–279 (2014). *Type*: Useless Loop Rd, Western Australia [precise locality withheld for conservation reasons], 1 August 1996, G.J. Keighery & N. Gibson 1992 (*holo*: PERTH 05045878; *iso*: CANB 826813, K, MEL 2389014).

Shrubs 0.7–1.5 m high, one record of 1.5 m wide. *Leaves* crowded and antrorse on branchlets, sometimes almost appressed when less densely arranged on older stems. *Petioles* almost absent to 0.3 mm long. *Leaf blades* obovate to broadly ovate or ± circular, 1.5–2.5 mm long, 1–1.5 mm wide, entire or sometimes minutely denticulate; abaxial surface convex and acutely keeled, with the keel distally incurved, with 1 or 2 main rows of oil glands on each side of the midvein and 3–7 glands per row; adaxial surface concave; apical point ± absent. *Peduncles* solitary in each axil, borne at 2–9 consecutive nodes, compressed or very compressed, 1–3 mm long, 1-flowered. *Bracteoles* ovate or broadly ovate, 1–1.3 mm long, caducous. *Pedicels* ± absent or rarely to 0.2 mm long. *Flowers* 5-merous, with a deeply to shallowly convex (or flat with curved margin) apex in bud, 3.5–6 mm diam. when fully open. *Hypanthium* very broadly obconic or expanded distally, 0.6–1.3 mm long, 1.2–1.8 mm diam., with a blistered surface at first; free part c. 0.3 mm long. *Sepals* very broadly or depressed ovate, 0.4–0.8 mm long, 0.7–1.3 mm wide, ± entire, ± erect to strongly incurved in bud; auricles (when present) less than 0.2 mm long. *Petals* 1.3–2.3 mm long, pink, ± entire, loosely closed inwards in fruit. *Stamens* 7–9, with 1 or 2 opposite each sepal, occasionally with the filaments of one pair connate. *Filaments* 0.35–0.6 mm long. *Anthers* c. 0.25 mm long, 0.3–0.4 mm wide, dehiscent by pores; connective gland broad-truncate. *Ovary* summit pink at first; ovules 2. *Style* 0.5–0.7 mm long; stigma to 0.1 mm diam. *Fruits* very broadly or depressed obovoid, 1.2–1.4 mm long, 1.4–1.7 mm diam., 1-seeded; hypanthium cup-shaped, with numerous low, rounded, irregular ridges and bumps. *Seeds* transversely reniform, c. 1.1 mm high, c. 1.5 mm across. (Figures 1A, B; 2A)

Diagnostic characters. Distinguished by the following combination of characters: bracteoles caducous; flowers with a deeply convex or more flattened apex in late bud; hypanthium with a blistered surface at first, becoming irregularly rugose-tuberculate in fruit (with numerous low, rounded, irregular ridges and bumps); sepals very broadly or depressed ovate, 0.4–0.8 mm long; petals 1.3–2.3 mm long; stamens 7–9; style 0.5–0.7 mm long; ovules 2.

Distribution and habitat. Occurs in the Yalgoo and Geraldton Sandplain bioregions, extending from Tamala Station east to near the Coburn Station area, and from near Hamelin Pool south to Murchison House Station, Western Australia (Figure 3). Recorded in sandy habitats, the sand of varied colours including yellow to red, with vegetation usually dominated by *Banksia* or *Eucalyptus* species.

Phenology. Flowers mainly in July and August, also recorded in April. Mature fruits recorded in August and September.

Etymology. From the Latin *caducus* (caducous, shed early), referring to the bracteoles.

Affinities. This species is closest to *T. conica* (see notes under that species). It is also closely related to *T. strongylophylla* (see comments provided above under the species complex).

Notes. Two geographically separated subspecies are recognised that differ in sepal length, flower size and bud shape.

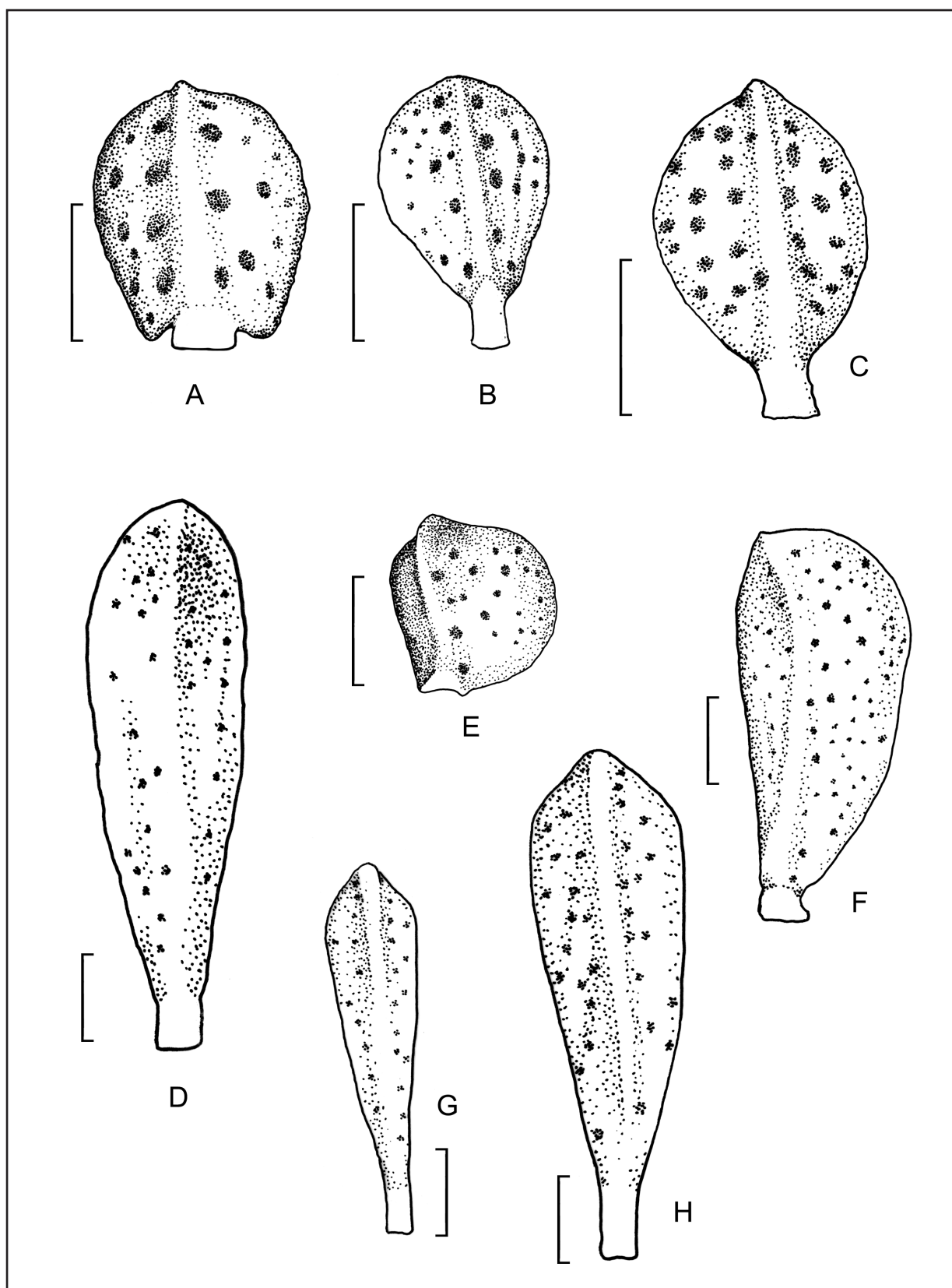


Figure 2. Leaf abaxial surface in the *Thryptomene caduca* (A, B) and *T. dampieri* (C–H) complexes. A – *T. caduca* subsp. *caduca*; B – *T. conica*; C – *T. butleri*; D – *T. dampieri* subsp. *capensis*; E, F – *T. dampieri* subsp. *dampieri*; G – *T. maritima* subsp. *freycinetensis*, showing the distal ridge by a line of dots; H – *T. maritima* subsp. *maritima*, showing a ridge extending along full length of blade. Drawn by Skye Coffey from L.S.J. Sweedman 9549 (A), B. Dell s.n., PERTH 04499131 (B), M.E. Trudgen, B. Moyle & C. Wilkins MET 21853 (C), Y. Chadwick 2296 (D), M.E. Trudgen MET 21927 (E, F), J.J. Alford 1350 (G), and A.G. Gunness 2358 (H). Scale bars = 1 mm.

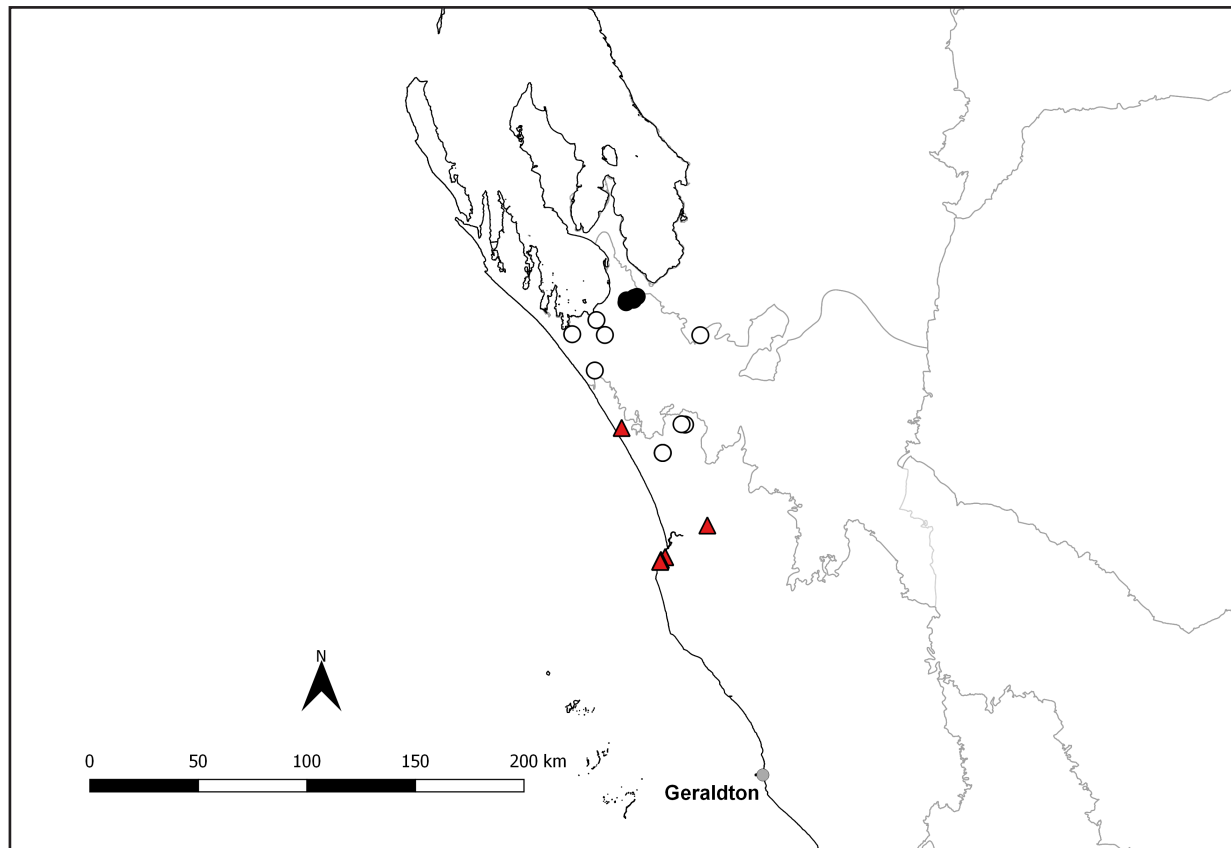


Figure 3. Distribution of the *Thryptomene caduca* complex: *T. caduca* subsp. *caduca* (●), *T. caduca* subsp. *incurva* (○) and *T. conica* (▲).

Thryptomene caduca* Rye & Trudgen subsp. *caduca

Flowers with a convex apex in bud, 5–6 mm diam. when fully open. *Hypanthium* 1–1.3 mm long. *Sepals* (0.5–)0.6–0.8 mm long, erect or loosely closed inwards in fruit. *Petals* 1.5–2.3 mm long. (Figures 1A, 2A)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 6 Aug. 1986, *S.D. Hopper* 5114 (PERTH); 19 Aug. 1995, *G.J. Keighery & N. Gibson* 937 (PERTH); 3 Aug. 1994, *M. Lewis* 26/94 (PERTH); 28 Aug. 2020, *L.S.J. Sweedman* 9549 (PERTH).

Distribution. Occurs in the Yalgoo bioregion where it is restricted to a small area not far south of Hamelin Pool, Western Australia (Figure 3).

Conservation status. To be listed as Priority One under Conservation Codes for Western Australian Flora (T. Llorens pers. comm.).

