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An expanded circumscription and revision of the Western Australian genus *Balaustion* (Myrtaceae: Chamelaucieae: Hysterobaeckeinae)

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Abstract

Rye, B.L. An expanded circumscription and revision of the Western Australian genus *Balaustion* (Myrtaceae: Chamelaucieae: Hysterobaeckeinae). *Nuytsia* 33: 149–204 (2022). *Balaustion* Hook. *s. lat.* comprises 18 species that are characterised by having a large cavity on the inner surface of their seeds. Other characters found in all or most of the species are a low growth form, sub-epidermal tissue on the young stems that disintegrates into fibres, one-flowered peduncles, scarcely keeled sepals, and very large, sessile placentas. The type species of *Balaustion* has a distinctive anther type and particularly large, colourful flowers adapted to bird-pollination, but white is the most common petal colour in the genus. New combinations are made for three species previously included in *Baeckea* L. *s. lat.*: *Balaustion exsertum* (S.Moore) Rye, *B. grandibracteatum* (E.Pritz.) Rye and *B. grande* (E.Pritz.) Rye. A neotype is selected for *Baeckea grandibracteata* E.Pritz. and lectotypes chosen for *B. grandis* E.Pritz. and the type species *Balaustion pulcherrimum* Hook. The new species and subspecies are *B. baiocalyx* Rye, *B. bimucronatum* Rye, *B. filifolium* Rye, *B. grandibracteatum* subsp. *meridionale* Rye, *B. grandibracteatum* subsp. *juncturum* Rye, *B. hemisphaericum* Rye, *B. interruptum* Rye, *B. karroun* Rye, *B. mukinbudin* Rye, *B. multicaule* Rye, *B. polyandrum* Rye, *B. quinquelobum* Rye, *B. spenceri* Rye, *B. tangerinum* Rye, *B. thamnoides* Rye and *B. unguiculatum* Rye. Most of these taxa are conservation-listed in Western Australia. Three sections are recognised: sect. *Balaustion* is monotypic, sect. *Nonfibrosa* Rye comprises three species with few ovules, and sect. *Tilophloia* Rye comprises 14 species characterised by stem tissue that tends to disintegrate into numerous fibres. One possible case of hybridisation between two of these sections is discussed.

Introduction

Balaustion Hook. *s. lat.* is a group of small, mostly low-growing shrubs that have one-flowered peduncles, sepals without horns or prominent ridges, seeds with a large cavity on the inner surface, and fruits with large, sessile placentas. Most species have very fibrous sub-epidermal tissue on the young stems. The genus belongs to subtribe Hysterobaeckeinae Rye & Peter G.Wilson (Rye *et al.* 2020) and its type species, *B. pulcherrimum* Hook., has the largest flowers found in that subtribe. Evidence supporting the new circumscription of *Balaustion* adopted in this revision of the genus has been accumulating since 2002 and is outlined below.

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Taxonomic history

James Drummond's discovery in the late 1840s of the very striking species known as Native Pomegranate created much interest. Within a few years the species had been named three times, first as *Balaustion pulcherrimum* Hook. (Hooker 1851), then as *Punicella carinata* Turcz. (Turczaninow 1852) and lastly as *Cheynia pulchella* J.Drumm. ex Harv. (Harvey 1855). Bentham (1867) and Niedenzu (1893) found no difficulty in separating the monotypic *Balaustion s. str.* from the numerous and very varied species of *Baeckea* L. *s. lat.* in view of its conspicuous adaptations to bird-pollination.

Later-named species treated here as members of *Balaustion* were collected as inland areas suitable for agriculture were explored, resulting in the publication of three new species under *Baeckea*, *B. grandibracteata* E.Pritz., *B. grandis* E.Pritz. and *B. exserta* S.Moore, early in the twentieth century (Diels & Pritzel 1904; Moore 1920). Pritzel and Moore did not describe the distinctive seeds of these species, nor were they aware of any other morphological similarities between these taxa and *Balaustion pulcherrimum*. Gardner considered *Baeckea exserta* to be so closely related to *B. grandis* that he applied the name *B. grandis* var. *exserta* (S.Moore) C.A.Gardner ms to one specimen (PERTH 09116400) during the 1940s.

During the 1920s, a second bird-pollinated species belonging to subtribe Hysterobaeckeinae was discovered. Like *Balaustion pulcherrimum*, it had large, brightly coloured, tubular flowers, numerous long stamens and a long style. Gardner (1927) had no hesitation in placing the new taxon in the same genus, naming it *Balaustion microphyllum* C.A.Gardner; however, this taxon was later transferred to the genus *Cheyniana* Rye based on molecular data (Lam *et al.* 2002; Wilson *et al.* 2004) and differences in the morphology of the stamens, pollen, fruits and seeds (see Rye 2009a).

Balaustion has since remained monotypic, although Rye (2009a: 131, 137) drew attention to a close relationship between *Balaustion* and a group then known as '*Tilophloia* Trudgen & Rye ms', noting similarities in seed morphology and the following shared features: 'a low spreading habit, sepals without ridges or horns, stamens arranged in a single continuous circle, filaments broad and markedly flattened at the base, and very large placentas'. Further evidence given in support of this relationship was the presence of one specimen (*A.P. Brown* 3636) that seemed intermediate in morphology between *B. pulcherrimum* and '*Tilophloia* ms'.

A recent molecular phylogenetic analysis based on nr ETS and cp *trn*K and *atp*B–*rbc*L spacer sequences (Rye *et al.* 2020) supports the recognition of a more broadly circumscribed *Balaustion* that includes '*Tilophloia* ms'. In this study, *Balaustion s. lat.* formed a strongly supported clade with two Western Australian species and two eastern Australian genera, *Harmogia* Schauer and *Sannantha* Peter G.Wilson, the latter genus also occurring in New Caledonia. The two Western Australian species, *Baeckea muricata* C.A.Gardner and *Baeckea* sp. Chapman Road (M.E. Trudgen MET 5446), were sister to *Balaustion s. lat.* They differ from *Balaustion* in having a muricate indumentum, strongly facetted seeds without a cavity, and up to four flowers per peduncle.

Harmogia was sister to the combined *Balaustion s. lat.*-*Baeckea muricata* group, with *Sannantha* forming the outermost sister group. The eastern genera differ from *Balaustion* in several characters, including having stamens in antisepalous groups.

Manuscript names and phrase names

Although only three names have been validly published for members of *Balaustion s. lat.*, there have been several manuscript names and 27 phrase names applied to taxa now included in *Balaustion* (Table 1). The phrase names were established by Malcolm Trudgen, except for *Baeckea* sp. Diemals (A.P. Brown 3636) and *B.* sp. Yorkrakine (C.A. Gardner s.n. 09/1933), which were established during the early stages of the current study.

Methods

Sharr (2021) was consulted for the derivations for many of the previously published and new epithets. Measurements were made from herbarium specimens (in their dry state), using the largest leaves available and being careful to avoid immature floral organs, fruits and seeds. Mature style length was taken from old flowers or fruits and included the immersed base of the style. Sepal length was recorded from the largest sepals from each flower or fruit (i.e. avoiding the shorter sepals). Type material housed at PERTH or on loan from BM was examined, and images of types housed elsewhere were examined through *Global Plants* (https://plants.jstor.org/).

As in the treatments of *Hypocalymma* (Rye *et al.* 2013) and *Rinzia* (Rye 2017), a policy of recognising sections within a single genus rather than several smaller, new genera was adopted for *Balaustion*. This was to allow the morphological discontinuities within *Balaustion s. lat.* to be clearly recognised without obscuring the close relationships between the morphological groups.

Morphology

Various aspects of the morphology of the largest group, sect. *Tilophloia* Rye, are illustrated in Figure 1, including some characters of importance in the keys.

Habit and stems. Sections *Balaustion* and *Tilophloia* comprise prostrate or low-growing shrubs that are mostly 0.15–0.8 m high, except for *B. thamnoides* Rye which is 0.7–1.2 m high. Section *Nonfibrosa* Rye has a greater range of heights, up to 1.7 m, but still with a tendency towards a low-growing, widely spreading habit, with taller shrubs being more straggly. The sole member of sect. *Balaustion*, *B. pulcherrimum*, appears to be the only species that produces adventitious roots from its prostrate stems (Rye 2009a: Figure 1A) and has its flowers borne on the ground (Figure 2).

A characteristic feature of sect. *Tilophloia* is the highly fibrous sub-epidermal tissue of the young stems. As the epidermis is shed, the sub-epidermal tissue disintegrates into numerous fine fibres (Figure 1A). This character is seen to a lesser degree in sect. *Balaustion*, whereas sect. *Nonfibrosa* has the epidermis and sub-epidermal tissue peeling off in strips.

Leaves. *Balaustion pulcherrimum* is unique in having leaves with a white apical point 0.15–0.3 mm long (Rye 2009a: Figure 1B). The three species of sect. *Nonfibrosa* have thicker leaves with an obtuse or truncate apex and a scarious border that is denticulate or entire. Many members of sect. *Tilophloia* have leaves with a keel that is strongly ridged towards the apex or projected into a small subterminal point (Figure 1A–D). The tip of the leaf (from side view) may have a 2-pointed shape with a vertical or oblique concave area in between the apical mucro and the subterminal one (Figure 1C), but often becomes truncate in older leaves. The apex itself is never prominently pointed in sect. *Tilophloia*; the mucro (when present) is less than 0.1 mm long. Other species of sect. *Tilophloia* have a keel that is rounded at the apex (Figure 1E & F).

Table 1. Phrase names, manuscript names and published names for taxa belonging to *Balaustion s. lat.*, with the years they were established and their new names.

Old name	Year	New name
Baeckea cryptonoma Trudgen ms	1994	*Balaustion interruptum* Rye
Baeckea exserta S.Moore	1920	*Balaustion exsertum* (S.Moore) Rye
Baeckea grandibracteata E.Pritz.	1904	*Balaustion grandibracteatum* (E.Pritz.) Rye
Baeckea grandibracteata subsp. Parker Range (K. Newbey 9270)	2007	*Balaustion grandibracteatum* (E.Pritz.) Rye subsp. *grandibracteatum*
Baeckea grandis E.Pritz.	1904	*Balaustion grande* (E.Pritz.) Rye
Baeckea grandis var. *brevifolia* C.A.Gardner ms	1930s	*Balaustion grande* (E.Pritz.) Rye
Baeckea grandis var. *exserta* (S.Moore) C.A.Gardner ms	1940	misapplied to *Balaustion quinquelobum* Rye
Baeckea grandis var. *minor* W.E.Blackall *nom. nud.*	1954	*Balaustion grande* (E.Pritz.) Rye
Baeckea rosea Trudgen ms	1990s	*Balaustion quinquelobum* Rye
Baeckea sp. Baladjie (P.J. Spencer 24)	2004	*Balaustion spenceri* Rye
Baeckea sp. Beringbooding (A.R. Main 11/9/1957)	2004	*Balaustion filifolium* Rye
Baeckea sp. Billyacatting Hill (A.S. George 14349)	2004	*Balaustion* sp. Billyacatting Hill (A.S. George 14349)
Baeckea sp. Blue Haze Mine (P. Armstrong 06/910)	2007	*Balaustion grandibracteatum* subsp. *juncturum* Rye
Baeckea sp. Burakin (M.E. & M.E. Trudgen 1423)	2010	*Balaustion interruptum* Rye
Baeckea sp. Crossroads (B.L. Rye & M.E. Trudgen 241186)	2007	*Balaustion grandibracteatum* subsp. *juncturum* Rye
Baeckea sp. Diemals (A.P. Brown 3636)	2008	*Balaustion tangerinum* Rye
Baeckea sp. Elsewhere Road (M.E. Trudgen 5420)	2004	*Balaustion mukinbudin* Rye
Baeckea sp. Eujinyn (J. Buegge D 99)	2005	*Balaustion exsertum* (S.Moore) Rye
Baeckea sp. Forrestania (K.R. Newbey 1105)	2004	*Balaustion grandibracteatum* subsp. *juncturum* Rye
Baeckea sp. Hatter Hill (K.R. Newbey 3284)	2004	*Balaustion thamnoides* Rye
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)	2004	*Balaustion polyandrum* Rye
Baeckea sp. Kellerberrin (C.A. Gardner s.n. PERTH 03351009)	2005	*Balaustion exsertum* (S.Moore) Rye
Baeckea sp. Koonadgin (B.L. Rye & M.E. Trudgen BLR 241137)	2010	*Balaustion quinquelobum* Rye
Baeckea sp. Koorda (W.E. Blackall 3371)	2004	*Balaustion baiocalyx* Rye
Baeckea sp. Lake Cronin (K.R. Newbey 9191)	2004	*Balaustion* sp. North Ironcap (R.J. Cranfield 10580)
Baeckea sp. Mt Gibbs (G.F. Craig 7031)	2007	*Balaustion grandibracteatum* subsp. *meridionale* Rye
Baeckea sp. Mt Glasse (P.G. Wilson 5717)	2004	*Balaustion grandibracteatum* subsp. *meridionale* Rye
Baeckea sp. Muntadgin (E.T. Bailey 231)	2004	*Balaustion quinquelobum* Rye
Baeckea sp. North Ironcap (R.J. Cranfield 10580)	2004	*Balaustion* sp. North Ironcap (R.J. Cranfield 10580)
Baeckea sp. Sheoaks Rocks (M.E. Trudgen 5452)	2004	*Balaustion multicaule* Rye
Baeckea sp. Stockton Road (M.E. Trudgen MET22077 & B. Rye)	2004	*Balaustion bimucronatum* Rye

Old name	Year	New name
Baeckea sp. Tammin (R. Coveny 8319 & B. Habberley)	2004	*Balaustion exsertum* (S.Moore) Rye
Baeckea sp. Tampia Hill (J.C. Anway 327)	2004	*Balaustion exsertum* (S.Moore) Rye
Baeckea sp. Wialki (G.M. Storr s.n. 4/10/1958)	2004	*Balaustion karroun* Rye
Baeckea sp. Yacke Yackine Dam (K.R. Newbey 9195)	2004	*Balaustion unguiculatum* Rye
Baeckea sp. Yorkrakine (C.A. Gardner s.n. 09/1933)	2004	*Balaustion* sp. Yorkrakine (C.A. Gardner s.n. 09/1933)

Inflorescence. Flowering branchlets commonly have just one flower-bearing node, with a single 1-flowered peduncle in the axil of each of the two leaves borne at this node. Sometimes one flower at the node fails to be initiated or aborts, particularly in very low-growing species with horizontal stems; hence many nodes may have just a solitary flower. In three species there are up to about six flower-bearing nodes on a flowering branchlet, but the nodes may be separated by sterile nodes. Widely spaced pairs of flowers and solitary flowers are characteristic of the genus and dense clusters of flowers are absent except occasionally in sect. *Nonfibrosa*. The flower bud (Figure 1G) is subtended by two bracteoles, which are often borne close below the base of the flower with little or no pedicel in between. However, in a few taxa the pedicels tend to be of a similar length to the peduncles, and *B. grande* (E.Pritz.) Rye has pedicels usually much longer than the peduncles. A typical-looking flower for sect. *Tilophloia* is illustrated in Figure 1H.

Bracteoles. Sections *Balaustion* and *Nonfibrosa* have persistent bracteoles that are much shorter than the mature flower buds. Within sect. *Tilophloia*, three species have very large bracteoles that enclose the buds up until anthesis and often persist even in late fruit (Figure 1I & J). In these taxa the bracteoles are very scarious (papery), readily torn and lack a prominent keel. Several taxa including *B. exsertum* have prominently keeled and somewhat more herbaceous bracteoles that enclose the younger buds and are widely antrorse to patent when the flowers open, persisting into the fruiting stage. Another group of taxa has caducous bracteoles that are only seen on the young buds. A few taxa are too variable to strictly belong in any of these three categories.

Calyx and corolla. The sepals are never prominently keeled or horned, and often have a pale border (Figure 1H). They are always much shorter than the petals and usually shorter than the stamens. Most species have petals 3–7 mm long that are white or pale pink on the inner surface. If such species have buds enclosed in bracteoles until just before the flowers open, the petals are uniformly coloured outside, but if the buds are exposed at an early stage, the outer petals are blotched with deep pink outside. Two taxa that appear to be adapted to bird-pollination have orange to red petals 7–10 mm long and stamens of a similar length (6.5–11 mm). Among the white- and pink-flowered species the petals are usually longer, up to three times longer, than the stamen filaments.

Androecium. Stamen numbers range from 13 to 35 and are variable within every species of *Balaustion*, but a fairly common stamen arrangement in the genus has one stamen opposite (but not necessarily exactly at the centre of) each sepal and petal, and one at each position between the sepals and petals, giving a total of 20 stamens (Figure 1H). Staminodes are absent or rare. In *B. grande*, the stamens are all united at the base into a short tube. At the other extreme, *B. hemisphaericum* Rye and *B. interruptum* Rye have narrow filaments and large gaps between some or all of them. In all other taxa, the stamens are all or mostly free, with the filaments broad at the base and contiguous or with narrow gaps between adjacent ones (Figure 1H). Broad filaments often have a slender midvein visible. Filaments are white or pale pink, sometimes with a darker pink base.

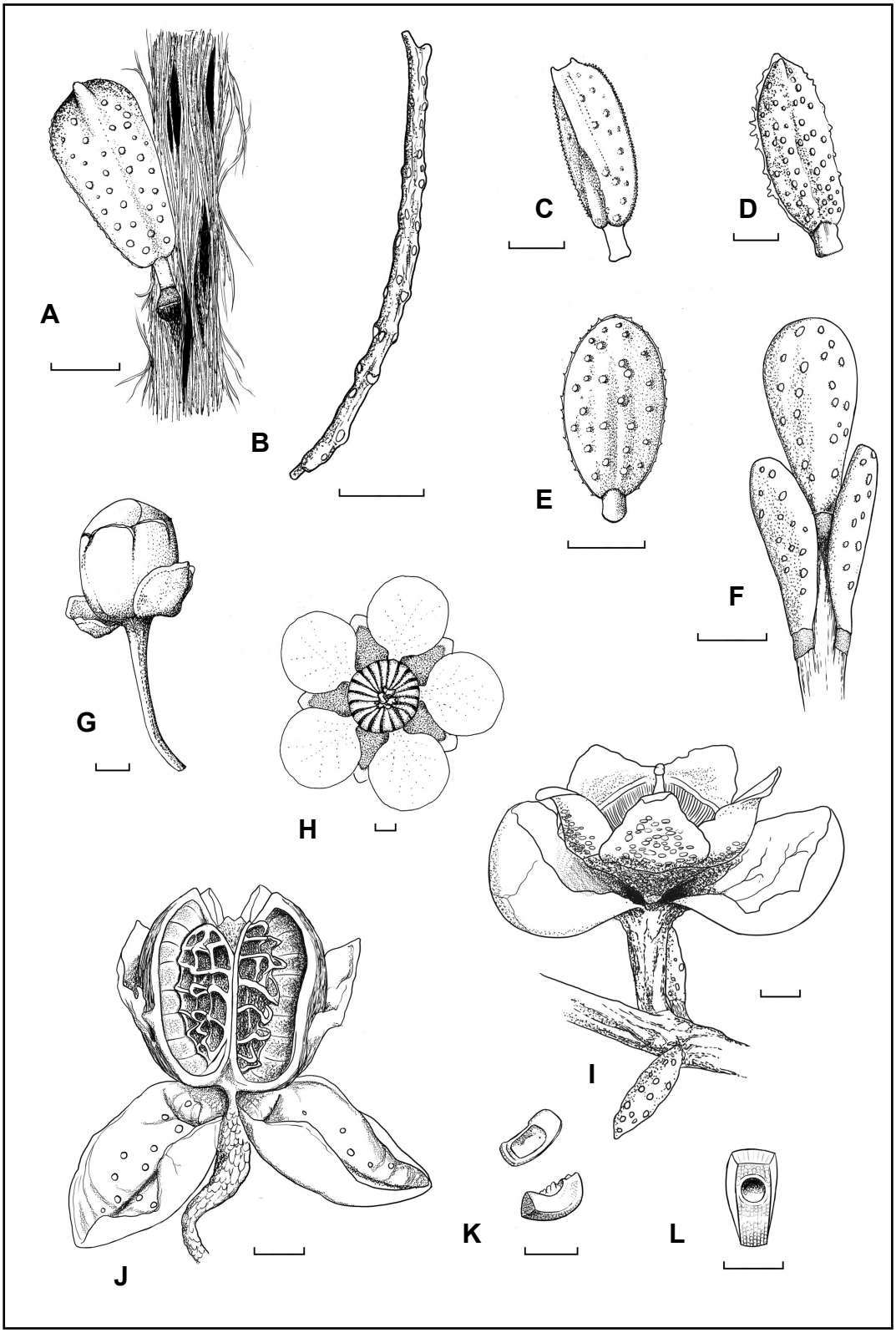

Figure 1. Caption overleaf.

Figure 1. Morphology in *Balaustion* sect. *Tilophloia*. A – young stem of *B. unguiculatum* with sub-epidermal tissue disintegrating into fibres and a leaf with an abrupt subterminal projection; B – leaf of *B. filifolium* from side view, showing terminal and subterminal points; C – leaf abaxial surface, showing a subterminal point of similar size to the apical point in *B. mukinbudin*; D – leaf abaxial surface in *B. polyandrum*, with subterminal point present but not very obvious from this viewpoint; E – leaf abaxial surface in *B. baiocalyx*; F – leaves of *B. karroun*, including one from side view showing the distally rounded keel; G – side view of flower bud in *B. baiocalyx* showing small bracteoles and very short sepals; H – top view of flower of *B. mukinbudin* showing numerous stamens and two-toned sepals; I – dehisced fruit of *B. grandibracteatum* subsp. *grandibracteatum* showing a node with a pair of leaves, a peduncle, and two large, persistent bracteoles; J – fruit of *B. mukinbudin* cut open to show the large placentas and two large, persistent bracteoles; K – seeds of *B. mukinbudin* from side and inside view, showing a large cavity taking up much of the inner surface; L – seed of *B. thamnoides* showing a cavity much smaller than the inner surface. Scale bars = 1 mm. Drawn by Lisa Rye from *K.R. Newbey* 9195 (A), *A.R. Main s.n.* 11 Sep. 1957 (B), *P. de Rebeira* 15 (C, H), *L.W. Sage & F. Hort* 2229 (D); *P. Armstrong s.n.* 8 Sep. 1995 (E,G), *H. Pringle* 30157 (F), *C.A. Gardner* 8017 (I), *M.E. Trudgen* 5420 (J,K), and *K.R. Newbey* 6552 (L).

Anthers. The stamens are geniculate, bending abruptly to be angled in towards the centre of the flower shortly below the attachment to the thecae, but this character is less obvious in the type species, *B. pulcherrimum* because of its elongated thecae. In all species apart from *B. pulcherrimum*, the connective gland is obvious and more or less ovoid, with its broad end protruding slightly outside the attachment point of the filament and the smaller end broadly attached to the thecae. The gland varies from about twice as long as the thecae to only slightly longer than them and differs at least slightly in colour. From front view the anther is much broader than long. The thecae are quite small; they are connate and each opens across the end in a pore-like slit, with the pollen extruded as a mass that often stays on the anther in pressed specimens. The thecae are introrse and their terminal slits diverge at the base. In *B. pulcherrimum*, anthers appear to be fully erect as they have long, fairly erect, parallel thecae with longitudinal dehiscence and a shorter connective gland.

Gynoecium and fruit. There are 16–21 ovules per loculus in sect. *Balaustion*, mostly 5–9 per loculus in sect. *Nonfibrosa*, and 8–22 per loculus in sect. *Tilophloia*. The base of the style is enclosed in a cylindrical depression at the centre of the ovary and usually becomes more deeply inset in the fruiting stage as the fruit summit expands upwards. Fruiting placentas are sessile, with free margins extending outwards from a broad attachment. In sections *Balaustion* (Rye 2009a: Figure 1E) and *Tilophlioia* (Figure 1J) they are ovate to broadly elliptic and particularly large, with seeds attached around the full perimeter. The attachment areas are contiguous and are demarcated by slight ridges to highly raised partitions. The adaxial surface has a light brown or grey, smooth, flat rim. Section *Nonfibrosa* differs from the other sections in having fewer seeds borne on more irregular fruiting placentas that are smaller than in the other two sections but still large enough to accommodate large attachment areas.

