NUYTSIA

WESTERN AUSTRALIA'S JOURNAL OF SYSTEMATIC BOTANY

ISSN 0085-4417

Wheeler, J.R. and Marchant N.G.
A revision of the Western Australian genus *Agonis* (Myrtaceae) and two new segregate genera *Taxandria* and *Paragonis*

Nuytsia 16(2): 393–433 (2007)

All enquiries and manuscripts should be directed to:

The Editor – *NUYTSIA*
Western Australian Herbarium
Dept of Environment and Conservation
Locked Bag 104 Bentley Delivery Centre
Western Australia 6983
AUSTRALIA

Telephone: +61 8 9334 0500
Facsimile: +61 8 9334 0515
Email: nuytsia@dec.wa.gov.au
Web: science.dec.wa.gov.au/nuytsia/

Department of Environment and Conservation
Western Australian Herbarium

A revision of the Western Australian genus *Agonis* (Myrtaceae) and two new segregate genera *Taxandria* and *Paragonis*

Judy R. Wheeler[1] and Neville G. Marchant[2,3]

[1]c/o Department of Environment and Conservation, 120 Albany Hwy, Albany, Western Australia 6330
[2]Western Australian Herbarium, Department of Environment and Conservation
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
[3]Current address: Botanic Gardens and Parks Authority, Kings Park, West Perth 6005

Abstract

Wheeler, J.R. and Marchant N.G. A revision of the Western Australian genus *Agonis* (Myrtaceae) and two new segregate genera *Taxandria* and *Paragonis*. *Nuytsia* 16(2): 393–433 (2007). Two new genera, *Taxandria* (Benth.) J.R. Wheeler & N.G. Marchant (11 species) and the monotypic *Paragonis* J.R. Wheeler & N.G. Marchant are segregated from *Agonis* (DC.) Sweet *s. str.* (4 species). The three genera are revised; all are endemic to the south-west of Western Australia and together comprise 16 species. Two new species are described, two species reinstated and several new combinations and lectotypifications are made. Keys are provided to the three genera and their taxa. All taxa are illustrated and mapped.

Introduction

This paper presents a taxonomic revision of the genus *Agonis s. lat*. and describes the new genera *Taxandria* and *Paragonis*.

The name *Agonis* was first published by De Candolle (1828) for a section of *Leptospermum* J.R. & G. Forster. In this section De Candolle placed *L. flexuosa* (Willd.) Spreng., *L. marginata* Labill. and *L. linearifolia* DC. Sweet (1830) raised it to generic rank as *Agonis* (DC.)Sweet, as independently did Lindley (1839). G. Don (1832) also raised *Leptospermum* section *Agonis* to generic rank as *Billotia* R.Br. ex G.Don, which is therefore an illegitimate name (since it was based on the same sectional name) and a homonym of *Billottia* Colla (1824). Several species were described under either *Agonis* or *Billotia* prior to the treatment by Bentham (1867).

Bentham (1867) placed *Billotia* (as *Billiottia*) in synonomy with *Agonis* and divided the genus *Agonis* into two sections; section *Taxandria* Benth. in which the species have only 10 stamens (one opposite each sepal and one opposite each petal) and only 2 ovules in each cell of the ovary, and section *Ataxandria* Benth. [= *Agonis s. str.*] whose species have 20–30 stamens (usually grouped opposite the sepals with none opposite the petals) and 4–6 ovules in each cell of the ovary.

The current study recognises the two sections of Bentham as distinct genera. His section *Ataxandria* is recognised here as *Agonis* and his section *Taxandria* is raised to generic level. We also segregate *Agonis grandiflora* Benth. as a new monotypic genus *Paragonis*.

Some species of *Agonis* and *Taxandria* are very common in the south-west of Western Australia, forming extensive stands and understorey trees and shrubs. Several species, mostly those from the genus *Taxandria*, have generated much interest in the wildflower industry and are widely picked under licence in Western Australia. Others have also been the subject of intensive study for the production of essential oils and some have been very widely cultivated. *Agonis flexuosa* (Willd.) Sweet is cultivated in many parts of the world and a number of selected cultivars, many of them sterile, are available in the nursery trade.

Methods

Measurements are based on herbarium specimens from PERTH. The biogeographic regions listed for the distributions of the taxa follow Thackway & Cresswell (1995). Types were selected and obtained on loan from K, KW, LD, MEL and P as well as studied in Cambridge (CGE), Harvard (GH), St Louis (MO) and Wroclaw (WRSL).

The authors have undertaken extensive field work and all taxa have been studied *in situ*. Hybrids and presumed hybrids have also been studied and assessed in the field, using morphological characters and by identifying apparent parent taxa in the vicinity.

Similarities and differences between *Agonis*, *Taxandria* and *Paragonis*

Agonis s. lat. belongs in the *Leptospermum* suballiance of the Myrtaceae (Briggs & Johnson 1979) along with *Homalospermum* Schauer, *Leptospermum* J.R. & G. Forster and *Pericalymma* Schauer.

This current study of *Agonis s. lat.* recognises three genera, *Agonis* (DC.) Sweet, *Taxandria* (Benth.) J.R. Wheeler & N.G. Marchant and *Paragonis* J.R. Wheeler & N.G. Marchant. The main morphological differences between the three genera are shown in Table 1. The genus *Agonis s. str.*, previously recognised by Bentham as section *Ataxandria* [= sect. *Agonis*], is here redefined as a genus of trees or shrubs with alternate/spirally arranged simple leaves and a variable number of stamens, usually 15–30, rarely a few more, arranged in a single whorl with 3–6, rarely 7 of them opposite the sepals and none opposite the petals. It has a 3-celled ovary with 4–14 ovules per cell but only 1 or 2 of the ovules develop into fertile seeds, while the remainder wither or develop into angular infertile seeds.

The genus *Taxandria*, previously recognised by Bentham as section *Taxandria* within the genus *Agonis*, is segregated here as a genus of shrubs or occasionally trees with leaves spirally arranged with one at each node or in clusters. *Taxandria* species all have 10 stamens, one opposite each sepal and one opposite each petal. There are 2, rarely 3 ovules per cell of the ovary, but only 1 ovule per cell develops into a fertile seed.

Bentham (1867) recognised that *Agonis grandiflora* was anomalous in section *Ataxandria*, having its stamens in a complete ring instead of an interrupted ring with stamens all grouped opposite the sepals. This species is placed here in *Paragonis,* a monotypic genus of shrubs, characterised by spirally arranged leaves in clusters and a variable number of stamens, usually 22–35, in a continuous ring. Like *Agonis*, *Paragonis* has an ovary with more than two (3–6) ovules per cell, with usually only 1 developing to a seed, the remainder withering or producing angular infertile seeds.

Table 1. Comparison of morphological characters of *Agonis*, *Taxandria* and *Paragonis*.