Notes. Distinguished from subsp. *incurva* by its longer, more erect sepals and larger flowers, which are more convex at the summit in bud.

Mature fruits and seeds have not been collected for this subspecies.

Thryptomene caduca* subsp. *incurva* Rye, *subsp. nov.

Type: State Barrier Fence track, west from North West Coastal Highway, Western Australia [precise locality withheld for conservation reasons], 30 July 1996, *G.J. Keighery & N. Gibson* 2054 (*holo:* PERTH 05278686; *iso:* CANB 826809).

Thryptomene stronglylophylla subsp. Tamala (M.E. Trudgen 7384), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Thryptomene sp. Tamala (M.E. Trudgen 7384) in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 404 (2000); Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Illustrations. B.L. Rye, *Nuytsia* 24: 278, Figure 1A (2014), as *T. caduca*.

Flowers with a shallowly convex (or flat with curved margin) apex in late bud, 3.5–4 mm diam. when fully open. *Hypanthium* 0.8–1.1 mm long. *Sepals* 0.4–0.6 mm long, strongly incurved. *Petals* 1.3–1.6 mm long. (Figure 1B)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 8 Apr. 1975, *J.S. Beard* 7392 (CANB, NSW, PERTH); 28 Aug. 1991, *A.H. Burbidge* 4370 (PERTH); 27 Aug. 1969, *A.S. George* 9590 (PERTH); 3 Aug. 1996, *G.J. Keighery & N. Gibson* 1984 (NSW *n.v.*, PERTH).

Distribution. Occurs in the Yalgoo and Geraldton Sandplain bioregions, extending from Tamala Station east to the Coburn Station area and south to Murchison House Station, Western Australia (Figure 3).

Etymology. From the Latin *incurvus* (bowed, curved inwards), referring to the sepals being strongly curved inwards in bud and in early fruit.

Conservation status. To be listed as Priority Three under Conservation Codes for Western Australian Flora (T. Llorens pers. comm.). This subspecies has a range *c.* 80 km long and is known from at least one conservation reserve.

Notes. Distinguished from subsp. *caduca* by its shorter, more strongly incurved sepals and smaller flowers, which are shallowly convex to almost flat at the summit in bud. While the sepals are strongly incurved in bud and young fruit, they become more erect when the fruit swells to its full size.

Southern specimens tend to have more elongate leaves than northern specimens.

Thryptomene conica* Rye, *sp. nov.

Type: near Red Bluff, Kalbarri, Western Australia [precise locality withheld for conservation reasons], 18 August 1977, *R.J. Chinnock* 3736 (*holo:* PERTH 02188953; *iso:* AD 97744132 *n.v.*, PERTH 02188872).

Thryptomene sp. Eagle Gorge (A.G. Gunness 2360) in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 404 (2000); Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs 0.3–1(–1.5) m high, commonly *c.* 1 m wide, spreading or rounded, often broader than high. *Leaves* antrorse or almost appressed, overlapping except on very fast-growing shoots. *Petioles* 0.2–0.4 mm long. *Leaf blades* mostly broadly obovate, 1.2–2.5 mm long, 1.3–1.7 mm wide, broadly obtuse at apex, entire; abaxial surface convex and prominently keeled, with the keel distally incurved, with usually 2 or 3 main rows of oil glands on each side of midvein, the central rows with 3–6 prominent glands; adaxial surface concave, less prominently gland-dotted; apical point absent. *Peduncles* solitary in each axil, borne at 1–6(–12) consecutive nodes, compressed, 1–2 mm long, 1-flowered. *Bracteoles* ± oblong-ovate, 1.3–1.5 mm long, caducous. *Flowers* 5-merous, with a conic apex in bud, 5–6.5 mm diam. when fully open. *Hypanthium* very broadly obconic at first, 1.1–1.6 mm long, 1.6–2 mm diam., densely blistered; free part 0.3–0.4 mm long. *Sepals* spreading in flower, closed inwards in fruit and with the distal half having the

sides closed together, triangular to broadly ovate, 1–1.5 mm long, 0.5–1.1 mm wide, purple, ± entire; auricles (when present) less than 0.2 mm long. *Petals* 2–2.5 mm long, mauve-pink, broadly obtuse, entire, loosely closed inwards in fruit. *Stamens* 9 or usually 10, mostly in widely separated pairs opposite the sepals. *Filaments* 0.6–0.8 mm long, deep pink. *Anthers* 0.25–0.3 mm long, c. 0.4 mm wide, dehiscent by pores; connective gland broad-truncate. *Ovules* 2. *Style* 0.6–0.8 mm long; stigma <0.1 mm diam. *Fruits* very broadly obovoid, 1.6–2.3 mm long, 1.8–2.3 mm diam., 1-seeded; hypanthium broadly cup-shaped, densely tuberculate. *Seeds* not seen at maturity. (Figures 1C, D; 2B)

Diagnostic characters. Distinguished primarily by the conic apex of the flower buds. Other important characters: bracteoles caducous; hypanthium with a blistered surface at first, becoming irregularly rugose-tuberculate in fruit; sepals 1–1.5 mm long; stamens usually 10; ovules 2.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 22 June 1982, D. & B. Bellairs 1650A (PERTH); 16 May 1971, B. Dell s.n. (PERTH); 19 Sep. 1994, A.G. Gunness 2359 (CANB, MEL, PERTH); 19 Sep. 1994, A.G. Gunness 2360 (AD, NSW, PERTH); 18 Aug. 1995, G.J. Keighery & N. Gibson 971 (BRI, NSW, PERTH); 22 Sep. 2002, M.E. Trudgen 21655 (PERTH).

Distribution and habitat. Occurs in the Yalgoo and Geraldton Sandplain bioregions, extending along the west coast from near the mid-point of the Zuytdorp Cliffs south to near Eagle Gorge in Kalbarri National Park, Western Australia (Figure 3). Recorded in gullies on sandstone or coastal limestone cliffs, in shallow sandy soil over rock, usually in low shrubland.

Phenology. Flowers from May to August. Fruits have been recorded in August and September.

Etymology. From the Latin *conicus* (cone-shaped), referring to the conic shape of the upper part of the flower buds, formed by the arrangement of the almost erect sepals.

Conservation status. Listed as Priority Two under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *T. sp.* Eagle Gorge. All of the specimens come from Kalbarri National Park except for an isolated collection made c. 80 km further north. Within the park, almost all of the collections are from a coastal belt less than 10 km long.

Affinities and co-occurrence. *Thryptomene caduca* is closely related to *T. conica*, the two species being very similar in their hypanthium patterning, which changes from blistered in bud and young flower (Figure 1A–C) to irregularly rugose-tuberculate in fruit (Figure 1D); however, *T. caduca* has a less pronounced bud apex resulting from its discretely shorter sepals (0.4–0.8 mm vs 1–1.5 mm) and tends to have fewer stamens (6–9 vs 9 or usually 10) and smaller flowers (3.5–6 mm vs 5–6.5 mm diam.). *Thryptomene conica* has a more obvious petiole that extends 0.2–0.4 mm below the base of the blade of its larger leaves (Figure 2B). The petiole is usually difficult to measure in *T. caduca* because it overlaps the base of the blade, with the margins of the blade reaching almost to the stem on each side; its maximum extension below the base of the blade is 0.2 mm (Figure 2A).

Thryptomene conica and *T. strongylophylla* both occur close to Kalbarri and an atypical specimen (*P. Armstrong s.n.*: PERTH 06364845), which looks somewhat intermediate in its hypanthium patterning although it clearly does not match *T. conica*, might be a hybrid between the two.

Notes. The rather long, erect sepals of *T. conica* are distinctive in having the sides closed together distally (Figure 1D) and in forming a high, conic summit to the flower bud (Figure 1C), but with the tips of the sepals often somewhat separated in late bud. *Thryptomene* has no other species with such a tall conic apex to the buds.

B. The *Thryptomene dampieri* Rye complex

The taxonomically difficult *T. dampieri* complex extends along the west coast for more than 1,000 km, from Cape Range south to Lancelin, and has five main variants. De Candolle (1828) gave one of the variants the name *Baeckea micrantha* DC. but by the time Gardner (1931) transferred that species to *Thryptomene* as *T. micrantha* (DC.) C.A.Gardner, the epithet had already been used for an eastern Australian species, *T. micrantha* J.D.Hook., so the new combination was illegitimate. The species was renamed as *T. dampieri* (Rye 2014), with three other members of the complex listed under phrase names (Western Australian Herbarium 1998–); the fourth unnamed taxon was not recognised as distinct at this time, with associated specimens housed at PERTH under *Thryptomene* sp.

The five variants cannot be accounted for by simple clinal variation in the complex from its northern extreme to its southernmost location. For example, the two taxa with the longest leaves and largest flowers are widely separated geographically from one another. All five variants are recognised here, either as species or subspecies, but there is no easy taxonomic solution for such a complex based just on morphology; molecular data may be needed to test the validity of the four new entities.

The *T. dampieri* complex belongs to the *T. baeckeacea* species group, which is characterised by prominently keeled, persistent bracteoles, flower buds that are concave at the top (Figure 1E), and sepals that are incurved in bud and fruit. Leaf morphology is important in distinguishing members of the complex (see Figure 2 and the key) but variation within each taxon, including on individual specimens, may partially obscure these differences. Different leaf types on a single branchlet include a tendency for the smaller leaves to have an incurved apex (Figure 2E) and larger ones to have a recurved apex (Figure 2F). Inflorescence length varies considerably; in some taxa the flowers are mostly borne at few consecutive nodes and therefore appear densely clustered on each branchlet, whereas in taxa with numerous fertile nodes the inflorescence is elongate.

Thryptomene butleri Rye, *sp. nov.*

Type: south-east of Lancelin, Western Australia [precise locality withheld for conservation reasons], 2 July 2013, N. Cadd & L. Vaughan NC 03 (*holo:* PERTH 08699186; *iso:* K, MEL).

Thryptomene sp. Lancelin (M.E. Trudgen 14000), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs low and spreading in exposed sites, more erect in sheltered sites, 0.15–1.1(–1.6) m high, 0.7–1.5 m wide, when prostrate then sometimes with adventitious roots. *Leaves* mostly crowded and widely antrorse. *Petioles* 0.3–0.7 mm long. *Leaf blades* often somewhat recurved towards apex (but with keel apex incurved), obovate to very broadly obovate, 1.5–2.5(–3.5) mm long, 1.2–2.2 mm wide, usually entire; abaxial surface convex, keeled for all or most of its length, mostly with 3 or 4 main rows of oil glands on each side of the midvein and 4–6 glands in the central rows; adaxial surface concave; apical point absent. *Peduncles* solitary in each axil, borne at 7–17 consecutive nodes, compressed, 0.3–0.65 mm long, 1-flowered. *Bracteoles* ovate or broadly ovate, 0.9–1.3 mm long, largely herbaceous and green but with petaloid denticulate margins, persistent. *Pedicels* ± absent. *Flowers* 5-merous, with a concave to almost flat apex in late bud, 3–4 mm diam. when fully open. *Hypanthium* broadly obconic, 1–1.1 mm long, 1.5–2 mm wide, with many fine irregular longitudinal wrinkles or similar irregular patterning; free part *c.* 0.3 mm long. *Sepals* strongly incurved, depressed ovate, the outermost ones auriculate, 0.5–0.7 mm long, 1.1–1.3 mm wide, minutely denticulate, tightly closed inwards in fruit. *Petals* 1.3–1.7 mm long, pale to fairly deep pink or pink-purple, ± entire, loosely closed inwards in fruit. *Stamens* usually 10, occurring close to the junctions of the sepals and petals and tending to occur in pairs opposite the sepals but still widely spaced. *Filaments* 0.45–0.5 mm long, pink. *Anthers* 0.25–0.35 mm long, 0.35–0.45 mm wide, dehiscent by pores; connective gland broad-truncate. *Ovules* 2. *Style* usually 0.6–0.7 mm long; stigma *c.* 0.15 mm diam. *Fruits* very broadly or depressed obovoid, 1.2–1.5 mm long, 1.6–2 mm diam.,

1-seeded; hypanthium with irregular longitudinal furrows. *Seeds* ± transversely reniform, 0.8–1 mm high, 1.3–1.4 mm across. (Figures 1E; 2C)

Diagnostic features. Distinguished by the following combination of characters: petioles 0.3–0.7 mm long; leaf blades 1.5–2.5(–3.5) mm long, keeled for all or most of their length, usually with 4–6 oil glands in the two central rows on the abaxial surface; flower buds with a concave to almost flat apex; peduncles borne at 7–17 consecutive nodes; hypanthium rugose with many fine irregular longitudinal wrinkles or similar irregular patterning; sepals 0.5–0.7 mm long; petals 1.3–1.7 mm long; stamens usually 10; ovules 2.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] July 1963, *W.H. Butler* 17 (PERTH); 4 Aug. 2004, *F. Obbens & C. Godden* 64.1 (CANB, PERTH); 9 Sep. 2016, *B.L. Rye* 290167 (PERTH); 20 Sep. 1996, *M.E. Trudgen* 14000 (AD, BRI, CANB, HO, MEL, NSW, PERTH).