Seeds and chaff. Seeds develop from few to most of the ovules. They are 1.2–1.8 mm long in most species but 2.0–2.4 mm long in *B. pulcherrimum*, shallowly to deeply colliculate and shiny, with the colliculae usually not as deep on the outer surface as on the lateral ones. There is a large concavity on the inner surface, usually 0.5–1 mm long (Figure 1K), but only 0.3–0.4 mm long in *B. thamnoides* (Figure 1L). The chaff pieces usually vary greatly in size but are all distinctly smaller than the seeds and more obviously facetted. They are usually differently coloured, either paler or darker, than the seeds.

Key to the named genera and sections of subtribe Hysterobaeckeinae

*Taxa that are keyed out more than once have an asterisk.

1. Seeds with a broad cavity usually 0.5–1 mm long on the inner surface, if the cavity smaller (0.3–0.4 mm in *B. thamnoides*) then with stem tissue disintegrating into numerous fibres ..... **BALAUSTION**

2. Hypanthium petaloid, orange to deep red, 9–20 mm long, with sepals and petals the same colour. Anthers fairly erect, dehiscent by 2 long parallel slits. Style 20–24 mm long ..... **BALAUSTION** sect. **BALAUSTION**

2: Hypanthium herbaceous, green to reddish, 1.5–4 mm long, with sepals and/or petals contrasting in colour. Anthers markedly tilted relative to filament, dehiscent by short divergent slits or pores. Style 2–12 mm long

3. Stems with sub-epidermal tissue that disintegrates into fibres. Stamen filaments ± contiguous or with small gaps at base but not, or only a few of them, connate. Ovules usually 10–22 per loculus ..... **BALAUSTION** sect. **TILOPHLOIA**

3: Stems with sub-epidermal tissue shed in strips with the epidermis. Stamen filaments either connate at the base or narrow and with distinct gaps between some or all adjacent filaments. Ovules usually 4–9 per loculus..... **BALAUSTION** sect. **NONFIBROSA**

1: Seeds lacking a cavity or with a cavity less than 0.3 mm long, or rarely with a narrow cavity less than 0.5 mm long. Stem tissue shed in strips or patches, with few or no fibres visible

4. Ovules 1 or 2 per loculus, if 2 then superposed..... **SCHOLTZIA**

4: Ovules 3–23 per loculus or rarely down to 2 per loculus in *Tetrapora*, if 2 then collateral, radially arranged if numerous

5. Ovary 1-locular or effectively so, i.e. with only one placenta

6. Stamen filaments very compressed at base. Anthers ± compressed ovoid, the connective gland not or scarcely protruding..... **BABINGTONIA***

6: Stamen filaments moderately to very thick. Anthers very thick, either with a distinctly protruding, dorsal connective gland or almost globular ..... **MALLEOSTEMON**

5: Ovary 2- or 3-locular and with the same number of placentas

7. Fruits indehiscent

8. Petals bright pink or orange to red. Stamens 30–60; connective gland not protruding. Fruits with a very hard, thick wall that is difficult to cut open ..... **CHEYNIANA**

8: Petals white or pale pink. Stamens 15–20; connective gland obvious, protruding below the thecae. Fruits with moderately thickened walls, readily cut open ..... **HYSTEROBAECKEA***

7: Fruits dehiscent at the summit by 2 or 3 valves

9. Stamens united ..... **BABINGTONIA***

9: Stamens free

10. Anthers rather helmet-like in shape (often with lateral grooves) or 2-lobed, dehiscent by terminal pores, the connective gland not obvious or only shortly protruding

11. Peduncles 1–6-flowered. Flowers with petals 2.3–6.5 mm long (if petals more than 5 mm long then sepals 0.2–1.1

mm long) and 8–25 stamens. Fruits 1/2 to largely inferior. Seeds brown ..... **BABINGTONIA***

11: Peduncles 1-flowered. Flowers with petals 4–7 mm long, sepals 1.1–1.6 mm long and 12–45 stamens. Fruits 1/2–2/3 superior. Seeds very dark brown or black ..... **ANTICORYNE**

10: Anthers of varied shape, either very compact (usually ± globular) or with the connective gland obvious as a swelling connecting the thecae to the unmodified part of the filament (usually with the stamen having a distinct bend at the base of the connective)

12. Anther connective gland either obscure or protruding by less than 0.25 mm from the base of the anther although it may be visible within the body of the anther, which is compact and often ± globular

13. Stamens (22–)25–35, in a continuous circle. Fruits 3-locular, fully inferior, with a broad, funnelled central depression ..... **OXYMYRRHINE**

13: Stamens 3–20(–25), in antisepalous groups (i.e. none directly opposite the centre of a petal) or if continuous then the fruits 2-locular. Fruits 2- or 3-locular, *c.* 1/2 to fully inferior, with a ± cylindrical central depression

14. Peduncles 1-flowered, with persistent bracteoles. Ovules 12–21 per loculus, never consistently 12. ..... **ERICOMYRTUS**

14: Peduncles 1–21-flowered, not regularly 1-flowered except in *Tetrapora tenuiramea*, with bracteoles usually shed before fruits form. Ovules 2–13 per loculus, never consistently 13

15. Anthers broader than the height of each of the thecae; connective gland protruding beyond the thecae, becoming hollowed. Seeds distinctly facetted in most species ..... **AUSTROBAECKEA**

15: Anthers globular or longer than wide; connective gland often evident as a paler coloured patch on the upper surface of the anther but not protruding beyond the thecae, not becoming hollowed. Seeds unfacetted or scarcely facetted ..... **TETRAPORA**

12: Anther connective gland obvious as a swelling connecting the thecae to the unmodified part of the filament (usually with the stamen having a distinct bend at the base of the connective), the protruding part of connective gland at least 0.25 mm long

16. Peduncles usually 3–9-flowered, never consistently 1-flowered (secondary axes absent). Seeds 0.6–0.8 mm long, reticulate-smooth. Occurring in eastern Australia and New Caledonia..... **SANNANTHA**

16: Peduncles 1–4-flowered. Seeds 0.6–2 mm long, if less than 0.8 mm long then colliculate to tuberculate. Endemic to mainland Australia (if in eastern Australia and with multi-flowered peduncles then the lateral flowers with secondary axes)

17. Seeds very smooth to almost tuberculate, without grooves. Extending from south-western and central Australia to north-western Victoria..... **HYSTEROBAECKEA***

17: Seeds deeply colliculate or tuberculate, each swelling minutely grooved. Occurring in eastern Australia

18. Leaves linear to circular, not uncinate. Sepals with a dorsal horn 0.3–1.7 mm long ..... **KARDOMIA**

18: Leaves linear or almost linear, uncinate. Sepals not horned..... **HARMOGIA**

Balaustion Hook., *Hooker's Icon. Pl.* 9, t. 852 (1851). *Type*: *Balaustion pulcherrimum* Hook.

Punicella Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg* 10: 333 (1852). *Type*: *Punicella carinata* Turcz. = *Balaustion pulcherrimum* Hook.

Cheynia J.Drumm. ex Harv., *J. Bot. Kew Gard. Misc.* 7: 56 (1855). *Type*: *Cheynia pulchella* J.Drumm. ex Harv. = *Balaustion pulcherrimum* Hook.

Shrubs prostrate or up to 1.2(–1.7) m high, glabrous; flowering branchlets with 1 or 2 flowers or up to 6 pairs of flowers. *Young stems* leafy, with a loose, pale grey epidermis and sub-epidermal tissue that, in most species, disintegrates into fine fibres when shed. *Leaves* opposite and decussate or rarely in whorls of 3, usually with a short but well defined petiole; blade linear in outline to almost circular, up to about as thick as wide; abaxial surface deeply convex or with steep sides and a convex summit, with 1 or few main rows of oil glands on each side of midvein; adaxial surface flat, narrowly grooved along middle, with oil glands often not as conspicuous as on abaxial surface. *Peduncles* short to moderately long, 1-flowered. *Bracteoles* strictly opposite or subopposite, broad, with margins incurved. *Buds* very obtuse. *Pedicels* absent to long. *Hypanthium* very broad to bell-shaped or cylindrical, often rugose-pitted or dotted with oil glands; adnate part broadly obconic to depressed hemispherical, sometimes 5-lobed; free part erect or spreading. *Sepals* 5, persistent in fruit, shorter than petals, in many taxa with a pale margin. *Petals* 5, very shortly clawed, broadly obovate to transversely broadly elliptic, white to brightly coloured. *Antipetalous colleters* minute, pale. *Staminodes* rare or absent. *Stamens* 13–35, geniculate, fairly uniformly distributed in a circle, in most species contiguous or with small gaps at the base, erect to incurved, those directly opposite the petals longest and those opposite the centre of the sepals shortest. *Anthers* introrse. *Ovary* 3-locular, *c.* 1/2 to fully inferior; summit raised at centre of flower; placentas axile, large, sessile, the adaxial surface with a free smooth rim surrounding the large zone of attachment, with ovules attached around the full margin; ovules 4–22 per loculus. *Style* with the base inset in a cylindrical depression; stigma small to moderately large, peltate, circular from top view. *Fruits* dry, almost fully inferior to 2/3 superior, few- or many-seeded; valves 3, fairly thick, opening to an erect position, often somewhat rugose or glandular-colliculate; placentas usually very large, ovate to broadly elliptic. *Seeds* slightly to distinctly facetted, somewhat reniform, with a large rounded outer surface, two equal lateral surfaces and a large inner surface, 1.2–2.6 mm long; inner surface with a broadly concave, whitish cavity (0.3–)0.5–1 mm long; testa crustaceous, golden to dark brown or greyish, colliculate, somewhat shiny. *Chaff pieces* smaller than seeds and of a different colour.

Diagnostic features. Distinguished from other genera in subtribe Hysterobaeckeinae by having a large cavity on the inner surface of its seeds. Other important characters: shrubs small, usually low-growing; sepals not horned; stamens 13–35, in a single circle; placentas sessile, large, with 4–22 ovules.

Size and distribution. A genus with 18 named species, endemic to the south-west of Western Australia, extending from Canna south-east to Frank Hann National Park and well inland. This distribution passes through parts of the Geraldton Sandplain, Avon Wheatbelt and Mallee bioregions of the South West Botanical Province and the Yalgoo and Coolgardie bioregions of the Eremaean Botanical Province, with one isolated record from the Murchison bioregion.

Etymology. '*Balaustion* is an old name given to the wild flowers of the Pomegranate' (Hooker 1851).

Chromosome number. There is probably a uniform base chromosome number of $x = 11$ as in other genera of subtribe Hysterobaeckeinae, but it is not known whether any polyploidy occurs in *Balaustion*. So far the only two records, both published by Rye (1979), are of the diploid number of $n = 11$, both from specimens now identified as *B. exsertum* (see details under that species).

Affinities. As discussed in the introduction, molecular studies suggest a relationship between *Balaustion* and the *Baeckea muricata* group as well as *Harmogia* and *Sannantha* from eastern Australian. Those related taxa do not have an obvious cavity on their seeds. However, two Western Australian species that do have a distinct, but narrow, cavity less than 0.5 mm long, are *Baeckea* spp. Nanga (A.S. George 11346) and Perenjori (J.W. Green 1516). In this case the seed is narrower on the inner surface and the cavity shape therefore also narrower than in *Balaustion* species. Those two species also differ in having some tendency for five antisepalous ribs on the hypanthium and base of the sepals, suggesting that they might be related to *B. elderiana* E.Pritz. and *Ericomyrtus* Turcz.

Co-occurring species. There has only been one record of co-occurrence of *Balaustion* species belonging to the same section. Two members of sect. *Tilophloia*, *B. thamnoides* (*G.F. Craig* 7029) and *B. grandibracteatum* subsp. *meridionale* Rye (*G.F. Craig* 7031), were recorded together near Mt Gibbs.

Balaustion pulcherrimum (sect. *Balaustion*) has been recorded growing with *B. quinquelobum* Rye (sect. *Tilophloia*) near Narembeen (*B.L. Rye & M.E. Trudgen* BLR 241153) and near Muntadgin (*M.E. Trudgen* MET 23383). It has also been recorded with *B. multicaule* (*B.L. Rye & M.E. Trudgen* BLR 241168) in the Sheoak Rock area, east of Hyden.

Baeckea muricata (sister to the *Balaustion* group) has been recorded growing with *Balaustion quinquelobum* at many locations from the Merredin area to east of Yellowdine (e.g. *B.L. Rye & M.E. Trudgen* BLR 241140) and with *B. grandibracteatum* at one locality (*M.E. Trudgen* MET 23363). Another member of the sister group, *Baeckea* sp. Chapman Road (M.E. Trudgen 5446), has been recorded (*B.L. Rye & M.E. Trudgen* BLR 241151) growing with both *Balaustion pulcherrimum* and *B. quinquelobum*.

Notes. Keighery (1982) suggested that bee-pollination is of greatest importance in *Baeckea s. lat.*, with beetle- and fly-pollination of lesser importance. In comparison with other genera of Hysterobaeckeinae, *Balaustion* has large flowers, which may produce more copious nectar. Such characteristics would be likely to predispose this group to specialisation for bird-pollination, as has occurred in *B. pulcherrimum*.

Key to species and subspecies of *Balaustion*

1. Petals orange or red, 7–10 mm long. Mature style 10–24 mm long

2. Leaves keeled for full length of blade, with an apical point 0.15–0.3 mm long. Hypanthium 8–20 mm long. Mature style 20–24 mm long (Latham–Kirkalocka Stn–near Hyden–W of Kalgoorlie) ..... **B. pulcherrimum**

2: Leaves only keeled in distal half, often indented along the midvein proximally, lacking an apical point. Hypanthium 3–4 mm long. Mature style 11–12 mm long (Diemals Stn area) ..... **B. tangerinum**

1: Petals white or pink, 2.5–7 mm long. Mature style 2–4 mm long

3. Young stems shedding outer layers in strips (without splitting into fibres). Stamens either all connate at the base, or in an interrupted circle with distinct gaps between some or all of the narrow-based filaments. Ovules 4–9(–11) per loculus

4. Peduncles 0–0.6 mm long, greatly exceeded by pedicels 2–8.5 mm long. Sepals 1.3–3 mm long. Stamens 16–28, basally united for 0.3–1 mm into a ring (Bookarra–Wongan Hills)..... **B. grande**

4: Peduncles 1–4.5 mm long, much longer than to slightly exceeded by pedicels 0–2 mm long. Sepals 0.5–1.3 mm long. Stamens 13–23, free, in an interrupted circle

5. Hypanthium ± hemispherical in bud and flower. Sepals 0.8–1.2 mm long. (Canna–Billeranga Hills)..... **B. hemisphaericum**

5: Hypanthium ± broadly obconic in bud and flower. Sepals 0.5–0.9 mm long. (Petrudor Rock Reserve–Wyalkatchem–Mukinbudin)..... **B. interruptum**

3: Young stems with outer layers tending to disintegrate into numerous fibres. Stamens all free or rarely with a few of the stamens connate, contiguous at base or with gaps narrower than the broad base of the filament. Ovules (8–)10–22 per loculus

6. Leaves all with the keel distally rounded, not knobbed or pointed (see Figure 1E & F), the apex also not pointed in most taxa

7. Mature stigma 0.3–0.4 mm diam. Seeds dark brown; cavity 0.3–0.4 mm long, much shorter than seed (Hatter Hill–Mt Gibbs area–near Frank Hann NP)..... **B. thamnoides**

7: Mature stigma 0.15–0.25(–0.3) mm diam. Seeds golden brown to medium brown; cavity 0.6–0.7 mm long, about half as long as seed

8. Leaves not much thickened, with the larger oil glands in 2 to 4 main rows on each side of midvein. Mature style 2.6–3.2 mm long. Occurring well to the N of Merredin

9. Sepals inconspicuous (see Figure 1G), 0.5–0.8 mm long. Bracteoles *c.* 2 mm long, shed early (near Kalannie–NE of Wongan Hills–E of Koorda)..... **B. baiocalyx**

9: Sepals obvious, 2–2.5 mm long. Bracteoles 4–6 mm long, persistent in flower (Diemals Stn–Bonnie Rock–Wialki)..... **B. karroun**

8: Leaves all or mostly very thick, less than four times as wide as thick, with the larger oil glands usually in 1 or 2 main rows on each side of midvein. Mature style 1.6–2.5 mm long. Occurring E and SE of Merredin

10. Shrub with multiple slender stems from a thickened woody base. Leaves 0.5–0.7 mm wide (S of Sheoak Rock)..... **B. multicaule**

10: Shrub single-stemmed or several-branched at base. Leaves 0.7–1.5 mm wide

11. Peduncles not changed much at distal end. Pedicels 0.7–1.5 mm long. Bracteoles usually caducous,

2–3 mm long (Mt Gibbs area–near NW end Frank Hann NP) ..... **B. grandibracteatum** subsp. **meridionale**

11: Peduncles usually broader and somewhat flattened distally. Pedicels 0–0.5(–0.7) mm long. Bracteoles caducous to persistent, 3–6 mm long

12. Bracteoles enclosing late buds and persistent after anthesis, usually present on mature fruits, 4–6 mm long (W of Southern Cross–Yellowdine) ..... **B. grandibracteatum** subsp. **grandibracteatum**

12: Bracteoles enclosing young buds but rarely present at anthesis, absent from mature fruits, 3–5.5 mm long (Mt Holland area–Forrestania area) ..... **B. grandibracteatum** subsp. **juncturum**

6: Young leaves with the keel projecting into a subterminal knob or small point, often with some leaves also with an apical point making them double-pointed (see Figure 1A–D).

13. Leaves obovate to almost circular, lacking a terminal point but with the keel often ending in an abrupt subterminal claw-like point. Associated with granite (N of Bullfinch) ..... **B. unguiculatum**

13: Leaves linear in outline to obovate-elliptic, commonly double-pointed, both the keel and the apex tending to have a small point. Occurring on sandplain, with *B. spenceri* probably also associated with granite

14. Bracteoles enclosing the mature bud, often persistent after anthesis and embracing the hypanthium, 4–5.5 mm long. Pedicels ± absent. Sepals 1.4–2.5 mm long (Bonnie Rock–Chiddarcooping NR) ..... **B. mukinbudin**

14: Bracteoles either borne well below the flowers at anthesis or shed at an earlier stage, 0.8–3.5 mm long. Pedicels 0.5–4 mm long. Sepals 0.8–2 mm long

15. Petals 6–7 mm long. Stamens *c.* 30. Ovules 20–22 per loculus (E of Koolyanobbing) ..... **B. polyandrum**

15: Petals 3–6 mm long. Stamens 15–25. Ovules 8–16 per loculus

16. Mature style 1.4–2.2 mm long

17. Hypanthium with 5 lobes surrounding and extending slightly below (rarely level with) the apex of the pedicel (North Bungulla NR–Lake Grace–E of Lake King) ..... **B. quinquelobum**

17: Hypanthium lacking lobes but sometimes with broadly rounded antisepalous 'ridges', entirely above the apex of the pedicel (Billyacatting Hill area) ..... **B.** sp. **Billyacatting Hill**

16: Mature style 2.5–4 mm long

18. Petioles 0.1–0.2 mm long. Longest leaf blades 3–7 mm long, 0.2–0.3(–0.4) mm wide, broadest at the base, entire (Bonnie Rock area–Mukinbudin area) ..... **B. filifolium**

18: Petioles 0.2–0.6 mm long. Longest leaf blades 1.3–5 mm long, 0.3–1.2 mm wide, usually narrowed at the base or not exceeding the width elsewhere, toothed laterally or around the apex at least when young

19. Bracteoles 2–3.5 mm long. Pedicels 0.6–2 mm long, much shorter than the peduncles (S of Mukinbudin) ..... **B. bimucronatum**

19: Bracteoles 0.8–1.6(–2) mm long. Pedicels (1.2–)2–3.5 mm long, shorter than to much longer than the peduncles

20. Leaf blades not very thick, remaining flattened at all stages (W of Bullfinch)..... **B. spenceri**

20: Leaf blades 0.4–0.5 mm thick, mostly or at least some of them not much broader than thick (Waddouring Hill–Hyden area) ..... **B. exsertum**

A. Balaustion Hook. sect. **Balaustion**

Shrubs prostrate, often with adventitious roots; flowering branchlets with 1 or 2(–6) fertile nodes, the flowering nodes often separated by sterile nodes. *Young stems* with sub-epidermal tissue that disintegrates into fine fibres. *Leaves* with petiole very well defined; blade dorsiventrally flattened, with an apical point. *Peduncles* longer than pedicels, which are usually ± absent. *Bracteoles* not scarious except on the margin. *Flowers* uniformly orange or red on the hypanthium, sepals and petals. *Hypanthium* long, bell-shaped or more cylindrical, free from ovary for more than half of its length. *Sepals* lacking an obviously contrasting border (fairly uniformly coloured). *Petals* erect or somewhat spreading, laciniate-toothed. *Stamens* 15–35, free, contiguous, without an obvious bend. *Broadest filaments* 0.4–0.7 mm wide near base. *Anthers* appearing ± erect and ± basifixed, dehiscent by long parallel slits; connective conspicuously coloured but gland not very obvious; thecae erect, parallel, longer than the connective. *Ovary* inferior; ovules 16–21 per loculus. *Fruits* almost fully inferior and hidden within the base of a long hypanthium, which has the same texture throughout. *Seeds* 2.4–2.6 mm long, medium brown, sometimes somewhat greyish, deeply colliculate.

Diagnostic features. Distinguished from the other two sections by its longer hypanthium, rather erect anthers dehiscent by long parallel slits, longer style and larger seeds.

Size and distribution. A monotypic section occurring in the Avon Wheatbelt and Mallee Bioregions of the South West Botanical Province and the Murchison, Yalgoo and Coolgardie bioregions of the Eremaean Botanical Province (Figure 3).

Notes. This section was revised in Rye (2009a) as *Balaustion s. str.* It comprises the only species of the now greatly expanded genus to have the hypanthium, sepals and petals all of the same colour, a character presumably adaptive to bird pollination. The sepals lack the obviously contrasting border found commonly in members of the other two sections of *Balaustion* although the border is thinner in texture and may differ somewhat in its colouring from the remainder of the outer surface.

1. Balaustion pulcherrimum Hook., *Hooker's Icon. Pl.* 9: t. 852 (1851). *Type citation*: 'South-western Australia, discovered between the Swan River and King George's Sound, *Drummond*'. *Type*: S.W. Australia, 1850 [south-west of Western Australia, 1847–1849], *J. Drummond* coll. 5 suppl.: 26 (*lecto*, here designated (or possible *holo*): K 000355362; *isolecto*: BM 000793705, G 00227446, K 000355360 & 000355361, KW photo seen).

Punicella carinata Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg* 10: 333 (1852). *Type*: 'Drum. V, n. 26' [south-west of Western Australia, 1847–1849], *J. Drummond* coll. 5 suppl.: 26 (*holo*: KW photo seen; *iso*: BM 000793705, G 00227446, K 000355360–000355362).

Cheynia pulchella J.Drumm. ex Harv., *J. Bot. Kew Gard. Misc.* 7: 56 (1855). *Type*: 'Northern districts' [south-west of Western Australia], *J. Drummond s.n.* (*holo*: TCD *n.v.*).

Illustrations. W.J. Hooker, *Hooker's Icon. Pl.* 9: t. 852 (1851); W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 88 (1980); M.G. Corrick, B.A. Fuhrer & A.S. George, *Wildfl. Southern W. Austral.* (1996: Figure 328); B.L. Rye, *Nuytsia* 19: 133, Figure 1 (2008); drawing on *C.A. Gardner s.n.* 20 Sep. 1934 (PERTH 03479382).