Character	*Agonis*	*Paragonis*	*Taxandria*
Leaves	borne singly	clustered	often clustered
Inflorescence	dense clusters of many flowers	not clustered, 1–3 flowers together	dense clusters of many flowers
Bracts basal to inflorescence	inconspicuous	conspicuous	inconspicuous except *T. floribunda*
Flower diameter	5–15(20) mm	12–17 mm	3–9 mm
Sepal length	1–2.5 mm	2–3 mm	0.5–2 mm
Petal shape	basally gradually tapered	basally gradually tapered	distinctly and abruptly clawed
Stamen number	usually 15–30	22–35	10 rarely fewer
Stamen arrangement	3–6 or rarely 7 opposite each sepal	continuous ring	1 opposite each sepal and 1 opposite each petal
Staminal filament length	0.5–2 mm	2.5–4 mm	usually 0.3–1 mm (up to 1.5 mm in *T. floribunda*)
Ovule number	3–7(14) per cell	3–6 per cell	2(3) per cell

Table 2. Comparison of morphological characters with *Pericalymma, Homalospermum* and *Leptospermum.*

Character	*Agonis*	*Homalospermum*	*Leptospermum*	*Paragonis*	*Pericalymma*	*Taxandria*
Inflorescence	dense cluster of many flowers	single flowers	small clusters	1–3 flowers together	1–3 flowers together	dense cluster of many flowers
Bract & leaf transition	abrupt	abrupt	abrupt	abrupt	gradual	abrupt
Petals	somewhat persistent	not persistent	not persistent	not persistent	not persistent	long persistent
Stamens (grouping)	opposite sepals only	continuous ring	opposite petals only	continuous ring	continuous ring	opposite sepals and petals
Ovary (-celled)	3	4	mostly 3–5	3	3	3
Ovules	hemitropous, erect	hemitropous	anatropous	hemitropous, erect	hemitropous, spreading or pendulous	hemitropous, erect

The three genera presented in this paper differ from the genera *Pericalymma*, *Homalospermum* and *Leptospermum*, which have similar floral morphology, in a variety of characters depicted in Table 2. *Homalospermum* differs from *Agonis s. lat*. in having a 4-celled ovary with numerous hemitropous ovules, winged seeds and large single flowers formed on unmodified shoots. *Leptospermum* differs from *Agonis s. lat*. in having anatropous ovules and non-peltate seeds. *Agonis s. lat*. has hemitropous ovules and peltate seeds.

The genus *Pericalymma*, revised by Cranfield (1999), appears to be the most similar morphologically to *Agonis s. lat.* It is here considered to be distinct, differing in its flexuose dichotomous branchlets and its pendulous or spreading, rather than erect, ovules and seeds. *Pericalymma* also differs from *Agonis* and *Taxandria* in having an inflorescence bearing only 1–3 flowers together rather than a dense head of flowers and in its less persistent petals.

Independent support for the recognition of three separate genera came from the molecular data of O'Brien *et al.* (2000). Their phylogenetic analysis suggested one clade with *A. flexuosa* and *A. baxteri* (*Agonis s. str*.) and a second clade comprised the species with only 10 stamens (*Taxandria*) weakly linked to the genus *Pericalymma.* Their analysis recognised *A. grandiflora* (*Paragonis*) as being weakly linked to both *Taxandria* and *Pericalymma*.

O'Brien *et al.* (2000) postulated three generic scenarios: (1) combining *Agonis* and *Pericalymma*, (2) placing *A. grandiflora* with *Pericalymma* but retaining the remaining species of *Agonis* as one genus or (3) maintaining *Pericalymma* as it currently is but recognising segregate genera within *Agonis*. It is the last of these options that the present authors believe best fits the independent, morphological taxonomic study presented here.

Interspecific hybrids or probable hybrids have been detected to date in 8 of the eleven *Taxandria* and in 3 of the 4 *Agonis* species. It is highly likely that hybridisation and introgression are commonplace in these genera and have contributed to considerable morphological diversity in many taxa.

The following taxonomic study is based solely on morphological characters. Species are recognised where we have observed morphological discontinuities that we felt intuitively are at species level. Subspecies are also recognised on the basis of morphological discontinuities in characters such as leaf shape and apex and size of inflorescence and flower parts, correlated with geographic separation. Varieties are recognised on the basis of a lesser degree of morphological discontinuities and some degree of overlap in geographic distribution.

Taxa are arranged alphabetically within each genus. The descriptions take into account the majority of specimens available but there are some specimens which, because of their probable hybrid nature, are at variance with the species descriptions. Observed variations have been noted. All species have been examined in the field, and as mentioned previously, hybrids noted to date, have also been assessed in the field. Attention is drawn to assumed hybridisation in the notes under each species.

Taxonomy

Key to genera of *Agonis s. lat.*

1. Stamens 10 or rarely fewer at maturity, one opposite each sepal and one opposite each petal. Petals distinctly clawed with a circular limb ..... **Taxandria**

1. Stamens 15–35, very rarely 11–14, in groups of 3–7 opposite each sepal or in a continuous ring. Petals spathulate to obovate and tapered gradually to their base

   2. Flowers and/or fruits in dense clusters, basal bracts subtending cluster usually inconspicuous. Sepals 1–2.5 mm long, densely hairy, not hooded. Stamens in groups opposite the sepals, none opposite the petals; filaments 0.5–2 mm long ..... **Agonis**

   2. Flowers and/or fruits borne singly or 2 or 3 together, sub tended by several conspicuous and imbricate basal bracts. Sepals 2–3 mm long, glabrous, hooded. Stamens arranged evenly in the whorl; filaments 2.5–4 mm long ..... **Paragonis**

Agonis (DC.) Sweet, Sweet's Hort. Brit. ed. 2, 209 (1830). – *Leptospermum* sect. *Agonis* DC., Prodr. 3: 226 (1828). – *lecto*: *Leptospermum flexuosum* (Willd.) Spreng. [≡ *Agonis flexuosa* (Willd.) Sweet.], *lecto: fide* ICBN 262 (2000)]. *Billotia* R. Br. ex G. Don, Gen. Hist. 2: 810, 827 (Oct. 1832) *nom. illeg.* – *Billottia* R. Br., *J. Roy. Geog. Soc*. 1: 19 (1832) *nom. nud*.; *lecto*: *Billotia flexuosa* (Willd.) G. Don.

?*Agonomyrtus* Schauer ex Reichb. *Handb*. 253 (1837) *nom. nud.*

Agonis sect. *Ataxandria* Benth., Fl. Austral. 3: 97 (1867). *Type:* since the lectotype of the genus *Agonis* was chosen subsequent to the description of *A.* sect. *Ataxandria*, it does not automatically become the lectotype of that section. The sectional name should therefore also be lectotypified on *A. flexuosa*.

Shrubs or *trees*. *Leaves* alternate to spirally arranged, single not clustered, exstipulate, sessile to petiolate, glandular-punctate, entire. *Inflorescence* of axillary globular heads of flowers with few to numerous inconspicuous basal bracts. *Flowers* bisexual, sessile, each subtended by a pair of bracteoles and below these a bract. *Floral tube* obconic but becoming cup-shaped, sometimes broadly so, adnate to the ovary, coriaceous, glandular-punctate. *Sepals* 5, ovate-triangular or triangular, hairy, persistent. *Petals* 5, usually white but frequently drying cream to yellow, spathulate to obovate and gradually tapered to the base, somewhat persistent. *Stamens* in a single whorl, free, (11–)15–30(–32), with 3–6(7) opposite each sepal, none opposite the petals; filaments linear to narrowly triangular; anthers ellipsoid to broadly ellipsoid, dorsifixed and versatile, with parallel cells, dehiscing by longitudinal slits; connective with a small globular gland. *Ovary* inferior, 3-celled; ovules 3–7(–14)per cell, erect. *Style* set in a depression at summit of ovary, terete; stigma capitate and disc-like, sometimes very shallowly lobed. *Infructescence* a globular cluster of fruits. *Fruit* a woody capsule formed from the ovary and surrounding floral tube, dehiscing by 3 valves. *Seeds* usually 1 or 2 per cell, grey to black, elliptic-obovoid, minutely papillose, very minutely apically winged; infertile seeds cream, angular to narrowly obovoid.

Size and distribution. A genus of 4 species endemic to the south-west of Western Australia.