Distribution and habitat. Occurs in the Geraldton Sandplains and Swan Coastal Plain bioregions from near Leeman south to Lancelin, Western Australia (Figure 4). Grows on sand dunes and limestone in low, exposed coastal heath, and with taller shrubs in more sheltered sites.

Phenology. Flowers recorded over most of the year, especially from June to September, with mature fruits mostly recorded in September and October.

Conservation status. Listed as Priority Three under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *T. sp.* Lancelin.

Etymology. The epithet honours William Henry (Harry) Butler (1930–2015), who made the first known collection of this taxon in 1963. Harry promoted membership of the Gould League and popularised natural history through his television series and book. He was most interested in reptiles but also collected close to 1,000 plant specimens throughout Western Australia and in the far south-west of the Northern Territory.

Co-occurring species. Not known to co-occur with any other species of *Thryptomene*.

Affinities. This species is the southernmost member of the *T. dampieri* complex. It is geographically widely separated from other members of this complex except for some overlap with *T. maritima*, which is distinguished by having larger flowers (4.5–8 mm diam. vs 3–4 mm in *T. butleri*) and leaves (2.5–6.5 mm long vs 1.5–2.5(–3.5) mm), and usually fewer consecutive flowering nodes (1–8(–12) vs 7–17). *Thryptomene butleri* has the smallest flowers in the complex and the highest maximum number of consecutive flowering nodes, with flowers borne at close or widely spaced nodes in a spike-like arrangement.

Notes. The sepals of *T. butleri* are strongly incurved onto the concave summit of the flower bud (see Figure 1E) and tend to remain so throughout the flowering and fruiting stages, making it difficult to measure their length.

Thryptomene dampieri Rye, *Nuytsia* 24: 281–284 (2014). *Type*: 2 miles [3 km] S of Denham, Western Australia, 21 July 1957, *J.W. Green* 1422 (*holo*: PERTH 02188368; *iso*: CANB 826767, K, MEL 2389007, NSW 937814, PERTH 02188600).

Shrub usually low and spreading, often described as prostrate or sprawling, 0.2–1.2 m high, commonly 0.5–2 m wide. *Leaves* mostly antrorse or crowded and widely antrorse. *Petioles* 0.2–1.5 mm long. *Leaf blades* often incurved or recurved towards apex, mostly narrowly to very broadly obovate, 1.3–5(–7) mm long, 1.5–2.2(–2.5) mm wide, usually entire; abaxial surface convex and keeled for its full length, with the keel often broad and flattened in the basal half, dotted with oil glands or with 2–5 main rows of oil glands

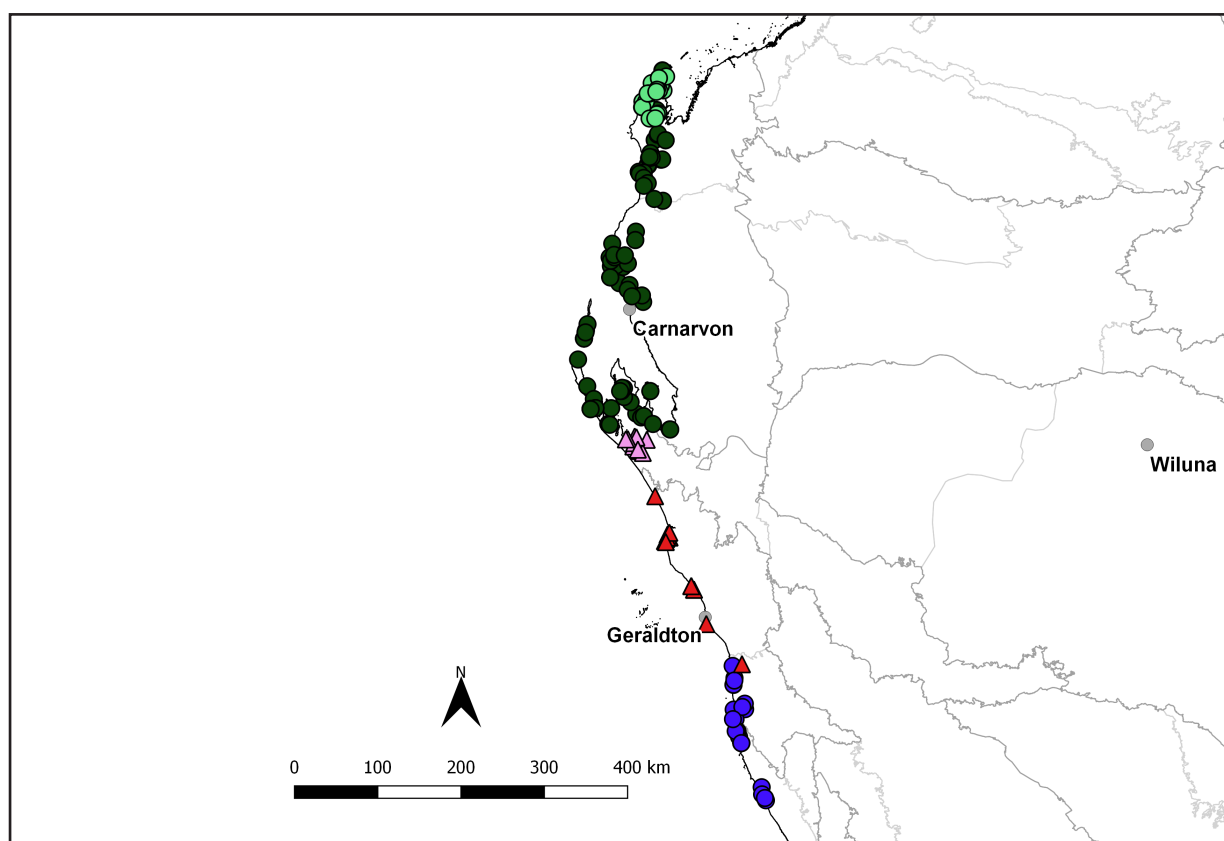


Figure 4. Distribution of the *Thryptomene dampieri* complex: *T. butleri* (●), *T. dampieri* subsp. *dampieri* (●) and subsp. *capensis* (●), *T. maritima* subsp. *maritima* (▲) and subsp. *freycinetensis* (▲).

on each side of the midvein and 3–10 glands in the central rows; adaxial surface concave; apical point absent. *Peduncles* solitary in each axil, borne at 2–14 consecutive nodes, compressed, 0.1–0.8(–1) mm long, 1-flowered. *Bracteoles* 0.6–2 mm long, denticulate or entire, persistent. *Pedicels* ± absent. *Flowers* 5-merous, with a concave to almost flat apex in late bud, 4–7 mm diam. when fully open. *Hypanthium* very broadly or depressed obconic, 1–1.6 mm long, 2–2.5 mm diam., with many fine irregular longitudinal wrinkles or similar irregular patterning; free part 0.3–0.5 mm long. *Sepals* broadly to depressed ovate, the outermost ones sometimes with obvious auricles, 0.5–1.3 mm long, 0.9–1.8 mm wide, denticulate or entire, tightly closed inwards in fruit. *Petals* 1.5–2.3(–2.5) mm long, pink or pink-purple, ± entire, loosely closed inwards in fruit. *Stamens* usually 10, in pairs opposite the sepals or ± equidistant and alternating with the sepals and petals. *Filaments* 0.4–0.8 mm long. *Anthers* 0.3–0.35 mm long, 0.35–0.5 mm wide, dehiscent by pores; connective gland broad-truncate. *Ovules* 2. *Style* 0.5–0.8 mm long; stigma 0.15–0.2 mm diam. *Fruits* very broadly or depressed obovoid, *c.* 1.4 mm long, *c.* 1.8 mm diam., 1-seeded; hypanthium with irregular longitudinal furrows. *Seeds* transversely reniform, 1.1–1.2 mm high, 1.4–1.5 mm across. *Sterile fruits* common.

Diagnostic features. Distinguished by the following combination of characters: leaf blades less than 3 times longer than wide, keeled for full length, the keel often broad and flattened in the basal half; flower buds with a concave to almost flat apex; hypanthium rugose with many fine irregular longitudinal wrinkles or similar irregular patterning; sepals 0.5–1.3 mm long; petals 1.5–2.3(–2.5) mm long; stamens usually 10; ovules 2.

Distribution. Occurs in the Carnarvon and Yalgoo bioregions, extending from near Exmouth south to the Hamelin Bay area including Dirk Hartog Island, Western Australia (Figure 4).

Phenology. Flowers from April to September. Fruits recorded from June to October.

Etymology. Named after William Dampier (1651–1715), an English privateer, navigator and naturalist, who was the first European to bring back a collection of Australian plant specimens; this species collected in the Shark Bay area in 1699 was part of this first Australian collection.

Co-occurrence. Although this species is the most widespread member of the *T. dampieri* complex, it is not known to co-occur with any other species of *Thryptomene*.

Notes. *Thryptomene dampieri* shows some regional variation in leaf morphology. For example, specimens from Steep Point and Dirk Hartog Island have leaves with fewer rows of oil glands on average than most other specimens. Two subspecies are recognised based primarily on habitat differences and leaf measurements.

Thryptomene dampieri* subsp. *capensis* Rye, *subsp. nov.

Type: Cape Range National Park, Western Australia [precise locality withheld for conservation reasons], August 1978, G. Perry 846 (*holo:* PERTH 07789831; *iso:* MEL).

Shrub 0.5–1.2 m high, 1.1–2 m wide. *Petioles* 0.5–1.2 mm long. *Leaf blades* narrowly obovate, 3.5–6(–7) mm long, 1.5–2.1(–2.5) mm wide; abaxial surface dotted with oil glands or with at least 2 main rows of them on each side of the midvein and 6–10 glands in the central rows. *Peduncles* borne at 5–14 consecutive nodes, 0.1–0.7(–1) mm long. *Bracteoles* ovate, 1.3–2 mm long. *Pedicels* ± absent. *Flowers* 5–7 mm diam. *Sepals* 0.6–1.2 mm long, 0.9–1.8 mm wide. *Petals* 2–2.3(–2.5) mm long, the outermost ones with auricles. (Figure 2D)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 6 Sep. 1970, K.M. Allan 464 (AD, BRI, PERTH); 21 July 2006, J. English JE 0093 (CANB, NSW, PERTH); 30 Aug. 1960, A.S. George 1309 (PERTH); 7 Aug. 1992, E. Leyland EL 11 A (PERTH); 27 July 2003, M.E. Trudgen 21934 (HO, PERTH).

Distribution and habitat. Occurs in the Carnarvon bioregion on the large peninsula on the west side of Exmouth Gulf, extending from the Milyering area south to Yardie Creek in Cape Range National Park, Western Australia (Figure 4). Recorded on sand dunes and in limestone areas, in gullies or gorges or other less exposed locations, commonly with *Acacia* and spinifex.

Etymology. From the English ‘cape’ and the Latin *-ensis* (native of), as this taxon is known only from the Cape Range National Park area.

Conservation status. To be listed as Priority Three under Conservation Codes for Western Australian Flora (Tanya Llorens pers. comm.). All or most of the distribution of this taxon is protected within a large national park.

Affinities and co-occurrence. This subspecies occurs within the northernmost part of the range of subsp. *dampieri* in the far north of the range of the whole complex. Specimens of subsp. *dampieri* occur in more exposed sites along the coast of the peninsula and usually have shorter petioles (0.2–0.5 mm long vs 0.5–1.2 mm in subsp. *capensis*), leaf blades that are shorter (1.3–3(–5) mm long vs 3.5–6(–7) mm) and have 3–5 (vs 6–10) oil glands in the central rows of the abaxial surface, and flowers that tend to be smaller (4–6 mm diam. vs 5–7 mm) and borne at fewer consecutive nodes (2–8 vs 5–14). Subsp. *dampieri* is very widespread and variable and may sometimes have leaves up to about 5 mm long, but these longer leaves still have a short petiole up to 0.5 mm long whereas subsp. *capensis* normally has a longer petiole on leaves of that length. Whether or not the two subspecies ever co-occur in mixed stands needs to be investigated but some cross-pollination seems likely. These two taxa might intergrade in intermediate habitats.

Notes. Floral characters have been based on relatively few specimens as most specimens lack mature flowers. No mature fertile fruits were found although there were plenty of very hard, infertile ones.

Thryptomene dampieri* Rye subsp. *dampieri

Baeckea micrantha DC., *Prodr.* 3: 230 (1828); *Thryptomene micrantha* (DC.) C.A.Gardner, *Enum. Pl. Austral. Occ.* 97 (1931), *nom. illeg. non* J.D.Hook. (1853). *Type:* ‘Nouvelle Hollande, côte orient’ [from Western Australia not the east coast], collector unknown (*holo:* G 00486600 ex P; possible *iso:* P 0029032, P 0029033).