Prostrate *shrub* 0.2–1.2 m across, sometimes with centre raised up to 0.2 m high; flowering branchlets with 1 or 2 or rarely up to 6 fertile nodes each bearing 1 or 2 flowers. *Leaves* mostly antrorse to patent. *Petioles* 0.3–0.6 mm long. *Leaf blades* ovate to narrowly obovate, 2.7–6 mm long, 1.2–1.5 mm wide, often glossy, margins laciniate or entire, with a white apical point 0.15–0.3 mm long; abaxial surface with a narrow keel that is prominent especially towards the apex, the larger oil glands in 2–4 main rows on each side of midvein. *Peduncles* 2–4 mm long, often orange to deep maroon. *Bracteoles* persistent, 2–3.5 mm long, orange with a somewhat greenish base or orange throughout to reddish. *Pedicels* up to *c.* 1 mm long but usually absent. *Flowers* 15–25 mm diam., orange or red on the hypanthium, sepals and petals. *Hypanthium* bell-shaped or more cylindrical, 8–20 mm long, 6–8 mm diam. at summit; free part 5–14 mm long. *Sepals* very broadly or depressed ovate, 2.5–4 mm long, 3–6.5 mm wide, entire to minutely laciniate. *Petals* erect or somewhat spreading, 7–9 mm long. *Stamens* as described for the section. *Antipetalous filaments* 6.5–8(–11) mm long. *Anthers* 0.4–0.6 mm wide, almost basifixed, introrse; connective broad and protruding to inside of thecae, 0.35–0.6 mm long, orange or reddish; thecae fairly erect, parallel, 0.55–0.9 mm long, pale-coloured. *Ovary* inferior; ovules 16–21 per loculus. *Style* 20–24 mm long; stigma 0.4–0.8 mm diam. *Fruits* 7–8 mm long, 9–10 mm diam., the hypanthium usually 10–15 mm long; placentas broadly ovate, 3–4.5 × 2.5–3.5 mm. *Seeds* somewhat facetted, 2.4–2.6 mm long, 0.7–1 mm wide, 1.4–1.6 mm thick; inner cavity 0.5–0.7 mm long. (Figure 2)

Diagnostic features. As for the section.

Selected specimens examined. WESTERN AUSTRALIA: on E side of main N–S track *c.* 7.7 km SSE Corriding Rock, ex Credo Station, 5 Sep. 2011, *N. Gibson & M.A. Langley* 5244 (PERTH); Mt Gibson Wildlife Sanctuary, Emu track, *c.* 6.1 km E of Goodlands Rd, 7 Oct. 2015, *M. Hislop & F. Lewis* MH 4540 (PERTH); Scott Rd, 5.3 km SSE of Bulls Head Rd, 1.9 km W of Koonadgin Rd, SE of Merredin, 4 Nov. 2004, *B.L. Rye & M.E. Trudgen* BLR 241135 (PERTH); Lazy Dee Farm, 27 km E of Hyden on Hyden–Norseman Rd, 22 June 2016, *J.E. Wajon* 3568 (PERTH).

Distribution and habitat. Extends from near Mongers Lake (east of Perenjori) and Kirkalocka Station south-east to near Hyden (Figure 3), occurring with varied sandplain species, often in yellow sand.

Phenology. Flowers recorded mainly from September to November and mature fruits mainly from October to December.

Etymology. From the Latin superlative of *pulcher* (beautiful), i.e. very beautiful or most beautiful.

Vernacular name. Native Pomegranate.

Figure 2. *Balaustion pulcherrimum*. A – a picked flowering stem showing the young stem starting to disintegrate into fibres, two flower buds and three open flowers with a protruding style; B – a prostrate flowering stem on sand at a reserve west of Lake Koorkoordine, showing flowers from top view. Photographs by Kevin Thiele (A, from *K.R. Thiele* 4253) and Juliet Wege (B, unvouchered).

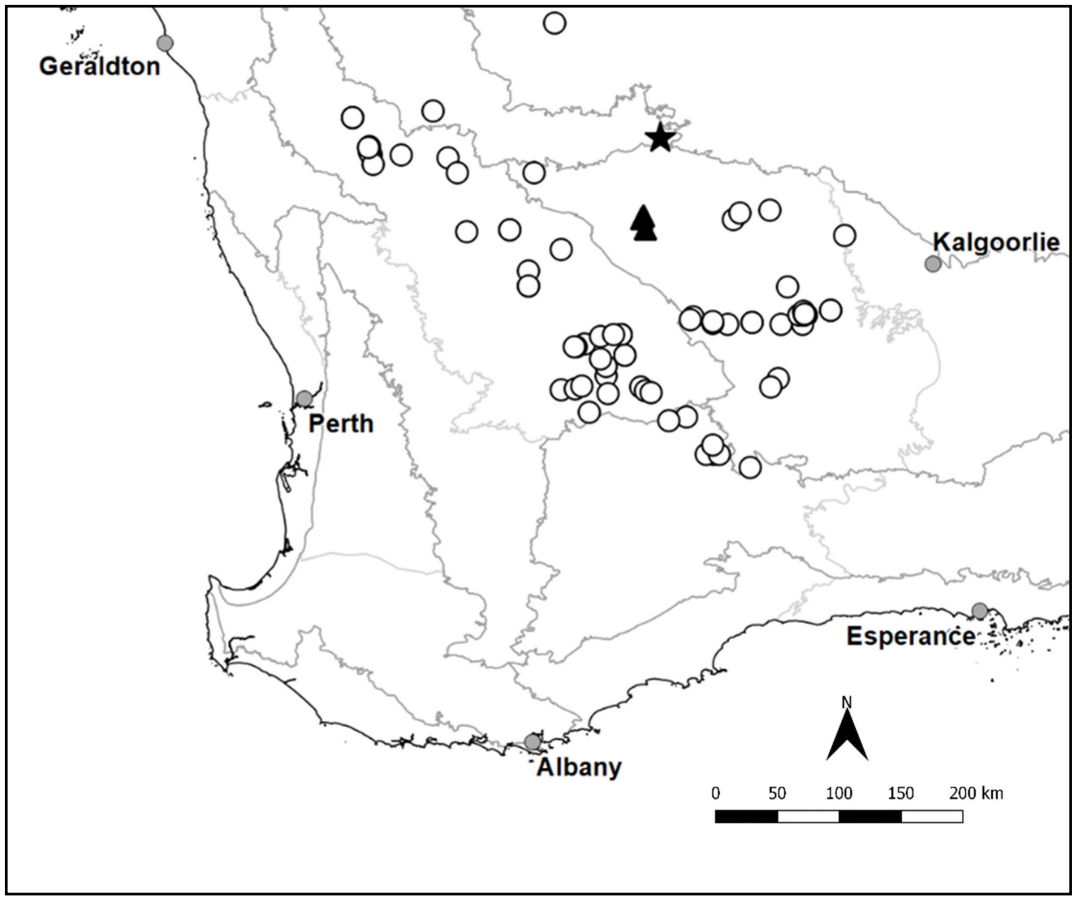

Figure 3. Distribution of the monotypic *Balaustion* sect. *Balaustion*, i.e. of *B. pulcherrimum* (○), the possible hybrid *B. tangerinum* (★) and possible parent *B. unguiculatum* (▲).

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

Typification. The KW holotype of *Punicella carinata* Turcz. has not been examined and is not currently displayed on *Global Pants*. However, a photograph of it taken by Neville Marchant has been seen at PERTH. A specimen examined by Hooker, K 000355362, is likely to be the holotype of *Balaustion pulcherrimem* Hook. because it is the only specimen stamped 'Herb. Hookerianum'. To avoid any doubt, this specimen is designated here as the lectotype.

Notes. At least one specimen (*W.E. Blackall s.n.* Sep. 1929) has the leaves in whorls of three, but the flowers are still only one or two per node.

Balaustion pulcherrimum has the largest area of distribution in the genus and its range overlaps the area of occurrence of some members of sect. *Tilophloia* (see co-occurring species section above). There is a possibility that *B. tangerinum* (see discussion under that taxon) is a hybrid between sections *Balaustion* and *Tilophloia*.

B. Balaustion sect. **Nonfibrosa** Rye, *sect. nov.*

Type: *Balaustion grande* (E.Pritz.) Rye.

Shrubs low or rarely over 1 m high; flowering branchlets with 1–6 fertile nodes, each node usually with a pair of flowers. *Young stems* with outer layers shed in long narrow strips but without disintegrating into fine fibres. *Leaves* ± *sessile* or with a very short petiole that is not as well defined as in the other sections; blade thick, not pointed. *Peduncles* very short to greatly exceeding the pedicels. *Bracteoles* scarious or partially herbaceous. *Flowers* with hypanthium and sepals distinct in their colouring from the petals. *Hypanthium* broadly obconic to hemispherical, adnate to ovary for most of its length. *Sepals* somewhat herbaceous with a petaloid border. *Petals* widely spreading or fairly erect, white or pink, minutely denticulate or entire. *Stamens* 13–27, either connate at the base or separated by distinct gaps, with a subterminal, 90° bend. *Broadest filaments* (at lowest free point) 0.1–0.5 mm wide. *Anthers* attached almost at base of connective gland to the free filament, dehiscent by two elliptic pores or short slits that diverge at the base; connective gland conspicuous, the exposed part somewhat longer than the thecae. *Ovary c.* 2/3 inferior to just over 1/2 superior; placentas ± elliptic, not particularly large; ovules 4–9(–11) per loculus. *Fruits c.* 1/2–2/3 superior, with hypanthium much shorter than the fruit. *Seeds* 1.3–1.6 mm long, pale to medium brown, deeply colliculate.

Diagnostic features. Distinguished from the other two sections of *Balaustion* by having the stamens either connate at the base or separated by distinct gaps, young stems shedding outer layers in strips rather than fibres, leaves sessile or less obviously petiolate, usually fewer ovules, and smaller fruiting placentas.

Size and distribution. Three species are recognised, occurring in the Avon Wheatbelt and Geraldton Sandplains bioregions of the South West Botanical Province and the Yalgoo bioregion of the Eremaean Botanical Province. The section extends from Canna south-east to Wyalkatchem (Figure 4).

Etymology. From the Latin *non* (not) and *fibrosus* (fibrous) as the outer stem tissue does not disintegrate into numerous fibres.

Notes. The few species placed here fall into two distinct categories based on their peduncle lengths and stamen characters (see key) but are placed in the same section because of their non-fibrous young stems and some similarities in their habit, leaf morphology, placentas, ovule numbers, seed surface and geographic distribution. They have a rugose-pitted hypanthium and persistent bracteoles like those of the *B. exsertum* group. Their seeds are deeply colliculate (almost tuberculate) whereas those of sect. *Tilophloia* are shallowly colliculate. Their petals are about 2–3 times longer than the stamen filaments whereas sect. *Balaustion* has petals and stamens of about the same length.

2. Balaustion grande (E.Pritz.) Rye, *comb. nov.*

Baeckea grandis E.Pritz. in L. Diels & E. Pritzel, *Bot. Jahrb. Syst.* 35: 417 (1904). *Type citation*: ‘Hab. in distr. Irwin haud proc. a Greenough River pr. Bukara in fruticosis glareoso-arenosis flor. m. Sept. (D. 6028)’. *Type specimens*: Bukara [Bookara], south of Greenough River, Western Australia, 10 September 1901, *F.L.E. Diels* 6028 (*lecto*, here selected: PERTH 01605569 ex B; probable *isolecto*: PERTH 03353893 ex B).

Baeckea grandis var. *brevifolia* C.A.Gardner ms, *in sched.* (PERTH 03353834, PERTH 03353842).

Baeckea grandis var. *minor* W.E.Blackall *nom. nud.*, in W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 1: 289 (1954); *in sched.* (PERTH 03353761, PERTH 08511861).

Illustrations: W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 1: 289 (1954), as *Baeckea grandis*; drawings on *C.A. Gardner* 2701 (PERTH 03353834) and *F. Vanzetti s.n.* (PERTH 03353842).

Low-growing *shrub*, usually 0.4–0.5 m high, 0.2–1 m wide; flowering branchlets with 1–3(–6) pairs of flowers. *Leaves* mostly antrorse to patent, often clustered. *Petioles* 0–0.3 mm long. *Leaf blades* ± oblong or narrowly oblong in outline, 2–4(–6) mm long, 0.5–1 mm wide, 0.4–0.8 mm thick, obtuse, initially with scarious lateral margins up to 0.3 mm wide that are broadest towards the apex and sometimes denticulate, tending to lose the scarious borders and become consistently entire at maturity; abaxial surface deeply curved on each side of the convex centre to form almost parallel sides, the oil glands in 1–4 main rows on each side of midvein, of very variable number but often *c.* 6 per row; adaxial surface fairly flat. *Peduncles* 0–0.6 mm long. *Bracteoles* persistent, 1.5–2.3(–2.5) mm long. *Pedicels* (2–)6–8.5 mm long. *Flowers* 8–13 mm diam. *Hypanthium* 1–1.5 mm long, 1.75–3.5 mm diam., finely rugose-pitted; free part 0.4–0.8 mm wide. *Sepals* broadly to depressed ovate, 1.3–3 mm long, 2.3–3.5 mm wide, deep maroon except near margin, the midvein often raised (but not part of any definite ridge); whitish border 0.2–0.6 wide, entire. *Petals* 2.5–6 mm long, usually white or pale pink, rarely a more obvious pink. *Stamens* 16–28, connate in a ring. *Antipetalous filaments* 1.2–2.5 mm long, united in basal 0.3–1 mm, up to 0.5 mm broad at base. *Anthers c.* 0.3 mm wide from front view;

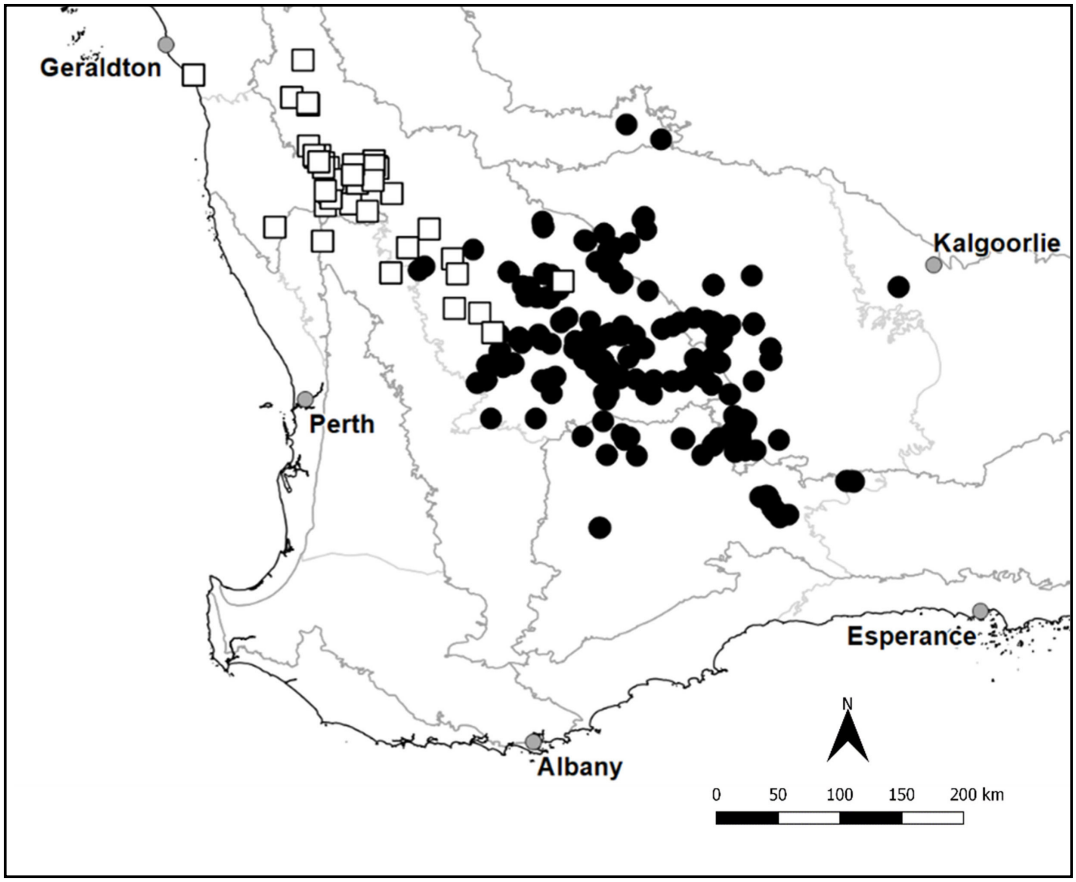

Figure 4. Distribution of *Balaustion* sections *Nonfibrosa* (□) and *Tilophloia* (●).

connective gland 0.3–0.35 mm long, pale-coloured; thecae 0.15–0.2 mm long, deep maroon. *Ovary c.* 1/2 or just over 1/2 superior; ovules 4–9 per loculus. *Style* 1.5–2.5 mm long; stigma 0.2–0.3 mm diam. *Fruits c.* 2/3 superior, 2.5–3.5 mm diam., 2–3 mm wide; hypanthium very shallow, smooth; placentas often irregular in height, ± elliptic to almost oblong in outline, 1–1.4 × 0.55–0.65 mm. *Seeds* 1.2–1.6 mm long, 0.5–0.7 mm wide, 0.65–0.75 mm thick, pale to medium brown, deeply colliculate; inner cavity 0.5–0.8 mm long.

Diagnostic features. Distinguished from all other members of the genus by its basally connate stamens and by its pedicels, which usually greatly exceed the peduncles in length.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 18 Sep. 2008, *R.L. Barrett, M.D. Barrett & C. Karsten* RLB 5072 (NSW, PERTH); Aug. 1977, *C. Chapman s.n.* (AD, BRI, NSW, PERTH); 15 Oct. 1982, *J. Coleby-Williams* 226 (PERTH); 4 Oct. 1981, *L.A. Craven* 6925 *& C. Chapman* (CANB *n.v.*, MEL *n.v.*, PERTH); 2 Sep. 2008, *M. Davis* 508 (PERTH); 20 Sep. 1985, *N. Hoyle* 307 (CANB, PERTH); 20 Sep. 1981, *B. Jack & V. Syme s.n.* (PERTH); 18 Sep. 2002, *M.E. Trudgen* 21607 (CANB, K, MEL, PERTH); 8 Nov. 2009, *M.E. Trudgen & P. Jobson* MET 23596 (PERTH); 31 Aug. 1976, *L.D. Williams* 8586 (AD *n.v.*, PERTH).

Distribution and habitat. Commonly occurs on sandplains or in sand overlying laterite. The full range recorded for this species is from Bookara (south of Greenough River) south-east to Wongan Hills (Figure 5). However, all collections since 1975, and also most of the collections up to 1975, have come from the region bounded by Winchester, Moora and Wubin. This main area of occurrence for the species was described by Griffin (1994 Appendix 6, p. 20) as east of the Darling fault. Four outlying localities that might not all be reliable are shown with an open symbol in the distribution map (Figure 4), as follows:

1. the type locality of 'Bukara' is 130 km north-east of the confirmed range of *B. grande* based on subsequent collections. The collecting routes taken by Diels (see Diels & Pritzel 1904) did also include many locations that are well within the confirmed range, such as Watheroo, so there is a possibility that the type locality was incorrectly recorded. However, if the date given for the type collection of 10 September 1901 is correct, then the locality must have been much closer to Bookara and the species must be assumed to have a large disjunction in its range.

2. 'near Mullewa (south of)' on *M.E. Trudgen s.n.* 1975 (PERTH 03353648). This vague locality could be taken to include the confirmed range of *B. grande*, which begins *c.* 130 km south of Mullewa; however, the implication is that it came from much closer to Mullewa, so it has been mapped as Mullewa in Figure 3B. The locality of this unnumbered collection, with no precise date and without any habitat information, is likely to be inaccurate or extremely vague.

3. 'Hill River' on *N.H. Speck s.n.* 22 Sep. 1951 (PERTH 03353591). This vague locality has been mapped as the upper reaches of Hill River, but the entire river is on the west side of the Darling fault.

4. 'Wongan Hills' on *C.A. Gardner s.n.* Dec. 1924 (PERTH 03353788). Both the locality and late flowering time of December are doubtful for this specimen, but perhaps the main reason for concern is that this sheet previously also had a piece of *Tetrapora floribunda* (Benth.) Trudgen & Rye, which has now been removed to a separate sheet (PERTH 08254192). *Tetrapora floribunda* is typical of the Wongan Hills flora and known to include a flowering time of December so the presence of *B. grande* may have been an accidental admixture of a quite independent collection.

Phenology. Flowers recorded from July to October and mature fruits from September to November.

Etymology. From the Latin *grandis* (great, large), presumably referring to the large size of the flowers in comparison with most other species that have been included within *Baeckea s. lat*. According to the protologue, the sepals are about 4 mm long and the petals are up to 7–9 mm long or wide, although the few flowers on the PERTH type specimens have sepals 2–2.5 mm long and petals 5–6 mm long.

Conservation status. This species has a good number of specimens, including two from a nature reserve, but there are few recent collections. Recently listed as Priority Three under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998 –), as *Baeckea grandis*.

Typification. Two fragments of Diels' gathering of *Baeckea grandis* were obtained by Charles Gardner from Berlin prior to the destruction of Myrtaceae type material housed at B during WWII; no other duplicates of this collection are known. The designated lectotype (PERTH 01605569), which has the locality 'Bukara', is a very small piece but has a number of open flowers attached as well as a packet containing a dissected flower. The fragment on the other specimen (PERTH 03353893) is larger and mostly in bud with only one open flower and, although annotated by Gardner as *B. grandis*, is incorrectly labelled as 'in distr. Irwin pr. Greenough River, pontem Mullewensem in fruticetis arenosis, L. Diels 4192 Septem. 1901', details that match the type citation of *Baeckea staminosa* E.Pritz. This specimen, which has connate stamens, is referable to *B. grandis* and is interpreted here as probable type material.

Variation. According to the protologue, the type has leaves 2–3 mm long, and measurements of the type fragments confirm this. Specimens that have been identified as *Baeckea grandis* var. *brevifolia* C.A.Gardner ms (*C.A. Gardner* 2701 and *F. Vanzetti s.n.* Oct. 1928) have leaves of a similar length, i.e. should be considered the typical variant in this respect, although in the former case only one of the four pieces mounted has consistently short leaves. Most other specimens have predominantly long leaves, with the maximum length recorded being *c.* 6 mm, or a mixture of short and long leaves, rendering this leaf character unsuitable for distinguishing entities within the species.

There is considerable variation in flower size in the species. Blackall and Grieve (1954: 289) recognised two entities, with *Baeckea grandis* keyed as having large flowers with petals '± 4 mm diam.' and *B. grandis* var. *minor* Blackall *nom. nud.* as having small flowers with petals '± 2 mm diam.'. In fact, the smallest-flowered specimens at PERTH (e.g. *M. Davis* 508 and *F. Lullfitz* L1892) have petals *c.* 2.5 mm long and *c.* 3 mm diam., and so fall halfway between the two choices of petal diameter offered in Blackall and Grieve's key. Diels and Pritzel (1904: 417) recorded the petals as 'ad 7–9 mm longa ac. lata' but the maximum size recorded in the current study was 6 mm long.

Most specimens have white or pale pink petals but a few collections (*L.A. Craven & C. Chapman* 6925, *C. Chapman s.n.* Aug. 1977) appear to have bright pink flowers. Pedicel length varies from about 2 mm to 8.5 mm. Stamen numbers and the degree to which stamens are united also show considerable variation within *B. grande*.

Affinities. This species is presumed to be more closely related to *B. hemisphaericum* and *B. interruptum* than to all other members of the genus (see notes under section description), although these taxa are readily distinguished by their longer peduncles and free stamens. They also differ in having shorter sepals, more truncate leaves, the hypanthium adnate to the ovary for a greater proportion of its length, and the style usually 0.7–1 mm longer than the stamen filaments (*B. grande* generally has little or no difference in the lengths of these organs).