Key to *Agonis* taxa

1. Infructescence 10–15 mm across. Leaves obovate or obovate-elliptic, (20–70 mm long and 7–20 mm wide), usually obtuse. Sepals 1.8–2.5 mm long. Petals 5–9 mm long ..... **A. baxteri**
1. Infructescence 6-10 mm across. Leaves linear to narrowly elliptic (45–135 mm long and 3.5–12 mm wide), or elliptic to ovate or obovate (6-45 mm long and 4–8 mm wide), acute and sometimes shortly mucronate. Sepals 1–2 mm long. Petals 3–6 mm long
   2. Leaves slender, 45–135 mm long, not twisted or undulate, margin smooth and entire. 3–7 (usually 4 or 5) stamens opposite each sepal. Tree to 10 m tall ..... **A. flexuosa** var. **flexuosa**
   2. Leaves broad, 6–45 mm long, often twisted and undulate, margin often minutely and irregularly indented. 2-5 (usually 3 or 4) stamens opposite each sepal. Shrub or small tree to 4 m tall
      3. Leaves 20–45 mm long, often slightly twisted..... **A. flexuosa** var. **latifolia**
      3. Leaves 6–20 mm long, distinctly twisted and undulate
         4. Sepals obtuse. Bracts and bracteoles obtuse. Leaves usually acute, the point often recurved ..... **A. theiformis**
         4. Sepals narrowly-acute. Bracts and bracteoles narrowly-acuminate. Leaves usually emarginate ..... **A. undulata**

Agonis baxteri (Benth.) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Melaleuca baxteri Benth., Fl. Austral. 3: 138 (1867). *Type:* King George Sound or to the eastwards, [Western Australia], *Baxter* (*holo:* K *n.v.*, photograph seen).

Agonis obtusissima F. Muell., Fragm. 11: 119 (1881). *Type:* East Mount Barren, [Western Australia], *J. Drummond* 133 (*lecto:* PERTH 01605046, here designated; *isolecto:* K, KW, MEL 3321, P); Stokes Inlet, Cape Arid [Western Australia], G. Maxwell *s.n.* (*lectopara: n.v.*).

Shrub erect to 2 m high, often spindly and few-branched; branchlets glabrous or with sparse sericeous hairs and glabrescent. *Leaves* erect to spreading, with an indistinct petiole up to 10 mm long; blade narrowly obovate to obovate or elliptic, (20)25–55(70) mm long, (5)7–20 mm wide, flat, coriaceous, glabrous, with 3(5) longitudinal veins, the midrib with faint lateral pinnate veins, gradually tapered to base, entire, apex usually obtuse but occasionally subacute or emarginate. *Flower clusters* 15–25 mm across, with numerous grey-hairy sterile basal bracts. *Bract* circular or broadly to depressed obovate, 2.5–3.5 mm long, sericeous with dense grey hairs, apex obtuse. *Bracteoles* obovate and very slightly laterally curved, 2–3 mm long, 1.2–2 mm wide, densely grey-hairy except for the glabrous margins, apex obtuse. *Flowers* white-petalled drying cream, rarely very pale pink, 12–15(20) mm across. *Floral tube* 2.5–4 mm long, glabrous at base, sericeous with grey hairs in distal half, extended to 0.2 mm above the ovary. *Sepals* ovate-triangular to broadly ovate-triangular, 1.8–2.5 mm long, densely softly sericeous to villous with grey hairs, apex more or less obtuse. *Petals* 5–9 mm long. *Stamens* (17)23–32, with (3)4–6(7) opposite each sepal; filament 1–2 mm long; anther 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 6–14 per cell. *Style* 2–3 mm long. *Infructescence* globular to broadly ellipsoid, 10–15 mm across. *Capsule* cup-shaped to turbinate, 4–5.5 mm across, shortly hairy in the distal half. (Figure 1A)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): 0.5 km N of Mt Belches, 5 Oct. 1995, *R.J. Cranfield* 10489 (CANB *n.v.*); near the estuary of Duke Creek, Duke of Orleans Bay (Duke Creek is *c.* 65 km E of Esperance), Esperance District, Eucla Division, 2 Oct. 1968, *N.N. Donner* 2866 (AD *n.v.*); Inter [between] Israelite Bay et [and] Cape Arid, 21 Oct. 1960, *C.A. Gardner* 12915; Northern end of Thumb Peak Range, 31 Oct. 1965, *A.S. George* 7108; Whoogarup Range, 2 Dec. 1960, *A.S. George* 1898; East Mt Barren, 28 Oct. 1972, *G.J. Keighery* 2205; 1 km N of beachfront car park, Cape Le Grand, E of Esperance, 2 Oct. 1979, *N.G. Marchant* 79/82 (CANB; between Culham Inlet and Ravensthorpe-Hopetoun road to East Mt Barren, 3 Oct. 1979, *N.G. Marchant* 79/88; *c*. 1 km W of Rossiter Bay on road to Lucky Bay, Cape Le Grand National Park, 14 Oct. 1979, *K.L. Wilson* 2857 (NSW *n.v.*); *c.* 67 km E of Esperance, near Mungliginup Creek, 30 Sep. 1968, *P.G. Wilson* 8067.

Distribution. South West Botanical Province, IBRA region of Esperance Plains. Occurs in near-coastal areas, from the Fitzgerald River National Park and between Esperance and Israelite Bay. (Figure 2A)

Habitat. Occurs in heath or shrubland, sometimes on the edge of swamps or seasonally wet slopes, on sandy soils usually over granitic or quartzite rocks but with a single record from over coastal limestone.

Phenology. Flowers mainly October to December; mature fruits December onwards, the fruits persisting for 1 or 2 years.

Conservation status. Recorded as common in several localities and occurring in several national parks.

Typification. Mueller based *Agonis obtusissima* on two elements, Maxwell material with localities cited as “Stokes Inlet” and “Cape Arid” and a Drummond collection from East Mount Barren.

