

Austrobaeckea, a new south-western Australian genus of Myrtaceae (Chamelaucieae: Hysterobaeckeinae)

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Abstract

Austrobaeckea, a new south-western Australian genus of Myrtaceae (Chamelaucieae: Hysterobaeckeinae). *Nuytsia* 32: 173–197 (2021). The new Myrtaceous genus *Austrobaeckea* Rye is described, with eight species recognised. It is a member of tribe Chamelaucieae DC. subtribe Hysterobaeckeinae Rye & Peter G. Wilson and is restricted to the southern part of the South West Botanical Province of Western Australia. Three new species are named as *A. columnaris* Rye, *A. fascifolia* Rye and *A. narembeen* Rye, and the following new combinations are made: *A. latens* (C.R.P. Andrews) Rye, *A. pygmaea* (R.Br. ex Benth.) Rye, *A. pachyphylla* (Benth.) Rye, *A. uncinella* (Benth.) Rye and *A. verrucosa* (Turcz.) Rye. A lectotype is selected for *A. uncinella*. Three species have conservation priority.

Introduction

A new genus of Myrtaceae tribe Chamelaucieae DC. is described here as *Austrobaeckea* Rye. It is one of many diverse species groups that were previously included in a large and indefinable, polyphyletic *Baeckea* L. *s. lat.* Since 1985, ten genera have been reinstated from synonymy, two infrageneric taxa raised to generic level, six new genera named and all 18 genera assigned to new subtribes (see Table 1), leaving *Baeckea s. str.* as the only genus of subtribe Baeckeinae Schauer. A few species of *Baeckea s. lat.* have also been transferred into *Astartea* DC. and *Malleostemon* J.W. Green.

Ten of the reassigned genera are now included in the large subtribe Hysterobaeckeinae Rye & Peter G. Wilson and all remaining unassigned species of *Baeckea s. lat.* also belong in this subtribe. All of these unassigned ‘*Baeckea*’ species occur in south-western Australia; some await new combinations or names to transfer them into existing genera while others, like the species assigned here to *Austrobaeckea*, are not a good match for any existing genus.

Austrobaeckea is restricted to the South West Botanical Province (*sensu* Beard 1980) of Western Australia and occurs primarily near the south coast between Walpole and Israelite Bay, a distribution favourable to the early discovery of its species by visiting naturalists and new colonists. Five of the eight species treated here were named within 80 years of the time of European settlement of Western Australia and one of the three new species was also collected within that period.

Table 1. Progressive publication from 1986 onwards of new or reinstated groups from *Baeckea s. lat.*, and the new subtribes assigned to them by Rye *et al.* (2020).

Publication	Genus	Action taken	Subtribe
Trudgen (1986)	<i>Rinzia</i> Schauer	reinstatement	Rinziinae
Trudgen (1987)	<i>Ochrosperma</i> Trudgen	new genus previously known as <i>Baeckea</i> sect. <i>Pausomyrtus</i> Radlk.	Ochrospermatinae
Bean (1995)	<i>Triplarina</i> Raf.	reinstatement	Rinziinae
Trudgen (2001)	<i>Euryomyrtus</i> Schauer	reinstatement	Rinziinae
Trudgen & Rye (2005)	<i>Astus</i> Trudgen & Rye	new genus	Rinziinae
Wilson <i>et al.</i> (2007)	<i>Harmogia</i> Schauer	reinstatement	Hysterobaeckinae
	<i>Kardomia</i> Peter G. Wilson	new genus	Hysterobaeckinae
	<i>Sanmantha</i> Peter G. Wilson	new genus	Hysterobaeckinae
Rye & Trudgen (2008)	<i>Seorsus</i> Rye & Trudgen	new genus	Astarteinae
Rye (2009a)	<i>Cheyniana</i> Rye	new genus	Hysterobaeckinae
Rye (2009b)	<i>Oxymyrrhine</i> Rye	reinstatement	Hysterobaeckinae
Trudgen & Rye (2010)	<i>Enekbatus</i> Trudgen & Rye	new genus	Rinziinae
Rye & Trudgen (2012)	<i>Anticoryne</i> Turcz.	reinstatement	Hysterobaeckinae
	<i>Cyathostemon</i> Turcz.	reinstatement	Astarteinae
	<i>Tetrapora</i> Schauer	reinstatement	Hysterobaeckinae
Rye (2015a)	<i>Ericomyrtus</i> Turcz.	reinstatement	Hysterobaeckinae
Rye (2015b)	<i>Hysterobaeckea</i> (Nied.) Rye	new combination for <i>Baeckea</i> subg. <i>Hysterobaeckea</i> Nied.	Hysterobaeckinae
Rye (2015c)	<i>Babingtonia</i> Lindl.	reinstatement	Hysterobaeckinae

History of recognition of the species

Robert Brown collected a swampland species of *Austrobaeckea* at King George Sound in December 1801 and gave it a manuscript name, but more than sixty years were to pass before Bentham (1867) formally described it as *Baeckea pygmaea* R.Br. ex Benth. By then, specimens collected by James Drummond and George Maxwell had been used to describe a related species, first as *Tetrapora verrucosa* Turcz. (Turczaninow 1852), then as *Harmogia corynophylla* F.Muell. (Mueller 1860). In a later publication, Mueller (1864) simultaneously published the names *Baeckea corynophylla* (F.Muell.) F.Muell. and *Babingtonia corynophylla* (F.Muell.) F.Muell.; hence, this species had been placed in four genera before Bentham (1867) combined all these genera under *Baeckea s. lat.* in *Flora Australiensis*.

Bentham (1867) increased the number of named species now recognised as *Austrobaeckea* by also describing *Baeckea pachyphylla* Benth. and *B. uncinella* Benth. He included those two species with *B. corynophylla* in *Baeckea* sect. *Oxymyrrhine* (Schauer) Benth. together with the type species of *Oxymyrrhine* Schauer and one species of *Ericomyrtus* Turcz.; hence, more than half of the species placed in sect. *Oxymyrrhine* were of *Austrobaeckea*. However, Bentham placed one species of *Austrobaeckea* [as *B. pygmaea*] in sect. *Babingtonia* (Lindl.) Benth., together with two species of *Ericomyrtus* [as *B. corymbulosa* Benth. and *B. pulchella* DC.] and species of *Anticoryne* Turcz., *Babingtonia* Lindl. and *Tetrapora* Schauer, as well as several currently unplaced species.

The final species to be named was *B. latens* C.R.P. Andrews, which Andrews (1904) placed in sect. *Oxymyrrhine* and considered to be closely allied to *B. uncinella*.

During the early 1990s, unpublished measurements and descriptions were prepared by Sandra Maley and Bronwen Keighery for all but one of the eight species recognised here for *Austrobaeckea*, as part of

an Australian Biological Resources Study project supervised by Malcolm Trudgen. Following the discovery of the eighth species, collected for the first time in 1999, Trudgen allocated phrase names under *Baeckea s. lat.* in 2004 and 2005 to the three undescribed taxa now included in *Austrobaekea*.

Molecular evidence

Two members of the genus formed a strongly supported clade in molecular analyses based on several chloroplast DNA sequences (Lam *et al.* 2002; Wilson *et al.* 2004). The two species sampled were *A. verrucosa* (Turcz.) Rye and *A. uncinella* (Benth.) Rye [as *Baeckea corynophylla* and *B. uncinella*]. The same two species of *Austrobaekea* were included among DNA samples used to produce Figure 1 in Rye *et al.* (2020: 196), where they formed the strongly supported clade labelled 'Baeckea 7/2' within subtribe Hysterobaeckinae. In this case a nuclear DNA region (ETS) was also used. Previously, a third member of the new genus, *A. latens* (C.R.P.Andrews) Rye, had also been sequenced for DNA and shown to belong to the same clade (P. Wilson, pers. comm. 2015).

It was not clear from these publications which genus of Hysterobaeckinae is most closely related to *Austrobaekea* but a clade of genera with reduced anthers was strongly supported in an unpublished study based on chloroplast and nuclear regions (P. Wilson, pers. comm. 2015). This clade had *Austrobaekea* as sister to a subclade comprising *Cheyनिया*, *Ericomyrtus* and 'Baeckea' *elderiana* E.Pritz., while *Oxymyrrhine* formed a separate clade.

Need for further studies

This is a taxonomically difficult species group in which separation of its members relies heavily on differences in leaf characters. The only species that can be readily identified from floral characters is *A. pygmaea* (R.Br. ex Benth.) Rye. The five previously named species are accepted here as being good species but further studies of them, and of the three new species, are needed in view of the great variability within most of them and the presence of a few specimens that are hard to place. There may be some hybridisation between taxa with greatly overlapping ranges; if so, it could account for a few apparently intermediate specimens.

Further molecular data are needed to investigate the placement of all the taxa listed above as possible relatives of *Austrobaekea* and the relationships between all eight species included here within *Austrobaekea*.

No chromosome numbers are known for the new genus.

Methods

Sharr (2019) was consulted for the derivations of epithets. Type material housed at PERTH, or borrowed from MEL, was examined and images of types housed elsewhere were examined through *Global Plants* (<https://plants.jstor.org/>). Some additional specimens on loan from AD, CANB and MEL were also examined.

Measurements were made from dry herbarium material, using the largest leaves and stalks available and being careful to avoid immature floral organs, fruits and seeds when taking measurements of those items. Stamen and ovule numbers recorded earlier by Sandra Maley and Bronwen Keighery were written onto the PERTH sheets they examined, as were some of their style measurements. Their

measurements of other organs were obtained by different methods so were not strictly comparable to those obtained in the current study, but were still useful to check the accuracy of the new measurements, and for the most part there was a good agreement in the measurements obtained in the two studies.

Characteristics of the genus

Vegetative characters

Austrobaekea species are small or medium-sized shrubs, either single-stemmed or multi-branched at the base. They commonly have galls on or within the young stems. One kind of gall is a long swelling of the stem well below its apex, with the mature insect eventually emerging via a circular hole. A more common kind of gall is a woody structure that usually terminates a branchlet. Terminal galls have a bulbous base and narrower flattened apex and appear to be empty once fully formed; they tend to split longitudinally into two halves.

The leaves in *Austrobaekea* are small and entire. In most species they are about as thick as wide; however, they range from being markedly bilaterally compressed in *A. verrucosa* to dorsiventrally compressed, although always still quite thick, on many specimens of *A. pygmaea*.

Separation of the species relies primarily on leaf morphology and whether the leaves are clustered. Apart from the differences in leaf thickness noted above, important characters include the petiole length, the curvature of the adaxial surface and the length of the apical point, if present.