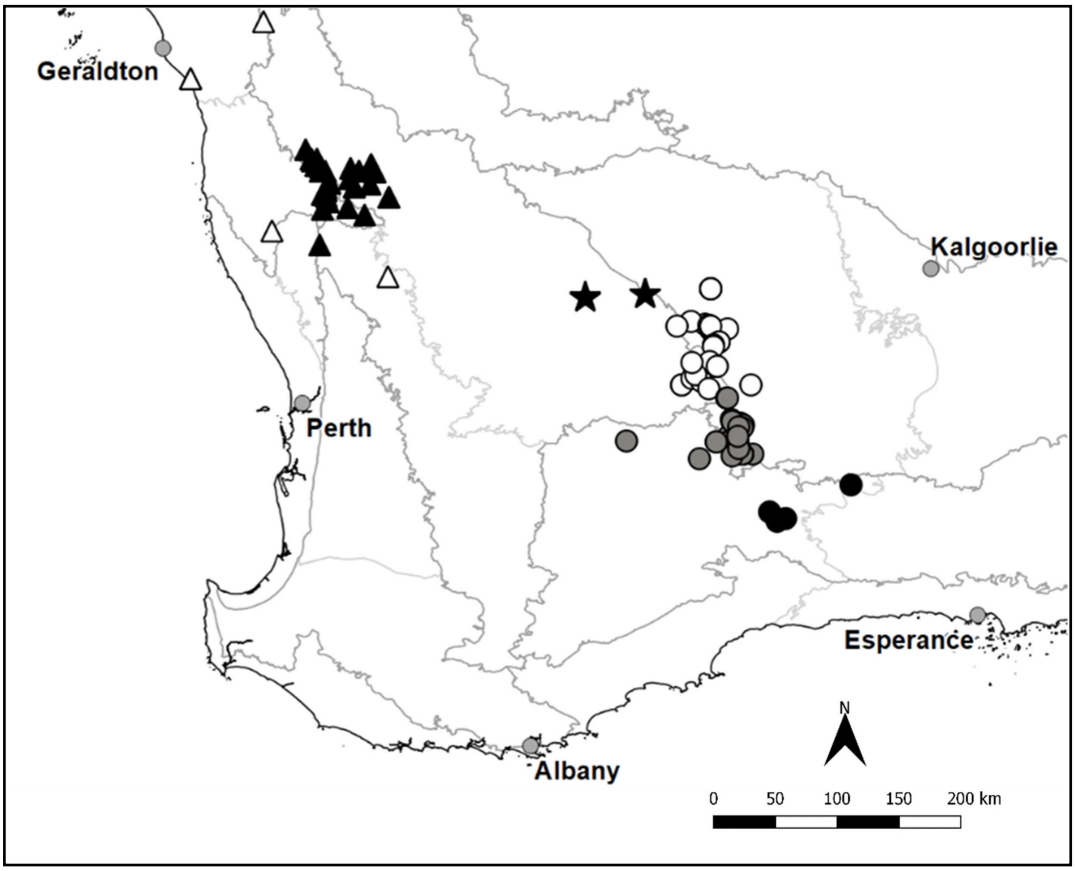

Figure 5. Distribution of *Balaustion bimucronatum* (★), *B. grande* confirmed (▲) and unconfirmed localities (△), *B. grandibracteatum* subsp. *grandibracteatum* (○), *B. grandibracteatum* subsp. *juncturum* (◉) and *B. grandibracteatum* subsp. *meridionale* (●).

Notes. Although several characters described above are sufficiently variable to have prompted the recognition of additional entities, no clear discontinuities in morphology have been found to justify recognising more than one species or subspecies. Field work targeting *B. grande* populations is needed to clarify the variation further and could possibly lead to the description of additional taxa.

3. Balaustion hemisphaericum Rye, *sp. nov.*

Type: north-east of Arrino, Western Australia [precise locality withheld for conservation reasons], 25 September 1990, *R.J. Cranfield & P.J. Spencer* 7853A (*holo*: PERTH 01209345; *iso*: CANB, K, MEL, NSW).

Baeckea cryptonoma Trudgen ms, in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 347 (2000), *ex parte*; Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022], *ex parte*.

Shrub 0.2–0.6(–1) m high, *c.* 0.5 m wide; flowering branchlets with 1–6 pairs of flowers. *Leaves* antrorse to patent. *Petioles* 0–0.15 mm long. *Leaf blades* ± oblong to narrowly oblong-obovate in

outline, 1.4–1.7(–2.5) mm long, 0.7–1 mm wide, 0.6–0.8 mm thick, ± truncate, denticulate (at least distally) on a narrow scarious margin; abaxial surface deeply convex (with almost parallel sides), oil glands in 2 or 3 main rows on each side of midvein, few per row; adaxial surface fairly flat. *Peduncles* 2–4.5 mm long. *Bracteoles* ± opposite to *c.* 1 mm separated, persistent, ovate or broadly ovate, 1.3–1.5 mm long. *Pedicels* (0–)0.4–2 mm long. *Flowers* 7.5–9 mm diam. *Hypanthium* hemispherical, 1.3–1.5 mm long, 2.5–3.5 mm diam., very pitted-rugose on adnate part; free part 0.3–0.5 mm long. *Sepals* depressed ovate, 0.8–1.2 mm long, 1.5–2.2 mm wide, herbaceous base thickened and pitted-rugose but usually not obviously ridged; petaloid border 0.35–0.5 wide, largely deep pink, with a white edge, entire. *Petals* 2.5–4 mm long, usually 3–4 mm wide, white or pink, minutely denticulate on the margin. *Stamens* 16–23, free, widely spaced. *Antipetalous filaments* 1.1–1.5 mm long, up to *c.* 0.25 mm wide at the base. *Anthers c.* 0.3 mm wide from front view; connective gland 0.3–0.4 mm long, often appearing brownish to deep maroon on dried material; thecae 0.2–0.3 mm long, maroon. *Ovary c.* 2/3 inferior; ovules usually 5–8. *Style* 1.8–2.4 mm long; stigma 0.15–0.2 mm diam. *Fruits* 1/2–2/3 superior, 2–2.7 mm long, 2.5–3 mm diam.; placentas much raised at centre, ovate to circular in outline, 0.7–1.1 × 0.5–0.65 mm. *Seeds* 1.3–1.5 mm long, 0.65–0.7 mm wide, 0.65–0.7 mm thick, medium brown, deeply colliculate; inner cavity 0.7–1 mm long.

Diagnostic features. Distinguished by the following combination of characters: hypanthium hemispherical, 1.3–1.5 mm long; sepals 0.8–1.2 mm long; stamens 16–23, widely spaced.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 1 Nov. 1974, *J.S. Beard* 7247 (PERTH); 10 Oct. 2006, *J. Borger* CM 1010–6 (AD, PERTH); 15 July 2008, *A. Chant* 649 (PERTH); 25 Sep. 1990, *R.J. Cranfield & P.J. Spencer* 7853 (PERTH); 19 Aug. 2019, *M. Hislop* 4793 (PERTH); 18 Aug. 1997, *F. Keast* M5A 210 (PERTH); 15 Aug. 1990, *G.J. Keighery & J.J. Alford* 2049 (BRI, PERTH); 3 Oct. 1994, *S. Patrick* 2021 (PERTH).

Distribution and habitat. Extends from Canna south-east to Billeranga Hills (Figure 6), often occurring on rocky or gravelly habitats with *Allocasuarina* and/or *Melaleuca* species dominant.

Phenology. Flowers from July to early October, with mature fruits recorded from October to November.

Etymology. From the Greek *hemi-* (half-) and *sphaericus* (spherical), referring to the shape of the hypanthium in bud and flower.

Conservation status. To be listed as Priority One under Conservation Codes for Western Australian Flora (Tanya Llorens pers. comm.). This newly recognised species is very restricted.

Affinities. *Balaustion hemisphaericum* was previously considered to be just a variant of *B. interruptum* but has a more northern distribution and is distinguished by its more or less hemispherical hypanthium and longer sepals, with the hypanthium and sepals tending to have a more encrusted, pitted and less obviously ridged appearance. *Balaustion interruptum* tends to have entire leaves or to have less obviously denticulate leaves than *B. hemisphaericum* and a larger stigma. It also tends to have fewer stamens, with 13–20 per flower; *B. hemisphaericum* usually has 17–23 stamens but a minimum of 16 stamens has been recorded in a specimen from Canna (*G.J. Keighery & J.J. Alford* 2049).

Notes. Although a minimum leaf length of 1.4 mm is recorded in the species description above, some specimens have very few leaves as large as this, with the great majority of their leaves about 1 mm

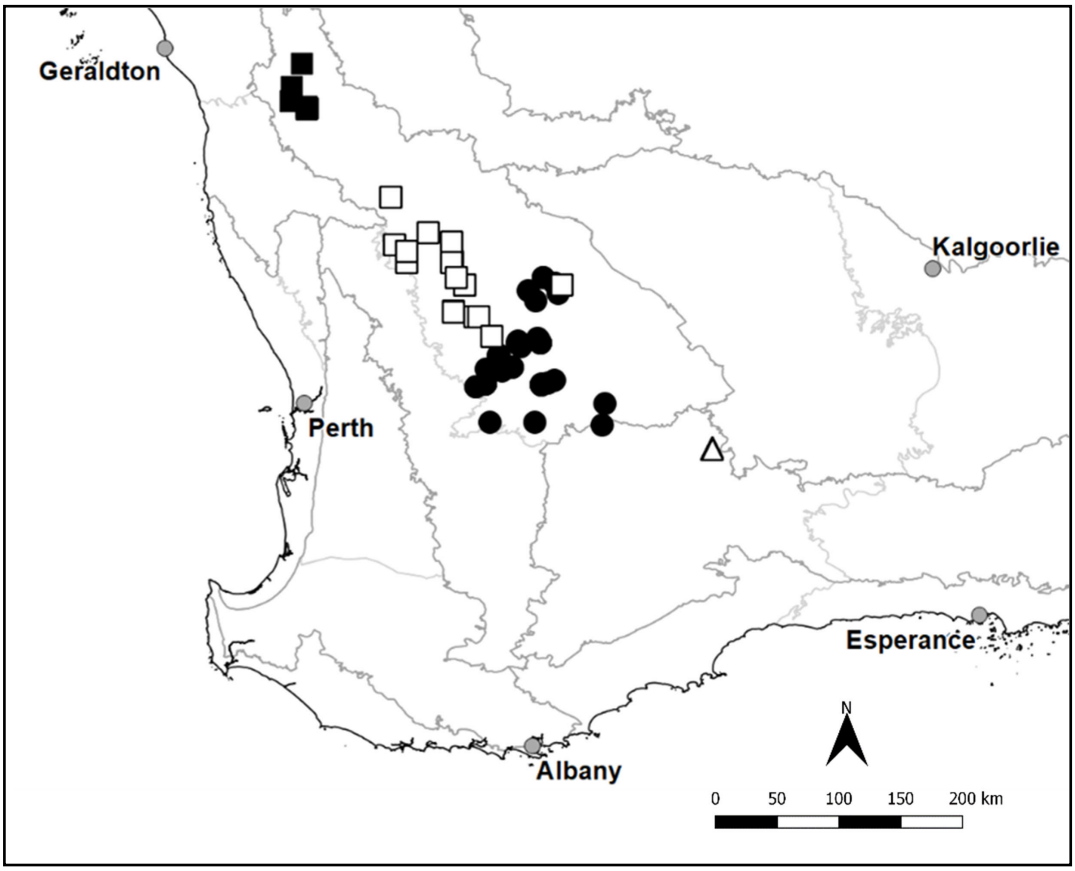

Figure 6. Distribution of *Balaustion exsertum* (●), *B. hemisphaericum* (■), *B. interruptum* (□) and *B. multicaule* (△).

long. The two bracteoles subtending a flower are sometimes borne at quite different levels, having a short stalk between them and then a further pedicel above and peduncle below. This is common on some specimens such as *R.J. Cranfield & P.J. Spencer* 7853.

4. Balaustion interruptum Rye, *sp. nov.*

Type: *c.* 200 m N of Old Koorda Road on Dowerin–Kalannie Road, NW of Dowerin, Western Australia, 26 September 2021, *J.A. Wege & B.P. Miller* JAW 2132 (*holo*: PERTH 09447148; *iso*: CANB, K, MEL, NSW).

Baeckea cryptonoma Trudgen ms, in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 347 (2000); Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022], *ex parte*.

Baeckea sp. Burakin (M.E. & M.E. Trudgen 1423), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Illustration. Drawing on *C.A. Gardner* 2717 (PERTH 03350061).

Shrub 0.3–0.8 m high or rarely up to 1.7 m high, commonly 0.5–0.8 m wide; flowering branchlets with usually 1–3 pairs of flowers. *Leaves* antrorse to patent. *Petioles* 0–0.2 mm long. *Leaf blades* ± oblong to narrowly oblong-obovate in outline, 1.3–2.5 mm long, 0.5–1.3 mm wide, 0.5–0.7 mm thick, truncate or slightly obtuse, entire or distally denticulate on a narrow scarious margin; abaxial surface deeply convex (with almost parallel sides), oil glands in 2 or 3 main rows on each side of midvein, few per row; adaxial surface fairly flat. *Peduncles* 2–4 mm long. *Bracteoles* ± opposite to *c.* 1 mm separated, persistent, ovate or broadly ovate, 1–1.4 mm long. *Pedicels* (0–)0.5–1.5 mm long. *Flowers* 8–12 mm diam. *Hypanthium* ± broadly obconic, 1.5–1.8 mm long, 2–2.5 mm diam., pitted-rugose on adnate part; free part 0.35–0.5 mm long. *Sepals* depressed ovate, 0.5–0.9 mm long, 1.3–1.6 mm wide, herbaceous part usually ridged, often greenish and gland-dotted or pitted-rugose along lower midvein; petaloid margin 0.35–0.5 wide, largely deep pink, with a white edge, entire. *Petals* 3–4.75 mm long, 2.75–4.75 mm wide, white or pale pink, minutely denticulate on the margin. *Stamens* usually 13–20, free, widely spaced. *Antipetalous filaments* 1.1–1.5 mm long, up to *c.* 0.2 mm wide at the base. *Anthers c.* 0.3 mm wide from front view; connective gland 0.25–0.4 mm long, orange-brown or pink; thecae 0.2–0.3 mm long, maroon. *Ovary c.* 2/3 inferior; ovules 4–8. *Style* 1.6–2.3 mm long; stigma 0.2–0.25 mm diam. *Fruits* 1/2–2/3 superior, *c.* 2 mm long, *c.* 2.5 mm diam.; placentas much raised at centre, broadly ovate to circular in outline, *c.* 0.5 × 0.5 mm. *Seeds c.* 1.2 mm long, *c.* 0.5 mm wide, *c.* 0.6 mm thick, golden brown and markedly colliculate; inner cavity 0.6–0.7 mm long. (Figure 7A)

Diagnostic features. Distinguished by the following combination of characters: hypanthium ± broadly obconic, 1.5–1.8 mm long; sepals 0.5–0.9 mm long; stamens usually 13–20, widely spaced.

Selected specimens examined. WESTERN AUSTRALIA: Rabbit Proof Fence Rd, N of Minnivale, 15 Oct. 2013, *R. Davis, A.J. Perkins & B.L. Rye* DPR 08 (NSW, PERTH); Minnivale North East Rd, 0.3 km E of King Rd, Minnivale Nature Reserve, 18 Oct. 2013, *R. Davis & B.L. Rye* DR 06 (AD, PERTH); Ballidu, 23 Sep. 1931, *C.A. Gardner* 2717 (PERTH, 3 sheets); Petrudor Rock Reserve, SE of Dallwallinu, 17 Sep. 1999, *M. Hislop* 1682 (PERTH); Dowerin–Kalannie Rd, 400 m N from the junction with Kokardine East Rd, Kokardine, 1 Nov. 2008, *F. & J. Hort* 3356 (AD, BRI, PERTH); Konnongorring, 17 Aug. 1925, *E.H. Ising* 122 (AD); Mindah Holdsworth Rd, *c.* 25 km NE of Wyalkatchem townsite, 4 Sep. 1999, *C. Keating et al.* WYHO 9/75 (PERTH); 28.8 mi. [46 km] S of Kulja, 16 Oct. 1972, *C.I. Stacey* 227 (PERTH, 2 sheets); 0.5 km S of Burakin then 0.4 km NE, 31 Aug. 1975, *M.E. & M.E. Trudgen* 1423 (BRI, CANB, MEL, PERTH).

Distribution and habitat. Extends from Petrudor Rock Reserve south-east to Wyalkatchem, with an isolated record from near Mukinbudin (Figure 6). Occurs in yellow to brown sandy soils, sometimes with gravel, with the dominant species often from the genera *Eucalyptus* (especially mallee species), *Allocasuarina*, *Melaleuca* or *Acacia*.

Phenology. Flowers mainly August to October, with mature fruits recorded at the beginning of December.

Etymology. From the Latin *interruptus* (broken in pieces, interrupted), referring to the presence of gaps in the circle of stamens.

Conservation status. Not considered to be at risk.

Affinities. See discussion under *B. hemisphaericum*.

Notes. The name '*Baeckea cryptonoma* Trudgen ms' was applied originally to the specimen that has

Figure 7. Images of *Balaustion* species. A – flowering branch of *B. interruptum*, showing distinctly separated filaments; B – flowering branch of *B. grandibracteatum* subsp. *juncturum* with a pair of flowers, showing broad, almost contiguous filaments and anthers with a pink connective gland and maroon thecae. Photographs by Juliet Wege (A, from *J.A. Wege & B.P. Miller* JAW 2132) and Kevin Thiele (B, from *K.R. Thiele* 4700).

now been selected to be the holotype of *Balaustion interruptum*, but was later applied to specimens of both *B. hemisphaericum* and *B. interruptum* as the two taxa were considered to be synonymous. One atypical specimen from Wubin (*S. de la Hunty s.n.*, 5 Sep. 1959) has 26 stamens.

Although many specimens of *B. interruptum* have a majority of their leaves less than 1 mm long, they all have some leaves 1.3 mm or longer. Mature fruits and seeds were observed on only one specimen. More fruiting material is needed to gain a reliable range of fruit and seed measurements.

C. Balaustion sect. **Tilophloia** Rye, *sect. nov.*

Type: *Balaustion grandibracteatum* (E.Pritz.) Rye.

Tilophloia Trudgen & Rye ms; B.L. Rye, *Nuytsia* 19: 129–148 (2009).

Shrubs prostrate or up to 1.2 m high; flowering branchlets usually with 1 or 2 flowers but sometimes apparently more when flowers are borne on very short lateral branchlets, or rarely with up to 3 consecutive nodes bearing flowers. *Young stems* with a sub-epidermal tissue that disintegrates into fine fibres. *Leaves* with petiole very well defined; blade sometimes with a subterminal point or knob, the apical point absent or minute. *Bracteoles* scarious, pale and translucent to reddish. *Pedicels* absent to long. *Flowers* with hypanthium and sepals distinct in their colouring from the petals. *Hypanthium* broadly obconic to very broad and 5-lobed, adnate to ovary for most of its length. *Sepals* usually somewhat herbaceous and green with a white petaloid border or tinged reddish. *Petals* widely spreading, usually white or pink, and minutely denticulate or entire (but orange and denticulate in *B. tangerinum*). *Stamens* 14–30, all or mostly free, contiguous or close, with a subterminal, 90° bend. *Broadest filaments* (excluding any connate pairs) 0.2–0.6 mm wide at base. *Anthers* horizontal, attached almost at base of connective gland to the free filament, dehiscent by two elliptic pores or short slits that tend to diverge at the base; connective gland conspicuous, distinctly longer than the thecae. *Ovary* 1/2–2/3 inferior; ovules (8–)10–22 per loculus. Fruits 2/3 inferior to 2/3 superior, not hidden by the hypanthium, which is often rugose-pitted or somewhat rugose except for a smooth rim 0.5–0.8 mm wide at the top. *Seeds* 1.2–1.8 mm long, golden brown to moderately dark brown, colliculate.

Diagnostic features. Distinguished from the other two sections by its greater tendency for the stem outer layers to disintegrate into numerous fibres and in having the stamen filaments broader in comparison with their length.

Size and distribution. Comprises 14 named species and two subspecies, with three additional taxa housed under phrase names. Section *Tilophloia* occurs in the Avon Wheatbelt and Mallee bioregions of the South West Botanical Province and the Yalgoo and Coolgardie Bioregions of the Eremaean Botanical Province (Figure 4), extending from Diemals Station south to Lake Grace.

Etymology. From the Greek *tilos* (thread, fibre) and *phloios* (bark), referring to the disintegration of the young stem epidermis into loose fibres before it is shed from the stems.

Notes. This section was referred to in the key to genera and sections given in Rye (2009b) as *Tilophloia* ms without any authorship or taxonomic level indicated.

The broadest filaments are usually 0.2–0.6 mm wide at the base, but occasionally filaments 0.5–1 mm wide are formed by amalgamation of two adjacent stamens, with two anthers at the top. There may

be a few pairs of partially or fully united stamens in a flower. There may also very rarely be a triplet of stamens united at the base.

Two main species groups can be distinguished on the basis of leaf morphology, the typical group having a rounded apex without a subterminal dorsal projection (Figure 1E & F) and the other group with the keel produced into a subterminal knob or small point (Figure 1A–D). The ratio of petal length to stamen filament length tends to be higher among the typical group but there is considerable overlap in this character.

Anthers often have deep pink colouration on the connective gland and/or thecae in fresh material.

5. Balaustion baiocalyx Rye, *sp. nov.*

Type: between Bencubbin and Koorda, Western Australia, 8 October 1937, *W.E. Blackall* 3371 (*holo*: PERTH 06748457; *iso*: CANB, PERTH 06748430, PERTH 06748449).

Baeckea sp. Koorda (W.E. Blackall 3371), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Illustration. Drawing on *W.E. Blackall* 3371 (PERTH 06748457).

Shrub 0.3–0.9 m high, commonly 0.15–0.6 m wide, single-stemmed at base; flowering branchlets with 1 pair of flowers. *Leaves* appressed to widely antrorse. *Petioles* 0.3–0.5 mm long. *Leaf blades* commonly obovate, 2–5 mm long, 1–2 mm wide, not very thick, obtuse, minutely serrulate or entire, slightly recurved at apex; abaxial surface convex, keeled towards apex, the keel distally rounded, with the larger oil glands usually in 3 or 4 main rows on each side of midvein; adaxial surface shallowly concave (or shallowly indented), with less obvious oil glands. *Peduncles* 3–4.5 mm long, somewhat glandular and with longitudinal patterning. *Bracteoles* shed from young or medium-sized buds, *c.* 2 mm long. *Pedicels* 0.5–1.5 mm long. *Flowers* commonly 12–14 mm diam. *Hypanthium* 2–3 mm long, 3.5–4.5 mm wide (increasing in fruit to a maximum of 4 × 6 mm), green and somewhat rugose throughout; free part 0.3–0.5 mm long. *Sepals* often difficult to see as very reduced and tending to curve inwards, 0.5–0.8 mm long, 2–3 mm wide, with little or almost no petaloid border, ± entire. *Petals* 4–5 mm long, white. *Stamens* commonly 22–24. *Antipetalous filaments c.* 2 mm long. *Anthers c.* 0.5 mm wide; connective gland *c.* 0.6 mm long; thecae *c.* 0.3 mm long. *Ovary c.* 2/3 inferior; ovules 18–20 per loculus. *Style* 2.6–3.2 mm long; stigma *c.* 0.25 mm diam. *Fruits* just over 1/2 inferior, 4–6 mm long, 5–6 mm diam.; placentas elliptic or ovate, *c.* 2 × 1.3 mm. *Seeds* reniform but somewhat facetted, 1.3–1.7 mm long, 0.6–0.85 mm wide, 0.9–1.2 mm thick, golden brown, colliculate; inner cavity 0.6–0.7 mm long. (Figure 1E & G)

Diagnostic features. Distinguished from other species of *Balaustion* by its particularly reduced sepals. Other important characters: leaves with a distally rounded keel, not much thickened; bracteoles *c.* 2 mm long.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 8 Sep. 1995, *P. Armstrong s.n.* (PERTH); Oct. 1937, *W.E. Blackall* 3513 (PERTH); 19 Nov. 2013, *A. Crawford* ADC 2414 (MEL, PERTH); 1 Dec. 2008, *M.E. Trudgen* 23333 A (CANB, PERTH); 1 Dec. 2008, *M.E. Trudgen* 23333 C (NSW, PERTH).