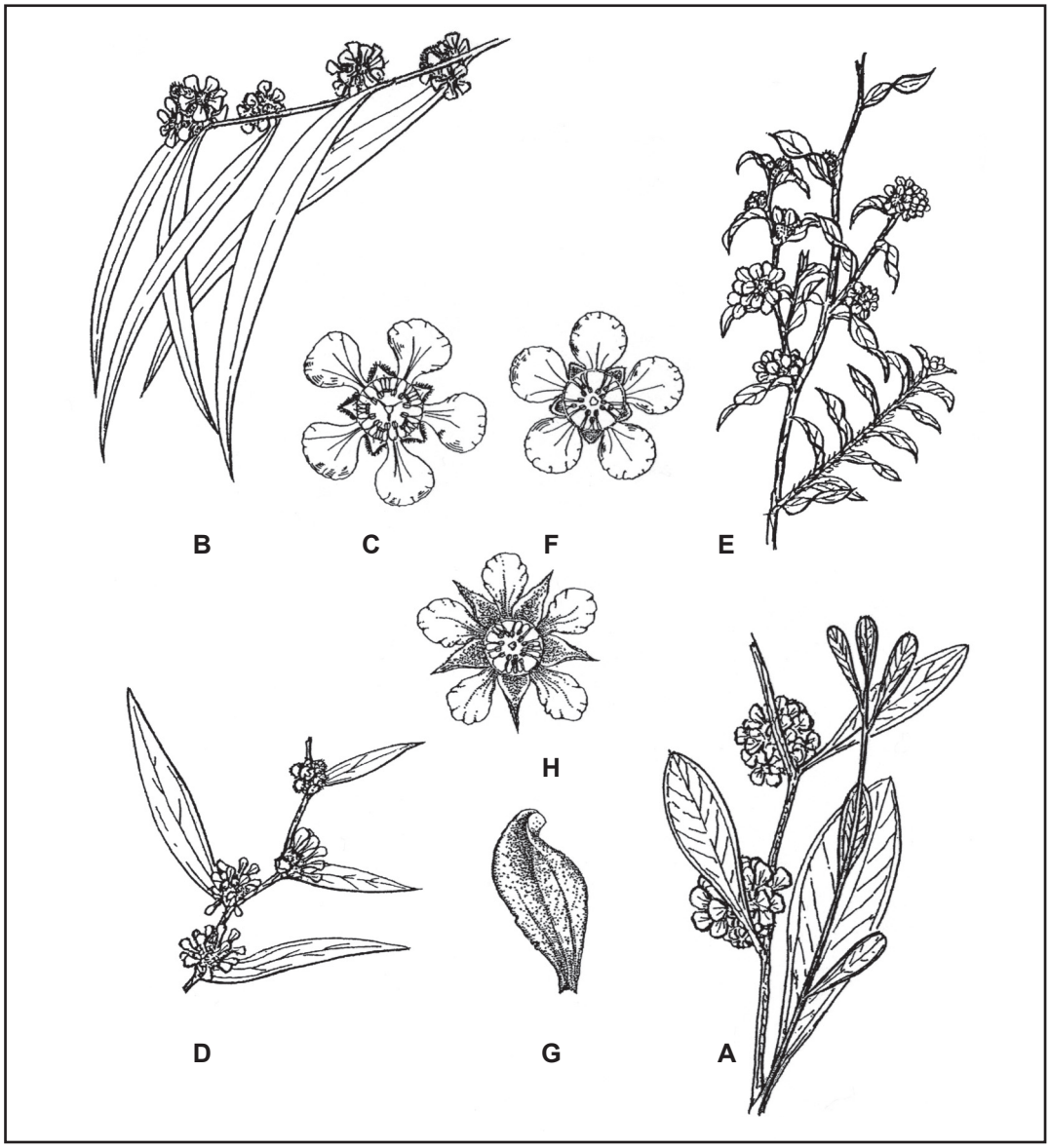

Figure 1. A – *Agonis baxteri* – flowering branch (×0.75); B, C – *Agonis flexuosa* var. *flexuosa*: B – flowering branch (×0.75), C – flower (×2); D – *Agonis flexuosa* var. *latifolia*, flowering branch (×0.75); E, F – *Agonis theiformis*: E – flowering branch, F – flower (×3); G, H – *Agonis undulata*: G – leaf (×2), H – flower (×3).

The Maxwell material has not been located. A specimen of *J. Drummond* 133 in MEL without locality details is regarded here as an isolectotype and the PERTH sheet of this collection, which has full locality details, is designated as the lectotype.

Affinities. Quite distinct from other species of the genus, it is characterised by its broad coriaceous leaves and large size of clusters, flowers and woody fruits.

Hybrids. No hybrids involving this species have been recorded.

Agonis flexuosa (Willd.) Sweet, Sweet's Hort. Brit. ed. 2, 209 (1830). – *Meterosideros flexuosa* Willd., Enum. Pl. Hort. Berol. 514 (1809). *Type:* 15 km along road from Dunsborough to Cape Naturaliste, 33° 36' 11" S, 115° 05' 53" E [Western Australia], small tree to 3m., flowers white, 02 Nov. 1978, *R.J. Cranfield* 931. (*neo:* PERTH 3882942, here designated; *isoneo:* MEL, NSW). – *Leptospermum flexuosum* (Willd.) Spreng., Novi provent. 25 (1818). – *Billotia flexuosa* (Willd.) G. Don, Gen. Hist. 2: 827 (1832). – *Billottia flexuosa* (Willd.) R. Br., *J. Roy. Geogr. Soc*. 1: 19 (1832). *Type:* "Habitat in Nova Hollandia" [Western Australia] (*n.v.*).

Tree to 10 m high, occasionally a wind-pruned mallee or tall to almost prostrate shrub; branchlets often flexuose, somewhat angular, sericeous but usually glabrescent. *Leaves* spreading, pendulous, sessile or with a petiole up to 5 mm long; blade very narrowly to narrowly elliptic or narrowly ovate, flat or somewhat twisted, sometimes falcate, 18–135 mm long, 3.5–12 mm wide, glabrous or sometimes with soft sericeous hairs but glabrescent, midrib prominent and usually 2 other longitudinal veins evident, lateral pinnate veins occasionally evident, base tapered or obtuse, margin smooth and entire or minutely and irregularly indented, apex acute. *Flower clusters* 10–15 mm across, basal sterile bracts few. *Bract* broadly ovate, circular or broadly obovate, 1.5(–2) mm long, densely sericeous, apex obtuse. *Bracteoles* narrowly elliptic to elliptic or obovate-elliptic, 1–1.5 mm long, 0.5–1 mm wide, densely sericeous on keel and towards the obtuse apex. *Flowers* white-petalled, often drying cream, 8–12 mm across. *Floral tube* 1.5–2 mm long, glabrous in lower two-thirds, sericeous in distal one-third, slightly extended for *c.* 0.5 mm above the ovary. *Sepals* ovate-triangular, 1–2 mm long, greyish sericeous, apex acute to subacute or obtuse. *Petals* spathulate-obovate, 3–6 mm long including an indistinct claw up to 1.5 mm long. *Stamens* (13–)20–25, 3–5 opposite each sepal but occasionally as many as 7 opposite some sepals, none opposite the petals; filament 1–1.5 mm long; anther 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 5 or 6 per cell. *Style* 1–2.5 mm long. *Infructescence* globular, 6–10 mm across. *Capsule* broadly turbinate to broadly cup-shaped, 2.5–4 mm across, hairy in the distal part or sometimes glabrescent.

Two varieties are recognised.

a. Agonis flexuosa (Willd.) Sweet var. **flexuosa**

Billotia flexuosa var. *angustifolia* Otto & Dietr., *Allg. Gartenzeitung* 9: 218 (1841); *Agonis flexuosa* var. *angustifolia* (Otto & Dietr.) Schauer in Lehm., Pl. Preiss. 1: 117 (1844) – type not cited.

Tree to 10 m high or wind-pruned shrub; branchlets sometimes flexuose. *Leaves* very narrowly elliptic to narrowly elliptic, 45–135 mm long, more or less flat neither twisted nor undulate, midrib prominent but other longitudinal veins only faintly evident, base tapered, margin smooth and entire. *Sepals* acute to subacute. *Petals* 3–6 mm long. *Stamens* (3)4 or 5(7) opposite each sepal. *Capsule* 2.5–3.5(4) mm across. (Figure 1B,C)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Port Jackson (*sic*, provenance regarded here as an error), *Baudin* 1801 (P, GH); 41 km N of Augusta on Caves Rd, 26 Oct. 1983, *M.G. Corrick* 8932 (CBG, MEL, NSW all *n.v.*); 6 km S of Bremer Bay on Fisheries Rd, 1. Dec. 1985, *D.B. Foreman* 1388 (AD, CANB, HO, K, MEL, NSW all *n.v.*); Mt

Frankland Rd, *c*. 22 km N of Walpole, 5 km E of Thompsons Rd, 5 Dec. 1985, *D.B. Foreman* 1493 (CANB, MEL, NSW all *n.v.*); Swan River, *Fraser* 54 (GH); Northcliffe Forest Park, 7 Dec. 1990, *L. Graham* 576; Barlee Brook, 30 km S of Nannup, 11 Sep. 1981, *W. Greuter* 18010; Campbell Rd, Denmark Shire, 13 Oct. 1991, *B.G. Hammersley* 570; Locke Nature Reserve, W of Vasse, 18 Oct. 1994, *G.J. Keighery* 14844 (CANB *n.v.*); SW corner of Mt Brown (Beeliar) Regional Park beside Cockburn Rd, 10 Nov. 1997, *L.W. Sage s.n.*; Albany, 8 Oct. 1971, *V. Scarth-Johnson* 936 (BRI *n.v.*); Cape Naturaliste, 5 Nov. 1974, *D.J.E. Whibley* 5026 (AD *n.v.*); Southern Estuary Rd, S of Mandurah, *c*. 30 km N junction to Old Bunbury Rd, 19 Oct. 1994, *A. Worz* 04.10.19.02.