Inflorescence characters

Most species of *Austrobaekea* produce fewer than five pairs of peduncles on each flowering branchlet, but *A. verrucosa* produces up to nine pairs of peduncles. Peduncles are not uniformly 1-flowered in any species; the most common multiple number of flowers per peduncle is three and *A. uncinella* has up to nine flowers. When there is a triad, the central flower normally matures earlier than the two lateral flowers and sometimes differs in the length of its pedicel. All pedicels usually arise directly at the summit of the peduncle, regardless of how many flowers there are, but in some species there is very rarely a short stalk (secondary axis) arising at the summit such that not all pedicels are directly attached to the peduncle. All occurrences of a secondary axis appear to be anomalies.

For distinguishing species, the inflorescence characters of greatest importance are the length of the peduncle and the relative length of the peduncles and pedicels. At 0.2–0.6 mm long, peduncles are particularly short in *A. columnaris*, with the pedicels up to about five times longer, while at the other extreme *A. pygmaea* has 4–11 mm long peduncles that are up to four times longer than the pedicels. There is a tendency within each species for peduncles that subtend just one flower to be shorter than those subtending multiple flowers as well as a tendency for fast-growing shoots to have longer peduncles and pedicels.

Floral characters and pollination

Like many other groups of species within *Baekea s. lat.*, *Austrobaekea* has small, white flowers that would attract a variety of small insects to their readily accessible nectar. One characteristic feature of *Austrobaekea* is the presence of prominent oil glands on the ovary summit. Rather prominent

glands are also found on the adnate part of the hypanthium and the sepals. The sepals are incurved and have a thickened or keeled herbaceous centre. The inner sepals usually have a broadly obtuse herbaceous portion within a petaline margin, while the outer sepals are more prominently keeled and the herbaceous part often extends well beyond the petaline margin, resulting in a more acute apex. The ridging of sepals is most extreme in *A. verrucosa*, in which the outer sepals appear to be horned, with the horn up to about 1 mm long.

The petals are white in all species and are broadly ovate to broadly obovate and narrowly attached at the base. They are piled up in bud, with each petal extending over the entire summit of the ovary, and must therefore open one at a time starting with the outermost, i.e. the topmost, petal. The innermost petal at the bottom of the pile lies directly over the stamens, causing it to be crinkled when it opens. Sepals are shorter than the petals but more broadly attached at the base.

Stamen number is variable within each species, especially in *A. pygmaea*, which has 10–25 stamens per flower. *Austromyrtus pygmaea* is the only species to sometimes have numerous stamens arranged opposite both the petals and the sepals in a more or less continuous circle. In the remainder of the genus there are 2–13 stamens that are all antisepalous with usually variable numbers of stamens opposite the sepals of a single flower. Note that stamens are only considered to be antipetalous if they are attached within the rather narrow attachment area of a petal.

In most species the stamens are ten or fewer, with the number of stamens opposite each sepal usually not exceeding two. What all species except *A. pygmaea* have in common is that a few or many of their flowers have eight stamens in the arrangement 2,2,1,2,1. In flowers with five stamens there is often one stamen opposite each sepal, i.e. 1,1,1,1,1.

Filaments are more or less terete and anthers are broad in comparison with the height of the thecae, which are 2-lobed. The connective gland protrudes slightly to fairly distinctly from between the base of the thecae and its exposed surface becomes hollowed after the pollen is released.

The ovary is fully inferior and has a shallowly concave summit. The small-flowered *A. pygmaea* is again the odd species out in having a 2-locular ovary, all other species having it 3-locular. Placentas are peltate, being more or less elliptic with a stalk towards the centre, and have ovules inserted around the full margin. The style length tends to be quite variable within species, reducing its value as a character in distinguishing species.

Fruiting characters

Austrobaekea species have a small, largely inferior capsule, which releases its seeds from two or usually three radial valves on its summit. Each valve extends along the centre of a loculus from the circumference of the fruit summit to the central cylinder, which houses the sunken base of the style. The summit of the fruit has the centre of each loculus shallowly convex so as to be shortly above its junctions with adjacent loculi. The persistent sepals are fairly erect.

Seeds are small and have a thin, crustaceous testa, which usually becomes dark red-brown when fully mature. They are only slightly faceted in *A. pygmaea* but distinctly faceted in all other species. The seeds produced at one end of the placenta may be of a somewhat different shape from most seeds. Such seeds can be wider than thick rather than the usual wedge shape that is thicker than wide.

Descriptions and key

Austrobaeckea Rye, *gen. nov.*

Typus: Austrobaeckea verrucosa (Turcz.) Rye.

Shrubs erect or rarely low-growing, 0.1–1.5(–2.6) m high, glabrous. *Young stems* with a loose, pale grey or brownish epidermis that splits into strips when shed. *Leaves* opposite, decussate, small, shortly petiolate; blade dorsiventrally compressed to bilaterally compressed but commonly about as thick as wide, entire. *Peduncles* usually very short to about as long as the pedicels, but in one species usually distinctly longer than the pedicels, 1–3(–9)-flowered, never consistently 1-flowered; secondary axes absent from all or most peduncles. *Bracts and bracteoles* shed early or at least shed prior to the fruiting stage in most species, narrow, with margins incurved. *Buds* with a convex or shallowly convex apex. *Hypanthium* broad, usually shallowly cup-shaped, dotted with oil glands; adnate portion broadly obconic to depressed hemispheric; free portion short, erect or spreading. *Sepals* 5, persistent in fruit, shorter than the petals but with a broader base, the outer ones dorsally ridged or appearing horned. *Petals* 5, shed before the fruit matures, very shortly narrowed at base, broadly obovate to broadly ovate to ± circular, 1.2–4 mm long, white inside, with the portion of the outermost petal that is exposed in late bud sometimes deep pink. *Antipetalous colleters* usually inconspicuous. *Staminodes* rare or absent. *Stamens* 2–25 but mostly in the range 5–13, in antisepalous groups of 0–5 (rarely also opposite petals), free, geniculate, mostly widely spaced, those closest to the centre of a sepal usually shortest. *Filaments* slender, ± terete, white or pale pink. *Anthers* introrse, small, broader than the height of the thecae, dehiscent by 2 pores or short slits that tend to diverge basally, brown to maroon; thecae short, closely connate, their junction marked by a groove; connective gland fused over its full length, shortly protruding at the rear of the thecae where the filament attaches but sometimes inconspicuous, becoming hollowed on the exposed surface. *Ovary* usually 3-locular but 2-locular in one species, inferior; summit green at first, becoming deep pink to red in fruit, with rather large oil glands; placentas axile, ± elliptic, distinctly stalked at the centre; ovules 5–14 per loculus. *Style* terete, 0.6–1.8(–2.2) mm long, with the base inset in a long cylindrical depression; stigma scarcely enlarged to somewhat peltate, circular from top view. *Fruit* 2/3 to fully inferior, few- or many-seeded, dehiscent by terminal valves; summit fairly level at first, becoming expanded upwards and 2- or 3-lobed in fruit, small, enclosed by the glandular, adnate part of the hypanthium, with the free hypanthium spreading outwards from the fruit summit. *Seeds* faceted, mostly wedge-shaped, with a large, curved outer surface, two equal lateral surfaces and usually a small inner surface, 0.45–1 mm long, with a small hilum; testa crustaceous, uniformly coloured or with some cells dark-coloured, usually becoming dark red-brown, colliculate on the lateral surfaces, somewhat smoother on the outer surface. *Chaff pieces* strongly faceted, more flattened and usually more numerous than the seeds, uniformly coloured and mostly darker or paler than the seeds.

Diagnostic features. Distinguished from other genera in subtribe Hysterobaeckeeinae by the following combination of characters: peduncles 1–9-flowered (never consistently 1-flowered); anthers small, broader than the length of the thecae; connective gland fused, scarcely to noticeably protruding, becoming hollowed; ovules 5–14 per loculus; fruits dehiscent by 2 or 3 terminal valves; and seeds faceted.

Size and distribution. A genus of eight species, endemic to the south-west of Western Australia and concentrated near the south coast, mainly occupying the Esperance and Mallee bioregions but also recorded in the Jarrah, Warren and Avon Wheatbelt bioregions (Figure 1). It extends from north of Lake Muir east to Cape Arid National Park and inland to the Merredin area.

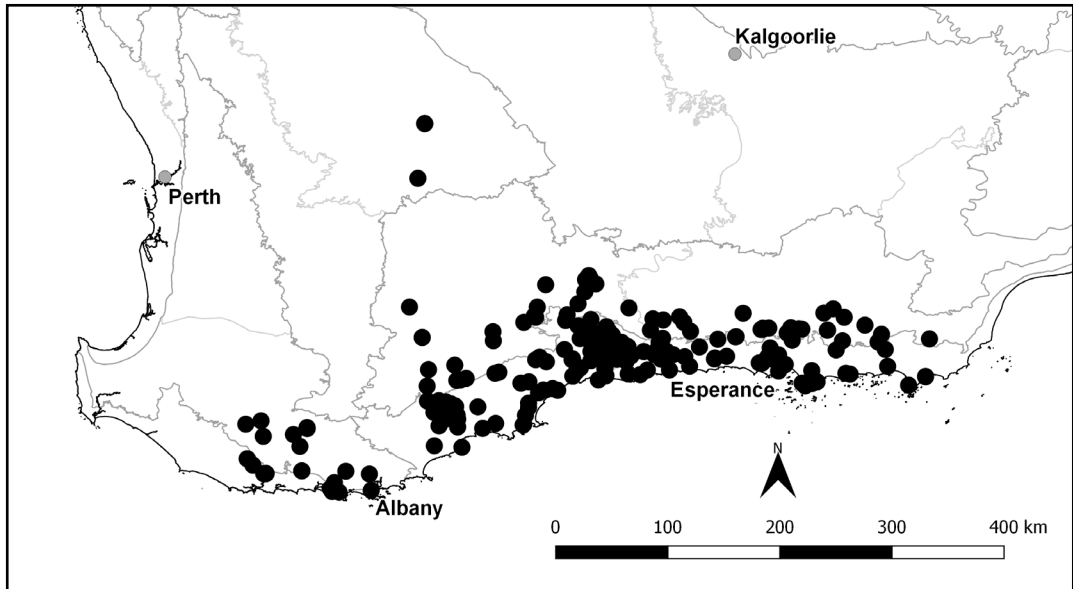


Figure 1. Distribution of the genus *Austrobaekea*.