Illustrations. A.P. de Candolle, *Mém. Soc. Phys. Genève* Pl. 14 (1841–1842), as *Baeckea micrantha*; W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 48 (1980), as *T. baeckeacea*.

Shrub 0.2–0.7(–1) m high, usually 0.5–1 m wide. *Petioles* 0.2–0.5 mm long. *Leaf blades* mostly broadly or very broadly obovate and 1.3–3(–5) mm long, 1.5–2.2 mm wide; abaxial surface with 2–5, usually 3 or 4 main rows of oil glands on each side of the midvein and 3–5 glands in the central rows. *Peduncles* borne at 2–8 consecutive nodes, 0.2–0.8 mm long. *Bracteoles* ovate or broadly ovate, 0.6–1.6 mm long. *Flowers* 4–6 mm diam. *Sepals* 0.5–1.3 mm long, 1.2–1.8 mm wide. *Petals* 1.5–2(–2.3) mm long. (Figure 2E, F)

Other specimens examined. WESTERN AUSTRALIA: inland of Herald Bay, Dirk Hartog Island, 18 Oct. 1974, *J.S. Beard* 7089 (PERTH); Shark Bay, 1699, *W. Dampier s.n.* (OXF image!); Edel Land National Park, 45 km SW of Denham, 28 July 2019, *E. Leitch & M. Starkey* WAA019156 (PERTH); Red Bluff, N of Cape Cuvier, 20 June 1976, *M.E. Murray* 21 (CANB *n.v.*, K *n.v.*, PERTH); Quoin Bluff area, Dorre Island, 21 Aug. 1977, *A.S. Weston* 10588 (CANB *n.v.*, PERTH); Point Quobba, 28 July 1969, *Paul G. Wilson* 8372 (PERTH).

Distribution and habitat. Occurs in the Carnarvon and Yalgoo bioregions, extending from near Exmouth south to the Hamelin Bay area including Dirk Hartog Island, Western Australia (Figure 4). Occurs in crevices in limestone and on white or coloured sand dunes, including red sand overlying limestone, or otherwise in salty brownish sand. Often in low heath including spinifex or in taller *Acacia* shrubland.

Conservation status. A widespread subspecies.

Co-occurrence. In the far north of its range, this subspecies may co-occur with subsp. *capensis* (see notes under that taxon).

Notes. See notes under subsp. *capensis* for differences between the two subspecies of *T. dampieri*.

Thryptomene maritima* Rye, *sp. nov.

Type: Kalbarri National Park, Western Australia [precise locality withheld for conservation reasons], 6 September 2016, *B.L. Rye* 290157 (*holo:* PERTH 08837295; *iso:* CANB).

Shrubs erect or low and spreading, 0.3–1.8 m high, 0.6–3 m wide. *Leaves* crowded and widely antrorse to not very crowded and antrorse or appressed. *Petioles* 0.4–0.7 mm long. *Leaf blades* often somewhat recurved towards apex (but with keel apex incurved), narrowly keeled for full length or keeled distally, mostly narrowly obovate or obovate, 2.5–6.5 mm long, 1–2 mm wide, usually entire; abaxial surface keeled throughout or distally keeled and somewhat flattened below, with 2–4 (rarely 1 in subsp. *freycinetensis*) main rows of oil glands on each side of the midvein and 6–12 glands in the central rows; adaxial surface concave; apical point absent. *Peduncles* solitary in each axil, borne at 1–8(–12) consecutive nodes, compressed, 0.5–2 mm long, 1-flowered. *Bracteoles* ± ovate, 1.5–2.5 mm long, entire or denticulate, persistent. *Pedicels* ± absent. *Flowers* 5-merous, with a concave to almost flat apex in late bud, 4.5–8 mm diam. when fully open. *Hypanthium* very broadly or depressed obconic, 1.2–1.5 mm long, 2–2.5 mm

diam., with many fine irregular longitudinal wrinkles or similar irregular patterning; free part *c.* 0.6 mm long. *Sepals* very broadly or depressed ovate, the outermost ones not or only shortly auriculate, 0.8–1.3 mm long, 0.9–2.1 mm wide, pink, minutely denticulate or entire, tightly closed inwards in bud and fruit, somewhat looser but still incurved between the petals or more erect in flower. *Petals* (1.8–)2–3 mm long, pink or pink-purple, ± entire, loosely closed inwards in fruit. *Stamens* usually 10, alternating with the sepals and petals, ± equidistant. *Filaments* 0.7–0.9 mm long. *Anthers* 0.3–0.35 mm long, 0.35–0.5 mm wide, dehiscent by pores; connective gland broad-truncate. *Ovules* 2. *Style* 0.8–0.9 mm long; stigma *c.* 0.15 mm diam. *Fertile fruits* depressed obovoid, 1.35–1.5 mm long, 1.8–2.2 mm diam., 1-seeded; hypanthium with irregular longitudinal furrows. *Seeds* ± transversely reniform, 1.1–1.2 mm high, 1.6–1.65 mm across. *Sterile fruits* common.

Diagnostic features. Distinguished by the following combination of characters: leaves less than 4 times as long as wide; peduncles 0.5–2 mm long, borne at 1–8(–12) consecutive nodes; bracteoles persistent; flower buds with a concave to almost flat apex; hypanthium rugose with many fine irregular longitudinal wrinkles or similar irregular patterning; sepals tightly closed inwards in fruit; petals 1.8–3 mm long; stamens usually 10; ovules 2.

Distribution. Occurs in the Yalgoo and Geraldton Sandplains bioregions, extending from Freycinet Estuary south to Yandanogo Nature Reserve, Western Australia, with the southernmost specimen separated from the remaining specimens by *c.* 70 km (Figure 4).

Phenology. Flowers recorded from May to September, with mature fruits recorded from September to November.

Etymology. From the Latin *maritimus* (growing by the sea) as this species, like other members of the *T. dampieri* complex, is restricted to habitats close to, and often overlooking, the sea.

Affinities and co-occurrence. Full separation of this species from other members of the complex requires a combination of characters, as indicated under the subspecies below and in the key above. Although there are many other *Thryptomene* species known from the region where *T. maritima* occurs, there are no records of co-occurrence with those species.

***Thryptomene maritima* subsp. *freycinetensis* Rye, subsp. nov.**

Type: Shark Bay area, Useless Loop Rd, Western Australia [precise locality withheld for conservation reasons], 29 July 2003, *M. Trudgen, B. Moyle & C. Wilkins* MET 21965 (*holo:* PERTH 08212759; *iso:* AD, CANB, K, MEL, NSW).

Thryptomene sp. Carrarang (M.E. Trudgen 7420), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs usually low and spreading, 0.3–1(–1.4) m high, 0.9–3 m wide. *Petioles* 0.4–0.65 mm long. *Leaf blades* often somewhat recurved towards apex (but with keel apex incurved), narrowly obovate or obovate, 2.5–4 mm long, 1–1.3 mm wide, usually entire; abaxial surface convex, with a keel evident only near the apex, the surface below smoothly convex, with 1–3 main rows of oil glands on each side of the midvein and 6–9 glands in the central rows; adaxial surface concave; apical point absent. *Peduncles* borne at 1–12 consecutive nodes. *Flowers* 4.5–5.5 mm diam. *Sepals* broadly or very broadly ovate, not auriculate, 0.8–0.9 mm long, 0.9–1.3 mm wide. *Petals* 1.8–2.2 mm long, pink or pink-purple, ± entire. (Figure 2G)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 12 Sep. 1989, *J.J. Alford s.n.* (PERTH); 29 July 2003, *M. Trudgen, B. Moyle & C. Wilkins* MET 21966 (AD, BRI, PERTH).

Distribution and habitat. Occurs in the Yalgoo bioregion in the vicinity of Freycinet Estuary, extending from Baudin Island south to Tamala Station (Figure 4). The habitat is recorded as white or brown sand, on dunes or in crevices in limestone, in a low coastal heath. The new subspecies is often one of the main taxa present, others often including *Melaleuca cardiophylla* or *Acacia rostellifera*.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *T. sp.* Carrarang.

Etymology. Named for its distribution, which is on islands in the Freycinet Estuary and on the mainland close to the western and southern margins of the estuary.

Affinities and co-occurrence. Distinguished from *T. maritima* subsp. *maritima* and other members of the *T. dampieri* complex by its mature leaves, which have a more consistently curved abaxial surface below the distal keel; it also usually has smaller flowers than subsp. *maritima*. It occurs south of the distribution of *T. dampieri* and north of that of *T. maritima* subsp. *maritima*. It is usually found closer to the coast than other *Thryptomene* species from the general area and is not known to co-occur with any of them.

Notes. This taxon has the smallest distribution of all the members of the *T. dampieri* complex and is probably the least variable.

Thryptomene maritima* Rye subsp. *maritima

Thryptomene sp. Red Bluff (A.G. Gunness 2358), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs low to moderately erect, 0.5–1.8 m high, 0.6–2 m wide. *Petioles* 0.5–0.7 mm long. *Leaf blades* often somewhat recurved towards apex (but with keel apex incurved), mostly narrowly obovate or obovate, 3–6.5 mm long, 1.2–2 mm wide, usually entire; abaxial surface keeled throughout or distally keeled for at least 1/4 the length of the blade and somewhat flattened below, commonly with 3 or 4 main rows of oil glands on each side of the midvein and 7–12 glands in the central rows. *Peduncles* borne at 1–8 consecutive nodes. *Flowers* 5.5–8 mm diam. *Sepals* very broadly or depressed ovate, 0.8–1.3 mm long, 1.4–2.1 mm wide. *Petals* 2–3 mm long. (Figure 2H)

Selected specimens examined. WESTERN AUSTRALIA: Goats Gulch, Kalbarri National Park, 8 July 2004, *D. & B. Bellairs* 6383 (PERTH); Yardanogo Nature Reserve, 6 Sep. 2004, *C. Godden* Opp 100 (PERTH); Horrocks, N of Geraldton, 31 July 2003, *M.E. Trudgen* MET 21991 (AD, BRI, CANB, PERTH); Red Bluff, S of Kalbarri, 6 May 1968, *Paul G. Wilson* 6539 (PERTH).

Distribution and habitat. Occurs in the Geraldton Sandplains bioregion, extending from north of Kalbarri south to Yardanogo Nature Reserve, Western Australia, with the southernmost specimen separated from the remaining specimens by about 75 km (Figure 4). Occurs in crevices in sandstone or limestone and in white or brownish sand on dunes, often in low coastal heath with herbs and a variety of shrub species, such as *Olearia*, *Scaevola* and *Scholtzia*.

Conservation status. Not currently considered to be at risk.

Notes. This subspecies is the only member of the *T. dampieri* complex to have petals up to 3 mm long. It is closest in location and morphology to *T. maritima* subsp. *freycinetensis* but has more prominently keeled leaves and usually has larger flowers. It is similar to *T. dampieri* subsp. *capensis* in having long leaves and large flowers but has fewer consecutive flowering nodes (1–8 vs 5–14).

C. Miscellaneous species

This section deals with seven phrase-named taxa from varied species groups and updates the descriptions given previously for *T. decussata* and *T. salina*. When the publication of new *Thryptomene* species began (Rye & Trudgen 2001) as part of a broader taxonomic study of tribe Chamelaucieae, two of the taxa described below had never been collected and four of them were known from just one collection. Now only one species, *T. sp.* Warburton, remains this poorly known.

Thryptomene decussata (W.Fitzg.) J.W.Green, *Census Vasc. Pl. W. Australia* edn 2, 6 (1985); *Scholtzia decussata* W.Fitzg., *J. W. Australian Nat. Hist. Soc.* 2(1): 19–20 (1904). *Type*: Mount Magnet, Western Australia, September 1903, *W.V. Fitzgerald s.n.* (*lecto*: PERTH 01631918, inadvertently designated by J.W. Green, *op. cit.*; *isolecto*: NSW 463200, NSW 463281, PERTH 01605143).