Distribution and habitat. Extends from near Kalannie to south of Dowerin and east of Koorda (Figure 8). There is one record from grey sand and another from yellow sand, the latter from *Melaleuca* low

shrubland with patches of *Allocasuarina* nearby.

Phenology. Flowers recorded from early September to November. Mature fruits recorded in November and December.

Etymology. From the Greek *baios* (small, scanty) and *kalyx* (calyx), referring to the very reduced sepals (Figure 1G) that may appear to be absent.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Koorda (W.E. Blackall 3371).

Affinities. *Balaustion baiocalyx* is readily distinguished by its very reduced sepals. It belongs in the typical group of sect. *Tilophloia* but is superficially similar to *B. polyandrum*, which belongs to the species group that has leaves commonly with a subterminal point or knob.

Notes. Better flowering material is needed for this species.

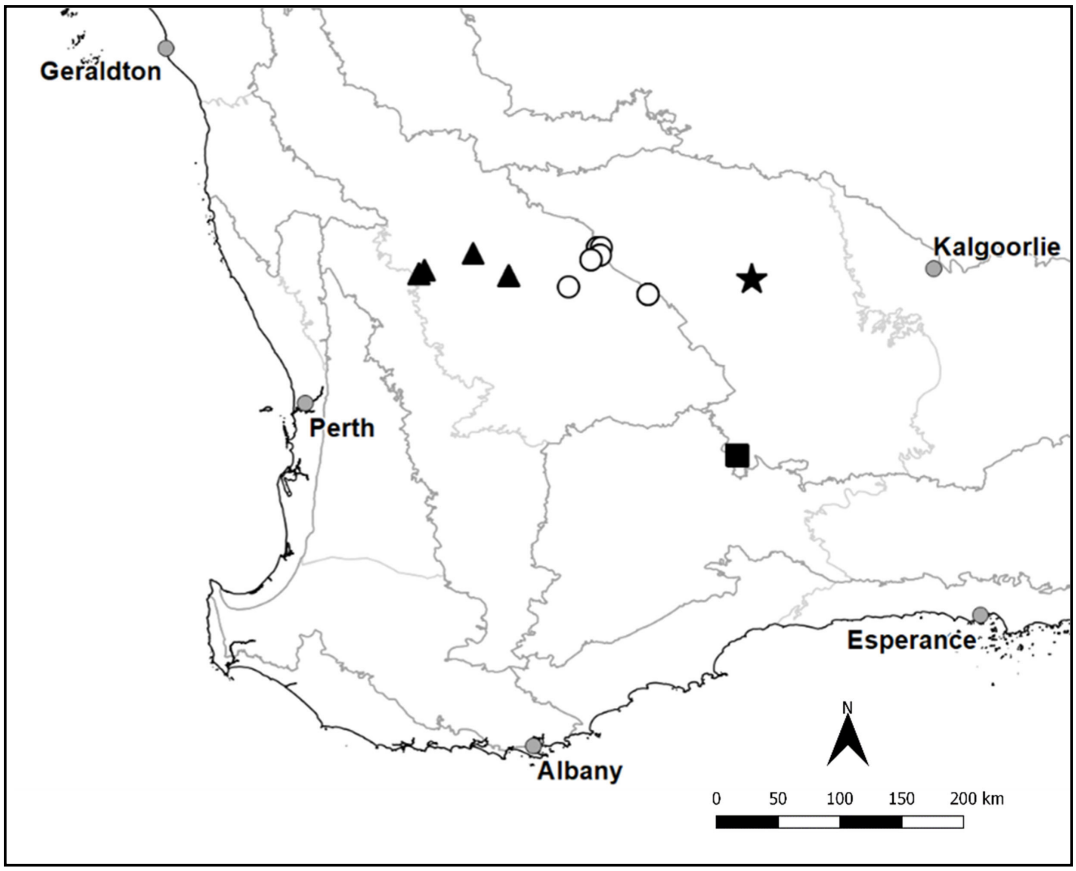

Figure 8. Distribution of *Balaustion baiocalyx* (▲), *B. filifolium* (○), *B. polyandrum* (★) and *B.* sp. North Ironcap (■).

6. Balaustion bimucronatum Rye, *sp. nov.*

Type: south of Mukinbudin, Western Australia [precise locality withheld for conservation reasons], 15 October 2003, *M.E. Trudgen & B.L. Rye* MET 22077 (*holo*: PERTH 06748295; *iso*: CANB, K, MEL).

Baeckea sp. Stockton Road (M.E. Trudgen MET22077 & B. Rye), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub c. 0.2 m high, *c.* 0.35 m across; flowering branchlets with 1 pair of flowers or more commonly just a solitary flower. *Leaves* mostly widely antrorse. *Petioles* 0.4–0.6 mm long. *Leaf blades* mostly narrowly ovate to linear but a few ovate or narrowly obovate, 2.5–3.5 mm long, 0.8–1.2 mm wide, 0.4–0.5 mm thick, with a minute apical mucro less than 0.1 mm long, minutely denticulate at first; abaxial surface convex, somewhat recurved at apex, keeled towards the apex and often grooved along the midvein below, the keel often developed into a subterminal point of similar size to the apical mucro, with the larger oil glands usually in 1 or 2 main rows on each side of midvein; adaxial surface fairly flat, often with a central longitudinal groove, with less obvious oil glands. *Peduncles* 2–5 mm long. *Bracteoles* caducous or rarely persistent at anthesis, 2–3.5 mm long. *Pedicels* 0.6–2 mm long. *Flowers* 10–11 mm diam. *Hypanthium* obconic in bud, becoming more hemispherical in flower and fruit, *c.* 2 mm long, 3.5–4 mm diam., green, rugose-pitted; free part 0.6–0.8 mm long. *Sepals* very broadly ovate, pink-tinged towards base and centre, or with an irregular white border or irregularly pink markings reaching the margins, 1.2–1.5 mm long, 1.8–2.5 mm wide, serrulate or minutely laciniate. *Petals* 3.5–4 mm long, white, the outer ones with some pink outside. *Stamens* 16–21, often with a few pairs connate for some distance. *Antipetalous filaments* 2–2.2 mm long. *Anthers c.* 0.5 mm wide from front view; connective gland 0.4–0.5 mm long; thecae 0.2–0.25 mm long. *Ovary c.* 1/2 inferior; ovules 12–14 per loculus. *Style c.* 3.4 mm long; stigma *c.* 0.25 mm diam. *Fruits c.* 1/2 inferior, *c.* 3.5 mm long, 3.5–4 mm diam.; placentas elliptic or elliptic-ovate, *c.* 2.2 × 1.5 mm. *Seeds* facetted-reniform, 1.3–1.4 mm long, 0.6–1 mm wide, 0.6–0.8 mm thick, golden brown, minutely colliculate; inner cavity 0.7–0.8 mm long. *Chaff pieces* somewhat paler than the seeds.

Diagnostic features. Distinguished from other species of *Balaustion* that commonly have leaves with a 2-pointed apex by the following combination of characters: bracteoles caducous or rarely persistent at anthesis, 2–3.5 mm long; pedicels 0.6–2 mm long; ovules 12–14 per loculus.

Other specimen examined. WESTERN AUSTRALIA: [locality withheld for conservation reasons] 14 Oct. 2006, *A. Crawford & N. Sheehy* ADC 1186 (PERTH).

Distribution and habitat. Recorded from south-east of Mukinbudin (Figure 5) in yellow sand with mallees, *Acacia* and *Thryptomene kochii*.

Phenology. Flowers and fruits recorded in October.

Etymology. From the Latin *bi-* (two-) and *mucronatus* (mucronate) as the leaves commonly have both a subterminal mucro and an apical one.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Stockton Road (M.E. Trudgen MET22077 & B. Rye).

Affinities. *Balaustion bimucronatum* is somewhat intermediate in morphology between *B. mukinbudin* and *B. spenceri* (see Table 2). The closest locality of *B. mukinbudin* is about 25 km to the north-east of *B. bimucronatum*. *Balaustion mukinbudin* is readily distinguished from *B. bimucronatum* by its longer bracteoles and sepals, and shorter pedicels and style. It also tends to have shorter petioles and a different leaf shape.

Balaustion spenceri, which occurs more than 50 km east of *B. bimucronatum*, differs in its shorter bracteoles and in having pedicels more or less equal to or much longer than the peduncles. A major concern with recognising both *B. bimucronatum* and *B. spenceri* as distinct species, rather than as subspecies or variants of other taxa, is that each is only known from a single population. If more populations had been found, more reliable descriptions could have been drawn up, with a greater range of measurements for most characters. On the available evidence, however, both taxa can be reliably distinguished from one another and from all other members of the genus.

7. Balaustion exsertum (S.Moore) Rye, *comb. nov.*

Baeckea exserta S.Moore, *J. Linn. Soc., Bot.* 45: 177 (1920). *Type*: Bruce Rock, Western Australia, 1917, *F. Stoward* 427 (*holo*: BM 000797537).

Baeckea sp. Eujinyn (J. Buegge D 99), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Kellerberrin (C.A. Gardner s.n. PERTH 03351009), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Tammin (R. Coveny 8319 & B. Habberley), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Tampia Hill (J.C. Anway 327), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 83 (1980) [as *Baeckea exsertum*]; drawing on *C.A. Gardner* 2749 (PERTH 07478941).

Table 2. Comparison of three geographically restricted species of *Balaustion* from east of Mukinbudin.

Species	*B. mukinbudin*	*B. bimucronatum*	*B. spenceri*
Petiole length	0.3–0.5 mm	0.4–0.6 mm	0.4–0.5 mm
Leaf width	(1–)1.2–1.8 mm	0.8–1.2 mm	0.6–1.1 mm
Peduncle length	2.5–4 mm	2–5 mm	1–2.5 mm
Bracteole length	4–5.5 mm	2–3.5 mm	1.3–1.6 mm
Pedicel length	0–0.3 mm	0.6–2 mm	2–3.5 mm
Sepal length	1.4–2.5 mm	1.2–1.5 mm	0.8–1.5 mm
Petal length	4–6.5 mm	3.5–4 mm	3.5–5 mm
Stamen number	19–25	16–21	20–24
Style length	1.9–2.5 mm	*c.* 3.4 mm	2.6–3.3 mm

Shrub low-growing, often ground-hugging, usually 0.1–0.3 m high, 0.3–1.5 m wide; flowering branchlets mostly with 1 or 2 flowers at a single node (rarely more per node in one specimen with whorled leaves). *Leaves* widely spreading in dense clusters on short lateral branchlets but tending to be closely antrorse to appressed on young shoots or older stems. *Petioles* 0.3–0.6 mm long. *Leaf blades* commonly narrowly oblong in outline, broadest towards the top (or at least not right at the base), (1.3–)1.5–4.5(–5) mm long, 0.5–1(–1.2) mm wide, 0.4–0.5 mm thick, entire or minutely denticulate; abaxial surface keeled towards apex and narrowly furrowed below, the keel prominent just below the apex as a knob or tending to form a subterminal point, with the larger oil glands usually in 1 or 2 main rows on each side of midvein; adaxial surface slightly convex to flat, often with a narrow furrow along the centre, with less obvious oil glands. *Peduncles* 1.3–4.5 mm long. *Bracteoles* borne well below the mature buds, widely antrorse, often persistent, 0.8–1.6(–2) mm long. *Pedicels* 1.2–3.5 mm long. *Flowers* 8–12 mm diam. *Hypanthium* usually broadly obconic, occasionally appearing a little more hemispherical with broadly rounded antisepalous 'ridges', 1.3–2 mm long, 3–3.5 mm wide, very rugose-pitted (and green in adnate part, with a smoother brownish/purplish rim in distal *c.* 0.6 mm); free part 0.4–0.5 mm long. *Sepals* depressed ovate, 1–1.8 mm long, 2–3(–3.5) mm wide, scarious, reddish within a broad pale border or with scarcely any pale border (sometimes with reddish parts irregularly extending into the broad pale border), minutely serrulate to laciniate. *Petals* 3–6 mm long, white. *Stamens* 17–24. *Antipetalous filaments* 2–3(–3.3) mm long. *Anthers* 0.3–0.4 mm wide from front view; connective gland 0.3–0.4 mm long, pink; thecae 0.2–0.3 mm long. *Ovary c.* 1/2 inferior; ovules 9–15 per loculus. *Style* 2.5–4 mm long; stigma 0.15–0.2 mm diam. *Fruits c.* 2/3 superior, 2.5–3.5 mm long, 3–4 mm diam.; placentas elliptic, 1.6–2.4 × 1.3–1.6 mm. *Seeds* facetted-reniform, 1.3–1.8 mm long, 0.5–0.85 mm wide, 0.6–0.8 mm thick, medium brown, minutely colliculate; inner cavity 0.6–1 mm long.

Diagnostic features. Distinguished from other species of *Balaustion* that commonly have a 2-pointed apex or subterminal knob to the leaves by the following combination of characters: bracteoles borne well below the mature bud, 0.8–1.6(–2) mm long, often persistent in flower; hypanthium usually broadly obconic; style 2.5–4 mm long; ovules 9–15 per loculus.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 2 Sep. 1965, *J.C. Anway* 327 (PERTH); 1893, *M. Cronin s.n.* (MEL); 30 Sep. 2010, *B. Hort* NM 242 (PERTH); 13 Sep. 2013, *B. Hort s.n.* (PERTH); 7 Aug. 2008, *B. Lullfitz, A. Konnur & H. Cannon* BRL 61 (PERTH); 8 Sep. 1974, *B.L. Powell* 74085 (PERTH).

Distribution and habitat. Extends from Kodi Kodjin Nature Reserve (south of Trayning) south-east to the Quairading area and south-west to the Narembeen area (Figure 6). The soil is commonly yellow to brown or grey sand, sometimes mixed with clay, and the vegetation commonly dominated by eucalypts, *Allocasuarina* and *Melaleuca*.

Phenology. Flowers from August to October, with mature fruits recorded in October and November.

Etymology. From the Latin *exsertus* (protruding), referring to the exposed stamens, which are longer than those of several close relatives.

Conservation status. Despite its expanded circumscription, this species retains its Priority Three status under Conservation Codes for Western Australian Flora (Western Australian Herbarium (1998–), as *Baeckea exserta*. The synonyms *B.* sp. Eujinyn, *B.* sp. Kellerberrin and *B.* sp. Tampia Hill were previously listed as Priority One, and *B.* sp. Tammin as Priority Three. Although there are numerous

collections spanning a distribution *c.* 130 km long, the landscape is highly cleared and there are few recent collections in the north of its range.

Chromosome number. *n* = 11 (Rye 1979), vouchers *B.L. Powell* 74058 [as *Baeckea grandis*] and *B.L. Powell* 74085 [as *B. grandiflora* Benth.].

Co-occurring species. There are no definite records of *B. exsertum* co-occurring with any other member of the genus but central and south-eastern populations of *B. exsertum* occur within the range of *B. quinquelobum*, and the habitat descriptions of the two species are similar.

Variants. A western variant that has been known as *Baeckea* sp. Tammin has consistently short leaves, with the larger ones usually 1.5–2.5 mm long. This seems to match the protologue of *B. exserta* which records the leaves as 1.5–2 mm long for the type specimen from Bruce Rock, although more recently collected specimens from the Bruce Rock area have their largest leaves mostly 2.5–4.5 mm long, and a particularly long-leaved specimen (*B. Hort s.n.* PERTH 08637148) has leaves up to 5 mm long. *Baeckea* sp. Tammin also has consistently short petals 3–4.3 mm long, again matching the protologue which gives them as 3.5 mm long, whereas other specimens have more variable petal length up to 6 mm long. The specimen on which the name *Baeckea* sp. Kellerberrin was based is like the Tammin variant in leaf and petal size whereas the name *B.* sp. Tampia Hill is based on a south-eastern specimen with slightly longer leaves and petals.

One collection from near Bruce Rock was given the phrase name *Baeckea* sp. Eujinjyn (J. Bruegge D 99). It has broader, flatter leaves than usual for *Balaustion exsertum*, often with two main rows of oil glands on each side of the midvein, whereas it is much more common in *B. exsertum* for leaves to have just one main row of oil glands. Broad leaves are found on some specimens of *B. exsertum* that also have the typical thick leaves; for example *B.G. Muir* 303 (3.16) has flat leaves on rapidly growing young branchlets. The very unusual height record of 0.8 m for *J. Bruegge* D 99 suggests that this population is distinctive but it could have been taken from a plant that was propped up by adjacent vegetation or it could be an inaccurate record.

Although considerable variation occurs across the range of the populations included here as *B. exsertum*, no clear-cut differences have been found to warrant recognition of more than one species. Further investigation of the *B. exsertum* group is needed to determine whether any variants should be recognised as subspecies.

Affinities. Similar to *B. quinquelobum*, which differs in having projecting basal lobes on the hypanthium, shorter stamens, a shorter style, and usually broader bracteoles with a greater tendency to be persistent, although the difference in bracteole shape may be just a consequence of the difference in hypanthium shape between the two taxa. An unpublished name, *Baeckea grandis* var. *exserta* (S.Moore) C.A.Gardner ms, is discussed under *Balaustion quinquelobum* because it was applied to an old collection of *B. quinquelobum*, which was previously included within *Baeckea exserta*.

Two other similar taxa are *B. filifolium* and *B. spenceri* (see notes under those species).

Notes. The connective gland in *B. exsertum* is often deep pink on relatively fresh material, but occasionally the thecae may be deep pink instead, or perhaps both parts of the anther deep pink, although they seem never to be identical in colour. The style seems to be pale at first, becoming deep pink to red in fruit.

One specimen of the Tammin variant (*R. Coveny* 8319 *& B. Habberley*) has its leaves mostly in whorls of three, although apparently still only with one or two flowers per node. However, one flowering branchlet has four leaves on some of its nodes, including one node with four flowers. The occurrence in this position also of some closely paired leaves and two apparently fused leaves suggests that all odd leaf arrangements in this specimen are an abnormality.

One specimen from the Quairading area (*B. Hort* 3466) is unusual in having bracteoles up to 2 mm long.

8. Balaustion filifolium Rye, *sp. nov.*

Type: Beringbooding, Western Australia, 11 September 1957, *A.R. Main s.n.* (*holo*: PERTH 06748317).

Baeckea sp. Beringbooding (A.R. Main 11/9/1957), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub prostrate or low-growing, 0.2–0.5 m high, 0.5–1.4 m wide; flowering branchlets mostly with 1 pair of flowers. *Leaves* widely spreading in dense clusters on short lateral branchlets but tending to be closely antrorse to appressed on older stems. *Petioles* 0.1–0.2 mm long. *Leaf blades* narrowly ovate-triangular to long-linear in outline, broadest at the base, 3–7 mm long, 0.2–0.3(–0.4) mm wide, 0.2–0.3 mm thick, with a minute apical mucro less than 0.1 mm long, entire; abaxial surface deeply convex, grooved along midvein for most of its length, the keel produced near apex into a prominent knob or dorsal point (the apex often appearing double-pointed), with the larger oil glands in 1 or less often 2 main rows on each side of midvein; adaxial surface flat, with less obvious oil glands. *Peduncles* 1–6 mm long. *Bracteoles* usually caducous, rarely persistent in flower, 1.3–1.8 mm long. *Pedicels* 2–3.5 mm long. *Flowers* 9–13 mm diam. *Hypanthium* ± hemispherical, 1.5–2 mm long, 3–4 mm diam., somewhat rugose-pitted; free part *c.* 0.4 mm long. *Sepals* depressed ovate, red-tinged on outer surface, 1.2–1.8 mm long, 2–2.5 mm wide, minutely serrulate. *Petals* 4–5 mm long, pale pink. *Stamens* 16–24, sometimes with a few of them connate to an adjacent stamen for most of their length. *Antipetalous filaments* 2.2–3.4 mm long. *Anthers* 0.3–0.4 mm wide from front view; connective gland *c.* 0.4 mm long; thecae 0.2–0.3 mm long. *Ovary c.* 1/2-inferior; ovules 10–16 per loculus. *Style* 3.5–3.8 mm long; stigma 0.15–0.2 mm diam. *Fruits c.* 2/3 superior, 2.5–3.5 mm long, 3–4 mm diam.; placentas elliptic, 1.4–1.7 × 0.8–1.25 mm. *Seeds* facetted-reniform, 1.3–1.55 mm long, 0.7–0.8 mm wide, 0.7–0.8 mm thick, medium brown, minutely colliculate; inner cavity 0.7–0.8 mm long. (Figure 1B)

Diagnostic features. Distinguished from other species that commonly have a 2-pointed apex or subterminal knob to the leaves by its narrow, entire leaves that are broadest at the base and have a very short petiole. Other important characters: bracteoles 1.3–1.8 mm long; pedicels at least half as long as the peduncles.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 17 Sep. 1965, *G. Byrne s.n.* (PERTH); 2 Oct. 2009, *B.R. Lullfitz* BRL 125 (PERTH, 2 sheets); 16 Aug. 1979, *P. de Rebeira* 141 (PERTH); 14 July 2007, *M. Squire* 002 (PERTH); 2 Dec. 2008, *M.E. Trudgen* MET 23346 A (NSW, PERTH); 2 Dec. 2008, *M.E. Trudgen* MET 23346 B (CANB, PERTH).

Distribution and habitat. Recorded from sandplains and associated with granite outcrops, extending from Beringbooding Rock (near Bonnie Rock) to west of Mukinbudin (Figure 8). Mostly recorded with *Acacia*. The sand colour is sometimes recorded as yellow or orange.

Phenology. Flowers recorded from August to October and mature fruits in November and December.

Etymology. From the Latin *filum* (a thread) and *-folius* (-leaved), referring to the usually slender leaves, which can be narrower than in any other member of the genus.

Conservation status. Listed as Priority Two under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Beringbooding (A.R. Main 11/9/1957). The species is known from one nature reserve.

Affinities. Very similar to *B. exsertum* but occurring further north and with shorter petioles and entire, usually longer leaf blades that are broadest at the base. *Balaustion quinquelobum* is also similar to *B. filifolium* but has a 5-lobed hypanthium, shorter stamens and style, and shorter leaves that are denticulate at first; it also appears to be geographically separated although not by a great distance.

Notes. *Balaustion filifolium* usually has only 16–19 stamens, fewer on average than in any related species, but *M. Squire* 002 has up to 24 stamens that seem particularly long in relation to the petal length. Two collections are described as having a domed habit.

9. Balaustion grandibracteatum (E.Pritz.) Rye, *comb. nov.*

Baeckea grandibracteata E.Pritz. *in* L. Diels & E. Pritzel, *Bot. Jahrb. Syst.* 35: 417 (1904). *Type*: near Southern Cross, Western Australia, November [1901], *L. Diels* 5593 (*holo*: B *n.v.*, presumably destroyed in WWII). *Neotype*: east of Southern Cross, Western Australia [precise locality withheld for conservation reasons], 30 September 1931, *C.A. Gardner* 2778 (*neo*: PERTH 03349705, here designated; *isoneo*: AD, CANB, K, MEL, NSW).

Illustration. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 80 (1980) [as *Baeckea grandibracteata*].