Etymology. From the Latin *austro-* (southern) and the generic name *Baeckea*, in which members of the new genus were previously placed, as *Austrobaekea* is distributed primarily along the south coast. Its distribution is more consistently southern than that of any other genus that has previously been included in *Baeckea s. lat.*

Co-occurring species. Two of the *Austrobaekea* species do not overlap in distribution with any other members of this genus. Among the other six taxa, there are very few records of two taxa co-occurring. Further field studies are needed to determine how frequently taxa co-occur and whether this results in hybridisation in the genus.

Affinities. Generic relationships within subtribe Hysterobaeckinae have yet to be fully determined. *Austrobaekea* is most likely to be confused with *Ericomyrtus*, *Oxymyrrhine* and *Tetrapora*, all of which have small anthers with the connective gland either fully incorporated within the structure housing the thecae or not greatly protruding. Both *Ericomyrtus* and *Oxymyrrhine* differ from *Austrobaekea* in having consistently 1-flowered peduncles. *Ericomyrtus* also has longer and more persistent bracteoles. *Oxymyrrhine* has a continuous circle of numerous stamens, a character absent in *Austrobaekea* except rarely in *A. pygmaea*, and also differs in having a broadly hollowed top to its ovary. *Tetrapora* matches *Austrobaekea* in having usually multi-flowered peduncles but does not appear to be particularly closely related on the basis of the molecular evidence presented above, as it falls into a clade that includes *Anticoryne*, *Babingtonia*, *Malleostemon* and *Scholtzia* Schauer. *Tetrapora* differs from *Austrobaekea* in having almost spherical to broadly ellipsoid anthers fully incorporating the connective gland, which does not become hollowed, and some differences in its stamen arrangement. More comprehensive molecular data could be valuable in determining the affinities of *Austrobaekea* more precisely.

Notes. Among the genera of subtribe Hysterobaeckinae, *Austrobaekea* is unusual in having a concentration of species near the south coast between Walpole and Israelite Bay, with only one of its eight species being restricted to an area well inland. Four other small genera, *Anticoryne*, *Ericomyrtus*, *Oxymyrrhine* and *Tetrapora*, have at least one species occurring near the south coast. There is also a

single member of the *Baেকেa muricata* C.A.Gardner group, *B. sp.* Gibson (K.R. Newbey 11084), but that differs from all other species in the region in having a very prominent connective gland.

Key to species of *Austrobaeckea*

1. Leaves noticeably to markedly bilaterally compressed
 2. Leaves distinctly bilaterally compressed, 1.2–1.8 mm thick, about twice as thick as wide; adaxial surface convex, grading into the lateral surfaces, usually narrower than abaxial surface. Outer sepals 1–1.5 mm long (Jerrumungup area–near Munglinup)..... **A. verrucosa**
 - 2: Leaves somewhat compressed, 0.8–1.3 mm thick, up to about 1.5 times thicker than wide; adaxial surface concave to shallowly convex, often distinctly demarcated from the lateral surfaces, broader than abaxial surface. Outer sepals 0.4–1.1 mm long (near Ongerup–SE of Mt Ney)..... **A. pachyphylla**
- 1: Leaves about as thick as broad or dorsiventrally compressed
 3. Petals 1.2–1.8 mm long. Stamens (10–)12–25. Ovary 2-locular in all or most flowers (N of Lake Muir–near Albany)..... **A. pygmaea**
 - 3: Petals 1.8–4 mm long. Stamens 3–10(–13). Ovary 3-locular in all or most flowers
 4. Peduncles up to 1.3 mm long when multi-flowered, down to 0.2 mm long when single-flowered
 5. Branches with a column-like appearance. Petioles 0.5–0.7 mm long. Leaf blades flattened on adaxial surface, 2.5–4.5 mm long (S & SE of Ongerup)..... **A. columnaris**
 - 5: Branches not column-like. Petioles 0.7–1.2 mm long. Leaf blades subterete, 4–6.5 mm long (Lake Mortijinup–Cape Arid NP)..... **A. fascifolia**
 - 4: Peduncles 1.5–6.5 mm long when multi-flowered, down to 1 mm long when single-flowered
 6. Leaves terminating in a recurved point 0.2–0.5 mm long. Stamens 7–13 (Young River–near Mt Heywood)..... **A. uncinella**
 - 6: Leaves with apical point absent or up to 0.1 mm long. Stamens 3–10
 7. Shrubs up to *c.* 2.6 m high, with subterete leaves. Sepals 0.5–0.8 mm long, at least five times shorter than the 3–4 mm long petals (Merredin area–Narembeen area)..... **A. narembeen**
 - 7: Shrubs up to *c.* 1.8 m high, with all or most leaves of flowering stems having the adaxial surface \pm flat. Sepals 0.8–1.3 mm long, about three times shorter than the 2.5–3.5 mm long petals (Merilup NR–near Mt Ragged)..... **A. latens**

1. *Austrobaeckea columnaris* Rye, *sp. nov.*

Typus: Corackerup, south-east of Ongerup [precise locality withheld for conservation reasons], Western Australia, 6 August 1977, K.R. Newbey 5048 (*holo*: PERTH 06707203; *iso*: CANB, K, MEL, NSW, PERTH 06266657).

Baেকেa sp. Corackerup (K.R. Newbey 5048), Western Australian Herbarium, in *Florabase*, <https://florabase.dpaw.wa.gov.au/> [accessed 24 July 2017].

Shrub 0.4–0.8 m high, 0.1–0.6 m wide, single-stemmed at base and usually with 2 or 3 major branches 20–150 mm above the base and with secondary branches few and short, giving the branches a column-

like appearance; flowering branchlets with 1–3 pairs of peduncles and with the flowers borne on them combining to produce a many-flowered cluster. *Leaves* widely antrorse or patent when clustered but shallowly antrorse when widely spaced, often clustered. *Petioles* 0.5–0.7 mm long. *Leaf blades* often recurved, commonly narrowly or very narrowly obovate in outline, 2.5–4.5 mm long, *c.* 0.6 mm wide, *c.* 0.6 mm thick, obtuse, without any obvious apical point but often recurved; abaxial surface deeply convex, with usually few oil glands in 2 or 3 main rows on each side of midvein; adaxial surface almost flat (rather than concave or convex), with less obvious oil glands. *Peduncles* 0.2–0.6 long, 1–3-flowered. *Largest bracts or bracteoles* 0.6–1.1 mm long. *Pedicels* 1–2 mm long, 3–5 times longer than the peduncles. *Flowers* 5–5.5 mm diam. *Hypanthium* hemispheric or shallowly cup-shaped, 1–1.5 mm long, 1.5–2 mm wide; free portion *c.* 0.4 mm long. *Sepals* very broadly ovate, 0.4–0.5 mm long, *c.* 0.6 mm wide, broadly obtuse, the outer ones prominently ridged. *Petals* 1.8–2.2 mm long, white. *Stamens* 7–10, with 1 or 2 opposite each sepal, most commonly 8 in the arrangement 2,2,1,2,1. *Longest filaments* 0.3–0.6 mm long. *Anthers* 0.25–0.3 mm wide; thecae up to 0.2 mm high, maroon; connective gland protruding by *c.* 0.1 mm, paler than the thecae. *Ovary* 3-locular; ovules 8–11 per loculus. *Style* 0.7–1.2 mm long; stigma somewhat peltate, 0.15–0.2 mm diam. *Fruits* *c.* 2/3 inferior, *c.* 1 mm long, 1.5–2 mm wide; summit prominently glandular; hypanthium glandular-rugose on adnate part. *Seeds* 0.5–0.55 mm long, *c.* 0.35 mm wide, *c.* 0.4 mm deep, faceted, golden brown, colliculate on lateral surfaces.

Diagnostic features. Distinguished from other species of *Austrobaeckea* in having branches with a column-like appearance. Other important characters: leaves tending to be clustered; petioles 0.5–0.7 mm long; leaf blades 2.5–4.5 mm long, *c.* 0.6 mm thick, about as thick as wide, flattened on adaxial surface; peduncles 0.2–0.6 long, up to five times shorter than the pedicels.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 15 Jan. 1979, *B. Barnsley* 637 (PERTH); 15 Apr. 2017, *G. Byrne* 6236 (PERTH); *s. dat.*, *J. Drummond s.n.* (MEL 76447, 76509 & 76511); 3 May 1974, *K.R. Newbey* 4126 (PERTH), 20 Apr. 2005, *S. Osborne* 63 (PERTH).

Distribution and habitat. Occurs south and south-east of Ongerup, such as in the vicinity of Corackerup Creek (Figure 2A). Recorded on flats, at the type locality with shallow, loamy sand with clay and spongolite, at another locality with clay sand on laterite and a low heath with *Eucalyptus uncinata*.

Phenology and insect associations. Flowers recorded from January to August and mature fruits recorded in April and May. According to Ken Newbey's field notes, the type population flowered from early July to late August with individual plants flowering for long periods. Terminal galls are common on one (*B. Barnsley* 637) of the few collections of this species.

Etymology. From the Latin *columnaris* (columnar), referring to the column-like branches. This habit is shown in a colour photograph attached to one of the specimens (*S. Osborne* 63).

Conservation status. Recently listed as Priority Two under the Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–) under the name *Baekkea* sp. Corackerup (K.R. Newbey 5048). This species has a restricted distribution and few populations are known.

Affinities. Possibly closest to *A. fascifolia*, as both species have short peduncles, clustered leaves and the smallest flowers apart from those of *A. pygmaea*, but differing from *A. fascifolia* in its habit and leaf morphology as indicated in the key.