Thryptomene sp. Leinster (B.J. Lepschi & L.A. Craven 4362), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs 0.3–3(–4) high, 0.5–3 m wide. *Leaves* antrorse to almost patent, mostly widely antrorse. *Petioles* 0.1–0.3 mm long. *Leaf blades* broadly obovate to depressed obovate-cordate, 1.3–2.5 mm long, 1.3–2.7 mm wide, thin apart from the keel or to 1 mm thick, entire; abaxial surface convex or shallowly convex, distally strongly keeled and incurved, also keeled below or more flattened, with scattered or numerous crowded oil glands; adaxial surface shallowly concave, dotted with oil glands; apical point absent or <0.1 mm long. *Peduncles* (when present) solitary in each axil, borne at 1–3 consecutive nodes, 0–0.4 mm long, 1-flowered. *Bracteoles* broadly to depressed ovate, 2–3.3 mm long, rather scarious except for the narrow keel, persistent in flower and probably often in fruit; apical point absent or to 0.4 mm long. *Flowers* 5-merous, with a convex apex in late bud, 6–11 mm diam. when fully open. *Hypanthium* very broadly or depressed obconic, 2–2.2 mm long, 2.3–3 mm wide, with close, irregular ribs; free part 0.8–1.3 mm long. *Sepals* very broadly or depressed ovate, 2–3.3 mm long, 3–4 mm wide, petaloid, without auricles, white, ± denticulate, widely spreading in fruit. *Petals* 2.2–4 mm long, pale pink or white, entire, loosely closed inwards in fruit. *Stamens* 16–40, in 2 whorls. *Longest filaments* 2.3–3.3 mm long. *Anthers* 0.3–0.4 mm long, 0.5–0.6 mm wide, dehiscent by 2 pores; connective gland broad-truncate. *Ovules* (5)6–10. *Style* 2.5–3.5 mm long; stigma 0.25–0.6 mm diam. *Fruits* very broadly obovoid, 2.2–2.7 mm long, 2.2–3 mm diam.; hypanthium with 12–16 full-length and 1–6 shorter, close-packed ribs. *Seeds* not seen at maturity, the largest seen *c.* 1.3 mm across. (Figure 5A–C)

Diagnostic features. Unique in having up to *c.* 40 stamens and up to 10 ovules. Other important characters: hypanthium with 12–16 full-length and a few shorter ribs; style 2.5–3.5 mm long.

Selected specimens examined of variants with sparsely to densely glandular leaves. WESTERN AUSTRALIA: Butchers Track, E of Meadow Station, 13 Oct. 1973, *J.S. Beard* 6828 (PERTH); Melka [Meka] Station, 24 Sep. 1987, *R.J. Cranfield* 6316 (CANB, PERTH); Blue Hills Range, 18 Oct. 2005, *A. Markey & S. Dillon* 3605 (PERTH); 30 km E of Hillview Homestead, 26 Sep. 1982, *A.A. Mitchell* 1049 (PERTH); Mount Narryer, 1898, *I. Tyson* 36 (PERTH); Mt Barloweerie, *c.* 20 km S of Wooleen Homestead, 13 Oct. 1975, *J.Z. Weber* 5080 (AD *n.v.*, PERTH); Hamelin Station, 5 Oct. 2015, *V. Westcott & B. Parkhurst* 3 (PERTH).

Selected specimens examined of far inland variant with very densely glandular leaves. WESTERN AUSTRALIA: SE of Leinster, 13 Oct. 2004, *P.G. Armstrong* PA 22 (MEL, NSW, PERTH); W of Ashburton Downs Rd, 175 km N of Meekatharra, 30 Sep. 2016, *S. Hitchcock & R. Haycock* M 198 (PERTH); 15 km NE of Leinster, within LNO Minesite tenements, 28 Sep. 2006, *S. Kern & A. Rea* 12053 (NSW, PERTH); 1.3 km NE of Goldfields Hwy on access road to Leinster, 27 Oct. 2000, *B.J. Lepschi & L.A. Craven* 4362 (CANB *n.v.*, PERTH); Lee Steere survey site LSTR23, NE of Wiluna, 16 Sep. 2008, *W.A. Thompson & N.B. Sheehy* 735 (MEL, PERTH); Yakabindie Station, 65 km N from Leinster, 6 Nov. 2016, *J. Warden & S. Smith* WB 38686 (PERTH).

Distribution and habitat. Occurs in the Carnarvon, Gascoyne, Yalgoo and Murchison bioregions, extending c. 900 km from near the coast in Yaringa Station inland to Lee Steere Range, and from near Congo Creek south to the Leonora area, Western Australia (Figure 6). Recorded on lateritic breakaways and other rocky sites, usually in *Acacia* shrublands. It is sometimes one of the tallest species present. The variants with sparsely to densely glandular leaves occur in all four bioregions from Yaringa Station south-east to the Leonora area, whereas the inland variant with very densely glandular leaves is restricted to the Murchison and Gascoyne bioregions, extending from near the upper Gascoyne River south to the Leinster area and east to Lee Steere Range (see Figure 6).

Phenology. Flowers mainly recorded from July to November, with fruits recorded from September to November.

Conservation status. A very widespread species that is not considered to be at risk.

Etymology. From the Latin *decussatus* (decussate), referring to the arrangement of the leaves in opposite pairs with those at each node orientated at right angles to those at adjacent nodes.

Co-occurring species. The distribution of this widespread species overlaps that of *T. costata* Rye & Trudgen, with both species occurring on rocky outcrops. There are two records of their co-occurrence in the Yalgoo area: a sparse shrubland of *T. decussata*, *Acacia aneura* and *A. umbraculiformis* over open shrubland of *T. costata* (*A. Markey & S. Dillon* 5368), *T. decussata* and *Philotheca sericea*; and a sparse shrubland of *Acacia aneura*, *A. umbraculiformis*, *A. aulacophylla* and *A. ramulosa* over open shrubland of *T. costata* (*A. Markey & S. Dillon* 5021), *T. decussata* and *Philotheca brucei*.

Affinities. The closest relative appears to be *T. duplicata* Rye & Trudgen, which also has stamens arranged in two rows but differs from *T. decussata* in its longer peduncles (0.7–1.4 mm long vs 0–0.3 mm), shorter sepals (c. 1.4 mm long vs 2–3.3 mm), shorter style (c. 0.7 mm long vs 2.5–3.5 mm) and fewer ovules (4 vs 5–10).

Notes. *Thryptomene decussata* is broadly circumscribed herein to include the ‘broad-leaved’ (or western) and ‘typical’ variants of Rye and Trudgen (2001: 520), which have sparsely to densely glandular leaves, and *T. sp.* Leinster (*B.J. Lepschi & L.A. Craven* 4362), a more recently recognised, far inland variant with very densely glandular leaves. Although it is now known from numerous collections, the far inland variant was only collected for the first time in October 2000, too late to be included in the Rye and Trudgen (2001) treatment.

The typical variant, which extends from north of Mount Magnet to Leonora, has broadly obovate leaves with dense oil glands (Figure 5B). Specimens to the west are more likely to have some broader (depressed ovate-cordate) leaves with widely spaced oil glands (Figure 5A); however, leaf shape is variable across the distribution of these two variants, including within populations (e.g. *S. Patrick*, *D. Edinger & G. Marsh* 3236 B: PERTH), suggesting it is of little taxonomic utility.

The far inland variant (*T. sp.* Leinster) has very broadly to depressed obovate leaves with a higher density of oil glands relative to most other populations of *T. decussata* (Figure 5C); however, there is material with comparably dense oil glands (albeit with narrower leaves) from Mt Dugel (e.g. *R. Meissner & G. Owen* 1660: PERTH), which is well within the distribution of the variants with less crowded glands (see Figure 6). The density of oil glands can also vary within a population as evidenced by a second collection from Mt Dugel (*R. Meissner & G. Owen* 1661: PERTH), which has fragments with either moderately dense or very dense oil glands. The Mt Dugel collections bridge the gap in oil gland density between the far inland variant and the remainder of *T. decussata*, suggesting that formal taxonomic recognition of the former is not warranted. The far inland variant, for which there are few specimens with well-pressed, open flowers, tends to have smaller flowers (6–8 mm diam. vs (7–)8–11 mm), although this difference is not discrete. Some specimens of the far inland variant have that the highest stamen numbers recorded for *Thryptomene*

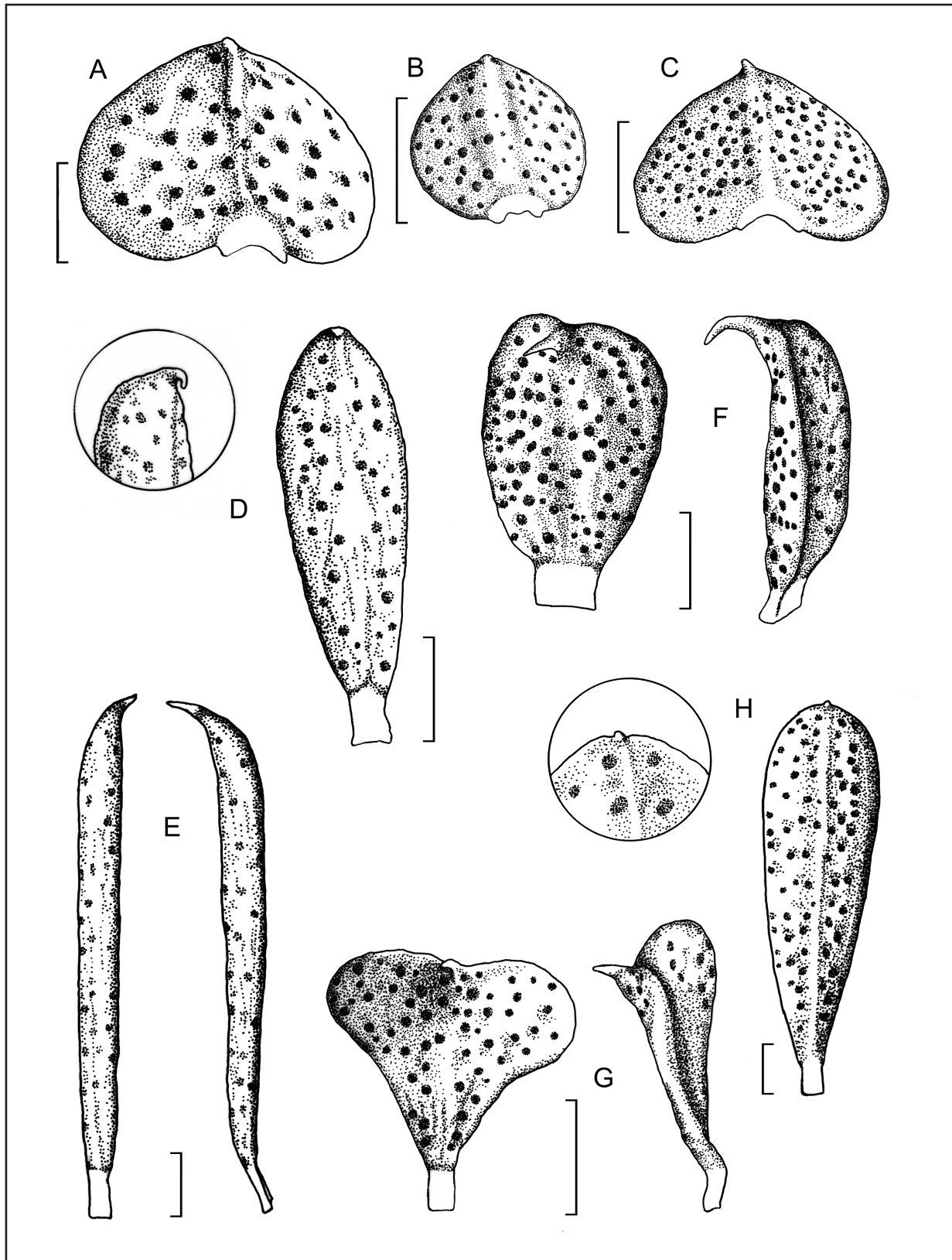


Figure 5. Leaf abaxial surface in miscellaneous species of *Thryptomene*. A – *T. decussata* variant with oil glands widely spaced; B – *T. decussata* typical variant; C – *T. decussata* inland variant with crowded oil glands; D – *T. interzonensis*, with close-up of recurved apical point; E – *T. jilbadji*, also with side view; F – *T.* sp. Coolgardie, also with side view; G – *T.* sp. Missionary Plain, also with side view; H – *T.* sp. Warburton, with close-up of minute point. Drawn by Skye Coffey from *S. Patrick, D. Edinger & G. Marsh 3236 B (A)*, *W.A. Thompson & N.B. Sheehy 553 (B)*, *P. Armstrong 06/46 (C)*, *C. Adams & H. Hughes WB 24456 (D)*, *L. Ducki 739 (E)*, *C.A. Gardner s.n., PERTH 02193736 (F)*, *D.E. Albrecht & A. Schubert 12728 (G)* and *M. Henson & M. Hannart 32433 (H)*. Scale bars = 1 mm.