Distribution. South West Botanical Province, IBRA region of Swan Coastal Plain, Warren, Jarrah Forest and Esperance Plains (western part). Common in near-coastal areas from Perth to Bremer Bay. (Figure 2B)

Habitat. Occurs in varied habitats from coastal heath to woodland or jarrah and karri forest, on sandy, loamy or clayey soils over granitic or limestone rocks.

Phenology. Flowers mostly September to December; fruits December onwards, the fruits persisting at least a year.

Conservation status. A very widespread and common species occurring in several national parks.

Typification. An extensive search for the Type of *Metrosideros flexuosa* Willd. has not been successful. Willdenow described this species from an immature cultivated specimen that he recorded as being 10 feet tall and with pendulous branches. The origin of the seed is uncertain; as it was probably collected prior to about 1809 it could have originated from Geographe Bay or King George Sound.

It seems very likely that it was based on the common, weeping *Agonis flexuosa* accepted here as the typical form and not *Agonis flexuosa* var *latifolia* that to date has only been recorded from the south coast. The authors have chosen a specimen from the Busselton-Cape Naturaliste area as a neotype.

Affinities. *Agonis flexuosa* var. *flexuosa* is a quite distinctive and relatively widespread taxon.

Hybrids. Possible hybrids have been noted between *A. flexuosa* var. *flexuosa* and *A. flexuosa* var. *latifolia* in populations where both varieties occur at William Bay and near Walpole.

Notes. A number of horticultural varieties of *Agonis flexuosa* have arisen in cultivation and have been selected for propagation. Others have arisen in nature, possibly the result of hybridisation between variants of *A. flexuosa* and morphologically similar taxa.

The horticultural variants have the general appearance of the typical variety except in habit, leaf colour and leaf shape but appear to be mostly non-flowering. Some cultivars have distinctly flexuose small branches, others may mature into low, spreading trees with right-angled branches. A few of the common cultivars are: *Agonis* ‘Belbra Gold’, *Agonis* ‘Nana’, and *Agonis* **‘**Fairy Foliage’.

b. Agonis flexuosa var. **latifolia** (Otto & Dietr.) Schauer in Lehm., Pl. Preiss. 1: 117 (1844). – *Billotia flexuosa* var. *latifolia* Otto & Dietr., *Allg. Gartenzeitung* 9: 218 (1841) – type not cited. *Type:* "In solo turfoso arenoso ad Stirling's Terrace (Plantagenet)" [Albany, Western Australia], September 1840, *Preiss* 144 (*neo:* LD; *isoneo:* K, KW, MEL 21 & 22, MO, NY, P).

Shrub or small tree to 4 m tall; branchlets commonly flexuose. *Leaves* usually narrowly ovate, 18–45 mm long, often somewhat twisted, midrib and two longitudinal veins usually evident, base obtuse, margin sometimes minutely and irregularly indented. *Sepals* obtuse to subacute. *Petals* 3–4 mm long. *Stamens* 3 or 4 opposite each sepal. *Capsule* 3–4 mm across. (Figure 1D)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Walpole–Nornalup National Park, Point 31, 20 Nov. 1987, *A.R. Annels* 81; without locality, undated, *J. Drummond* 77 (NY, P); Denmark Shire, Lights Rd, below S face of Mt Hallowell, 13 Oct. 1991, *B.G. Hammersley* 563; E boundary of William Bay National Park, 17 Oct. 1992, *B.G. Hammersley* 725; Bakers Spring, Stirling Ranges, 13 May 1982, *G.J. Keighery* 4981; Lake Williams, William Bay National Park, 13 Aug. 1991, *C.J. Robinson s.n.*; Two Peoples Bay Reserve, S point, Eyre Botanical District, 24 Oct. 1994, *L. Sweedman* S3504; Near plot 5455, W of Betty's Beach on Two Peoples Bay, Boulder Hill, 2 May 1992*, G. Wardell-Johnson* 107; 5.5 km SE of Manypeaks town site, 4 May 1993, *G. Wardell-Johnson* 3216; Walpole–Nornalup National Park, near Isle Rd junction with South West Highway, 15 Oct. 1991, *J.R. Wheeler* 2733; Cheyne Beach, 22 Feb. 1994, *J.R. Wheeler & N.G. Marchant* JRW 3897.

*Distribution***.** South West Botanical Province, IBRA regions of Warren, Jarrah Forest and Esperance Plains. Occurs from west of Walpole to Cheyne Beach, with a population recorded from the Stirling Range. (Figure 2C)

Habitat. Recorded mainly from sandy soils in heath, shrubland or woodland.

Phenology. Flowers September to November; fruits December onwards, the fruits persisting at least until the next season.

Conservation status. Widespread and occurring in several national parks.

Typification. Since there is no evidence of any extant type material for the basionym *Billotia. flexuosa* var. *latifolia*, a neotype has been selected. Of the several specimens seen of *Preiss* 144, the LD specimen is chosen as the neotype as it is the one most likely to have been seen by Schauer.

Affinities. *Agonis flexuosa* var. *latifolia* differs from var. *flexuosa* in its smaller leaves and usually fewer stamens and from *A. theiformis* in its slightly larger less twisted leaves in which the margins are only sometimes minutely and irregularly indented. The variety may be the result of hybridisation between *Agonis flexuosa* and *A. theiformis*. However *A. flexuosa* var. *latifolia* seems to be relatively morphologically consistent and fertile. It has been known from 1840, before agricultural and road-making disturbances. As this taxon is very similar to the typical variety and they often grow together it is recognised here at varietal level.

Hybrids. A range of variants between *A. flexuosa* var. *flexuosa*, *A. flexuosa* var. *latifolia* and *A. theiformis* have been examined by the authors east of Albany indicating a hybrid swarm with introgressants tending to resemble *A. flexuosa* var. *latifolia* (*J.R. Wheeler & N.G. Marchant* JRW 3897 & 3898). Possible hybrids have also been noted between the two varieties of *A. flexuosa* at other localities (see note under *A. flexuosa* var. *flexuosa)*.