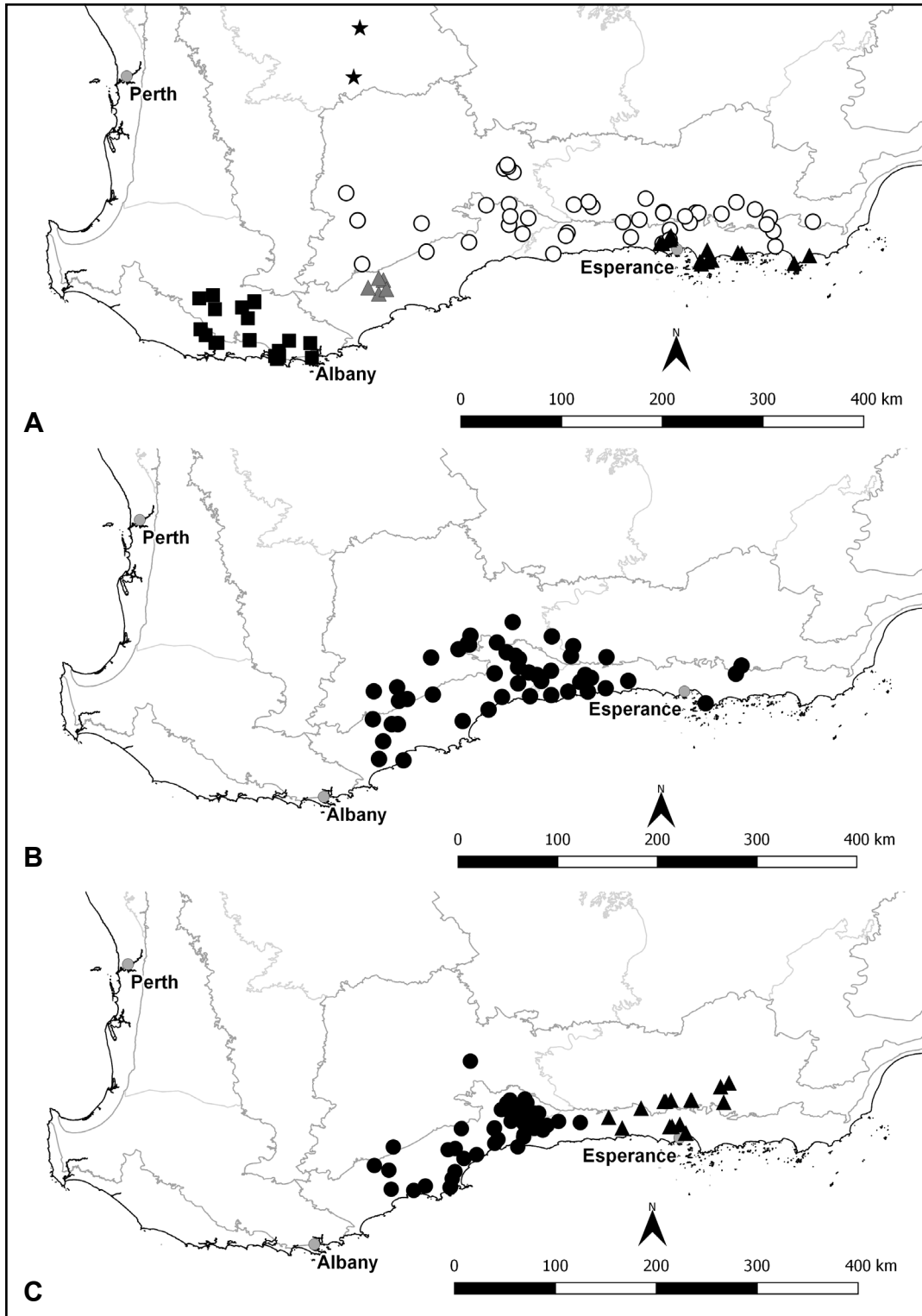


Figure 2. Distribution of *Austrobaekea* species. A – *A. columnaris* (▲), *A. fascifolia* (▲), *A. latens* (○), *A. naremben* (★) and *A. pygmaea* (■); B – *A. pachyphylla* (●); C – *A. uncinella* (▲) and *A. verrucosa* (●).

Notes. This species was collected by James Drummond (see MEL collections listed above) probably in 1843–1844 on his third or 1848–1849 on his fifth collecting trip but no details are given on the specimens. Fortunately, Ken Newbey's very detailed field notes have been attached to the type specimen. His description records ten stamens, with one stamen located on each side of the base of each petal, i.e. with two stamens opposite every sepal. However, most flowers on the type have fewer stamens than this.

2. *Austrobaekea fascifolia* Rye, *sp. nov.*

Typus: inland from western side of road to Le Grand Beach, approximately 0.5 kilometres south from its junction with Frenchman's Peak turnoff, Cape Le Grand National Park, Western Australia, 22 December 1994, A.G. Gunness AG 2435 (*holo:* PERTH 06707343; *iso:* CANB, K, MEL).

*Baecke*a sp. Esperance (A.G. Gunness AG 2435), Western Australian Herbarium, in *Florabase*, <https://florabase.dpaw.wa.gov.au/> [accessed 24 July 2017].

Shrub usually widely spreading, 0.3–1.2 m high, 0.4–1.2 m wide, with a single stem commonly *c.* 10–70 mm diam. at base; flowering branchlets with 1–3 pairs of peduncles. *Leaves* antrorse or patent, often clustered. *Petioles* 0.7–1.2 mm long. *Leaf blades* often incurved, appearing \pm terete but with adaxial surface somewhat less curved than the deeply convex abaxial surface, narrowly or very narrowly obovate in outline, 4–6.5 mm long, 0.7–1.1 mm wide, 0.6–1 mm thick, obtuse, sometimes with a slight mucro, dotted with oil glands that are often prominent. *Peduncles* 0.4–1.3 mm long, 1–3-flowered. *Largest bracts or bracteoles* 0.6–1.3 mm long. *Pedicels* (1.5–)2–3.5 mm long, 3–4 times longer than the peduncles. *Flowers* 5–7 mm diam. *Hypanthium* almost cup-shaped in bud but becoming more flared at anthesis, 1–1.9 mm long, 1.5–2 mm wide; free portion 0.2–0.35 mm long. *Sepals* very broadly or depressed ovate, 0.4–0.7 mm long, 0.7–1.4 mm wide, broadly obtuse, with oil glands on the thickened keel and often with narrow petaline borders. *Petals* 1.8–2.8 mm long, white. *Stamens* 5–9, 0–2 opposite each sepal, commonly 8 in the arrangement 2,2,1,2,1. *Longest filaments* 0.35–0.6 mm long. *Anthers* *c.* 0.3 mm wide; thecae *c.* 0.2 mm high; connective gland protruding by *c.* 0.1 mm. *Ovary* 3-locular; ovules 7–11 per loculus. *Style* 0.7–1.5 mm long; stigma scarcely enlarged, up to *c.* 0.1 mm diam. *Fruits* usually *c.* 2/3 inferior, 1.2–1.5 mm long, *c.* 2 mm wide; summit prominently glandular; hypanthium glandular-rugose on adnate part. *Seeds* strongly faceted, 0.5–0.7 mm long, 0.4–0.5 mm wide, 0.4–0.5 mm deep, pale or golden brown with dark reddish markings, shallowly colliculate on lateral surfaces. (Figure 3A)

Diagnostic features. Distinguished from other species of *Austrobaekea* by the following combination of characters: leaves tending to be clustered; petioles 0.7–1.2 mm long; leaf blades subterete, 4–6.5 mm long, 0.6–1 mm thick; peduncles 0.4–1.3 mm long, much shorter than the pedicels.

Selected specimens examined. WESTERN AUSTRALIA: Rossiter Bay, Cape Le Grand National Park, 27 Nov. 1985, D.B. Foreman 1274 (AD *n.v.*, CANB *n.*, MEL *n.v.*, NSW *n.v.*, PERTH); S of farm land on E of Duke of Orleans Bay Rd, 9.5 km S of Merivale Rd crossing, Duke of Orleans Bay, 21 Dec. 2005, R.M. Hoggart 1/1205 (PERTH); 1.9 km W of Hellfire Bay carpark, 2.0 km SE of Mt Le Grand summit, 6.7 km WSW of Lucky Bay campsite, Cape Le Grand National Park, 29 km SE of Esperance township, 26 Nov. 2011, A. Markey & B. Bayliss NIB 9533 (PERTH); Cape Arid National Park, 29 Nov. 1971, R.D. Royce 9830 (PERTH); maintenance track, Helms Arboretum, 10 Dec. 2003, B.L. Rye 231234 & C.D. Turley (NSW, PERTH); Telegraph Rd, Lake Mortijinup, 9 Jan. 2004, C.D. Turley 2/104 (PERTH); Cape Le Grand National Park, gravel pit up slope from general camp site, Lucky Bay, 13 Jan. 2004, C.D. Turley 10/104 & 11/104 (PERTH).