Shrub 0.2–0.8 m high, 0.3–0.8 m wide; flowering branchlets with up to 4 nodes bearing pairs of flowers or solitary flowers, but most commonly just one node. *Leaves* widely antrorse to appressed, commonly ± appressed for long distances along unbranched sections of stems. *Petioles* 0.1–0.6 mm long. *Leaf blades* mostly narrowly oblong-elliptic in outline, 2–5 mm long, 0.7–1(–1.5) mm wide, 0.4–0.7 mm thick, obtuse, not mucronate or with mucro less than 0.1 mm long, with denticulate margins at first, usually becoming entire; abaxial surface convex, sometimes broadly furrowed towards the base, keeled above, the keel distally rounded (gently curved down to the apex), with the larger oil glands in 1–3 main rows on each side of midvein; adaxial surface ± flat, often with a longitudinal central furrow, with less obvious oil glands. *Peduncles* 1–6 mm long, broad and somewhat compressed at summit, with rather prominent, often reddish, lateral ridges, the remainder green and rugose-pitted throughout or at least towards the summit with similar rugose-pitting to that on hypanthium. *Bracteoles* 2–6 mm long. *Pedicels* usually absent or very short. *Flowers* 10–15 mm diam. *Hypanthium* 1.7–3 mm long, 3.5–5 mm diam., green, rugose-pitted; free part *c.* 0.8 mm long, sometimes red-tinged. *Sepals* ovate to semi-elliptic or depressed ovate or depressed semi-circular, 0.6–2 mm long, 2.5–3 mm wide, reddish on outer surface, often with an irregular whitish margin 0.2–0.3 mm wide, minutely laciniate. *Petals* 4–6.5 mm long, white. *Stamens* 14–27. *Antipetalous filaments* 1.3–2.1 mm long. *Anthers c.* 0.4 mm wide from front view; connective gland 0.4–0.5 mm long; thecae 0.2–0.3 mm long. *Ovary c.* 2/3 inferior; ovules 13–20 per loculus. *Style* 1.6–2.5 mm long; stigma 0.2–0.25 mm diam. *Fruits c.* 2/3 superior, 3–3.5 mm long, 4.5–5 mm diam.; placentas ovate or broadly ovate, 1.8–2.35 × 1.3–1.4 mm. *Seeds*

1.3–1.7 mm long, 0.5–0.8 mm wide, 0.75–0.85 mm thick, becoming medium brown, colliculate, the outer surface somewhat smoother than lateral surfaces; inner cavity 0.6–0.8 mm long.

Diagnostic features. Distinguished from other species of *Balaustion* that have leaves with the keel distally rounded (not pointed or knobbed) in having the following combination of characters: thick leaves 0.7–1(–1.5) mm wide; style 1.6–2.5 mm long.

Distribution. Recorded from the Southern Cross area south-west to the Hyden area and south-east to Frank Hann National Park (Figure 5).

Etymology. From the Latin *grandis* (large, great) and *bracteatus* (bracteate), because the typical variant has large bracteoles that enclose the mature flower buds and are often retained in fruit. Two other species, *B. mukinbudin* and *B. karroun*, have similarly large bracteoles.

Typification. A neotype is selected for this species from amongst material collected near Southern Cross as the type specimen from this locality, *L. Diels* 5593, appears to have been destroyed during WWII. The neotype has a suitable number of duplicates and was compared against the holotype at B on 24 August 1937 by Gardner, whose determinavit indicated that it was identical with the type.

Affinities. *Balaustion grandibracteatum* is similar to *B. multicaule*, which is distinguished by its particularly narrow leaves and its multi-stemmed habit.

Variation. Many phrase names have been applied to the *B. grandibracteatum* complex, based primarily on differences in sepal shape, bracteole persistence and the sizes of these two organs as well as peduncle shape and length, pedicel length and hypanthium shape. Some of these characters may have appeared to be diagnostic when very few specimens were available for study, but it is now clear that measurements and shapes can vary considerably within populations (see below). No reliable differences have been found to allow recognition of more than one species except for *B. multicaule*, which occurs on the western margin of the distribution of the complex.

Northern specimens of *B. grandibracteatum* have conspicuous bracteoles 4–6 mm long, which are large enough to enclose late buds and are often persistent even after the fruits have dehisced. In the southernmost specimens, bracteoles are 2–3 mm long and are mostly shed prior to anthesis. In the central part of the distribution, bracteoles are closer in size to the northern populations but are mostly shed prior to anthesis as in the southern populations. This means that bracteole persistence can be used to distinguish the typical variant from all central and southern populations. Some central and southern specimens, especially those in fruit, lack bracteoles but the likely size of the bracteoles can be inferred by the length of the pedicels as specimens with short bracteoles have longer pedicels than those with long bracteoles.

Petiole lengths tend to be the shortest in the northern populations, while some of the central and southern populations tend to have the most densely denticulate young leaves. Other characters, such as sepal size and shape, can vary greatly within populations (see *Variation* under subsp. *juncturum*) and so have not proved useful in delimiting infraspecific taxa.

Sepal shape varies from depressed semi-circular to ovate. Ovate or broadly ovate sepals often have a triangular apex whereas very short sepals are level across the top.

Notes. Three subspecies are recognised, occurring in the northern, central and southern parts of the distribution respectively. Differences between them are based primarily on two bracteole characters that have been used to distinguish species elsewhere in the genus; however, the lack of any clear disjunctions in the morphology does not support recognition of multiple species in this case.

9a. Balaustion grandibracteatum E.Pritz. subsp. **grandibracteatum**

Baeckea grandibracteata subsp. Parker Range (K. Newbey 9270), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Petioles 0.1–0.4 mm long. *Leaf blades* 2.5–5 mm long, 0.7–1(–1.5) mm wide, 0.4–0.6 mm thick. *Peduncles* 1–4.5 mm long. *Bracteoles* persistent at anthesis and often in late fruit, 4–6 mm long. *Pedicels* 0–0.4 mm long. *Sepals* 0.8–2 mm long. *Stamens* 18–23(–27). *Ovules* 13–19 per loculus. *Style* 1.8–2.5 mm long. (Figure 1I)

Diagnostic features. Differs from the other two subspecies in having more persistent bracteoles and usually shorter petioles (0–0.4 mm *cf.* 0.3–0.5 mm long).

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 3 Oct. 1952, *P.H. Barrett* 4 (PERTH); Sep. 1929, *W.E. Blackall s.n.* (PERTH); 4 Oct. 1931, *W.E. Blackall* 874 (PERTH); 19 Oct. 1981, *L.A. Craven* 7198 (CANB *n.v.*, MEL *n.v.*, PERTH); 20 Oct. 1945, *C.A. Gardner* 8017 (AD, BRI, PERTH); 11 Oct. 1959, *C.A. Gardner* 12235 (PERTH); 18 Dec. 1993, *A.S. George* 17190 (NSW, PERTH); 15 Oct. 1994, *N. Gibson & M. Lyons* 2085 (PERTH); 15 Nov. 2011, *M. Hislop & J. Williams* MH 4167 (MEL, PERTH); 6 Oct. 1981, *K.R. Newbey* 9440 (PERTH); 10 Nov. 1982, *A. Strid* 21344 (PERTH); 4 Dec. 2008. *M.E. Trudgen* 23366 (CANB, PERTH); 30 Oct. 1974, *D.J.E. Whibley* 4708 (AD *n.v.*, PERTH); 14 Oct. 1997, *Peter G. Wilson* 1378 *& N. Lam* (NSW *n.v.*, PERTH).

Distribution and habitat. Recorded from west of Southern Cross to Yellowdine and south to near Mt Hampton and the Parker Range area (Figure 5), often from yellow sand. The dominant vegetation often includes *Allocasuarina* species such as *A. spinossisima* and/or *Grevillea*, *Callitris* and mallee species.

Phenology. Flowers recorded from September to December and mature fruits in early December.

Conservation status. Listed as Priority Three under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea grandibracteata* subsp. Parker Range (K. Newbey 9270). There are numerous collections of this taxon, which has a distribution *c.* 80 km long.

Variants. Southern specimens that were previously housed as *Baeckea grandibracteata* subsp. Parker Range (e.g. *N. Gibson & M. Lyons* 2085, *M. Hislop & J. Williams* MH 4167 and *K.R. Newbey* 9440) may have a slightly greater tendency to shed their bracteoles prior to fruit maturation than in typical *B. grandibracteatum*, but both variants have large, persistent bracteoles. Two specimens from the Mt Hampton area (e.g. *M.E. Trudgen* MET 23397 A), have a minute apical mucro on young leaves that is seldom present on other specimens.

Notes. This subspecies has straight, compressed peduncles that expand to be very broad distally and tend to have the same rugose-pitted patterning as the hypanthium (Figure 1I). The basal stem was recorded as being 14 mm in diameter on *B.L. Rye & M.E. Trudgen* BLR 241065.

9b. Balaustion grandibracteatum subsp. **juncturum** Rye, *subsp. nov.*

Type: east of Forrestania crossroads, Western Australia [precise locality withheld for conservation reasons], 6 November 2004, *B.L. Rye* & *M.E. Trudgen* BLR 241187 (*holo*: PERTH 07218141; *iso*: CANB, K, MEL).

Baeckea sp. Blue Haze Mine (P. Armstrong 06/910), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Crossroads (B.L. Rye & M.E. Trudgen 241186), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Forrestania (K.R. Newbey 1105), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Petioles 0.3–0.6 mm long. *Leaf blades* 2–5 mm long, 0.8–1.1 mm wide, 0.5–0.7 mm thick. *Peduncles* 2–6 mm long. *Bracteoles* mostly shed prior to or at anthesis, 3–5.5 mm long. *Pedicels* 0–0.5(–0.7) mm long. *Sepals* 0.6–1.5(–1.7) mm long. *Stamens* 14–26. *Ovules* 12–20 per loculus. *Style* 1.6–2.3 mm long. (Figure 7B)

Diagnostic characters. Differs from the other subspecies by the combination of deciduous bracteoles 3–5.5 mm long and pedicels 0–0.5(–0.7) mm long.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 10 Nov. 2005, *G.F. Craig* 7031 (PERTH); 10 Oct. 2018, *R. Davis & M. Hislop* 121948 (PERTH); 23 Oct. 1997, *T.D. Macfarlane* 2008 (PERTH); 14 Oct. 1963, *K.R. Newbey* 1105 (PERTH); 5 Nov. 2004, *B.L. Rye & M.E. Trudgen* BLR 241176 (PERTH); 12 Dec. 2008, *M.E. Trudgen* 23417 (PERTH).

Distribution and habitat. Extends from the Mt Holland area south to the Forrestania crossroads area (Figure 5), occurring in sandy soils, sometimes with lateritic gravel or granite cobbles, in shrublands commonly dominated by *Acacia*, *Allocasuarina* or *Eucalyptus* species.

Phenology. Flowers recorded in October and November.

Etymology. From the Latin *junctura* (join, junction) as this taxon has mainly been collected in the vicinity of the Forrestania crossroads.

Conservation status. To be listed as Priority Two under Conservation Codes for Western Australian Flora (Tanya Llorens pers. comm.). The synonyms *Baeckea* sp. Blue Haze Mine, *B.* sp. Crossroads (B.L. Rye & M.E. Trudgen 241186) and *B.* sp. Forrestania (K.R. Newbey 1105) are all currently listed as Priority One (Western Australian Herbarium 1998–).

Variation. Three phrase names have been applied to this subspecies but there are no clear morphological discontinuities between them. *Baeckea* sp. Forrestania and *B.* sp. Blue Haze Mine were applied to specimens with sepals 0.6–1 mm long, while *B.* sp. Crossroads was applied to specimens with short or long sepals (see population samples below). Sepal length is similarly variable in subsp. *grandibracteatum* but somewhat greater on average, having the range 0.8–2 mm long.

Where multiple specimens have been collected from the same population, sepal length, peduncle length and other characters can vary considerably. For example, both population samples of *Baeckea* sp. Crossroads (*B.L. Rye & M.E. Trudgen* BLR 241186–241189; *M.E. Trudgen* MET 23402) have sepals of very varied size (0.6–1.5 mm long) and shape. *M.E. Trudgen* 23359C has pedicels more or less absent whereas *M.E. Trudgen* 23359A from the same population has pedicels *c.* 0.7 mm long. This high degree of variation in sepal morphology within a population, or even on a single specimen, does not support recognition of additional subspecies let alone species among the central populations of the *Balaustion grandibracteatum* complex. However, the overall variation in subspecies *juncturum* needs further study in the field.

Stamen numbers are particularly variable in specimens collected in the Mt Holland area, ranging from 14 to 26.

Notes. A specimen (*R.E. Sokolowski s.n.* 19 Oct. 1988) of *Baeckea* sp. Blue Haze Mine has a flower bud with a distinct pedicel 2 mm long above a peduncle 5 mm long (with the bracteoles shed), but also has a flower with no pedicel and persistent bracteoles above a peduncle 5 mm long. The 2 mm long pedicel has not been included in the subspecies description as it appears to be an abnormality.

9c. Balaustion grandibracteatum subsp. **meridionale** Rye, *subsp. nov.*

Type: west of Kumarl, Western Australia [precise locality withheld for conservation reasons], 10 October 1966, *P.G. Wilson* 5717 (*holo*: PERTH 06748279; *iso*: K, MEL).

Baeckea sp. Mt Gibbs (G.F. Craig 7031), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Mt Glasse (P.G. Wilson 5717), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Petioles 0.3–0.6 mm long. *Leaf blades* 2.5–3.5 mm long, 0.8–1.1 mm wide, 0.5–0.7 mm thick, densely denticulate at first. *Peduncles* 2–3.5 mm long. *Bracteoles* mostly shed prior to anthesis, 2–3 mm long. *Pedicels* 0.7–1.5 mm long. *Sepals* 1.2–1.6 mm long. *Stamens* 18–23. *Ovules* 12–16 per loculus. *Style* 2–2.45 mm long.

Diagnostic characters. Differs from the other subspecies in having longer pedicels and shorter bracteoles.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 10 Nov. 2005, *G.F. Craig* 7031 (PERTH); 25 Oct. 1993, *R. Heberle s.n.* (PERTH); 14 Oct. 1978, *D. Monk* 444 (PERTH).

Distribution and habitat. Extends from the Mt Gibbs area in the west to beyond the eastern end of Frank Hann National Park (Figure 5), occurring in sandy soils, sometimes with lateritic gravel or granite cobbles, in shrublands commonly dominated by *Acacia*, *Allocasuarina* or *Eucalyptus* species.

Phenology. Flowers recorded in October and November.

Etymology. From the Latin *meridionalis* (southern) as this subspecies occurs south of the other subspecies and at the southern margin of the distribution of the genus.

Conservation status. To be listed as Priority Two under Conservation Codes for Western Australian Flora (Tanya Llorens pers. comm.). The synonyms *Baeckea* sp. Mt Glasse (P.G. Wilson 5717) and *B.* sp. Mt Gibbs (G.F. Craig 7031) are listed as Priority One and Two, respectively (Western Australian Herbarium 1998–).

Variation. Although two phrase names have been applied to this subspecies, only ten specimens are known and they show much less morphological variation than has been found amongst the specimens examined for each of the other two subspecies. All subsp. *meridionale* specimens have bracteoles 2–3 mm long and pedicels 0.7–1.5 mm long whereas all specimens of subspp. *grandibracteatum* and *juncturum* have bracteoles 3–6 mm long and pedicels 0–0.4(–0.7) mm long.

10. Balaustion karroun Rye, *sp. nov.*

Type: Bonnie Rock, 10 October 1984, Western Australia, *B.H. Smith 475* (*holo*: PERTH 06748414; *iso*: MEL 1527970 *n.v.*).

Baeckea sp. Wialki (G.M. Storr s.n. 4/10/1958), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub 0.4–0.5 m high, *c.* 0.5 m wide; flowering branchlets with 1 pair of flowers. *Leaves* appressed to widely antrorse. *Petioles* 0.4–0.6 mm long. *Leaf blades* obovate, 2.5–3.7 mm long, 1.4–1.6 mm wide, not very thick, obtuse, entire or very minutely serrulate, slightly recurved at apex; abaxial surface keeled towards apex, the keel distally rounded, with the larger oil glands usually in 2 or 3 main rows on each side of midvein; adaxial surface shallowly concave (or shallowly indented), with less obvious oil glands. *Peduncles* 3–3.5 mm long, longitudinally finely ridged. *Bracteoles* enclosing the late buds, usually shed before the fruits mature, 4–6 mm long. *Pedicels* scarcely developed, less than 0.5 mm long. *Flowers c.* 15 mm diam. *Hypanthium* 2.5–3.5 mm long, 4–5 mm wide (increasing in fruit to a maximum of 4 × 5.5 mm), green and somewhat rugose in adnate part; free part *c.* 0.8 mm long, often reddish-tinged. *Sepals* broadly or very broadly ovate, 2–2.5 mm long, 3–4 mm wide, scarious, reddish outside with a whitish border 0.3–0.5 mm wide, ± entire. *Petals c.* 5 mm long, white. *Stamens* commonly 22–25. *Antipetalous filaments c.* 2.5 mm long. *Anthers c.* 0.5 mm wide from front view; connective gland 0.4–0.5 mm long; thecae *c.* 0.25 mm long. *Ovary c.* 1/2 inferior; ovules usually 20–22 per loculus. *Style* 2.7–3.1 mm long; stigma 0.2–0.3 mm diam. *Fruits c.* 2/3 inferior, 4–4.5 mm long, *c.* 6 mm diam.; placentas ovate, 2.5–2.9 × 1.4–1.6 mm. *Seeds* reniform but slightly facetted, 1.35–1.5 mm long, 0.55–0.65 mm wide, 0.6–0.7 mm thick, golden brown, minutely colliculate; inner cavity 0.5–0.8 mm long. (Figure 1F)

Diagnostic features. Distinguished from other species of *Balaustion* that have leaves with the keel distally rounded (not pointed or knobbed) in having the following combination of characters: obovate leaves 1.4–1.6 mm wide and large bracteoles that enclose the flowers in late bud.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 13 Oct. 2006, *A. Crawford & N. Sheehy* ADC 1175 (PERTH); 18 Nov. 1993, *H. Pringle* 30157 (PERTH); 4 Oct. 1958, *G.M. Storr s.n.* (PERTH); 18 Nov. 2008, *M.E. Trudgen* MET 23275 A (AD, BRI, PERTH); 18 Nov. 2008, *M.E. Trudgen* MET 23269 C (CANB, NSW, PERTH).

Distribution and habitat. Extends from Diemals Station south-west to near Wialki (Figure 9), growing in yellow sandy soils with scrub, and at one location with *Acacia* and *Eucalyptus leptopoda*.

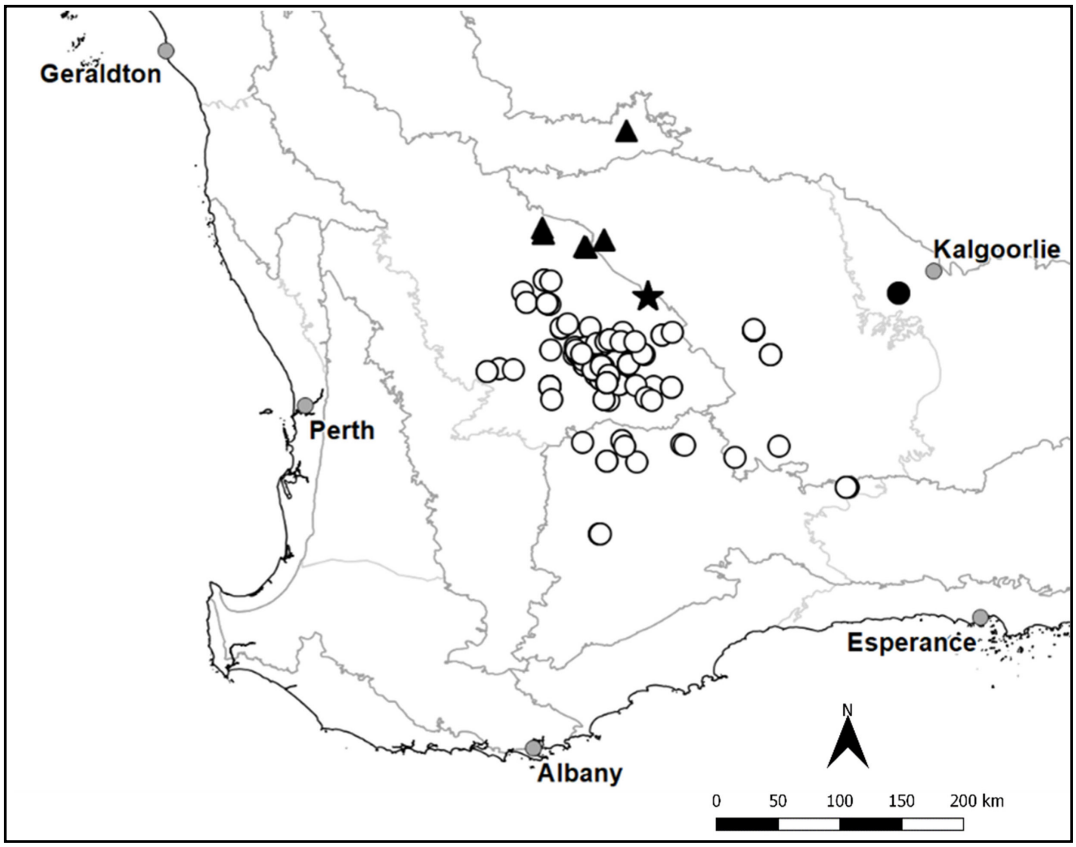

Figure 9. Distribution of *Balaustion karroun* (▲), *B. quinquelobum* confirmed (○) and unconfirmed localities (●), and *B. spenceri* (★).

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

Etymology. Named after the Karroun Hill Nature Reserve. The new species has been recorded both to the north-east and to the south of this very large reserve, with all its known localities less than 40 km from the reserve. The epithet is formed as a noun in apposition.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Wialki (G.M. Storr s.n. 4/10/1958). The geographic range recorded for *B. karroun* is about 135 km long, with most of the region between the north-eastern and southern localities being very poorly explored botanically, so additional localities are likely to be discovered for this species with targeted survey.

Affinities. This species is similar to *B. grandibracteatum* in having bracteoles up to 6 mm long but its bracteoles are less persistent. It is more like *B. baiocalyx* in its flattened leaves and long style but is readily distinguished by its larger sepals and bracteoles. It also shows some similarities to *B. thamnoides* (see details under that species).

Notes. There is limited good flowering material of this species, reducing the reliability of the above description of floral characters, such as ovule numbers.

11. Balaustion mukinbudin Rye, *sp. nov.*

Type: north-east of Mukinbudin, Western Australia [precise locality withheld for conservation reasons], 15 October 2005, *M. Hislop & F. Hort* MH 3528 (*holo*: PERTH 07421486; *iso*: CANB, K, MEL, NSW).

Baeckea sp. Elsewhere Road (M.E. Trudgen 5420), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub 0.2–0.8 m high, 0.3–1 m wide; flowering branchlets with 1 pair of flowers or more commonly just a solitary flower. *Leaves* appressed to widely antrorse. *Petioles* 0.3–0.5 mm long. *Leaf blades* narrowly to broadly obovate, 2–4 mm long, (1–)1.2–1.6(–1.8) mm wide, *c.* 0.4–0.5 mm thick, obtuse, not mucronate or with a mucro less than 0.1 mm long, denticulate at first, slightly recurved at apex; abaxial surface prominently and rather narrowly keeled towards apex and produced into a ridge or slight subterminal point (the apex then appearing double-pointed), with the larger oil glands usually in 2 or 3 main rows on each side of midvein; adaxial surface shallowly concave (or shallowly indented), with less obvious oil glands. *Peduncles* 2.5–4 mm long. *Bracteoles* enclosing the late buds, scarious, often persistent on young fruits, 4–5.5 mm long. *Pedicels* ± absent. *Flowers* 11–16 mm diam. *Hypanthium* 2–2.7 mm long, *c.* 5 mm wide, green and minutely but distinctly rugose in adnate part; free part *c.* 0.6 mm long, often reddish-tinged. *Sepals* depressed ovate-elliptic to somewhat more triangular, 1.4–2.5 mm long, 2.5–3.5 mm wide, reddish with whitish irregular margins not forming a definite border or with a definite whitish border up to *c.* 0.4 mm wide, margin minutely laciniate. *Petals* 4–6.5 mm long, white. *Stamens* 19–25. *Antipetalous filaments* 1.8–2.4 mm long. *Anthers* *c.* 0.6 mm wide from front view; connective gland *c.* 0.8 mm long; thecae *c.* 0.25 mm long. *Ovary* *c.* 1/2 inferior; ovules 13–18(–20) per loculus. *Style* 1.9–2.5 mm long; stigma 0.2–0.25 mm diam. *Fruits c.* 2/3 superior, *c.* 4 mm long, *c.* 5 mm diam.; placentas elliptic or ovate, *c.* 2.6 × 1.6 mm. *Seeds* reniform but somewhat facetted, 1.2–1.35 mm long, 0.5–0.65 mm wide, 0.6–0.7 mm thick, golden brown, minutely colliculate; inner cavity 0.7–0.75 mm long. (Figure 1C, H, J & K)

Diagnostic features. Distinguished from other species of *Balaustion* that have a 2-pointed apex to the leaves in having scarious, persistent bracteoles 4–5.5 mm long and pedicels ± absent.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 28 Oct. 1999, *M. Buist s.n.* (PERTH); 24 Sep. 2016, *G. Byrne* 6050 (PERTH); 14 Oct. 2006, *A. Crawford* ADC 1183 (PERTH); 22 Sep. 1982, *K.R. Newbey* 9576 (CANB *n.v.*, PERTH); 16 Oct. 1978, *P. de Rebeira* 15 (PERTH); 10 Oct. 1988, *B.H. Smith* 1102 (BRI *n.v.*, CBG *n.v.*, HO *n.v.*, MEL *n.v.*, PERTH); 14 Nov. 1986, *M.E. Trudgen* 5420 (AD, MEL, NSW, PERTH), 2 Dec. 2008, *M.E. Trudgen* MET 23340 A, B (PERTH); 30 Sep. 1984, *A.S. Weston* 14131 (PERTH).