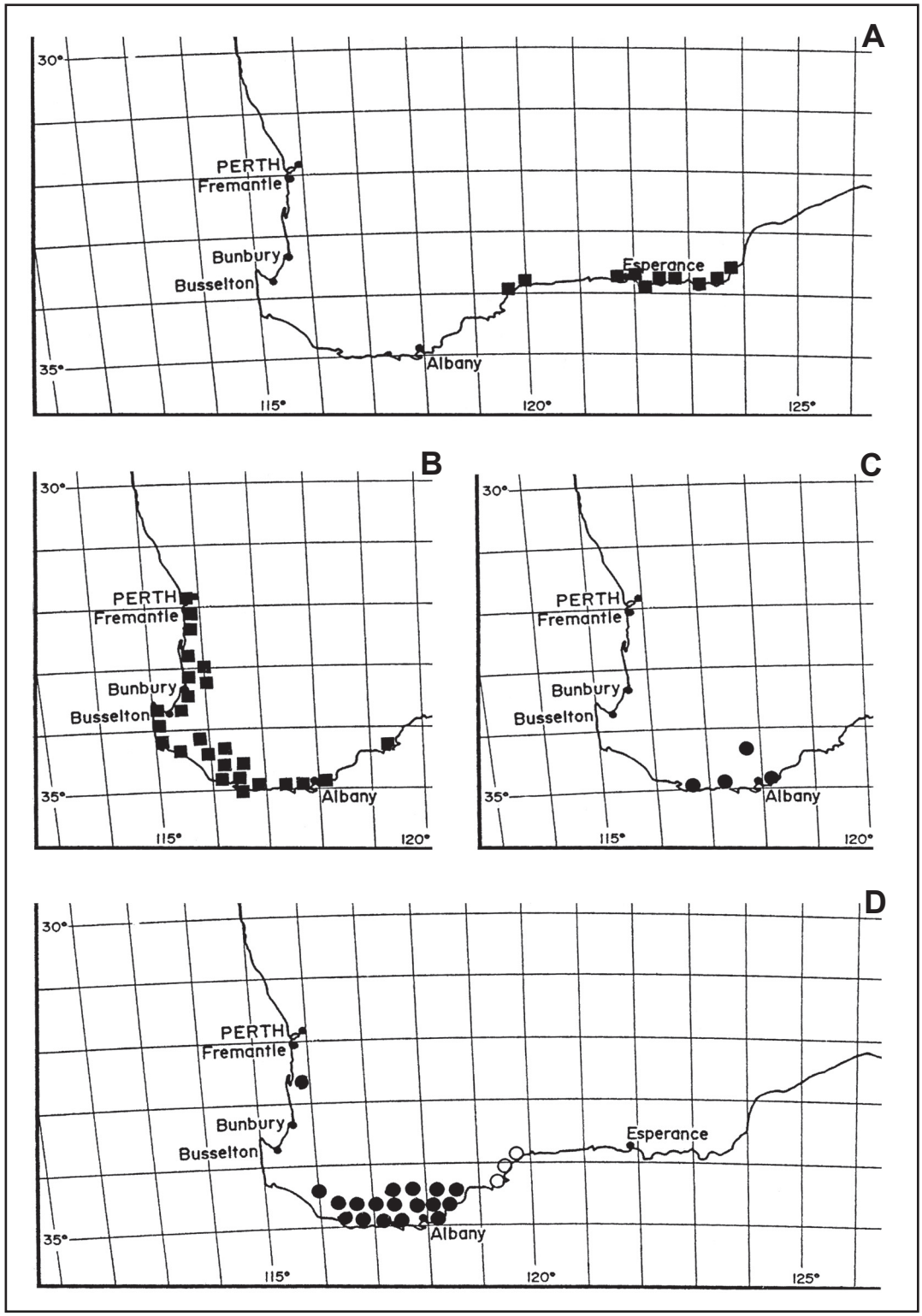

Figure 2. Distribution maps for *Agonis*. A – *A. baxteri*; B – *A. flexuosa* var. *flexuosa*; C – *A. flexuosa* var. *latifolia*; D – *A. theiformis* ● and *A. undulata* ○.

Agonis theiformis Schauer in Lehm., Pl. Preiss. 2: 223 (1848) [as *theaeformis*]. – *Billotia theaeformis* (Schauer) G. Don ex Loudon, Encycl. Pl. Suppl. 2, 1380 (1855). *Type*: "in subturfoso-arenosis circe urbisculam Albany", [Western Australia], 21 December 1840, *Preiss* 153 (*lecto:* LD, here designated; *isolecto:* K, KW, MEL 3304, 3305, P).

[*Agonis hypericifolia auct .non* (Otto & Dietr.) Schauer: Schauer in Lehm., Pl. Preiss. 1, 117 (1844). Misapplication of the name *Leptospermum hypericifolium* Otto & Dietr., *Allg. Gartenzeitung* 9: 243 (1841).]

Shrub to 2(3) m high, often somewhat spindly; branchlets sometimes flexuose, with short to long appressed to erect hairs, glabrescent. *Leaves* sessile or subsessile, elliptic to ovate and sometimes broadly so, undulate and twisted, sometimes somewhat recurved in distal half, 6–20 mm long and 4–10 mm wide, upper surface glabrous or almost so, lower surface with sparse soft hairs, midrib prominent, often with faint pinnate lateral veins, base truncate, obtuse or cordate, margin sometimes with minute irregular indentations, apex usually acute, usually shortly mucronate. *Flower clusters* 7–11 mm across, sterile basal bracts few. *Bract* broadly to very broadly ovate or obovate, 1.3–2 mm long, densely sericeous, ciliolate, apex obtuse. *Bracteoles* ovate or elliptic to obovate, often broadly so, 1–2 mm long and 1–1.5 mm wide, densely sericeous, ciliolate, apex obtuse. *Flowers* white-petalled, often drying cream to pale yellow, 5–8 mm across. *Floral tube* 1–2 mm long, sericeous, extending for *c.* 0.5 mm above the ovary. *Sepals* ovate-triangular, 1–1.5 mm long, hairy but the margin more or less glabrous and ciliolate, apex obtuse. *Petals* 2.5–4 mm long including an indistinct claw up to 0.5 mm long. *Stamens* (11–)15–20, (2)3 or 4 opposite each sepal; filament 0.7–1.5 mm long; anther *c*. 0.3 mm long. *Ovary* summit glabrous; *ovules* 4–7 per cell. *Style* 0.7–1.5 mm long. *Infructescence* globular, 6–8 mm across. *Capsule* cup-shaped to very broadly turbinate, 3.5–4 mm across, shortly hairy to glabrous. (Figure 1E,F)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Spencer Rd Reserve, 12 km W of Narrikup, 15 Nov. 1986, *E.J. Croxford* 5467; behind the Ranger's cottage, Porongurup Range, 19 Nov. 1983, *D. Davidson s.n.*; Top of Sukey Hill, 3 km E of Cranbrook, 10 Dec. 1996, *R. Davis* 1695; *J. Drummond* 3: 41 (NY, P); Mt Frankland Rd, *c.* 22 km N of Walpole, 5 km E of Thompson Rd, 5 Dec. 1985, *D.B. Foreman* 1495 (CANB, MEL both *n.v.*); S end of Lake Muir, Lake Muir Nature Reserve, 27 Oct. 1997, *G.J. Keighery & N. Gibson* 2649; Valley of the Giants Rd, *c*. 14 km E of Walpole, 25 Oct. 1997, *B.J. Lepschi & B.A. Fuhrer* BJL 3674; upper slopes of Toll Peak, Chester Pass, Stirling Range, 6 Dec. 1979, *N.G. Marchant* 79/106 (CANB *n.v.*); Reserve 13240, Cheyne Bay, N of Cape Riche, 24 Oct. 1996, *J.W. Mercer* 72; South West, Plantagenet, Nov. 1901, *E. Pritzel* 927 (GH, P, WRSL); Mt Manypeaks, 10 Oct. 1961, *H. Seddon s.n.*; 60 km NE of Albany on road to Jerramungup, 10 Nov. 1974, *D.J.E. Whibley* 5220 (AD *n.v.*).

Distribution. South West Botanical Province, IBRA regions of Warren, Jarrah Forest, Swan Coastal Plain, Avon and Esperance Plains. Occurs from Northcliffe and Shannon to Cheyne Bay (north of Cape Riche) extending inland to the Stirling Range, with a doubtful record from Pinjarra (*W.E. Blackall s.n.*). (Figure 2D)

Habitat. Occurs in a variety of vegetation types from heath, shrubland and forest, on a variety of soil types from sand, loam or clay soils over laterite, granite or limestone.

Phenology. Flowers October to December; fruits December to February, old fruits persisting at least until the following season.

Conservation status. Widespread and often quite common.

Typification. Of the syntypes examined (*Preiss* 152 and 153; *Cunningham* 1822), *Preiss* 153 has been distributed to several herbaria. The LD specimen is chosen as the lectotype as it is the one most likely to have been seen by Schauer.

Nomenclatural notes. The epithet of this species has been corrected from the original "*theaeformis"* to "*theiformis"* in accordance with Article 60.8 of the International Code of Botanical Nomenclature (McNeill *et al.* 2006).

Affinities. Easily confused with *Agonis undulata,* the two with similar foliage, stamens and petals but this species has distinctly obtuse bracts, bracteoles and sepals. *A. undulata* has acute sepals and distinctive long-acuminate bracts and bracteoles.

Hybrids. Possible hybrids have been recorded with *Agonis flexuosa* var. *latifolia* at Cheyne Beach (*J.R. Wheeler & N.G. Marchant* JRW 3897 and 3898). See note under that taxon.

Agonis undulata Benth., Fl. Austral. 3: 100 (1867). *Type:* Western Australia, *Drummond* 6 (*holo:* K).