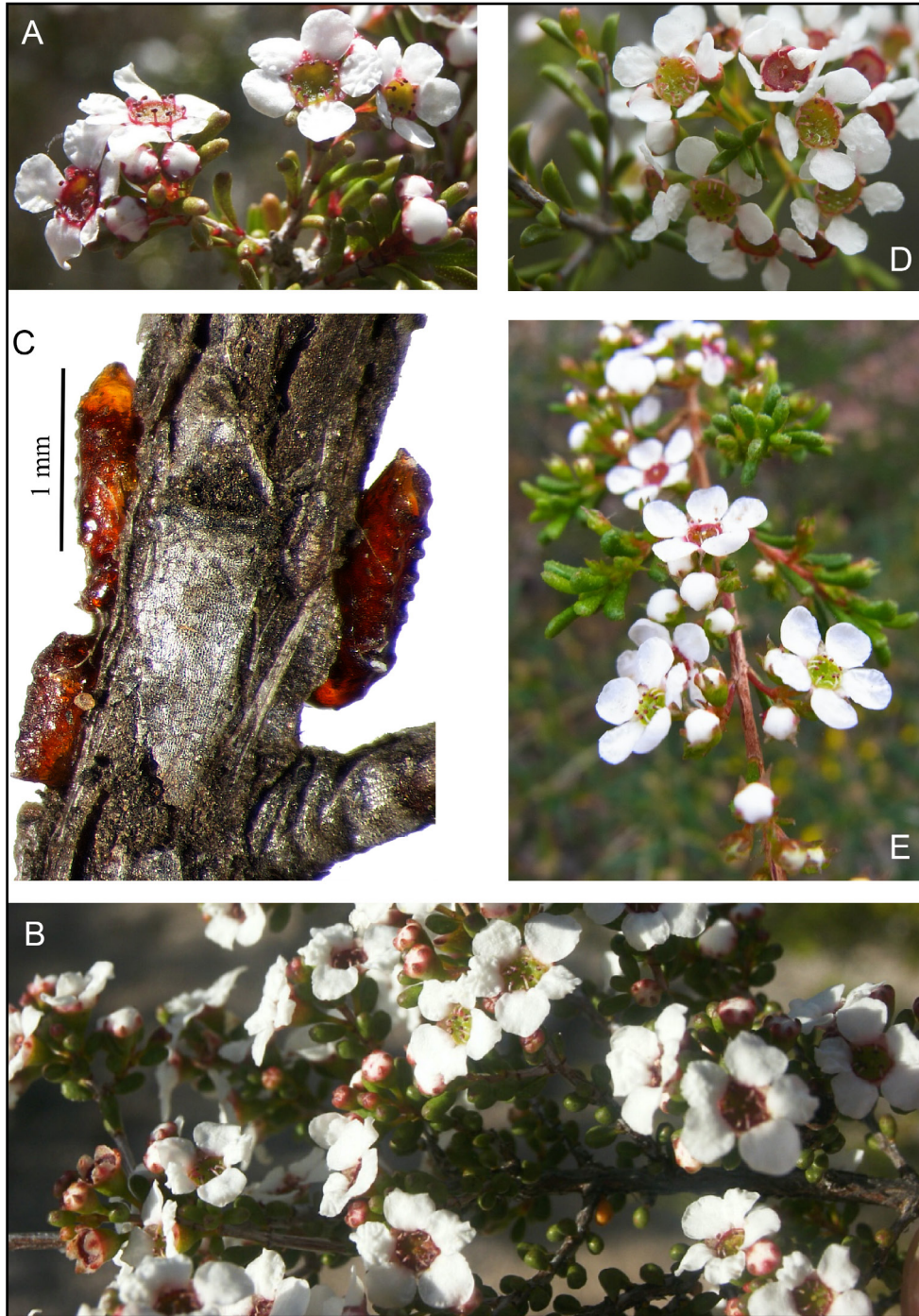


Figure 3. Images of *Austrobaekea* species, most showing a change in the ovary summit from green glistening with nectar at anthesis to red in old flowers or young fruits. A – *A. fascifolia* in bud and flower, showing almost terete leaves; B – *A. pachyphylla* branch in bud, flower and fruit, showing short, thick leaves; C – stem of *A. pygmaea* infested with lac insects; D – *A. uncinella* flower cluster and leaves with a small apical point; E – *A. verrucosa* branch with buds, flowers and fruits, showing bilaterally compressed leaves and with horned sepals visible on some of the buds. Images taken by Peter Rye (A, B, D & E) and Alex Williams (C). Vouchers: *B.L. Rye* 231234 & *C.D. Turley* (A), *B.L. Rye* 231203 (B), *A.R. Annels* & *R.W. Hearn* 5102 and *B.L. Rye* 231215 (D). The *A. verrucosa* photograph (E) was taken between Ravensthorpe and Hopetoun, and is unvouchered.

Distribution and habitat. Extends from Lake Mortijinup, west of Esperance, east to the southern part of Cape Arid National Park (Figure 2A), apparently in sandy soils in seasonally damp habitats close to the coast, sometimes associated with granite.

Phenology and insect associations. There is probably a long flowering season but all flowering specimens have been collected from November to February. Mature fruits have been recorded in January, February and September. Seed predation by weevils is suggested by the presence of a weevil within an old fruit from the September collection (*G. Byrne* 2618). Terminal galls appear to be rare in this species.

Etymology. From the Latin *fascis* (bundle) and *-folius* (-leaved), referring to the clustered leaves.

Conservation status. This species is not currently considered to be at risk. It probably extends along the coast for a distance of *c.* 150 km but does not extend very far inland.

Co-occurring species. Known to co-occur with *A. uncinella*, as discussed under that species.

Affinities. *Austrobaekea fascifolia* shows some morphological similarities to *A. columnaris* as discussed under that species. It has previously been identified as *A. latens* but differs in its shorter peduncles, its clustered leaves on flowering shoots, its usually longer petioles and leaf blades that are subterete (*cf.* mostly flattened on adaxial surface). It tends to have the longest petioles in the genus although there is some overlap in length with *A. uncinella* (0.7–1.2 vs. 0.5–1 mm long).

Notes. This species was apparently collected for the first time in 1960 by Alex George (*A.S. George* 2231). Many of the subsequent collections were made by Coral Turley, whose botanical expertise and commitment in the Esperance region have been acknowledged by three species having been named after her, including *Hibbertia turleyana* J.R.Wheeler.

One specimen (*A. Strid* 21211) gives the flower colour as white or pale pink but the pink might refer to the buds, which may have a pink flush.

3. *Austrobaekea latens* (C.R.P.Andrews) Rye, *comb. nov.*

Baeckea latens C.R.P.Andrews, *J. Western Australia Nat. Hist. Soc.* 2(1): 41 (1904). *Type:* sandplains north of Esperance, Western Australia, October 1903, *C.R.P. Andrews s.n. (holo: PERTH 01605577).*

Illustration. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 77 (1980) as *Baeckea latens*.

Shrub 0.3–1.8 m high, 0.4–1.5 m wide, one specimen multi-branched from a thick base 70 mm wide; flowering branchlets with 1–3(–6) pairs of peduncles. *Leaves* mostly antrorse, sometimes a few patent, sometimes almost appressed on rapidly growing shoots, not clustered on flowering shoots but sometimes clustered on lower vegetative branches. *Petioles* 0.5–0.8 mm long. *Leaf blades* very narrowly obovate to linear in outline, 4.5–8.5 mm long, 0.5–0.7 mm wide, 0.4–0.7 mm thick, dotted with small but sometimes prominent oil glands, sometimes with a slight mucro; abaxial surface deeply convex; adaxial surface shallowly concave to flat on flowering stems and when leaves widely spaced on vegetative branches. *Peduncles* mostly 1–1.5 mm long if 1-flowered and 1.5–6 mm long if multi-flowered, 1–3(–6)-flowered, never all 1-flowered. *Largest bracts or bracteoles* 1.2–2 mm long, rarely with a longer more leaf-like bract present, sometimes retained in late flower. *Pedicels* 2.5–4.5 mm long, mostly 0.75–2 times as long as the multi-flowered peduncles. *Flowers* 6.5–9 mm diam. *Hypanthium*

cup-shaped, 1.7–2.2 mm long, 2–2.5 mm wide; free portion 0.3–0.4 mm long. *Sepals* ovate or broadly ovate, 0.8–1.3 mm long, 1–1.6 mm wide, the outer ones strongly ridged or shortly horned. *Petals* 2.5–3.5 mm long, white. *Stamens* 3–10, with 0–3 opposite each sepal, commonly 8 in the arrangement 2,2,1,2,1, rarely with the stamen number reduced to 3. *Longest filaments* 0.5–0.7 mm long. *Anthers* pink, 0.2–0.25 mm wide; thecae 0.15–0.2 mm high; connective gland protruding by up to 0.1 mm. *Ovary* 3-locular; ovules 9–13 per loculus. *Style* 1.3–1.8 mm long; stigma 0.1–0.15 mm diam. *Fruits* inferior, 1.5–2.2 mm long, 2.5–2.75 mm wide. *Seeds* faceted, 0.7–0.8 mm long, 0.35–0.5 mm wide, 0.4–0.5 mm thick, brown, becoming dark red-brown, shallowly colliculate on lateral surfaces.

Diagnostic features. Distinguished from other species of *Austrobaecka* by the following combination of characters: leaf blades about as wide as thick, with adaxial surface flattened on flowering stems; pedicels about as long as multi-flowered peduncles but often much longer than 1-flowered peduncles; sepals 0.8–1.3 mm long, about three times shorter than the 2.5–3.5 mm long petals.

Selected specimens examined. WESTERN AUSTRALIA: Hamersley River, SW of Ravensthorpe, Oct. 1903, *C. Andrews s.n.* (PERTH); 9 miles SE of Mt Ragged, 19 Oct. 1970, *T.E.H. Aplin* 4301 (PERTH); 5.3 km SE of Mt Gibbs, 9 Nov. 2005, *G.F. Craig* 7015 (PERTH); Merilup Nature Reserve, SE of Kukerin, N boundary of E block, c. 200 m E of NW corner, 9 Nov. 2015, *M. Hislop* 4569 (PERTH); Speddingup Reserve, SE boundary on Robins Rd, 580 m SW of Speddingup Rd, 11 Oct. 2016, *E. Massenbauer* 755 (PERTH); near Twertup Creek, Fitzgerald River National Park, 19 Oct. 1968, *K.R. Newbey* 2790 (PERTH); c. 32 km NNE of coast at Stokes Inlet, 18 Oct. 1968, *E.A. Orchard* 1640 (AD, PERTH); W of Salmon Gums, Frank Hann National Park, 10 Dec. 1971, *R.D. Royce* 10218 (PERTH); 2.2 km NW of the Gibson Soak Hotel, 8 Aug. 2003, *P.G. Wilson* 1630 & *N. Lam* (PERTH).

Distribution and habitat. Extends from Merilup Nature Reserve, south-east of Kukerin, east to near Mt Ragged (Figure 2A), in varied habitats including sandy soils with mallees and low-lying, winter-wet sites.

Phenology and insect associations. Flowers from late August to November, with mature fruits recorded from late August to December. Terminal galls occur on some specimens.

Etymology. From the Latin *latens* (hidden, secret), perhaps because the type specimen was referred to as 'a small fragment of this species among flowers gathered on the sand plain north of Esperance' (Andrews 1904: 41).

Conservation status. This is the most widespread species in the genus and is not at risk.

Co-occurring species. See notes under *A. uncinella*.

Affinities. See notes under *A. fascifolia*, *A. naremben* and *A. pachyphylla*.

Notes. *Austrobaecka latens* is typical of the genus in all characters scored, with no unique features, and therefore its identification relies on the absence of unusual characters. The type specimen is a fragment which has only the uppermost leaves and young flowers; its leaves are not clustered and they have a flattened adaxial surface. Its peduncles and pedicels are of about the same length.

A specimen that has been bent towards the base to allow a particularly long piece to be mounted (*M.E. & M.E. Trudgen* 1478) has similar leaves at the top where the flowers are borne but has densely clustered

leaves that are closer to terete on sterile branches nearer the base. This suggests that mature leaves may tend to be clustered and subterete but are usually not present on the specimens. *Austrobaecka fascifolia* differs in having subterete leaves in dense clusters apparently throughout the plant, including its flowering stems, which gives it a different overall appearance.

One specimen (*E. Massenbauer 755*) is unusual in having a few flowers with ten stamens in the arrangement 3,2,1,3,1, which is very rare in *Austrobaecka*, although it also has the typical eight stamens in the 2,2,1,2,1 arrangement and at least two other stamen numbers present.

4. *Austrobaecka narembeen* Rye, *sp. nov.*

Typus: north-west of Narembeen, Western Australia [precise locality withheld for conservation reasons], 2 October 1997, *G.J. Keighery & N. Gibson 3010* (*holo*: PERTH 06776515; *iso*: CANB, K, MEL, NSW).

*Baecke*a sp. Narembeen (*G.J. Keighery & N. Gibson 3010*), Western Australian Herbarium, in *Florabase*, <https://florabase.dpaw.wa.gov.au/> [accessed 24 July 2017].