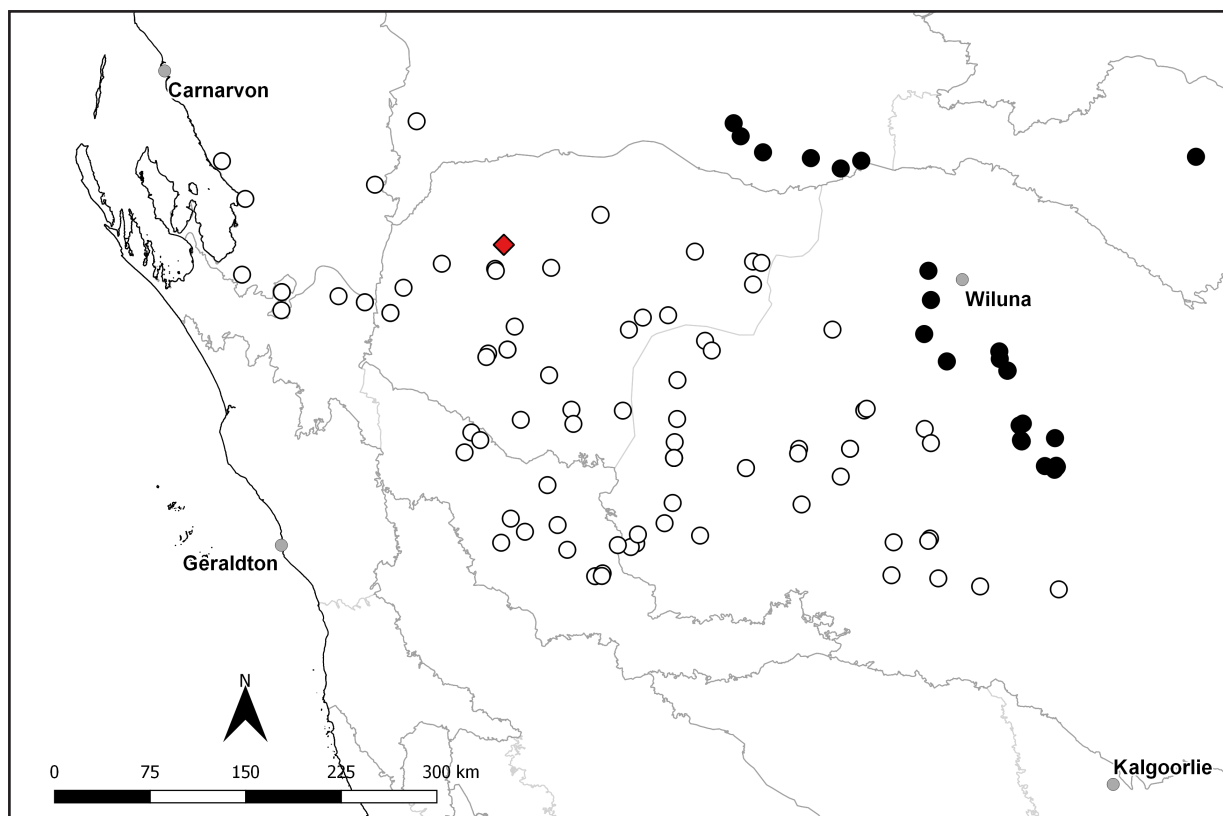


Figure 6. Distribution of *Thryptomene decussata*: variants with sparsely to densely glandular leaves (○), far inland variant with very densely glandular leaves (●) and narrow-leaved specimens from Mt Dugel with very densely glandular leaves (◆).

(c. 40 per flower), although low stamen numbers (c. 16 per flower) have also been recorded for this and other variants.

Thryptomene decussata was originally described as *Scholtzia decussata* because its ovary was misinterpreted as being ‘2-celled with 2 or 3 superposed ovules in each cell’ (Fitzgerald 1904: 20) and perhaps also because of its high stamen numbers in comparison with all previously described *Thryptomene* species. The protologue implies there can be as few as four ovules per ovary but the lowest number, only found on one specimen in this study, was five and even six was rather unusual, most flowers examined having 7–10 ovules.

Despite the large number of specimens of *T. decussata* at PERTH, no mature seeds have been observed. Most specimens are vegetative or in bud, and when flowers are present they are often galled (e.g. see *P. Armstrong* 853). Other insect associations, identified by L. Cook, include psyllids in the form of white hairy scales (see *A.A. Mitchell* 4147) and flattened scales of white flies (see *F. Lullfitz* 2831).

Thryptomene interzonensis* Rye, *sp. nov.

Type: north-north-east of Mount Clara [east of Southern Cross], Western Australia [precise locality withheld for conservation reasons], 2 December 1997, *R.J. Cranfield* 11702 (*holo:* PERTH 0523104; *iso:* CANB).

Thryptomene sp. Mt Clara (R.J. Cranfield 11702), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs 0.3–0.8 high, 0.3–1 m wide. *Leaves* patent to almost appressed, mostly antrorse. *Petioles* 0.5–0.6 mm long. *Leaf blades* narrowly obovate, 3.5–4.5 mm long, 1–1.3 mm wide, obtuse, entire, often with narrow, scarious margins; abaxial surface shallowly convex, not or scarcely keeled, with 2 or more longitudinal rows of oil glands, the rows closest to the midvein on each side with 8–12 main glands; adaxial surface flat or shallowly concave, dotted with oil glands; apical point recurved, 0.15–0.2 mm long, white. *Peduncles* borne at 2–6 consecutive nodes, 1 per axil, not or scarcely compressed, 0.4–0.8 mm long, 1-flowered. *Bracteoles* ovate to elliptic, 0.4–1 mm long, entire, rather scarious, persistent in flower; apex often recurved. *Pedicels* absent. *Flowers* 5-merous, with a convex apex in late bud, 3.5–4 mm diam. when fully open. *Hypanthium* becoming somewhat urceolate and wider than thick, 1.3–1.4 mm long, *c.* 1.2 mm wide, prominently 10-ribbed; free part 0.2–0.25 mm long. *Sepals* broadly or very broadly obovate, with a distinct claw, 1.3–1.5 mm long, 1.4–1.6 mm wide, petaloid, without auricles, white, entire, widely spreading in fruit. *Petals* broad-based, *c.* 1.3 mm long, white, entire, apparently erect in flower, closed inwards and overlapping across the summit of the fruit. *Stamens* 5, antisepalous, widely spaced. *Filaments* 0.3–0.6 mm long. *Anthers* *c.* 0.2 mm long, *c.* 0.3 mm wide, dehiscent by 2 pores; connective gland broad-truncate. *Ovules* 2. *Style* 0.3–0.4 mm long; stigma ≤ 0.1 mm diam. *Fertile fruits* very broadly or depressed obovoid, *c.* 1.2 mm long, *c.* 1.35 mm diam.; hypanthium with 10 full-length ribs, the ribs rounded and mostly separated by broad sinuses, 1-seeded. *Seeds* *c.* 0.8 mm long, *c.* 1.2 mm wide. *Sterile fruits* globular, commonly with two equal-sized, hard pieces of chaff. (Figure 5D)

Diagnostic features. Distinguished by the following combination of characters: leaves narrowly obovate, with a strongly recurved apical point 0.15–0.2 mm long; hypanthium not compressed in flower, 10-ribbed; sepals similar in length to, or slightly longer than, the petals; anthers dehiscent by 2 pores; fruit ribs 10, widely spaced, rounded.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 12 Nov. 2008, *C. Adams & H. Hughes* WB 24456 (PERTH); 1 Feb. 2010, *J. Jackson* 87 (CANB, NSW, MEL, PERTH); 6 Nov. 2022, *Z. Sims* 3737 (PERTH).

Distribution and habitat. Occurs in the Coolgardie and Avon Wheatbelt bioregions, extending from Jaurdi Station south to Parker Range, Western Australia (Figure 7). Various recorded from open scrub on a yellow clayey sandplain, the edge of a salt pan over exposed granite, and sandplain.

Phenology. Flowers recorded from November to January and mature fruits in January and February.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *T. sp.* Mt Clara. Known from three localities spread over a distance of *c.* 110 km.

Etymology. Named for its occurrence in the South-western Interzone of Beard (1980).

Co-occurring species. Not known to co-occur with any other species of *Thryptomene*.

Affinities. This distinctive species has not been sampled in molecular studies but its morphology indicates that it would fall into a group that includes sections *Oligandron* and *Paryphantha*. There are no obvious close relatives to *T. interzonensis* but it keys out above (couplet 22) with *T. pieroniae* (see affinities section under that species).

Notes. *Thryptomene interzonensis* is a fairly recently discovered species, the first collection of it having been made in 1997. Its sepals are more narrowly clawed than usual in the genus. Its hypanthium is obviously 10-ribbed in late flower and fruit, but only the five prominent antisepalous ribs may be obvious in late bud. In fruit the 10 ribs are broad and rounded, with gaps between them.

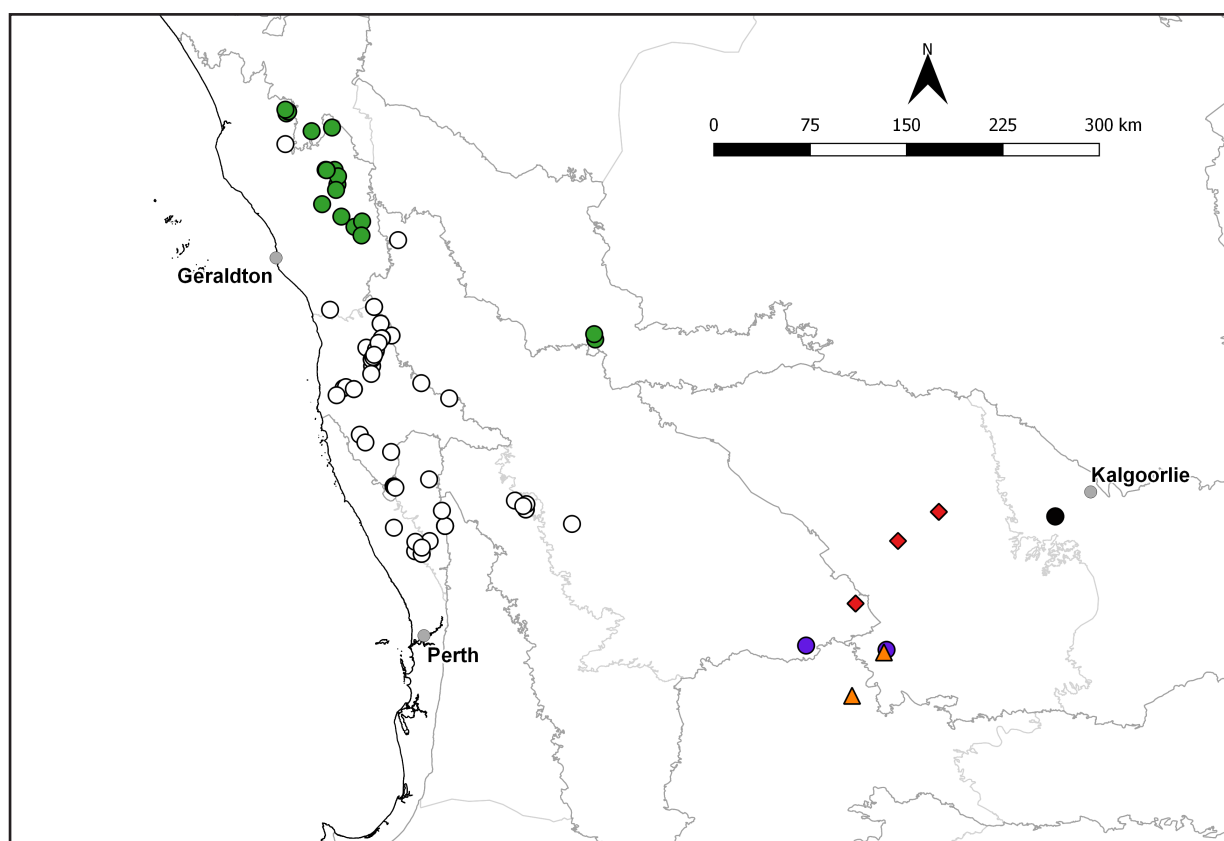


Figure 7. Distribution of *Thryptomene interzonensis* (◆), *T. jilbadji* (●), *T. pieroniae* (●), *T. salina* (▲), *T. mucronulata* (○) and *T. sp. Coolgardie* (●).

Thryptomene jilbadji* Rye, *sp. nov.

Type: c. 50 km NNE of Hyden, Western Australia [precise locality withheld for conservation reasons], 1 November 2000, B.J. Lepschi & L.A. Craven 4477 (*holo:* PERTH 06466532; *iso:* AD 156024, CANB 638632, K, MEL 2225948, NSW 586448).