Distribution and habitat. Extends from east of Bonnie Rock south to Chiddarcooping Nature Reserve (Figure 10), occurring in yellow sand, at least sometimes with *Melaleuca*, and at one locality recorded with *Baeckea elderiana*.

Phenology. Flowers from September to November, with copious nectar observed. Mature fruits were recorded in November.

Etymology. Named after the town of Mukinbudin, which is a centre for the occurrence of *Balaustion*, with seven additional taxa recorded in or near the Shire of Mukinbudin: *B. bimucronatum*, *B. exsertum*,

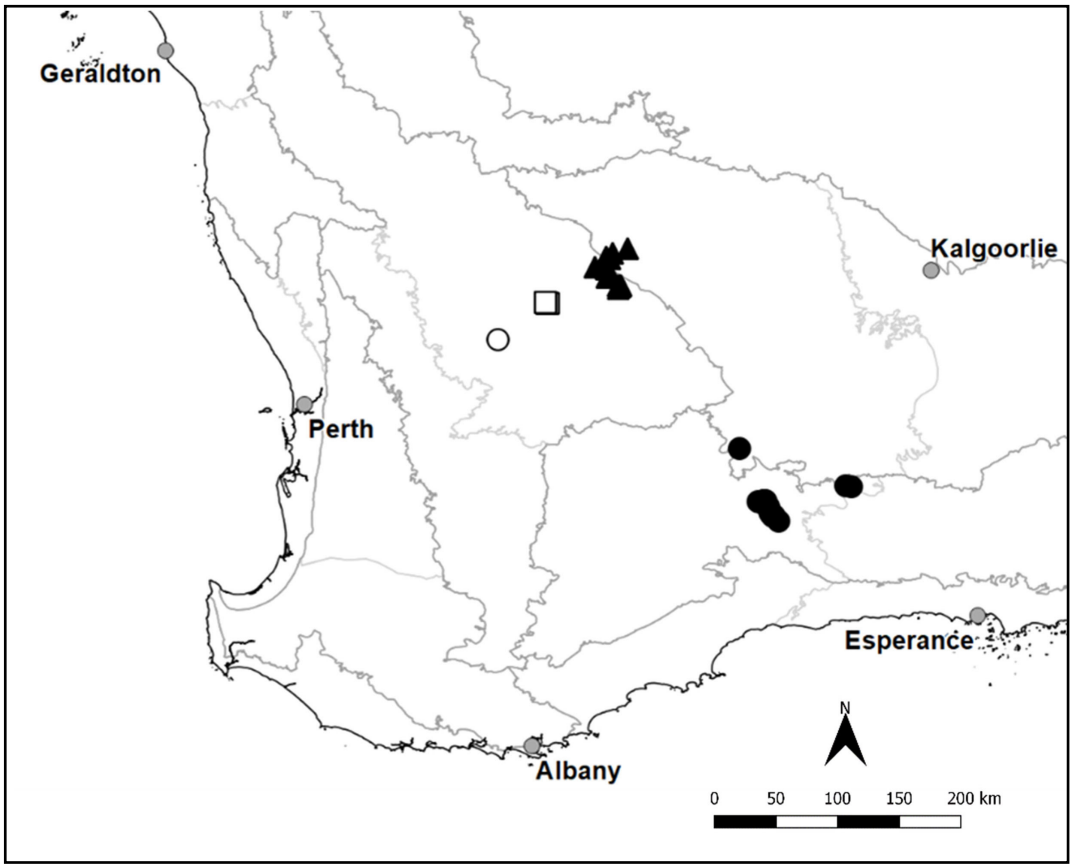

Figure 10. Distribution of *Balaustion mukinbudin* (▲), *B. thamnoides* (●), *B.* sp. Billyacatting (□) and *B.* sp. Yorkrakine (○).

B. filifolium, *B. interruptum*, *B. karroun*, *B. pulcherrimum* and *B. quinquelobum*. The epithet is formed as a noun in apposition.

Conservation status. Listed as Priority Three under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Elsewhere Road (M.E. Trudgen 5420). *Balaustion mukinbudin* is a geographically restricted species, its known range less than 40 km long and *c.* 30 km wide.

Affinities. *Balaustion mukinbudin* is similar to *B. grandibracteatum* in having large bracteoles clasping the base of its flowers and fruits (Figure 1J), but *B. grandibracteatum* differs in having narrower, thicker leaves with a rounded keel. Its closest relative might be *B. bimucronatum*, which occurs just to the south but has shorter, less persistent bracteoles, shorter sepals and a longer style (see Table 2).

Notes. The style of *B. mukinbudin* is quite short in comparison with the taxa that appear to be close relatives (see Table 2) but similar-sized or shorter styles are found within the *B. grandibracteatum* complex and in *B. quinquelobum*.

12. Balaustion multicaule Rye, *sp. nov.*

Type: Mount Holland Track, Western Australia [precise locality withheld for conservation reasons], 5 November 2004, *B.L. Rye & M.E. Trudgen* BLR 241168 (*holo:* PERTH 09447164; *iso*: CANB, K, MEL, PERTH 07218532).

Baeckea sp. Sheoaks Rocks (M.E. Trudgen MET 5452), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub 0.15–0.3 m high, with many slender stems from a woody base; flowering branchlets usually with 1 pair of flowers. *Leaves* almost appressed to widely antrorse. *Petioles c.* 0.4 mm long. *Leaf blades* narrowly ovate to very narrowly obovate or linear in outline, *c.* 3 mm long, 0.5–0.7 mm wide, 0.4–0.5 mm thick, obtuse, with denticulate margins at first, becoming entire; abaxial surface deeply convex, with the larger oil glands usually in 1 or 2 main rows on each side of midvein; adaxial surface shallowly concave (or shallowly indented), with less obvious oil glands. *Peduncles* 3–5 mm long. *Bracteoles* sometimes persistent on the mature fruits, 2–3 mm long. *Pedicels c.* 1 mm long. *Flowers* 10–11 mm diam. *Hypanthium* 1.7–2.3 mm long, 3–4.5 mm diam., green; free part *c.* 0.6 mm long. *Sepals* depressed ovate, *c.* 1 mm long, *c.* 1.6 mm wide, red, almost entire. *Petals c.* 4 mm long, pale pink. *Stamens* 18–20. *Antipetalous filaments c.* 1.6 mm long. *Anthers c.* 0.4 mm wide from front view; connective gland *c.* 0.4 mm long; thecae *c.* 0.25 mm long. *Ovary c.* 1/2 inferior; ovules 11–16 per loculus. *Style c.* 2 mm long, exserted part red, with basal 0.6 mm enclosed and green; stigma 0.15–0.2 mm diam. *Fruits c.* 2/3 superior, 3–3.5 mm long, 4–5 mm diam.; placentas elliptic-ovate, 1.6–1.8 × 1–1.3 mm. *Seeds* facetted-reniform, 1.4–1.6 mm long, 0.6–0.7 mm wide, 0.7–0.8 mm thick, medium to dark brown, minutely colliculate, the colliculae not as deep on outer surface as on lateral surfaces; inner cavity 0.8–1 mm long. *Chaff pieces* golden-brown, distinctly paler than seeds.

Diagnostic features. Distinguished from other species of sect. *Tilophloia* by the combination of its multi-stemmed habit, small bracteoles and narrow, thick leaves with the keel rounded at the apex (not pointed or knobbed).

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 5 Nov. 2004, *B.L. Rye & M.E. Trudgen* BLR 241166 (AD, PERTH); 21 Nov. 1986, *M.E. Trudgen* MET 5452 (AD, MEL, PERTH).

Distribution and habitat. Known from a single locality in the Sheoak Rock area, east of Hyden (Figure 6), where it grows in pale yellow-brown sand with scattered mallees over Myrtaceae and Proteaceae heath.

Phenology. Flowers in October and November. Fruits recorded in late November.

Etymology. From the Latin *multus* (many) and *caulis* (stem), referring to the multi-stemmed habit.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Sheoaks Rocks (M.E. Trudgen MET 5452). Known from only two, very close localities.

Affinities. This is a member of the *B. grandibracteatum* complex. It can be distinguished from

B. grandibracteatum by its multi-stemmed habit and narrower leaves (0.5–0.7 mm *cf.* 0.7–1(–1.5) mm wide).

Notes. The description of the flowers of *B. multicaule* is based on very little material, resulting in little or no range of measurements for each organ. *Balaustion multicaule* (*B.L. Rye & M.E. Trudgen* BLR 241168) has been recorded growing with *B. pulcherrimum* (*B.L. Rye & M.E. Trudgen* BLR 241169) at the type locality.

13. Balaustion polyandrum Rye, *sp. nov.*

Type: Jaurdi Station, Western Australia [precise locality withheld for conservation reasons], 12 October 1999, *L.W. Sage & F. Hort* 2229 (*holo*: PERTH 06202446; *iso*: CANB, K).

Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub c. 0.5 m high, width unknown; flowering branchlets with 1 pair of flowers. *Leaves* mostly widely antrorse. *Petioles* 0.4–0.5 mm long. *Leaf blades* commonly obovate, 3–4 mm long, 1.2–1.5 mm wide, not very thick, obtuse, denticulate; abaxial surface prominently and rather narrowly keeled towards apex and frequently produced into a ridge or slight subterminal point (the apex often appearing double-pointed), with the larger oil glands usually in 1 or 2 main rows on each side of midvein; adaxial surface shallowly concave (or shallowly indented), with less obvious oil glands. *Peduncles* 3–4 mm long. *Bracteoles* shed from young buds, *c.* 2 mm long. *Pedicels* usually 0.5–1 mm long. *Flowers* 15–17 mm diam. *Hypanthium* 3–4 mm long, 5–6 mm wide, green and somewhat rugose throughout; free part *c.* 1 mm long. *Sepals* depressed ovate, 0.8–1 mm long, *c.* 3 mm wide, deep red outside with a whitish border *c.* 0.2 mm wide, minutely denticulate. *Petals* 6–7 mm long, white. *Stamens c.* 30. *Antipetalous filaments c.* 2.5 mm long. *Anthers c.* 0.5 mm wide from front view; connective gland *c.* 0.6 mm long; thecae *c.* 0.3 mm long. *Ovary c.* 2/3 inferior; ovules 20–22 per loculus. *Style c.* 4 mm long; stigma *c.* 0.25 mm diam. *Fruits* not seen at maturity. (Figure 1D)

Diagnostic characters. Distinguished from other species of *Balaustion* that have a dorsal point or knob and sometimes 2-pointed apex to the leaves by the following combination of characters: bracteoles caducous, *c.* 2 mm long; sepals very reduced, 0.8–1 mm long; stamens *c.* 30; ovules 20–22 per loculus.

Distribution and habitat. Recorded from Jaurdi Station, east of Koolyanobbing (Figure 8), in yellowish sand with *Eucalyptus* low woodland and *Acacia* heath.

Phenology. Flowers recorded in October.

Etymology. From the Greek *poly-* (many-) and *-andrus* (male), referring to the numerous stamens. Judging from its single collection, this species has the highest stamen number, on average, in sect. *Tilophloia*.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Jaurdi Station (L.W. Sage & F. Hort 2229). Known from only one collection.

Affinities. This species keys out with the fairly numerous species that have leaves with the apex often appearing double-pointed, such as *B. spenceri*, which differs in its longer pedicels and smaller flowers, and *B. mukinbudin*, which is distinguished by its longer sepals and large, persistent bracteoles. It is also similar to *B. baiocalyx* in being large-flowered and having reduced sepals but differs as discussed under that species, including by its usually 2-pointed leaves.

Notes. In *B. polyandrum*, the pedicels are 0.5–1 mm long and much shorter than the 3–4 mm long peduncles. In contrast, pedicels are up to 4 mm long and usually greater in relation to the peduncles, sometimes exceeding the peduncles in length, in most of the subsequently keyed species (choices 16–20).

Only one flower bud was dissected; it had 30 stamens and one staminode, giving a total of 31 filaments, and 20, 21 and 22 ovules respectively in the three loculi, giving a total of 63 ovules in the ovary. The oldest fruit present was still *c.* 2/3 inferior, 4.5–5 mm long and *c.* 6 mm diam. A lack of mature fruits renders the description incomplete.

14. Balaustion quinquelobum Rye, *sp. nov.*

Type: 106 km west of Southern Cross, Western Australia, 20 September 1978, *R.J. Cranfield* 601 (*holo*: PERTH 09447172; *iso*: AD, BRI, CANB, HO, K, MEL, NSW, PERTH 03416356).

Baeckea rosea Trudgen ms., in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 348 (2000), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Koonadgin (B.L. Rye & M.E. Trudgen BLR 241137), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Muntadgin (E.T. Bailey 231), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

[*Baeckea grandis* var. *exserta* (S.Moore) C.A.Gardner ms, *in sched.* (PERTH 09116400). Misapplied with respect to current circumscription of *Balaustion exsertum*.]

Shrub low-growing to fairly erect, 0.15–0.8 m high, 0.2–1.4 m wide, sometimes multi-stemmed; flowering branchlets with 1(2) pairs of flowers. *Leaves* closely antrorse to almost patent. *Petioles* 0.2–0.4 mm long. *Leaf blades* narrowly ovate or narrowly oblong to linear in outline, often broadest at the base at maturity, 2–3(–4) mm long, 0.5–0.7 mm wide, 0.4–0.6 mm thick, minutely denticulate at first (sometimes very sparsely), often becoming entire, with a subterminal, dorsal knob or mucro, sometimes also with a minute terminal mucro less than 0.1 mm long; abaxial surface keeled towards apex and narrowly furrowed below, the keel prominent just below the apex and tending to form a subterminal point, with the larger oil glands in 1–3 (usually 1 or 2) main rows on each side of midvein; adaxial surface slightly convex to flat, often with a narrow furrow along the centre, with less obvious oil glands. *Peduncles* 1.5–2.5 mm long. *Bracteoles* borne well below the mature buds, widely antrorse to patent, usually persistent, 1.3–2.5 mm long, narrowly keeled almost to apex. *Pedicels* (1–)1.3–2.5 mm long. *Flowers* 10–14 mm diam. *Hypanthium* with 5 lobes surrounding and extending somewhat below (rarely level with) the apex of the pedicel, 1–1.5 mm long, 2.5–3.5 mm wide, rugose-pitted; free part 0–0.4 mm long. *Sepals* broadly ovate, 1.5–2 mm long, 2.3–2.8 mm wide, scarious, reddish outside within a broad pale border or with scarcely any pale border (often with reddish parts irregularly extending

into the broad pale border), minutely serrulate to laciniate. *Petals* 3.5–6 mm long, white or pale pink. *Stamens* 18–25. *Antipetalous filaments* 1.3–2 mm long. *Anthers* 0.3–0.35 mm wide from front view; connective gland 0.35–0.5 mm long, pink; thecae 0.2–0.3 mm long, brownish. *Ovary c.* 1/2 inferior; ovules (8–)10–15 per loculus. *Style* 1.4–2.2 mm long; stigma *c.* 0.1 mm diam. *Fruits c.* 2/3 superior, 2.2–2.7 mm long, 3–4 mm diam.; placentas elliptic, 1.7–2.5 × 1.1–1.3 mm. *Seeds* facetted-reniform, 1.2–1.5 mm long, 0.6–0.75 mm wide, 0.6–0.7 mm thick, golden brown, minutely colliculate; inner cavity 0.7–0.8 mm long.

Diagnostic features. The most distinctive feature is the 5-lobed hypanthium, with the lobes usually projecting down below the summit of the pedicel. Other important characters: bracteoles borne well below the mature buds, 1.3–2.5 mm long, persistent; antipetalous filaments 1.3–2 mm long; style 1.4–2.2 mm long; ovules 8–15 per loculus.

Selected specimens examined. WESTERN AUSTRALIA: Karalee Rock, 8 Oct. 2018, *R. Davis & M. Hislop* 12926 (PERTH); adjacent to Great Eastern Hwy, 2.75 km W of Burracoppin, Dec. 2004, *N. Everidge s.n.* (CANB, PERTH); on W side of Roberts Rd, *c.* 1 km S of Nangeenan North Rd, Nature Reserve 11522, *c.* 9 km SE of Nungarin, 29 Aug. 1999, *G.J. Keighery & N. Gibson* 3012 (PERTH); SWATT Sandplain Survey, UCL (Unallocated Crown Land), survey site SWA0404D, *c.* 61.09 km N (6.99 degrees) of Hyden and *c.* 55.04 km WNW (70.89 degrees) of Narembeen, 14 Oct. 2013, *R. Meissner & B. Bayliss* 5728 (PERTH); W of Moorine Rock, toward Nulla Nulla, 10 Sep. 1968, *M.E. Phillips* WA 68/753 (CBG, PERTH); Roe Rd, 1.8 km N of Billericay Rd, NW of Hyden, 4 Nov. 2004, *B.L. Rye & M.E. Trudgen* BLR 241157 (PERTH); 18.9 km E of Yellowdine on Great Eastern Hwy, 6 Nov. 2004, *B.L. Rye & M.E. Trudgen* BLR 241197 (BRI, PERTH); *c.* 3–5 km E of Merredin along Great Eastern Hwy, 29 Sep. 1981, *R. Spjut, G. White, R. Phillips & L. Lacy* 7231 (PERTH); Quadrat T33-15. NW of Hyden on northern boundary of Roe Nature Reserve, 6 Oct. 2003, *A. Waters* 187 (PERTH); Great Eastern Hwy near Walgoorlan (± 20 miles E of Merredin), 18 Sep. 1963, *J.H. Willis s.n.* (MEL *n.v.*, PERTH); 19.7 km E of Yellowdine, 15 Oct. 1997, *Peter G. Wilson & N. Lam* PGW 1384 (NSW *n.v.*, PERTH, UNSW *n.v.*).

Distribution and habitat. Extends mainly from Welbungin south to Lake Grace and to east of Lake King (Figure 9), occurring in varied vegetation on yellow sand or other kinds of sandy soils, sometimes over laterite or with lateritic gravel. *Balaustion quinquelobum* has often been recorded co-occurring with *Baeckea muricata*. There is one isolated, unconfirmed locality (Figure 9) of 'Coolgardie' on *B.A. Rockel* U (PERTH 03378276 & 04532856).

Phenology. Flowers recorded from August to November but mainly in September and October. Mature fruits recorded from October to January.

Etymology. From the Latin *quinque-* (five-) and *lobus* (lobe), referring to the hypanthium being 5-lobed where it is attached to the pedicel.

Conservation status. There are numerous collections of this species, which has a distribution *c.* 300 km long. No conservation code is required (Tanya Llorens pers. comm.). Note that *Baeckea* sp. Muntadgin (E.T. Bailey 231) was previously listed as Priority One under Conservation Codes for Western Australian Flora.

Affinities. Similar to *B. exsertum*, *B. filifolium* and *B. spenceri* but differing from all of them in its usually shorter hypanthium with more obvious lobes, shorter stamens and shorter style. See notes under those taxa. All four species have very similar flower diameters and petal lengths.

Variants. Inland specimens, such as those from the Yellowdine area, tend to be small-leaved and small-flowered, including one used as the basis for the name *B.* sp. Muntagin (E.T. Bailey 231), which has leaves about 2 mm long and petals about 3.5 mm long. However, small-leaved and small-flowered specimens are also found scattered throughout the range of the species and there is no clear separation between them and specimens with longer leaves and petals, so this variant does not appear to be sufficiently distinctive to recognise formally.

Notes. Gardner noted on a Tammin specimen that he collected in September 1936 (PERTH 06115144) that *Baeckea exserta* may just be a variety of *B. grandis* and later applied the manuscript name *B. grandis* var. *exserta* to a duplicate (PERTH 09116400), both sheets of which have subsequently been identified as *B. quinquelobum*. There is also a collection of *B. exsertum* with the same date (*C.A. Gardner s.n.* PERTH 03350991) from 'Tammin district' (rather than just Tammin). Whether the two species co-occurred at a single locality or were collected from two different localities in that month is uncertain, but this is the only case where Tammin is recorded as the locality for *B. quinquelobum* and it is the westernmost locality recorded for that species, although only by a relatively short distance.

Baeckea sp. Koonadgin (B.L. Rye & M.E. Trudgen BLR 241137) was established to replace the manuscript name *B. rosea* Trudgen. On some early collections, the flower colour was recorded as pink or 'rose pink', which apparently explains the choice of the manuscript name *Baeckea rosea* for this species. Recent collections record flower colour as white or pale pink, but buds are commonly deep pink in colour, with the outer petals retaining deep pink patches on their outer surface after anthesis.

Some specimens are multi-stemmed at ground level but in some cases this is because the base of the plant has been buried. The species is usually not lignotuberous but further survey is needed to determine whether some populations or individual plants can produce a lignotuber.

15. Balaustion spenceri Rye, *sp. nov.*

Type: near Baladjie, Western Australia [precise locality withheld for conservation reasons], 14 October 2004, *B.L. Rye & M.E. Trudgen* BLR 241060 (*holo*: PERTH 07264550; *iso*: CANB, K, MEL, NSW).

Baeckea sp. Baladjie (P.J. Spencer 24), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub forming a low dome 0.2–0.3 m high, 0.5–0.9 m wide; flowering branchlets with 1 pair of flowers or more commonly just a solitary flower. *Leaves* appressed to patent, commonly antrorse. *Petioles* 0.4–0.5 mm long. *Leaf blades* ovate to narrowly obovate or narrowly elliptic, 3–3.5 mm long, 0.6–1.1 mm wide, not very thick, obtuse or acute and with a mucro less than 0.1 mm long, minutely denticulate at first, becoming entire, slightly recurved at apex; abaxial surface prominently and rather narrowly keeled towards apex and produced into a ridge or slight subterminal point (the apex often appearing double-pointed), with the larger oil glands usually in 1 or 2 main rows on each side of midvein; adaxial surface shallowly concave (or shallowly indented), with less obvious oil glands. *Peduncles* 1–2.5 mm long. *Bracteoles* widely antrorse and well below the older buds, shed prior to anthesis, 1.3–1.6 mm long. *Pedicels* 2–3.5 mm long. *Flowers* 8.5–11 mm diam. *Hypanthium* obconic, 1.5–2 mm long, 3–4 mm wide, green and somewhat rugose in adnate part; free part *c.* 0.7 mm long, deep reddish. *Sepals* broadly to depressed ovate, 0.8–1.5 mm long, 1.7–2.3 mm wide, deep red with a whitish border *c.* 0.3 mm wide, minutely denticulate. *Petals* 3.5–5 mm long, white. *Stamens* 20–24, the broadest ones up to 0.6 mm wide at base. *Antipetalous filaments* 2–3.3 mm long. *Anthers c.* 0.4 mm wide

from front view; connective gland 0.3–0.35 mm long; thecae 0.25–0.3 mm long. *Ovary c.* 1/2 inferior; ovules 10–13 per loculus. *Style* 2.6–3.3 mm long; stigma *c.* 0.2 mm diam. *Fruits* not seen at maturity.