Shrub tall, 1.3–2.6 m high, up to 4.5 m wide, with numerous spreading branches from the base; flowering branchlets with 1 or 2 pairs of peduncles. *Leaves* mostly antrorse, sometimes almost appressed on rapidly growing shoots, not clustered. *Petioles* 0.4–0.6 mm long. *Leaf blades* very narrowly obovate to linear in outline, subterete, 4.5–5.5 mm long, 0.4–0.7 mm wide, 0.4–0.6 mm thick, dotted with small but often prominent oil glands, without any obvious apical point but occasionally with a minute mucro; abaxial surface deeply convex; adaxial surface shallowly convex throughout or only flattened near the base. *Peduncles* 2–5 mm long, 1–3-flowered. *Largest bracts or bracteoles* 0.9–1.3 mm long. *Pedicels* 3–4.5 mm long, 0.7–1.5 times as long as the peduncles. *Flowers* 8–9 mm diam. *Hypanthium* cup-shaped in bud, becoming more flared, 1.5–2 mm long, 2–2.5 mm wide, often 5-angled to somewhat 5-ribbed; free portion *c.* 0.5 mm long. *Sepals* broadly to depressed ovate, 0.5–0.8 mm long, 1.2–1.5 mm wide, the outer ones often strongly ridged. *Petals* 3–4 mm long, white. *Stamens* 8–10, 1–3 opposite each sepal, most commonly 8 in the arrangement 2,2,1,2,1 but 10 in the arrangement 3,2,2,2,1 also observed. *Longest filaments* 0.7–0.9 mm long. *Anthers* 0.25–0.3 mm wide; thecae 0.15–0.2 mm high, darker than the connective gland; connective gland protruding by 0.15–0.2 mm. *Ovary* 3-locular; ovules 10–13 per loculus. *Style* 1.3–1.7 mm long; stigma somewhat peltate, 0.15–0.2 mm diam. *Fruits* 4/5 to fully inferior, 1.6–2 mm long, 2.3–2.5 mm wide, rugose-glandular. *Seeds* faceted, 0.45–0.5 mm long, 0.35–0.4 mm wide, 0.3–0.35 mm deep, golden brown, shallowly colliculate on lateral surfaces.

Diagnostic features. Distinguished from other species of *Austrobaecka* in its larger habit and more northern distribution. Other important characters: leaves subterete; petals 3–4 mm long, at least five times longer than the sepals.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 8 Sep. 1999, *G.J. Keighery & N. Gibson 7024* (PERTH); 9 Nov. 2008, *M.E. Trudgen & P. Jobson* MET 23134A & MET 23134B–E (PERTH); 31 Aug. 2006, *M.E. Trudgen & B. Moyle* MET 22542 (PERTH).

Distribution and habitat. Occurs near Merredin and Narembeen (Figure 2A), one of the localities on a breakaway with *Callitris canescens* and *Melaleuca hamata* and another with granite outcropping in places.

Phenology and insect associations. Flowers from late September to November, with fruits recorded in November. Specimens often have terminal galls or non-terminal stem galls, but the terminal galls observed are more elongated than those seen in other members of the genus and lack the longitudinal seam.

Etymology. Refers to the Narembeen area where this species was collected for the first time. The name of the town comes from a Noongar word for ‘place of female emus’.

Conservation status. Listed by Smith and Jones (2018) as Priority Two under the Conservation Codes for Western Australian Flora under the name *Baeckea* sp. Narembeen (G.J. Keighery & N. Gibson 3010). Only two populations are known for this species.

Affinities. Apparently closest to *A. latens*, differing in its larger habit and uniformly subterete leaves. It also has shorter sepals but longer petals on average and hence its petals are at least five times longer than the sepals (*cf. c.* three times longer).

Notes. This is the most recently discovered species in the genus and was collected for the first time in September 1999 by Greg Keighery and Neil Gibson. It is odd in its occurrence on rocky habitats well north of the distribution of the other species of *Austrobaeckea*. Perhaps it benefits from increased moisture caused by runoff from the rock outcrops.

Most specimens now available are in immature fruit, limiting the opportunities to record stamen numbers and arrangement as well as seed measurements. Only one mature fruit with seeds was found amongst the specimens; this had the smallest seeds recorded so far for the genus.

Stamen filaments were recorded as red on one specimen 1.3 m high (*M.E. Trudgen & P. Jobson* MET 23134A) and white on a specimen 2.6 m high from the same population. As both plants were primarily in young fruit, the red filament colour may have been a sign of aging or stress. More collections in both flower and mature fruit are needed to check the description provided here.

5. *Austrobaeckea pachyphylla* (Benth.) Rye, *comb. nov.*

Baeckea pachyphylla Benth., *Fl. Austral.* 3: 85 (1867). *Type citation:* ‘in the interior from the south coast, Maxwell. A single specimen in Herb. F. Mueller’. *Type:* south-west coast and interior of Western Australia, 1858–1866, *G. Maxwell s.n. (holo:* MEL 72895; *iso:* K 000821682, possibly also K 000821681 & PERTH 01606107).

Illustration. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 74 (1980) as *Baeckea pachyphylla*.

Shrub 0.4–1.5(–2) m high, 0.3–1.2(–2.5) m wide; flowering branchlets with 1–4 pairs of peduncles. *Leaves* antrorse or patent, not clustered. *Petioles* 0.3–0.6 mm long. *Leaf blades* somewhat bilaterally compressed (up to 1.5 times thicker than wide), irregularly obovate or narrowly so from side view, 2.5–4.5 mm long, 0.7–1.1 mm wide, 0.8–1.3 mm thick, dotted with oil glands, which are sometimes prominent, without any apical point or with a point less than 0.1 mm long; abaxial surface deeply convex; adaxial surface slightly convex to flat. *Peduncles* 0.4–1.2 mm long if 1-flowered, 1–2(–3) mm long if multi-flowered, up to 3(4)-flowered but often all or mostly 1-flowered. *Largest bracts or bracteoles* 0.6–0.8 mm long. *Pedicels* 1.5–3.3 mm long, *c.* 3 times longer than the peduncles. *Flowers* 5–7.5 mm

diam. *Hypanthium* cup-shaped, 1.4–1.5 mm long, 2–2.2 mm wide; free portion *c.* 0.3 mm long. *Sepals* broadly to depressed ovate, 0.6–1.1 mm long, 1.1–1.5 mm wide, the outer ones strongly ridged or somewhat horned. *Petals* 2.2–3.5 mm long, white. *Stamens* 2–8, 0–2 opposite each sepal, commonly 8 in the arrangement 2,2,1,2,1 but ranging down to just 2 in the arrangement 1,0,1,0,0. *Longest filaments* 0.4–0.6 mm long. *Anthers* *c.* 0.3 mm wide; thecae *c.* 0.2 mm high, dark-coloured; connective gland protruding by *c.* 0.1 mm, usually paler than the thecae. *Ovary* 3-locular; ovules 8–12 per loculus. *Style* 0.8–1.3 mm long; stigma capitate or somewhat peltate, up to 0.1 mm diam. *Fruits* inferior, 1.5–1.7 mm long, 2–2.5 mm wide; prominently rugose-pitted. *Seeds* faceted, 0.55–0.85 mm long, 0.3–0.45 mm wide, 0.35–0.5 mm deep, brown, becoming dark red-brown, shallowly colliculate or colliculate on lateral surfaces. (Figures 3B, 4)

Diagnostic features. Distinguished primarily by having bilaterally compressed leaf blades that are up to *c.* 1.5 times thicker than wide. Other important characters: petioles 0.3–0.6 mm long; blade 0.9–1.3 mm thick; peduncles 0.4–1.2 mm long if 1-flowered, 1–2(–3) mm long if multi-flowered, usually much shorter than the pedicels.

Selected specimens examined. WESTERN AUSTRALIA: Corackerup Nature Reserve, corner of Corackerup and Moojebup Rds, 7 Apr. 2015, *G. Byrne* 5453 (PERTH); 6.3 km along track from Melaleuca Rd, 43 km NNW of Munglinup, 12 Dec. 2005, *R. Davis* 10965 (PERTH); ranger's residence, Quiss Rd, Fitzgerald River National Park, *C.R. Hart* 28 (PERTH); Lake Shaster Nature Reserve, northern firebreak, 1 May 2009, *M. Hoggart & E. Adams* EA 545 (PERTH); Springdale Rd, 3.9 km W of Bedford Harbour Rd and 17.9 km E of Mason Bay Rd, 9 Dec. 2003, *B.L. Rye* 231201 (PERTH); near



Figure 4. A large spreading shrub, *c.* 2 m high, of *A. pachyphylla* in full flower, south of Ravensthorpe. Image taken by Peter Rye, voucher: *B.L. Rye* 231214.

crossing of Yallobup Creek on Mason Bay Rd, 1.0 km S of the Springdale Rd, 9 Dec. 2003, *B.L. Rye* 231223 (PERTH); Mt Le Grand, 11 Dec. 2003, *B.L. Rye* 231249 (PERTH); 12 km NNW of Ongerup, adjacent to Foster Rd, 5 Nov. 2003, *L.M. Strahan* 128 (CANB, PERTH); 6 km from Munglinup on the road to Ravensthorpe, 5 Nov. 1982, *A. Strid* 21165 (AD, BRI, K, NSW, MEL, PERTH); 10 km W of Jerramungup, 10 Nov. 1974, *D.J. Whibley* 5250 (AD, PERTH).

Distribution and habitat. Extends from near Ongerup east to near Mt Ney (Figure 2B), in varied habitats with sandy soils, sometimes in relatively damp situations, often with mallees or other eucalypts dominant.

Phenology and insect associations. Flowers and fruits have been recorded through most of the year, with flowering especially common from October to January. Terminal galls are often present.

Etymology. From the Greek *pachys* (thick) and *-phyllus* (-leaved), an appropriate name as the leaves are thicker than wide.

Conservation status. This species has many populations extending over an area *c.* 400 km long and is not at risk.

Co-occurring species. The distribution of *A. pachyphylla* greatly overlaps the ranges of both *A. latens* and *A. verrucosa* and there appear to be at least two cases of co-occurrence with the latter species. For example, *A. pachyphylla* (*A. Strid* 22429) was recorded growing with a specimen of *A. verrucosa* (*A. Strid* 22435), with both taxa in full flower.

Typification. Since Bentham (1867: 85) indicated that he was basing his new species on a single specimen ‘in Herb. F. Mueller, which I am unable to refer to any other species’, MEL 72895 is evidently the holotype. One specimen from Kew (K 000821682) is probably an isotype. Two other possible isotypes are a fragment with the locality given as ‘Oldfield Range’ (PERTH 01606107) and K 000821681.