Thryptomene sp. Hyden (B.J. Lepschi & L.A. Craven 4477), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs 0.3–0.45 m high, one record of 0.15 m wide. *Leaves* antrorse or appressed. *Petioles* 0.8–1.3 mm long. *Leaf blades* long-linear in outline, 7–11 mm long, 0.4–0.5 mm wide, 0.5–0.6 mm thick, acute, entire, almost terete but slightly thicker than wide distally; abaxial surface deeply convex, not keeled, usually with 2 main longitudinal rows of oil glands on each side of midvein, with numerous oil glands in the central rows; adaxial surface flat or shallowly convex, often grooved along the centre; apical point recurved, 0.4–0.6 mm long. *Peduncles* 1 per axil, borne at 1–3 consecutive nodes, somewhat compressed, 0.7–0.8 mm long, 1-flowered. *Bracteoles* obovate, 1.2–1.7 mm long, somewhat scarious, with an apical point to 0.3 mm long, entire, persistent in flower, not seen in fruit. *Pedicels* absent. *Flowers* 5-merous, with a convex apex in late bud, 5–7 mm diam. when fully open. *Hypanthium* cup-shaped, 1–1.2 mm long, 1.6–1.8 mm wide, 10-ribbed or with fewer ribs visible; free part 0.2–0.3 mm long. *Sepals* very similar to the petals but broader, almost circular, 1.7–2.3 mm long, 1.8–2.2 mm wide, white, without auricles, entire, widely spreading in flower and fruit. *Petals* 1.7–2.3 mm long, white, entire, widely spreading in flower, possibly closed in fruit. *Stamens* 5, antisepalous, widely spaced. *Filaments* 0.3–0.4 mm long. *Anthers* c. 0.25 mm long, 0.3–0.35 mm wide, dehiscent by 2 slits ± as long as the thecae; connective gland broad-truncate. *Ovules* 2. *Style* not seen at maturity but apparently small. *Fruits* not seen at maturity. (Figure 5E)

Diagnostic features. Distinguished by the following combination of characters: leaves long-linear in outline, 7–11 mm long, with an apical point 0.4–0.6 mm long; hypanthium not compressed in flower; sepals similar to the petals but broader; anthers dehiscent by slits \pm as long as the thecae; ovules 2.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 15 Nov. 2022, *L. Ducki* 739 (PERTH); 30 June 2022, *D. Rubick* 556 (PERTH).

Distribution and habitat. Occurs in the Avon Wheatbelt and Coolgardie bioregions, Western Australia (Figure 7), recorded from the type population that is east of Narembeen and north of Hyden and from two later collections from near Jilbadji Nature Reserve. The type collection was made from yellowish brown sand in a regrowth of *Acacia*, Proteaceae and Myrtaceae species, while one of the later collections was from flat, red-orange, heavier soil in *Eucalyptus* low open mallee woodland over *Melaleuca*, *Persoonia* and *Santalum*.

Phenology. Flowers recorded in October and November.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *T.* sp. Hyden. Described at the type locality as being uncommon and in two collections from the area near Jilbadji Nature Reserve as having 6–10 or up to 25 plants, the overall range less than 70 km long.

Etymology. Named for its occurrence near Jilbadji Nature Reserve.

Affinities. This species belongs to *T.* sect. *Thryptocalype*. It is similar to *T. cuspidata* (Turcz.) J.W.Green in having long leaves with an obvious apical point but with the point shorter (0.4–0.6 mm long vs 0.7–1.4 mm) and also differing in its larger flowers (5–7 mm diam. vs 3–4.5 mm).

Notes. Good fruiting material is needed to complete the description of this species but a non-flowering collection made in June had a single infertile, probably immature, fruit. The young stems are often reddish at first but soon become white.

Thryptomene pieroniae* Rye, *sp. nov.

Type: east of Bulla–Whelarra Road, Western Australia [precise locality withheld for conservation reasons], 21 August 2003, *B.L. Rye & M.E. Trudgen* BLR 238086 (*holo:* PERTH 06744648; *iso:* CANB, K, MEL, NSW).

Thryptomene ninghanensis J.W.Green ms in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 404 (2000); Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Thryptomene sp. Wandana (M.E. Trudgen MET 22016), Western Australian Herbarium, in *Florabase*, <https://florabase.dbca.wa.gov.au> [accessed 13 October 2023].

Shrubs usually 0.4–0.8 m high, possibly to 1.5 m high, 0.5–1 m wide, single-stemmed at base. *Leaves* antrorse or \pm appressed, mostly closely antrorse. *Petioles* 0.4–0.8 mm long. *Leaf blades* broadly or very broadly obovate, 1.7–3 mm long, 1.2–1.8 mm wide, obtuse, entire; abaxial surface shallowly convex but flattened along midvein, distally keeled, flattened or indented below along the midvein, with 1–3 main rows of oil glands on each side of midvein, with 3–5(6) oil glands in the central rows; adaxial surface shallowly concave; apical point absent or to 0.2 mm long. *Peduncles* 1 per axil, borne at 1–6(–13) consecutive nodes, not or scarcely compressed, 0.5–1 mm long, 1-flowered. *Bracteoles* ovate or narrowly ovate, 0.7–0.8 mm long, somewhat scarious, acute, entire, persistent in flower, shed in fruit. *Pedicels* absent. *Flowers* 5-merous, with a convex apex in bud, 3–4 mm diam. when fully open. *Hypanthium* dorsiventrally

compressed in adnate part and \pm circular in TS in the short free part, becoming \pm obconic as the fruit begins to form, 1.3–2.3 mm long, 1.2–1.5 mm wide, with 5 or 10 narrow ribs; free part *c.* 0.2 mm long. *Sepals* ovate, 1.2–1.4 mm long, 0.6–1 mm wide, petaloid and pink except for a short, broad green claw, without auricles, entire, widely spreading in flower, erect in fruit. *Petals* more narrowly clawed than the sepals, 1.1–1.3 mm long, pink or white, entire, widely spreading in flower, closed inwards to an erect position in fruit. *Stamens* 5, antisepalous, widely spaced. *Filaments* *c.* 0.3 mm long. *Anthers* 0.2–0.25 mm long, 0.3–0.35 mm wide, dehiscent by 2 slits; connective gland broad-truncate. *Ovules* 2. *Style* 0.3–0.5 mm long; stigma to *c.* 0.1 mm diam. *Fertile fruits* almost obconic, *c.* 1.8 mm long, *c.* 1.35 mm diam., 1-seeded; hypanthium incurved over summit of fruit, not compressed, smooth, darkened. *Seeds* erect, truncate, almost obconic, *c.* 1.2 mm long, *c.* 1 mm diam. *Sterile fruits* numerous, similar in shape but very hard. (Figures 8 & 9)

Diagnostic features. Distinguished by the following combination of characters: leaves broadly or very broadly obovate, with apical point absent or to 0.2 mm long; sepals slightly to distinctly longer than the petals, erect in fruit.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 1934, *H.K. Barker s.n.* (PERTH); 31 Aug. 1990, *A.H. Burbidge* 4351 (PERTH); 9 July 1963, *F.G. Smith* 1673 (PERTH); 27 Sep. 2002, *M.E. Trudgen* MET 21730 (AD, BRI, NSW, PERTH); 19 Oct. 2011, *V. Yeomans* VY 52 (PERTH).

Distribution and habitat. Occurs in the Geraldton Sandplains and Yalgoo bioregions mainly extending from Eurardy Station south to the Yuna area, Western Australia, with two old records from near Ninghan, some 250 km to the south-east (Figure 7). Recorded in sandy soils, commonly in *Acacia* high shrubland, or sometimes in vegetation dominated by scattered emergent *Eucalyptus* species.

Phenology. Flowers recorded from late July to September, with mature fruits recorded in September and October.

Conservation status. Listed as Priority Three under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *T. sp.* Wandana.

Etymology. Named after Margaret Pieroni (1936–), a superb botanical illustrator who prepared a plate for this species more than twenty years ago. Margaret has produced artwork for many books, scientific papers and other works, one of her most outstanding contributions being the line illustrations and exquisite paintings for all the named species and variants of Featherflowers in *Verticordia: the Turner of Hearts*. Her many other contributions to botany include being the leader of the Dryandra Study Group from 1987 to 2023, and she was awarded an Order of Australia Medal in 2024.

Co-occurring species. The distribution of this species overlaps that of a few other *Thryptomene* species but the only record of co-occurrence (*M.E. Trudgen* MET 22016) is with *T. strongylophylla* in the McGauren Nature Reserve.

Affinities. This species has no obvious close relatives. It came out closest to *T. biseriata* J.W.Green and *T. longifolia* J.W.Green in unpublished molecular data (Peter Wilson pers. comm.) but with very weak support. Rather than with those two species, *T. pieroniae* keys out above (couplet 22) with *T. interzonensis*, which differs in having narrowly obovate (*vs* broadly or very broadly obovate) leaves and very broadly or depressed obovoid (*vs* almost obconic) fruits.

Notes. The manuscript name of *T. ninghanensis* J.W.Green refers to the Ninghan district where *T. pieroniae* was collected for the first time in 1934 (*H.K. Barker s.n.*), but the species is far more common in the disjunct area to the north-west.

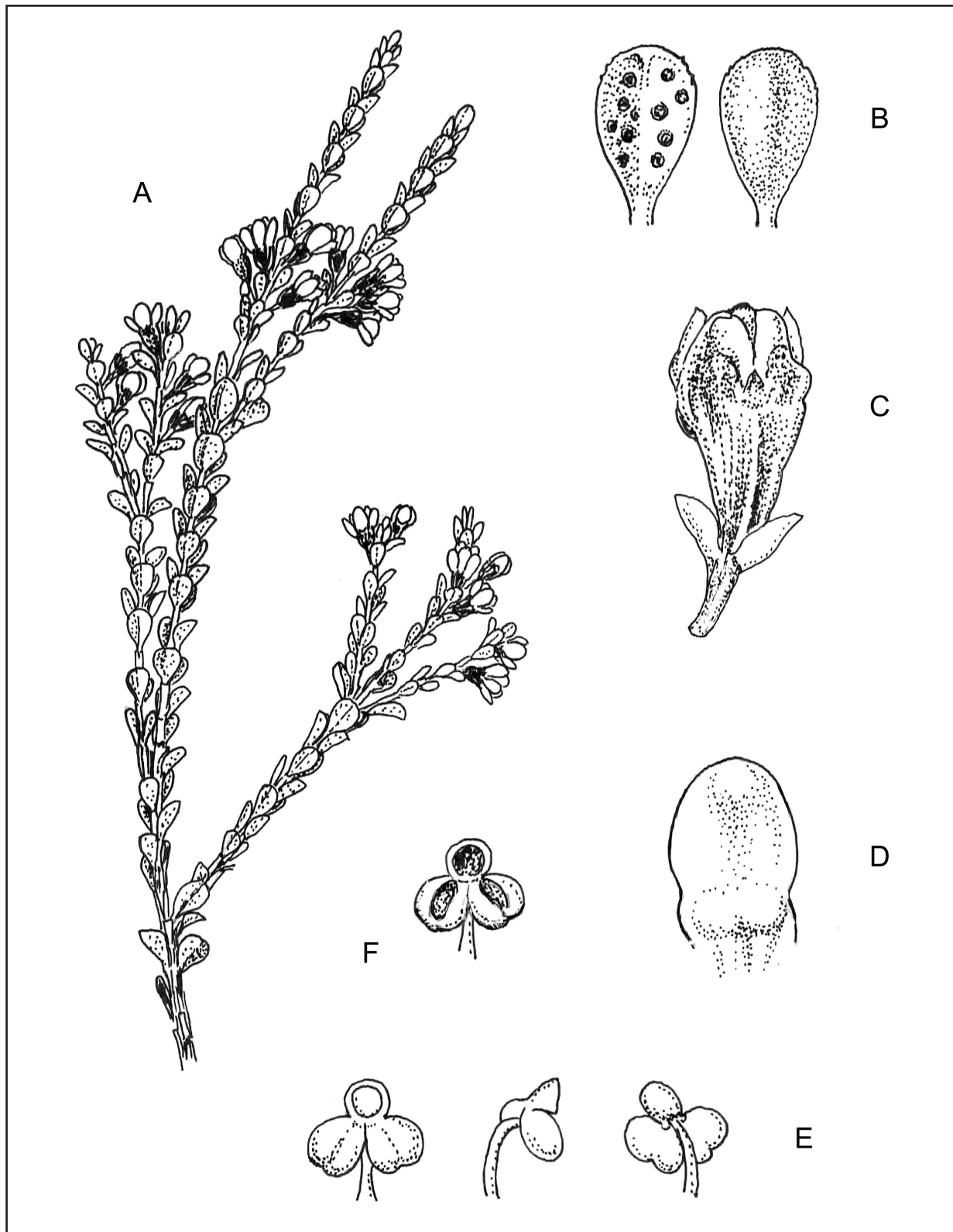


Figure 8. *Thryptomene pieroniae*. A – flowering branch; B – abaxial and adaxial views of leaf; C – flower bud with two bracteoles and the peduncle; D – sepal; E – three views of anther prior to dehiscence; F – anther after dehiscence. Drawn by Margaret Pieroni from *A.H. Burbidge* 4350 (A, C–F) and *M.E. Trudgen* 2221 (B).



Figure 9. *Thryptomene pieroniae*. A – habitat and single-stemmed habit; B – flowering stems with buds to fully open flowers. Images by Juliet Wege from *J.A. Wege* 2207.

Normally the species is an erect shrub but one plant that had been knocked over by roadworks or some other disturbance was observed to have produced adventitious roots from horizontal stems (*B.L. Rye & M.E. Trudgen* 238086).

Thryptomene salina Rye & Trudgen, *Nuytsia* 13(3): 525–526 (2001). *Type*: east of Hyden, Western Australia [precise locality withheld for conservation reasons], 9 October 1981, *K.R. Newbey* 9171 (*holo*: PERTH 02159481; *iso*: CANB 558563, MEL 2137181).