Diagnostic features. Distinguished from other species of *Balaustion* that have a 2-pointed apex to the leaves by the following combination of characters: leaves flattened; bracteoles shed early or borne well below mature buds, 1.3–1.6 mm long; hypanthium obconic; pedicels ± equalling to much longer than the peduncles; antipetalous filaments 2–3.3 mm long; ovules 10–13 per loculus.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 14 Oct. 2004, *B.L. Rye & M.E. Trudgen* BLR 241061 (AD, PERTH); 14 Oct. 2004, *B.L. Rye & M.E. Trudgen* BLR 241062 (BRI, PERTH); 13 June 1995, *P.J. Spencer* 24 (CANB *n.v.*, PERTH); 2 Dec. 2008, *M.E. Trudgen* MET 23350 A (PERTH).

Distribution and habitat. Recorded from between Warralakin and Bullfinch (Figure 9), in brown loam with some large quartz sand grains, probably with granite not far below the surface. The vegetation is recorded as *Acacia* high open shrubland, over *Malleostemon* shrubland over *Balaustion* low open shrubland over *Borya* herbland.

Phenology. Flowers recorded in June and October.

Etymology. Named after its first collector, Phillip J. Spencer (1964–), who was a technical officer at the Western Australian Herbarium for many years and is now a volunteer at the herbarium. The new species was amongst 40 specimens that he collected from the central wheatbelt in March and June 1995, at a time of year when relatively few species would have been in flower.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Baladjie (P.J. Spencer 24). Only one population is known.

Affinities. This taxon is similar to *B. exsertum* but has flatter leaves, usually a more basally tapering (obconic) hypanthium and a greater tendency for the bracteoles to be shed early. It occurs about 75 km east of the closest known locality for *B. exsertum*, which is at the far north of *B. exsertum*'s distribution. Several other related taxa have closer populations. *Balaustion quinquelobum* occurs just south of *B. spenceri* and differs in its shorter style and 5-lobed hypanthium, while *B. filifolium* occurs less than 50 km to the north-east and has thicker leaves with a shorter petiole. Both *B. bimucronatum* and *B. mukinbudin* occur just to the west and differ in having larger bracteoles.

As discussed under *B. bimucronatum*, the apparent differences (see Table 2) between that species and *B. spenceri* might be an illusion resulting from the paucity of collections of both taxa and it might be more appropriate to treat them as subspecies.

Notes. This poorly known taxon has only been collected in flower on two occasions and has never been collected in mature fruit. The original collection made in June 1995 has large flowers in comparison with three specimens collected in October 2004. One flower dissected from *B.L. Rye & M.E. Trudgen* BLR 241060 is abnormal in having two loculi and placentas united, the total number ovules being 26, while the other loculus has 12 ovules.

16. Balaustion tangerinum Rye, *sp. nov.*

Type: Diemals, Western Australia [precise locality withheld for conservation reasons], 5 September 1999, *A.P. Brown* 3636 (*holo*: PERTH 07512600).

Baeckea sp. Diemals (A.P. Brown 3636), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub height and width not recorded; flowering branchlets with 1 or 2 flowers. *Leaves* almost appressed to widely antrorse. *Petioles* 0.5–0.7 mm long. *Leaf blades* oblong or obovate, 3.5–4.5 mm long, 1.5–1.6 mm wide, not very thick, shallowly obtuse or truncate, ciliolate, often somewhat recurved at the apex; abaxial surface keeled towards apex, the keel rounded and thickened distally, sometimes appearing to be a slight subterminal swelling, with the larger oil glands usually in 2 or 3 main rows on each side of midvein; adaxial surface flat (at least for most of its length), with less obvious oil glands. *Peduncles* 3–4 mm long. *Bracteoles* usually persistent in fruit, *c.* 2.5 mm long, denticulate. *Pedicels* absent. *Flowers* 20–25 mm diam. *Hypanthium* 3–4 mm long, 6–8 mm wide, somewhat rugose, broad and hollowed at base, variously green-orange to reddish, not identical in colour to the petals; free part *c.* 1.5–2 mm long. *Sepals* ± depressed ovate, *c.* 3 mm long, 4–5.5 mm wide, usually green with a whitish or pink-tinged border 0.3–0.5 mm wide, denticulate. *Petals* 9–10 mm long, orange, denticulate. *Stamens c.* 24. *Antipetalous filaments c.* 8 mm long. *Anthers c.* 0.5–0.6 mm wide from front view; connective gland 0.4–0.5 mm long; thecae *c.* 0.35 mm long. *Ovary c.* 1/2 inferior; ovules *c.* 20 per loculus. *Style* 11–12 mm long; stigma 0.2–0.3 mm diam. *Fruits* largely superior but not seen at maturity.

Diagnostic features. Distinguished from other species of *Balaustion* by having a hypanthium 3–4 mm long by 6–8 mm wide. Other important characters: sepals two-toned; petals orange, 9–10 mm long; style 11–12 mm long.

Distribution and habitat. Known from a single collection from the Diemals area (Figure 3). The habitat was not recorded but is likely to be sandplain.

Phenology. Flowers recorded in early September.

Etymology. From the Latin *tangerinus* (orange), referring to the orange colour of the petals.

Conservation status. Recently listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Diemals (A.P. Brown 3636). This taxon is known from only one collection and an attempt to recollect it at its type locality failed.

Affinities. Since *B. tangerinum* is known from just one collection and is unusual in having large, orange petals with a denticulate margin, the possibility that it is a hybrid between the orange-flowered *B. pulcherrimum* and a white-flowered species must be considered. *Balaustion karroun*, a white-flowered species that has been recorded from Diemals Station, was thought to be a candidate but has been excluded primarily on the basis of its leaf morphology. The combination of its thickened leaves, with no protrusion on the keel distally, and the leaf morphology found in *B. pulcherrimum*, cannot account for the broad, truncate, thin leaves of *B. tangerinum*. In terms of leaf morphology, *B. unguiculatum* is the only white-flowered species to look feasible as a parent species. *Balaustion tangerinum* is intermediate between *B. pulcherrimum* and *B. unguiculatum* in some respects but matches one or other of the putative parent species in others (Table 3). Although neither of the two possible

parent species has been collected from Diemals Station to date (Figure 2B), *B. pulcherrimum* has been observed there (A. Brown pers. comm.). *Balaustion unguiculatum* is currently known from three collections made about 80 km or more to the south of the single recorded location for *B. tangerinum*.

Overall, *B. tangerinum* shows greater similarity to members of sect. *Tilophloia* than to sect. *Balaustion* and hence is included in the former section. Its petals appear to be the longest in the genus; being up to 10 mm long, they just slightly exceed the maximum petal length recorded in *B. pulcherrimum*.

Notes. The Diemals Station area is poorly explored botanically. Surveys are needed to attempt to locate both previously recorded and additional populations in the region to determine how many *Balaustion* species occur there, investigate their conservation status, and assess whether *B. tangerinum* should be treated as a hybrid. A comparison of molecular sequences of *B. tangerinum* and any possible parent species should be very useful.

To protect the limited herbarium material of *B. tangerinum*, only one flower was dissected; it had 24 stamens, a style 11.5 mm long, and 18, 20 and 20 ovules in the three loculi, giving a total ovule number of 58.

Table 3. Comparison of *Balaustion tangerinum* with two possible parent species.

Species	*B. pulcherrimum*	*B. tangerinum*	*B. unguiculatum*
Stems fibres	not very abundant	abundant	abundant
Petiole length	0.3–0.6 mm	0.5–0.7 mm	0.5–0.6 mm
Leaf shape	ovate to narrowly obovate	oblong or obovate	obovate to ± circular-
length	2.7–6 mm	3.5–4.5 mm	cordate
width	1.2–1.5 mm	1.5–1.6 mm	2–3.5 mm
apex shape	acute	obtuse to truncate	1.2–1.6 mm
mucro	0.15–0.3 mm long	absent	obtuse to truncate
			absent
Peduncle length	2–4 mm	3–4 mm	2–3 mm
Pedicel length	0–1 mm, usually ± absent	0–0.3 mm	1–3 mm
Hypanthium length	9–20 mm	3–4 mm	2–2.5 mm
width	6–8 mm	6–8 mm	*c.* 4 mm
colour	identical to petals	not matching petals	not matching petals
Sepal length	2.5–4 mm	*c.* 3 mm	1.3–1.6 mm
border	obscure	obvious	obvious
Petal length	7–9 mm	9–10 mm	4.5–5.5 mm
colour	orange	orange	white
margin	laciniate-denticulate	denticulate	almost entire
Stamen end	erect	directed inwards	directed inwards
filament length	6.5–11 mm	*c.* 8 mm	2–2.4 mm
length of thecae	0.55–0.9 mm	*c.* 0.35 mm	0.35–0.4 mm
slits	parallel	mostly divergent at base	mostly divergent at base
Style length	20–24 mm	11–12 mm	*c.* 3.5 mm
stigma width	0.4–0.8 mm	0.2–0.3 mm	0.2–0.3 mm

17. Balaustion thamnoides Rye, *sp. nov.*

Type: north-east of Lake King, Western Australia [precise locality withheld for conservation reasons], 13 November 1979, *K.R. Newbey* 6552 (*holo*: PERTH 06748236; *iso*: PERTH 06206077).

Baeckea sp. Hatter Hill (K.R. Newbey 3284), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub 0.7–1.2 m high, commonly 0.4–0.6 m wide; flowering branchlets with 1 or 2 fertile nodes, each with 1 or 2 flowers. *Leaves* widely antrorse to appressed. *Petioles* 0.6–0.8 mm long. *Leaf blades* mostly narrowly elliptic, 3–5.5 mm long, 1.1–1.4 mm wide, up to *c.* 0.4 mm thick, obtuse, denticulate on scarious margins, slightly recurved at apex; abaxial surface with a poorly defined, rounded 'keel' gently to deeply curved down to the apex, with the larger oil glands usually in 2 or 3 main rows on each side of midvein; adaxial surface shallowly concave or flat, with less obvious oil glands. *Peduncles* 3–5 mm long. *Bracteoles* usually shed from medium-sized buds, 3.5–4.5 mm long. *Pedicels* 0.3–1 mm long. *Flowers* 13–17 mm diam. *Hypanthium* 2.5–4 mm long, 5–6 mm wide (somewhat increasing in fruit to a maximum of 4.5 mm long), green with surface tending to be rugose-wrinkled; free part *c.* 0.8 mm long, often reddish-tinged. *Sepals* depressed ovate, 1.2–2 mm long, 3–3.5 mm wide, partially reddish on outer surface and with an irregular white border 0.15–0.3 mm wide or ± fully reddish, ± entire or ciliolate. *Petals* 4.5–6.5 mm long, white or pale pink. *Stamens* 19–28. *Antipetalous filaments* 1.8–2.4 mm long. *Anthers* 0.6–0.7 mm wide from front view; connective gland 0.5–0.6 mm long; thecae 0.3–0.4 mm long. *Ovary c.* 2/3 inferior; ovules (13–)15–18. *Style* 3.5–3.7 mm long; stigma 0.3–0.4 mm diam. *Fruits c.* 2/3 inferior, 4–5 mm long, 5.5–6 mm diam.; placentas elliptic, 2.3–2.4 ×1.3–1.7 mm. *Seeds* facetted, 1.4–1.7 mm long, 0.6–1 mm wide, 0.6–1 mm thick, dark brown, colliculate; inner cavity 0.3–0.4 mm long. (Figure 1L)

Diagnostic features. Distinguished from other species of sect. *Tilophloia* by its usually greater height of 0.7–1.2 m, its broad stigma, and its dark brown seeds with a cavity only 0.3–0.4 mm long (much shorter than the seed).

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 30 Mar. 2004, *P. Armstrong* PA 19 (PERTH); 20 Oct. 1964, *J.S. Beard* 3728 (PERTH); 3 Aug. 2005, *G.F. Craig* 6702 A (PERTH); 10 Nov. 2005, *G.F. Craig* 7029 (PERTH); 11 Oct. 1965, *F. Humphreys s.n.* (PERTH); 15 Sep. 2011, *P. Knapton* 19 (PERTH); 4 Sep. 1970, *K.R. Newbey* 3284 (PERTH); 31 July 1980, *K.R. Newbey* 6834 (PERTH); 24 Sep 1971, *C.I. Stacey* 29 (PERTH); 16 Oct. 1997, *Peter G. Wilson* 1396 *& N. Lam* (NSW *n.v.*, PERTH).

Distribution and habitat. Recorded from Hatter Hill south to the western end of Frank Hann National Park (Figure 10), often in gravelly soils but also rocky soils with quartz pebbles. The vegetation is often dominated by *Melaleuca*, *Allocasuarina* or *Eucalyptus*.

Phenology. Flowers recorded from late June to November. Mature fruits recorded in November and March.

Etymology. From the Greek *thamnos* (bush, shrub) and the adjectival suffix *-oides* (indicating resemblance), referring to the fairly erect, shrubby habit of this species (most members of the genus are low-growing).

Conservation status. Listed as Priority Two under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Hatter Hill (K.R. Newbey 3284). Known only from a small area.

Affinities. See the notes below under *Baeckea* sp. Yorkrakine (C.A. Gardner s.n. 09/1933), which appears to be closely related to *B. thamnoides*. *Balaustion thamnoides* is atypical of section *Tilophloia* in its somewhat taller habit, broad stigma, and its darker-coloured and more strongly facetted seeds with a small cavity in relation to the seed size. Its seeds, up to 1.7 mm long, are among the largest in the section yet have the smallest cavity (0.3–0.4 mm long). Flower-subtending leaves tend to be distinctive in this species, having broader scarious margins than other leaves, or sometimes appearing to be prominently winged on each side (e.g. *C.I. Stacey* 29) in which case they are shorter and much broader than the vegetative leaves. Despite these differences, *B. thamnoides* still seems to fit within sect. *Tilophloia*.

Balaustion karroun resembles *B. thamnoides* in having large bracteoles, leaves with a distally rounded keel and a 2/3 inferior fruit, but differs in its lower habit, narrower stigma and larger seed cavity.

Notes. Sepals tend to be widely spreading in fruit, giving the fruit an apparent diameter of up to 9 mm.

18. Balaustion unguiculatum Rye, *sp. nov.*

Type: north-north-west of Bullfinch, Western Australia [precise locality withheld for conservation reasons], 2 October 1981, *K.R. Newbey* 9195 (*holo*: PERTH 06748473; *iso*: CANB, K, MEL).

Baeckea sp. Yacke Yackine Dam (K.R. Newbey 9195), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Shrub 0.2–0.5 m high, recorded as 0.35–0.4 m wide; flowering branchlets with 1 pair of flowers. *Leaves* antrorse or widely antrorse. *Petioles* 0.5–0.6 mm long. *Leaf blades* obovate to almost circular-cordate, 2–3.5 mm long, 1.2–1.6 mm wide, thin, flat on average, the margins often either recurved or incurved, obtuse to truncate, entire or minutely serrulate on margins; abaxial surface keeled towards apex, the keel suddenly produced into a prominent subterminal ridge and not obvious as a keel elsewhere, with the larger oil glands usually in 2–4 main rows on each side of midvein; adaxial surface often somewhat pinched in towards apex, with oil glands similar to those on abaxial surface. *Peduncles* 2–3 mm long, curved, laterally somewhat ridged, somewhat glandular-rugose. *Bracteoles* shed from very young buds, *c.* 2.5 mm long. *Pedicels* 1–3 mm long. *Flowers c.* 13 mm diam. *Hypanthium* 2–2.5 mm long, *c.* 4 mm wide, green, somewhat rugose and gland-dotted; free part *c.* 0.7 mm long. *Sepals* depressed ovate, 1.3–1.6 mm long, 2–3 mm wide, somewhat scarious, deep pink with an irregular white border up to 0.3 mm wide in places, ± entire. *Petals* 4.5–5.5 mm long, white, tinged pink. *Stamens* 20–22. *Antipetalous filaments* 2–2.4 mm long. *Anthers c.* 0.5 mm wide from front view; connective gland 0.4–0.5 mm long; thecae 0.35–0.4 mm long. *Ovary c.* 1/2 inferior; ovules 12–17 per loculus. *Style c.* 3.5 mm long; stigma 0.2–0.3 mm diam. *Fruits* over 1/2 and up to 2/3 superior, *c.* 3.5–4 mm long, *c.* 4 mm diam.; placentas elliptic or ovate, *c.* 2.6 × 1.3 mm. *Seeds* reniform but somewhat facetted, 1.4–1.5 mm long, 0.8–0.9 mm wide, 0.6–0.9 mm deep, golden brown, colliculate; inner cavity 0.6–0.9 mm long. (Figure 1A)

Diagnostic features. Distinguished from other species of sect. *Tilophloia* by its scarcely thickened, obovate to almost circular-cordate leaves, with an abrupt, subterminal ridge on the abaxial surface.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 2 June 2010, *S. Reiffer* SRE 181 (PERTH); 9 Sep. 2010, *S. Reiffer* SRE 300 (PERTH).

Distribution and habitat. Associated with granite outcrops in a small area north of Bullfinch (Figure 3).

Phenology. Flowers recorded in September and October.

Etymology. From the Latin *unguiculatus* (clawed), referring to the leaves having an abrupt subterminal projection, which resembles a small claw, on their abaxial surface.

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Yacke Yackine Dam (K.R. Newbey 9195).

Affinities. A very distinctive species, with leaves less thickened than in all other members of sect. *Tilophloia* and unusual in having peduncle and pedicel lengths similar. See the notes under *B. tangerinum*, which shows the closest approach to it in leaf shape and might possibly be a hybrid between it and *B. pulcherrimum* (see also Table 3).

Notes. Bracteoles were only seen on one very young bud in this poorly known species.

Phrase names transferred to *Balaustion*

Three poorly known taxa that have been known by phrase names under *Baeckea* are transferred to *Balaustion* but retained under informal names for now. They need further study to establish their taxonomic status.

Balaustion sp. **Billyacatting Hill** (A.S. George 14349)

Baeckea sp. Billyacatting Hill (A.S. George 14349), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Conservation status. Recently listed as Priority Two under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Billyacatting Hill. Currently known from a single nature reserve.

Notes. Previously known as *Baeckea* sp. Billyacatting Hill (A.S. George 14349), this member of the *Balaustion exsertum* group occurs in the northern part of the group's distribution (Figure 10) and differs from *B. exsertum* and *B. quinquelobum* in its habitat associated with granite. *Balaustion* sp. Billyacatting Hill possibly shows the greatest tendency for a low-growing, more or less prostrate habit in the group. It resembles *B. quinquelobum* in having a short style but lacks the degree of lobing of the hypanthium found in that species.

Balaustion sp. **North Ironcap** (R.J. Cranfield 10580)

Baeckea sp. North Ironcap (R.J. Cranfield 10580), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Baeckea sp. Lake Cronin (K.R. Newbey 9191), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Conservation status. To be listed as Priority One under Conservation Codes for Western Australian Flora (Tanya Llorens pers. comm.). *Baeckea* sp. Lake Cronin and *B.* sp. North Ironcap, now considered to be synonymous, were both previously listed as Priority One (Western Australian Herbarium 1998–).

Notes. *Balaustion* sp. North Ironcap is not included in the key to species and subspecies, although it is still mapped (Figure 8). It is very similar to *B. grandibracteatum* but differs in having subterminal knobs common on its leaves. Its bracteoles have mostly fallen from the specimens but the very few observed are 2.2–2.5 mm long, suggesting that *B.* sp. North Ironcap is close to *B. grandibracteatum* subsp. *meridionale*. However, if *B.* sp. North Ironcap were keyed out it would need to be included with the species that have subterminal points or knobs on their leaves rather than with *B. grandibracteatum*.

Balaustion sp. **Yorkrakine** (C.A. Gardner s.n. 09/1933)

Baeckea sp. Yorkrakine (C.A. Gardner s.n. 09/1933), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 2 February 2022].

Conservation status. Listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–), as *Baeckea* sp. Yorkrakine (C.A. Gardner s.n. 09/1933).

Notes. *Balaustion* sp. Yorkrakine is possibly conspecific with *B. thamnoides* but occurs further west (Figure 10) and differs in its smaller, usually thicker leaves, with less obviously scarious and denticulate margins. It may also tend to have smaller flowers with fewer ovules and a more rugose-pitted hypanthium, but these characters are difficult to judge from the few flowers examined. As this taxon is only known from one specimen that lacks habit details and fruits, it is too poorly known to determine whether it shares the unusual habit and seed characters found in *B. thamnoides*.

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References

Bentham, G. (1867). *Flora Australiensis*. Vol. 3. (Reeve & Co.: London.)

Blackall, W.E. & Grieve, B.J. (1954). *How to Know Western Australian Wildflowers*. Part 1. (West Australian Newspapers Ltd: Perth.)

Diels, L. & Pritzel, E. (1904). Myrtaceae. Fragmenta Phytographiae Australiae Occidentalis. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pfanzengeographie* 35: 398–444.

Gardner, C.A. (1927). Contributiones florae Australiae Occidentalis VI. *Journal and Proceedings of the Royal Society of Western Australia* 13: 61–68.

Griffin, E.A. (1994). *Floristic survey of Northern sandplains between Perth and Geraldton*. Department of Agriculture and Food, Western Australia, Perth. Report 144.

Harvey, W.H. (1855). Characters of some new genera of plants recently discovered by Mr James Drummond in Western Australia. *Hooker's Kew Journal of Botany and Kew Garden Miscellany* 7: 51–58.

Hooker, W.H. (1851). *Balaustion pulcherrimum* Hook. *Hooker's Icones Plantarum* 9: tab. 852.

Lam, N., Wilson, P.G., Heslewood, M.M. & Quinn, C.J. (2002). A phylogenetic analysis of the *Chamelaucium* alliance (Myrtaceae). *Australian Systematic Botany* 15: 535–543.

Moore, S. le M. (1920). A contribution to the flora of Australia. *Journal of the Linnaean Society, Botany* 45: 159–220.

Niedenzu, F. (1893). Myrtaceae. *In:* Engler, A. & Prantl, K. (eds) *Die Natürlichen Pflanzenfamilien*. Vol. 3(7), 57–105. (Englelmann: Liepzig.)

Paczkowska, G. & Chapman, A.R. (2000). *The Western Australian Flora: a Descriptive Catalogue.* (Wildflower Society of Western Australia; Western Australian Herbarium: Perth, Western Australia.)

Rye, B.L. (1979). Chromosome number variation in the Myrtaceae and its taxonomic implications. *Australian Journal of Botany* 27: 547–573.

Rye, B.L. (2009a). A reduced circumscription of *Balaustion* and description of the new genus *Cheyniana* (Myrtaceae: Chamelaucieae). *Nuytsia* 19: 129–148.

Rye, B.L. (2009b). An interim key to the Western Australian tribes and genera of Myrtaceae. *Nuytsia* 19: 313–323.

Rye, B.L. (2017). An expanded circumscription and new infrageneric classification of *Rinzia* (Myrtaceae: Chamelaucieae). *Nuytsia* 28: 39–93.

Rye, B.L., Wilson, P.G. & Keighery, G.J. (2013). A revision of the species of *Hypocalymma* (Myrtaceae tribe Chamelaucieae) with smooth or colliculate seeds. *Nuytsia* 23: 283–312.

Rye, B.L., Wilson, P.G., Heslewood, M.M., Perkins, A.J. & Thiele, K.R. (2020). A new subtribal classification of Myrtaceae tribe Chamelaucieae. *Australian Systematic Botany* 33: 191–206.

Sharr, F.A. (2021). *Western Australian Plant Names and their Meanings*. Fourth edition by A.S. George. (Four Gables Press: Kardinya, Western Australia.)

Turczaninow, N. (1852). Myrtaceae xerocarpicae, in Nova Hollandia. *Bulletin de la Classe Physico-Mathematique des Sciences di Saint-Pétersburg* 10: 322–346.

Western Australian Herbarium (1998–). *Florabase—the Western Australian flora*. Department of Biodiversity, Conservation and Attractions. https://florabase.dpaw.wa.gov.au/ [accessed 7 June 2022].

Wilson, P.G., Heslewood, M., Lam, N. & Quinn, C. (2004). Progress towards a phylogeny of the *Chamelaucium* alliance (Myrtaceae). *Australian Biologist* 17: 28–33.