Affinities. This species is like *A. verrucosa* in having very thick leaves although they are not markedly bilaterally compressed as in *A. verrucosa*. Many specimens included here under *A. pachyphylla* were previously identified as *A. verrucosa* or less commonly as *A. latens*, which differs in having leaves about as wide as thick and usually longer peduncles with the pedicels and peduncles tending to be of about the same length. As currently delimited *A. pachyphylla* is widespread and very variable. More study is needed of its variants and its relationships with other members of the genus.

Notes. On pressed specimens a few leaves may appear to be broader than long if their abaxial surface has been strongly pressed towards the adaxial surface, whereas leaves that have been pressed side on may appear more highly bilaterally compressed than they actually are.

The lowest stamen number recorded for the genus, of two stamens per flower, is known from *B.L. Rye* 231201, which also has flowers with three to five stamens.

6. *Austrobaeckea pygmaea* (R.Br. ex Benth.) Rye, *comb. nov.*

Baekkea pygmaea R.Br. ex Benth., *Fl. Austral.* 3: 89 (1867). *Type:* King George Sound, Western Australia, December 1801, *R. Brown s.n.* (*holo:* K 000821686; *iso:* BM 000889768, K 000821687, possibly also CANB 278743).

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 75 (1980); drawings on C. Andrews s.n. Dec. 1903.

Shrub low-growing and 0.1–0.5 m high or erect and 0.6–1(–1.5) m high, 0.2–1 m wide; flowering branchlets with 2–6 pairs of peduncles. *Leaves* antrorse, sometimes almost appressed on fast-growing branchlets, not clustered. *Petioles* 0.2–0.4 mm long. *Leaf blades* narrowly obovate to almost linear in outline, 3.5–8 mm long, 0.5–1.1 mm wide, 0.4–0.7 mm thick, usually somewhat dorsiventrally compressed but sometimes slightly thicker than wide, with a minute recurved apical point up to 0.1 mm long; abaxial surface convex, with the larger oil glands often in 2 main rows on each side of midvein; adaxial surface concave to flat. *Peduncles* 4–11 mm long, 1–3-flowered. *Largest bracts or bracteoles* 0.7–1.5 mm long. *Pedicels* 1.5–2.5 mm long, 0.25–0.5 times as long as the peduncles. *Flowers* 3–5 mm diam. *Hypanthium* cup-shaped in bud, sometimes becoming more flared, 0.9–1.6 mm long, 1.3–2.2 mm wide, often 5-angled to somewhat 5-ribbed; free portion 0.2–0.3 mm long. *Sepals* broadly triangular-ovate, 0.4–0.8 mm long, 0.5–1.1 mm wide, slightly keeled or ridged, largely herbaceous, with a narrow whitish entire margin, keel incurved at apex. *Petals* 1.2–1.8 mm long, white, with a few large glands towards the base. *Stamens* (10–)12–25, with up to 5 opposite each sepal or (when numerous) with a complete circle of stamens opposite the petals and sepals. *Longest filaments* 0.3–0.4 mm long. *Anthers* c. 0.2 mm wide; thecae c. 0.15 mm high; connective gland protruding by less than 0.1 mm. *Ovary* 2-locular in all or most flowers (occasionally a few flowers with a 3-locular ovary); ovules 6–12 per loculus. *Style* 0.7–0.8 mm long; stigma small. *Fruits* inferior, 1.3–1.5 mm long, 1.5–1.75 mm wide. *Seeds* faceted, 0.55–0.7 mm long, 0.35–0.5 mm wide, 0.4–0.5 mm deep, with many or all cells dark maroon, colliculate on lateral surfaces. (Figure 3C)

Diagnostic features. Distinguished from other species of *Austrobaekea* by its smaller petals, usually more numerous stamens, which sometimes form a complete circle rather than being all antisepalous, and its occurrence in the near-coastal region west of Albany. It is the only species in which the ovary is normally 2-locular.

Selected specimens examined. WESTERN AUSTRALIA: near Albany, Dec. 1903, C.R.P. Andrews s.n. (PERTH); Weld Rd, c. 3.5 km W of Thompson Rd, 24 Jan. 1995, R.W. Hearn 5670 (CANB, K, MEL, PERTH); Tootanellup Nature Reserve, SE of Frankland, 6 Jan. 2012, G.J. & B.J. Keighery 2010 (PERTH); Kodjilup Nature Reserve, 22 Mar. 1997, G.J. Keighery & N. Gibson 2800 (PERTH); 1.1 km in along track into water reserve from Poorrarecup Rd, 21 Jan. 2003, B.L. Rye 230188 & R.W. Hearn (PERTH); lower Denmark Rd near Bornholm, 19 Dec. 1982, A. Strid 21816 (AD, BRI, CANB, HO, MEL, NSW, NT, PERTH).

Distribution and habitat. Extends from north of Lake Muir eastwards to near Albany (Figure 2A), in winter-wet depressions with other wetland species such as species of *Astartea* and *Pericalymma*.

Etymology. From the Latin *pygmaeus* (dwarf), referring to the small habit.

Phenology and insect associations. Flowers from December to March, with mature fruits recorded in March. This species appears to be unique in having red-brown scales of a lac insect (family Kerridae) attached to the stems of some specimens (e.g. A.R. Annel & R.W. Hearn 5102, R.W. Hearn 5670, both also with terminal stem galls). Figure 3C shows a stem infested with the lac insects. As well as terminal galls, there are also galls in the form of long narrow stem swellings on A. Strid 21816. Terminal galls are commonly 3–4.5 by 2–3.5 mm.

Conservation status. This species has many populations extending over an area c. 130 km long and is not at risk.

Typification. Of the three confirmed type specimens, K 000821686 was the only one annotated by Bentham; this specimen has been annotated by David Mabberley as 'Holotype'. K 000821687 came via J.J. Bennett at too late a date to be available to Bentham at the time he wrote up the species for *Flora Australiensis*.

Affinities. This very distinctive species is readily distinguished from all other members of the genus and its closest affinities are unclear. Its leaves have a recurved apical point as in *A. uncinella* but much shorter. The seeds are less strongly faceted than in other *Austrobaeckea* species but with more pronounced colliculae than in most other species.

Notes. Being restricted to winter-wet habitats within a high rainfall region of the south-west, this species occurs in more humid conditions than the other members of the genus. Its largest habit was recorded as 1–1.5 m high from *G.J. & B.J. Keighery* 2010, and some collections (e.g. *B.L. Rye* 230181 & *R.W. Hearn*) record the presence within populations of both multi-stemmed plants from a lignotuber and many single-stemmed plants. Evidently there is considerable variation in habit within *A. pygmaea*.

The species is particularly variable in stamen numbers with specimens from near the coast in the Denmark to Albany area often having few stamens down to ten but specimens from other areas having up to 25 stamens, the highest number recorded for the genus. Although the lowest stamen number recorded for *A. pygmaea* is ten, most flowers on each plant have more numerous stamens and many specimens regularly have stamen numbers of 15 or more. The stamen number is given as 'about 10' in the protologue and this led Blackall and Grieve (1980: 75) to key '*Baeckea*' *pygmaea* out in Section 3 (stamens 10 or fewer) rather than in Section 4 (stamens more than 10) where it should predominantly belong. The species was also incorrectly described as having precisely ten stamens in Wheeler *et al.* (2002).

7. *Austrobaeckea uncinella* (Benth.) Rye, *comb. nov.*

Baeckea uncinella Benth., *Fl. Austral.* 3: 84 (1867). *Type citation:* 'Plains E. of Stokes Inlet, Maxwell'. *Type:* plains east of Stokes Inlet, Western Australia, 1858–1866, *G. Maxwell s.n.* (*lecto:* MEL 73062, here selected; possible *isolecto:* PERTH 07244789); south west coast and interior, *G. Maxwell s.n.* (*syn:* K 000821676, PERTH 07244770).

Illustration. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 77 (1980) as *Baeckea uncinella*.

Shrub 1–2 m high, 1–1.5 m wide, single-stemmed at base; flowering branchlets with 1–4 pairs of peduncles. *Leaves* antrorse to patent, sometimes appressed on fast-growing shoots, not clustered. *Petioles* 0.5–1 mm long. *Leafblades* recurved, narrowly obovate to linear in outline, 3.5–6.5 mm long, 0.5–1.1 mm wide, 0.5–1.1 mm thick, with an apical point 0.2–0.5 mm long, the point usually obviously recurved; abaxial surface deeply convex, dotted with numerous oil glands, which are sometimes somewhat prominent; adaxial surface concave to flat. *Peduncles* 2.5–6.5 mm long, 1–9-flowered. *Largest bracts or bracteoles* 0.8–1.3 mm long. *Pedicels* 2.5–4.5 mm long, mostly 0.6–1 times as long as the peduncles. *Flowers* 5–8 mm diam. *Hypanthium* cup-shaped, 1.5–2 mm long, 2–2.5 mm wide; free portion 0.3–0.5 mm long. *Sepals* broadly or depressed ovate, 0.5–1.1 mm long, 0.8–1.5 mm wide,

the outer ones prominently ridged. *Petals* 2–3 mm long, white. *Stamens* 7–13, 1–4 opposite each sepal, when 13 then recorded in the arrangements 4,2,3,3,2 or 3,3,3,3,2. *Longest filaments* 0.5–0.8 mm long. *Anthers* 0.25–0.3 mm wide; thecae *c.* 0.2 mm high; connective gland protruding by *c.* 0.2 mm. *Ovary* 3-locular; ovules 8–14 per loculus. *Style* 0.8–1(–1.3) mm long; stigma small. *Fruits* largely inferior, 1.3–1.5 mm long, 1.8–2 mm wide. *Seeds* faceted, 0.6–0.8 mm long, 0.3–0.5 mm wide, 0.4–0.5 mm deep, golden brown, often with a few dark cells, shallowly colliculate on lateral surfaces. (Figure 3D)

Diagnostic features. Distinguished from other species of *Austrobaekea* by its more prominently pointed leaves, with the point usually distinctly recurved. It also tends to have more flowers per peduncle than other species and a more prominently protruding connective gland.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 18 Oct. 1968, *N.N. Donner* 3067 (CANB *n.v.*, PERTH); 20 Nov. 19983, *M. Hislop* 1257 (MEL, NSW, PERTH); 9 May 2012, *M. Hislop* 4192 (PERTH); 10 Dec. 2003, *B.L. Rye & C.D. Turley* 231232 (PERTH); 12 Dec. 2003, *B.L. Rye* 231252 (NSW, PERTH); 23 Nov. 1999, *R.T. Schuh, G. Cassis & R. Silveira* 102 (PERTH); 6 Nov. 1982, *A. Strid* 21180 (AD, BRI, CANB, HO, MEL, NT, PERTH); 17 Oct. 2007, *B. Taylor & C. Anderson* Opp 113 (PERTH); 21 Oct. 1997, *P.G. Wilson, N. Lam & E.A. Brown* PGW 1423 (PERTH); 2 Nov. 1968, *J.W. Wrigley s.n.* (CBG).