Shrubs 0.5–1.1 m high, one record as 1.2–1.5 m wide. *Leaves* antrorse, overlapping. *Petioles* 0.5–0.6 mm long. *Leaf blades* narrowly to very broadly obovate, 2.3–2.6 mm long, 2–2.6 mm wide, entire or denticulate; abaxial surface convex, flattened along middle for most of length, distally keeled, dotted with numerous oil glands; adaxial surface concave; apical point absent or rarely *c.* 0.1 mm long, more commonly with a dorsal-subterminal point *c.* 0.1 mm long. *Peduncles* solitary in each axil, borne at 3–6 consecutive nodes, compressed, 0.8–1.2 mm long, 1-flowered. *Bracteoles* very broadly ovate, 1.5–2 mm long, scarios, persistent. *Pedicels* ± absent. *Flowers* 5-merous, with a convex apex in late bud, 5–6 mm diam. when fully open. *Hypanthium* obconic with a flared top, 2.5–3 mm long, 2.5–3.5 mm diam., with close, irregular ribs; free part 0.5–1 mm long. *Sepals* depressed ovate, 1.2–1.7 mm long, 2–2.5 mm wide, ± entire, widely spreading in fruit. *Petals* 1.8–2.1 mm long, entire, closed inwards and overlapping across the summit of the fruit. *Stamens* 5–7, with 1 or 2 opposite each sepal. *Filaments* 0.3–0.4 mm long. *Anthers* *c.* 0.35 mm long, *c.* 0.6 mm wide, dehiscent by pores; connective gland broad-truncate. *Style* 0.35–0.4 mm long; stigma *c.* 0.15 mm diam. *Ovules* 5 or 6. *Fruits* very broadly obovoid, *c.* 2.2 mm long, *c.* 2.2 mm diam., 1-seeded, the seed only occupying the top of the fruit; hypanthium with 8–10 full-sized ribs and 3–6 shorter ones. *Seeds* transversely reniform, *c.* 0.8 mm high, *c.* 1.5 mm across.

Diagnostic features. Distinguished by the following combination of characters: hypanthium with 8–10 full-sized ribs and 3–6 shorter ones; stamens 5–7, with 1 or 2 opposite each sepal; ovules 5 or 6.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 2 Aug. 2023, G. Cockerton WB41136 (PERTH); 15 Aug. 2023, N. Dakin WB41137 (PERTH).

Distribution and habitat. Known from two populations east and north-east of Hyden in the Coolgardie and Mallee bioregions, Western Australia (Figure 7). Both populations were recorded from a drainage line or creek, the surrounding vegetation dominated by *Eucalyptus* and *Allocasuarina* and at one location with a myrtaceous understory that included *Euryomyrtus maidenii*. Only one of the locations was described as saline.

Phenology. Flowers recorded in October and November and mature fruits in August.

Conservation status. Listed as Priority Two under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). The two known localities are less than 50 km apart, and about 100 plants were recorded at the more recently discovered site.

Etymology. From the Latin *salinus* (salty, saline), referring to the habitat of the original collection. Note that the location of the more recently discovered population is not saline, just low-lying.

Affinities. This species belongs to *T.* sect. *Thryptomene sensu* Rye and Trudgen (2001), differing from other members of that group in having fewer stamens. However, molecular data suggest the typical section may need a broader circumscription (Peter Wilson pers. comm.).

Notes. When it was described by Rye and Trudgen (2001), *T. salina* was only known from a single specimen in bud. Recent collections include open flowers and mature fruits, allowing a much fuller description of the species. The petals fold inwards to form a flat cover over the top of the fruit.

Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)

Illustrations. Line drawings on E. Kelso s.n. 1902; PERTH 02193647).

Shrub size unknown. *Leaves* antrorse. *Petioles* 0.3–0.5 mm long. *Leaf blades* very broadly obovate, 2–3 mm long, 1.8–2.3 mm wide, entire; abaxial surface shallowly convex or convex, flattened or grooved along the centre, not or scarcely keeled, dotted with numerous oil glands; adaxial surface concave to almost flat, usually shallowly concave; apical mucro thick, white, recurved, 0.4–0.5 mm long. *Peduncles* solitary in each axil, borne at 1–5 consecutive nodes, compressed, 0.5–0.8 mm long, 1-flowered. *Bracteoles* c. 2 mm long, scarious, apparently caducous or shed in flower. *Pedicels* ± absent. *Flowers* 5-merous, c. 6.5 mm diam. *Hypanthium* broadly to depressed obconic, 1.5–2 mm long, 1.5–3 mm diam., with close, irregular ribs; free part 0.5–0.8 mm long. *Sepals* depressed ovate, 1.5–1.7 mm long, 2–2.5 mm wide, ± entire. *Petals* c. 2.5 mm long, colour not recorded, entire. *Stamens* 10, with 1 opposite each sepal and petal. *Antipetalous filaments* c. 0.6 mm long. *Anthers* c. 0.25 mm long, c. 0.4 mm wide, dehiscent by pores; connective gland broad-truncate. *Ovules* 6. *Style* c. 0.7 mm long; stigma small. *Fruits* not seen at maturity, with c. 11 full-length and several shorter ribs. (Figure 5F)

Specimens examined. WESTERN AUSTRALIA: Coolgardie, Oct. 1920, C.A. Gardner s.n. (PERTH); Coolgardie district, 1902, E. Kelso s.n. (PERTH).

Distribution and habitat. Occurs in the Coolgardie bioregion, Western Australia (Figure 7). The habitat is not known, although given *T.* sp. Coolgardie is most similar in morphology to *T. mucronulata*, it might similarly favour low-lying, winter-wet sites.

Phenology. Flowers recorded in October.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). As more than a hundred years have passed since its last collection, this taxon may now be extinct. Its two collections give the locality just as Coolgardie, and if they were made close to the town centre, the population was probably cleared long ago.

Affinities. Although well separated from *T. mucronulata* s. lat. geographically (Figure 7), *T. sp.* Coolgardie shows only minor morphological differences. It differs from *T. mucronulata* in its broader leaves (very broadly obovate vs narrowly to broadly obovate in *T. mucronulata*) having an apical point up to 0.5 mm long (vs usually absent or less than 0.3 mm long) and it appears to have less persistent bracteoles. The most similar specimen of *T. mucronulata* in leaf morphology is probably *S.B. Rosier* 196 [3216] from the Wongan Hills area. The *T. mucronulata* complex is very variable and needs further study to determine whether any of its variants warrant formal recognition.

Thryptomene sp. Missionary Plain (A. Schubert 267)

Shrubs recorded up to 1 m high, width not recorded. *Young stems* smooth, white, dotted with oil glands. *Leaves* antrorse or appressed. *Petioles* 0.4–0.6 mm long. *Leaf blades* obcordate to very broadly obcordate, 1.5–2.2 mm long, 1.5–2.5 mm wide, entire or with a few minute crenulations or teeth on the margins where the leaf is broadest, with margins level or incurved; abaxial surface shallowly convex or flat in basal half, convex with apex recurved distally, not or scarcely keeled, dotted with numerous oil glands; adaxial surface shallowly concave or flat in basal half, distally concave; apical point recurved, to 0.2 mm long. *Peduncles* 1 per axil, borne at a solitary or 2 consecutive nodes, c. 0.3 mm long, 1-flowered. *Bracteoles* broadly ovate, 0.8–1.3 mm long, somewhat scarious, denticulate, with an apical point to 0.3 mm long, persistent in flower, not seen in fruit. *Pedicels* absent. *Flowers* with a convex apex in late bud, c. 5 mm diam. when fully open, 5-merous. *Hypanthium* very broadly or depressed cup-shaped, 1.3–2 mm long, c. 2 mm wide, with irregular ribs that are largely hidden by the auricles; free part ± absent. *Sepals* attached below the petals in the space between their wide lateral auricles, almost circular in outline overall but depressed cordate excluding the auricles, 1.5–2.3 mm long (including auricles), 2–2.5 mm wide, denticulate, yellow, spreading in fruit; auricles 0.6–1 mm long. *Petals* moderately broadly attached at base, 1.7–2.3 mm long, denticulate, yellow. *Stamens* 5, antisepalous, widely spaced. *Filaments* 0.6–0.8 mm long. *Anthers* c. 0.4 mm long, c. 0.6 mm wide, dehiscent by 2 pores or short slits; connective gland broad-truncate. *Ovules* 2. *Style* c. 0.6 mm long; stigma c. 0.15 mm diam. *Fruits* depressed ovoid, c. 1.5 mm long, c. 1.8 mm diam. *Seeds* unknown. (Figure 5G)

Specimens examined. NORTHERN TERRITORY: [localities withheld for conservation reasons] 29 Apr. 2010, *D. Albrecht* 13246 (NSW n.v., NT n.v., PERTH); 10 Nov. 2008, *D.E. Albrecht & A. Schubert* 12728 (NSW n.v., NT n.v., PERTH).

Distribution and habitat. Occurs between Gosses Bluff and Haasts Bluff, Northern Territory. Recorded on undulating sandy country with *Acacia* and *Triodia*.

Phenology. Flowers recorded in April and May. Fruits recorded in November.

Conservation status. Listed as Near Threatened in the Northern Territory based on IUCN criteria (Northern Territory Herbarium 2013).

Affinities. This highly distinctive species is unique in having yellow sepals and petals and can also be distinguished from all other species by its sepals being inserted below the petals and having large auricles. Molecular data (Peter Wilson pers. comm.) indicate that its closest relative is the Queensland species *T. parviflora* (F.Muell. ex Benth.) Domin, which differs also in having narrower leaves and smaller flowers.

Notes. Galls are very common on the flowering stems in the two specimens examined, and this may have restricted the number of flowers produced. Presumably there is some better material available among the specimens housed at NT, which are currently on loan to Peter Jobson at NSW.

The overall shape of the sepals including their large auricles is almost circular, with the auricles adding up to 1 mm to their full length. Excluding the auricles, the sepals are somewhat shorter than the petals and arise at a lower level, so that the petal apex is distinctly above the sepal apex.

Thryptomene sp. Warburton (M. Henson & M. Hannart 32433)

Shrub size not recorded but with branches more than 0.3 m long. *Leaves* antrorse, not clustered. *Petioles* 0.6–1 mm long. *Leaf blades* narrowly obovate, 5–9.5 mm long, 2–3.5 mm wide, entire; abaxial surface shallowly convex or flat, not or scarcely keeled, dotted with oil glands; adaxial surface shallowly concave or flat; apical point absent or *c.* 0.1 mm long. *Peduncles* 1 or 2 per axil, borne at 1 or 2 consecutive nodes, very compressed, 0.7–1.3 mm long, 1-flowered. *Bracteoles* apparently caducous or shed in flower. *Pedicels* ± absent. *Flowers* 5-merous, *c.* 4 mm diam. *Hypanthium* campanulate, 1.5–1.7 mm long, 1.5–2 mm diam., prominently 10-ribbed; free part 0.4–0.5 mm long. *Sepals* very broadly obovate, 1–1.2 mm long, *c.* 1.5 mm wide, petaloid, white, ± entire. *Petals* *c.* 1.4 mm long, white, entire. *Stamens* 5. *Filaments* 0.3–0.35 mm long. *Anthers* *c.* 0.4 mm long, *c.* 0.6 mm wide, dehiscent by pores or short slits; connective gland curved-urceolate. *Ovules* 2. *Style* *c.* 0.5 mm long; stigma *c.* 0.15 mm diam. *Fruits* not seen at maturity; hypanthium with 10 full-length ribs. (Figure 5H)

Specimen examined. WESTERN AUSTRALIA: [locality withheld for conservation reasons] 24 Dec. 2011, M. Henson & M. Hannart 32433 (PERTH).

Distribution and habitat. Occurs in the Central Ranges bioregion near Warburton, Western Australia. Habitat unknown.

Phenology. Flowers and immature fruits recorded in October.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). This taxon occurs in a remote area that is difficult to access and needs to be specifically targeted by collectors to gain a reliable assessment of its conservation status.

Affinities and co-occurrence. This taxon belongs to the *T. wittweri* complex, which also includes *T. nealensis*. It is distinguished from *T. nealensis* and *T. wittweri* by its broader leaves that are obovate and 2–3.5 mm wide (*vs* narrowly obovate to linear in outline and 0.6–1.3 mm wide in *T. nealensis* and *T. wittweri*). *Thryptomene nealensis* also differs from *T. sp. Warburton* in having thickened leaves and *T. wittweri* differs in having clustered leaves. Recorded only from a far-inland locality, *T. sp. Warburton* is highly unlikely to co-occur with any other species of *Thryptomene*. It occurs north of the known range of *T. nealensis* and east of the known range of *T. wittweri*.

Notes. Very few flowers and fruits are present on the sole specimen of *T. sp. Warburton*. One immature seed was examined; it was erect to oblique and *c.* 1 mm long. More collections are needed to provide a full description but the taxon certainly appears to be distinct.

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