Shrub to 2 m high, mature plants usually with thick gnarled branches; branchlets almost glabrous, sometimes with a few tiny appressed hairs below the leaf bases. *Leaves* erect, not or scarcely spreading, subsessile to indistinctly petiolate, obovate and somewhat undulate, 9–20 mm long and 4–10 mm wide, glabrous and 1-veined or faintly 3–5-veined, margin with minute irregular indentations, apex emarginate or occasionally with an acute recurved mucro in the sinus of the emarginate apex. *Flower clusters* 7–10 mm across, a vegetative shoot later continuing to grow from the inflorescence axis. *Bract* ovate, 2.5–3 mm long, somewhat ribbed and with sparse appressed hairs towards the centre in the lower half, tapered to a very long-acuminate apex. *Bracteoles* ovate-elliptic, *c.* 2.5 mm long and *c.* 2 mm wide, keeled, densely hairy down the keel but otherwise glabrous, apex long-acuminate. *Flowers* white-petalled, 5–8 mm across. *Floral tube* obconic, 1.7–2 mm long, appressed-hairy, extended for 0.5 mm above the ovary. *Sepals* triangular, 2–2.5 mm long, appressed-hairy, long-acute. *Petals* 2–2.5(–3) mm long, gradually tapered to the base. *Stamens* 15–20, 3 or 4 opposite each sepal; filament 0.5–1 mm long; anther *c.* 0.3 mm long. *Ovules* 4 per cell. *Style c.* 1.5 mm long. *Infructescence* globular, 8–10 mm across., occasionally those of successive years formed above one another forming a cylindric but interrupted spike 30–40 mm long. *Capsule* broadly cup-shaped to broadly turbinate, 4–5 mm across, somewhat hairy. (Figure 1G,H)

Other specimens examined. WESTERN AUSTRALIA (all PERTH): Thumb Peak, Barren Range, 10 Jan. 1996, *S. Barrett* 425; quartzite outcrop above St Marys Inlet gorge, Fitzgerald River National Park, 29 Apr. 1996, *N. Brown* 250/96; Mt Bland, Fitzgerald River National Park, 15 July 1970; *A.S. George s.n.*; Thumb Peak, E of Albany, 28 Oct. 1967, *K.R. Newbey* 2658; 2.2 km NE of Quoin Head, Fitzgerald River National Park, 26 Mar. 1987, *K.R. Newbey* 11528; Fitzgerald River National Park, West Mt Barren, upper eastern slopes, 6 Sep. 2001, *J.R. Wheeler* 4079; Fitzgerald River National Park, West Mt Barren, eastern slopes, 6 Sep. 2001, *J.R. Wheeler* 4080; Fitzgerald River National Park, Point Ann Rd, 4.2 km W of Trigelow Beach turn-off and 8.6 km SE of Collets Rd, 7 Sep. 2001, *J.R. Wheeler* 4092.

Distribution. South West Botanical Province, IBRA region of Esperance Plains. Restricted in distribution, recorded only from Fitzgerald River National Park. (Figure 2D)

Habitat. In shrubland or heath, from rocky or skeletal sands, often in areas of outcropping quartzite.

Phenology. Flowers spasmodically, recorded for September and March, the petals soon shed; fruits persisting for several years.

Conservation status. Conservation Codes for Western Australian Flora: Priority Three. Although restricted, the species occurs at a number of sites in a large national park and was found to be quite common at two sites.

Affinities. Most similar to *Agonis theiformis*, but bracts, bracteoles and sepals of *A. theiformis* are all shorter and distinctly obtuse. The leaves of *A. theiformis*, although similar to those of *A. undulata*, are more spreading, ovate-elliptic in shape and with an acute recurved apex, rarely emarginate.

Hybrids. No hybrids have been recorded involving this species.

Notes. *Agonis undulata* has previously been confused with *A. theiformis* until a study was made of the type specimen and material in PERTH was re-examined. Blackall & Grieve (1980) recognised both species, assuming that *A. undulata* occurred in the Stirling Range and coastal areas of the Stirling District between Albany and the Beaufort Inlet west of Bremer Bay. *A. undulata* occurs to the east of *A. theiformis,* in the western part of the Fitzgerald River National Park.

Nomina dubia

Leptospermum resiniferum Bertol., *Opusc. Sci.* 1: 148 (1817),. *Type:* "*Eucalyptus resiniferum* Hort. Ital. Frut. Habitat in Nova Hollandia". Type not seen, possibly a synonym of *Agonis flexuosa* as indicated by Bentham (1867) and Thompson (1989).

Leptospermum glomeratum Wendl. Flora 2: 678 (1819). *Type:* "in Nova Hollandia" . Type not seen, but placed as a synonym of *Agonis flexuosa* by Bentham (1867).

Taxandria (Benth.) J.R. Wheeler & N.G. Marchant, *stat. et gen. nov*.

Agonis sect. *Taxandria* Benth., Fl. Austral. 3: 97 (1867). – *Agonis* sect. *Billotia* Kuntze *nom. illeg.* [= sect. *Taxandria*], Lex. Gen. Phan. 14 (1903). *Lecto* (here designated): *Agonis marginata* (Labill.) Schauer [= *Taxandria marginata* (Labill.) J.R. Wheeler & N.G. Marchant].

Shrubs or *trees*. *Leaves* spirally arranged, single or in clusters, exstipulate, glandular-punctate, entire. *Inflorescence* usually of globular to ellipsoid heads of flowers, each flower subtended by a pair of bracteoles and below these a bract, further outermost bracts usually sterile and inconspicuous, the heads hemispherical in bud, the shoots often continuing to grow after flowering. *Flowers* bisexual, sessile. *Floral tube* obconic, sometimes broadly so, coriaceous, glandular-punctate, adnate to the ovary but extending very slightly to distinctly beyond the ovary. *Bracts* concavo-convex. *Bracteoles* concavo-convex, usually slightly to distinctly laterally curved. *Sepals* 5, ovate-triangular or triangular, glabrous to densely hairy, persistent. *Petals* 5, usually white (rarely pale pink) but sometimes tinged pink in bud, remaining white when dry, distinctly clawed and with a circular limb, long-persistent. *Stamens* in a single whorl, free, 10 (rarely fewer by abortion), one opposite each sepal and one opposite each petal; filaments linear to narrowly triangular, those opposite the petals often slightly longer; anthers ellipsoid to broadly ellipsoid with parallel cells, dorsifixed and versatile, dehiscing by longitudinal slits; connective with a small globular gland. *Ovary* inferior, 3-celled; ovules 2(3) per cell, erect. *Style* terete, set in a deep depression at the summit of the ovary; stigma capitate and disc-like, sometimes

very shallowly lobed. *Infructescence* a globular to ellipsoid cluster of fruits, long-persistent. *Fruit* a woody capsule formed from the ovary and surrounding floral tube, dehiscing by 3 valves. *Seeds* usually only one developing per cell, red-brown to black, obovate-elliptic, papillose, minutely apically winged; infertile seeds cream, angular to narrowly obovoid.

Size and distribution. A genus of 11 species endemic to the south-west of Western Australia.

Lectotypification. Of the six species included in section *Taxandria* by Bentham (1867), *A. marginata* is chosen as the lectotype because it was the first member of the group to have been formally named. It was originally described by Labillardiere in 1806 as a species of *Leptospermum.*

Notes. There are many possible hybrids between species of *Taxandria* with resultant difficulty in circumscribing taxa and thus identifying some specimens.

Taxandria floribunda is unusual in the genus because of its prominent sterile basal bracts forming an involucre around each flower cluster.