Distribution and habitat. Extends from Young River east to near Mt Heywood, which is *c.* 80 km north-east of Esperance (Figure 2C), associated with salt lakes and watercourses.

Etymology. From the Latin *uncinus* (hook) and diminutive *-ellus*, referring to the uncinately leaf tip.

Phenology and insect associations. Flowers recorded from September to January, especially from October to December. Mature fruits recorded in April, May and November. Non-terminal stem swellings (galls) and terminal galls are present on many specimens, such as *B.L. Rye* 231252 and *R.T. Schuh, G. Cassis & R. Silveira* 102.

Conservation status. Recently listed as Priority Three under the Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–) under the name *Baeckea uncinella* Benth. Of the five previously named species, *A. uncinella* has the fewest populations, but still extends for *c.* 130 km.

Co-occurring species. This species (*B.L. Rye & C.D. Turley* 231232) has been recorded growing with *A. fascifolia* (*B.L. Rye & C.D. Turley* 231234) in natural vegetation in Helms Arboretum, both species in full flower in December.

Typification. Bentham (1867: 84) cited a single collector and locality, ‘Plains E. of Stokes Inlet, Maxwell’, but stated that he had ‘seen two specimens’. One specimen he certainly examined was MEL 73062, which gives the identical locality and indicates on the label that it was seen by Bentham. The second sheet Bentham examined was K 000821676, which gives the locality as ‘south west coast and interior’ and has a much more densely leafy appearance so is considered to represent a different collection. Two PERTH specimens are fragments obtained by C.A. Gardner; both give the same locality as the Kew specimen but PERTH 07244789 also gives the protologue location below on its label, although that locality is given with a question mark. MEL 73062 is selected here as the lectotype because it is a good match for both the description and locality given in the protologue. It is difficult to tell from the fragments at PERTH whether they match the lectotype or K 000821676, but the fragment labelled

with the protologue locality is a possible isolectotype and has been identified by M.E. Trudgen as being a good match for MEL 73062.

Affinities. A distinctive species that is unlikely to be confused with any other members of the genus because its leaves have a recurved point. A shorter recurved point is often present on *A. pygmaea* but that species is readily distinguished by its smaller flowers.

Notes. Mueller (1864) tentatively included this species as a western variant under the south-eastern Australian species *Baeckea behrii* (Schltdl.) F.Muell. [= *Hysterobaeckea behrii* (Schltdl.) Rye] but noted that it differed in its almost blunt leaves, always multi-pedicellate peduncles, slightly longer sepals and differently shaped filaments. Bentham (1867) described further differences in its inflorescence, stamens, etc. and reported higher ovule numbers of 15–20 per loculus. However, the ovule numbers recorded here for *A. uncinella* are all lower than this, with only 8–14 per loculus, very similar to the numbers of ovules present in *H. behrii*.

Specimens of *A. uncinella* that have a straighter point on the leaves than usual include *J.S. Beard* 5312, which also has a longer style than usual, *c.* 1.3 mm long, and comes from the far east of the species' range.

8. *Austrobaeckea verrucosa* (Turcz.) Rye, *comb. nov.*

Tetrapora verrucosa Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersburg* 10: 329–330 (1852). *Type:* Swan River colony [Stirling Range to Cape Riche to Mt Barren Range], Western Australia, 1848–1849, *J. Drummond* 5: 127 [as 137] (*holo:* KW 001001270; *iso:* PERTH 03350649).

Harmogia corynophylla F.Muell., *Fragm.* 2: 30 (1860); *Baeckea corynophylla* (F.Muell.) F.Muell., *Fragm.* 4: 72 (1864); *Babingtonia corynophylla* (F.Muell.) F.Muell., *Fragm.* 4: 74 (1864). *Type:* Fitzgerald Range, Western Australia, 1858–1860, *G. Maxwell s.n.* (*holo:* MEL 72574).

Illustration. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 78 (1980) as *Baeckea corynophylla*.

Shrub 0.4–1.5(–1.8) m high, 0.45–1.5 m wide; flowering branchlets with 1–9 pairs of peduncles. *Leaves* antrorse or patent, not clustered. *Petioles* 0.3–0.6 mm long. *Leaf blades* markedly bilaterally compressed, thickest towards apex so that from side view the shape is almost obovate but with the adaxial margin straight, 2.5–6 mm long, 0.5–0.7 mm wide, 1.2–1.8 mm thick, without an apical point or rarely with a short one to 0.15 mm long, often verrucose with very prominent oil glands; abaxial and adaxial surfaces convex, grading into the broad, flat, lateral surfaces, the adaxial surface narrower than the abaxial surface or rarely ± as broad. *Peduncles* 0.3–1 mm long if 1-flowered, 0.6–5.5 mm long if multi-flowered, 1–4-flowered but mostly 1- or 3-flowered. *Bracts and bracteoles* often deciduous, the largest ones 1.1–1.8 mm long. *Pedicels* 0.7–4(–7) mm long, 0.7–2 times as long as the peduncles. *Flowers* 5–9 mm diam. *Hypanthium* cup-shaped, 1.1–2 mm long, 1.5–2.5 mm wide; free portion 0.2–0.3 mm long. *Sepals* ovate or broadly ovate, 1–1.5 mm long, 0.8–1.5 mm wide, acute, the outer ones often with keel extended into a horn-like point, with a narrow petaline border on each side; longest horn 0.4–1 mm long. *Petals* 2–3.2 mm long, white. *Stamens* 3–9, 0–3 opposite each sepal, commonly 8 in the arrangement 2,2,1,2,1 but down to 3 arranged as 1,1,0,1,0. *Longest filaments* 0.4–0.7 mm long. *Anthers* *c.* 0.3 mm wide; thecae *c.* 0.2 mm high, commonly dark reddish or reddish brown; connective gland protruding by *c.* 0.1 mm, usually pale. *Ovary* 3-locular; ovules 5–11 per

loculus. *Style* 0.9–1.3 mm long; *stigma* 0.1–0.15 mm diam. *Fruits* largely inferior, 1.5–1.8 mm long, 2.5–2.7 mm wide. *Seeds* faceted, 0.7–1 mm long, 0.4–0.5 mm wide, 0.5–0.6 mm deep, golden brown at first, often developing dark reddish cells, colliculate on lateral surfaces. (Figure 4E)

Diagnostic features. Unique in having markedly bilaterally compressed leaves, which are up to 1.8 mm thick. Other important characters: outer sepals 1–1.5 mm long, with a horn 0.4–1 mm long; seeds 0.7–1 mm long.

Selected specimens examined. WESTERN AUSTRALIA: 10 km SW of Mukinwobert Rock on Nindilbillup Rd, 25 Mar. 1983, *M.A. Burgman & S. McNee s.n.* (PERTH); a firebreak along a fence line E of the South Coast Hwy and S of the Pallinup River, 29 Aug. 2017, *G. Byrne* 6426 (PERTH); 50 km N of South Coast Hwy, on Old Ravensthorpe Rd, 23 Nov. 1985, *D.B. Foreman* 1194 (AD *n.v.*, CANB *n.v.*, MEL *n.v.*, NSW *n.v.*, PERTH); 28.8 km S of Varley, 1991, *S. Gourley* 91/274 (PERTH); 1 km S of Bandalup Hill, 20 Jan. 1981, *G.J. Keighery* 3718 (PERTH); on Norman Rd, 5 km N of Boxwood Hill–Ongerup Rd, 13 Jan. 2005, *B.L. Rye* 250118 & *M.E. Trudgen* (AD, BRI, PERTH); 20 km S of Ravensthorpe on Hopetoun Rd, Eyre district, 9 Aug. 2003, *P.G. Wilson & G.M. Towler* PGW 1638 (NSW *n.v.*, PERTH); *c.* 27.7 km E of Ravensthorpe, Eyre District, 22 Oct. 1997, *P.G. Wilson & N. Lam* PGW 1433 (NSW *n.v.*, PERTH).

Distribution and habitat. Extends from south-east of Jerramungup east to the Jerdacuttup River, with an isolated record from the Lake King area (Figure 2C), in varied soil types, sometimes associated with laterite, granite or other rock outcrops, often in mallee-dominated vegetation.

Etymology. From the Latin *verrucosus* (covered with warts), referring to the warty appearance of dried leaves that have very prominent oil glands. Other members of the genus often have prominent glands on the leaves too but not to the same degree.

Phenology and insect associations. Flowers recorded all year but primarily from August to November. Mature fruits have been recorded in many months, possibly primarily from October to May. Terminal or lateral galls are often present.

Conservation status. *Austrobaeckea verrucosa* is known from numerous populations over an area more than 160 km long and is not at risk.

Co-occurring species. Appears to co-occur occasionally with *A. pachyphylla*, as noted under that species. *Austrobaeckea verrucosa* has a quite similar distribution to *A. pachyphylla* except that it does not extend as far east (see Figure 2B,C).

Affinities. Molecular data (see *Molecular evidence* section above) indicate that *A. verrucosa* is more closely related to *A. latens* than it is to *A. uncinella*. In leaf morphology *A. verrucosa* is closest to *A. pachyphylla* (see notes under that taxon).

Notes. An isolated specimen from the far north of the distribution (*S. Gourley* 91/274) with spindly fast-growing stems and very compressed leaves has exceptionally long peduncles and pedicels up to 5.5 mm and 7 mm long respectively. This specimen is quite similar in these characters to the type specimen, which has very compressed leaves and old bare peduncles up to 4.5 mm long, although its pedicels are only up to about 4 mm long on the younger peduncles. The type collection is very verrucose and has particularly long horns on the outer sepals.

At the other extreme, specimens from the Ravensthorpe area often have very short peduncles and pedicels. Some specimens from the far west of the distribution (e.g. *S. Osborne* 95) have less than five stamens in most flowers and low stamen numbers are occasionally found elsewhere. Apart from those, most specimens include flowers with the most common stamen number of eight in its usual arrangement of 2,2,1,2,1.

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