Key to *Taxandria* taxa

1. Flower clusters surrounded by conspicuous and persistent involucral bracts that surround the fruits (Cranbrook and Stirling Ranges) ..... **T. floribunda**
1. Flower clusters lacking conspicuous involucral bracts
2. Leaves usually somewhat recurved in distal half. Bracteoles obtuse to emarginate
3. Leaves 2–6.5 mm long and 0.6–1.5 mm wide. Sepals 0.5–1(–1.2) mm long, glabrous or sparsely hairy. Bracteoles up to 2 mm long
4. Leaves sessile, narrowly obovate to narrowly elliptic, much longer than broad. Bract emarginate (Bunbury to Two Peoples Bay)..... **T. parviceps**
4. Leaves petiolate, very broadly spathulate-obovate to very broadly elliptic, often scarcely longer than broad. Bract very obtuse (Lake King to Israelite Bay)..... **T. spathulata**
3. Leaves 6–14 mm long and (2–)3–6 mm wide. Sepals 1–1.7 mm long, densely hairy at least in distal half. Bracteoles more than 2 mm long (Augusta to Denmark) ..... **T. inundata**
2. Leaves more or less straight, not recurved in distal half. Bracteoles usually obtuse or acute (obtuse to emarginate in *T. fragrans*)
5. Leaves broad, less than 3 times longer than wide
6. Leaves obtuse, distinctly petiolate
7. Leaves 9–28 mm long, usually with a distinct fringe of marginal hairs even when mature. Sepals densely hairy (Walpole to Cheyne Beach and Esperance to Israelite Bay)..... **T. marginata**
7. Leaves 2–6 mm long, glabrous apart from marginal hairs when young. Sepals with sparse coarse hairs and ciliolate margins (Lake King to Israelite Bay)..... **T. spathulata**
6. Leaves acute and bluntly mucronate, usually with a poorly defined petiole (Fitzgerald River and Mt Ragged) ..... **T. conspicua** subsp. **abrupta**

5. Leaves narrow, more than 3 times longer than wide
  8. Bracteoles small, narrow and distinctly laterally curved, 0.3–0.8(–1) mm wide. Sepals obtuse to subacute, usually quite densely hairy to almost glabrous
    9. Leaves linear, the upper surface conspicuously concave. Sepals subacute to obtuse, often almost glabrous (Ravensthorpe to Cape Paisley) ..... **T. callistachys**
    9. Leaves linear to obovate-elliptic flat to shallowly concave above. Sepals obtuse, usually quite densely hairy
      10. Leaves flat or almost so. Flowers 3–5 mm across. Shrub or tree of watercourses (South west to Mt Manypeaks)..... **T. linearifolia**
      10. Leaves slightly concave above. Flowers 5–9 mm across. Shrub of heath, shrubland or granitic outcrops
        11. Leaves narrowly elliptic to narrowly elliptic-obovate and gradually tapered at each end. Granitic outcrops (Busselton to Albany) ..... **T. conspicua** subsp. **conspicua**
        11. Leaves usually obovate to obovate-elliptic and abruptly tapered at each end. Shrub of a variety of soils in heath or shrubland (Fitzgerald River and Mt Ragged)..... **T. conspicua** subsp. **abrupta**
  8. Bracteoles scarcely to very slightly laterally curved, 1 mm or more wide. Sepals acute, glabrous or with fairly sparse hairs
    12. Leaves widely spreading and somewhat rigid. Bracteoles 1.8–4 mm wide, obtuse to emarginate (Margaret River to Albany)..... **T. fragrans**
    12. Leaves ascending to slightly spreading, fairly soft. Bracteoles 1–2.7 mm wide obtuse to acute or acuminate
      13. Shrub. Leaves 10–23 mm long, distinctly concave above and convex below. Sepals glabrous or some with fairly sparse hairs (West Cape Howe to Cheyne Beach)..... **T. angustifolia**
      13. Tree. Leaves 7–13 mm long, usually flat to very slightly concave above and convex below. Sepals glabrous (Augusta to Waychinicup) ..... **T. juniperina**

Taxandria angustifolia (Schauer) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Agonis angustifolia Schauer in Lehm. Pl. Preiss. 1: 118 (1844). *Type*: "In rupestribus summitatis montis Wuljenup (Plantagenet)", [Mt Willyung, Western Australia], 13 October 1840, *Preiss* 149 (*lecto:* LD, here designated; *isolecto:* MEL 3376, 3377, MO).

Agonis glabra Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg* 10: 334 (1852). *Type:* [Western Australia], *Drummond* V: n. 132 (*holo:* KW; *iso:* K).

Shrub, erect to 3.5 m high, often quite dense; branchlets usually glabrous, occasionally with appressed hairs. *Leaves* single or sometimes clustered in short axillary shoots, subsessile, linear, (8–)10–23 mm long, 0.6–1.2(–1.5) mm wide, thick and concave above and convex below, almost glabrous but often with appressed hairs towards the base of the upper surface, midrib evident only towards the base of the lower surface, base cuneate, margin with appressed hairs especially towards the base, apex acute and mucronate. *Flower clusters* usually axillary but sometimes terminating short shoots, hemispherical

to globular, 6–10 mm across, sterile basal bracts few. *Bracts* ovate or occasionally oblong-elliptic, 1.5–3(–4) mm long, somewhat keeled, glandular-punctate and somewhat verrucose but margins thinner and smooth, glabrous or hairy particularly on the keel, apex shortly acute to acuminate. *Bracteoles* elliptic to obovate-spathulate, 1.5–2.5(–3) mm long, (0.9–)1–2(–2.5) mm wide, not or only slightly laterally curved, glandular-punctate and somewhat verrucose but margins thinner and smooth, glabrous or hairy especially towards the apex and along the keel, apex acute, or obtuse and shortly acuminate to long-acuminate. *Flowers* 5–8 mm across. *Floral tube* obconic, 1–2 mm long, glabrous or minutely hairy, slightly extended for up to 0.5 mm above the ovary. *Sepals* triangular, 1–1.5(–2) mm long, shortly acute to long-acute but occasionally subacute, usually glabrous but quite often with fairly sparse spreading or appressed hairs. *Petals* 2–3(–3.5) mm long including the claw of *c.* 0.5 mm long. *Stamens:* filament 0.5–0.8 mm long; anther 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 1–1.5 mm long. *Infructescence* globular and 6–10 mm across or ellipsoid and up to 15 mm long. *Capsule* ovoid, 2–3 mm across, glabrescent or puberulous. (Figure 3A–E)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Porongurup, Sep. 1995, *A. Burchell* 95/3; Gull Rock Rd, above beach turnoff, 10 June 1979, *E.J. Croxford* 351; N side of Peak Head, 27 July 1981, *D. Davidson* 55; Mt Manypeaks, N base of second peak from E, 15 Oct. 1984, *D. Davidson s.n.*; Cheyne Beach near caravan park, 20 Mar. 1997, *R. Davis* 2955; Mt Gardner, E of Albany, 29 May 1964, *A.S. George* 6309; N side of Moyle Rd, near Two Peoples Bay Rd junction, Two Peoples Bay Nature Reserve, 1 May 1992, *N. Gibson* & *M. Lyons* 761; 9 km direct NNW of Albany at Willyung Hill, SW side below trig., 2 Nov. 1992, *A.M. Lyne* 969, *Craven & Zich* (AD, BRI, CBG, MEL, NSW all *n.v.*); top of Boulder Hill, 2 May 1992, *G. Wardell-Johnson* 105; West Cape Howe, Shelly Beach Rd at Lake William turnoff, 22 Feb. 1994, *J.R. Wheeler* & *N.G. Marchant* JRW3891.

Distribution. South West Botanical Province, IBRA regions of Warren, Jarrah Forest. Occurs in near-coastal areas from West Cape Howe to Cheyne Beach and also Mt Willyung and the Porongurup Range. (Figure 4A)

Habitat. Occurs in heath, shrubland or woodland, on sandy or loamy soils often overlying granitic rocks, only occasionally in winter-wet swamps.

Phenology. Flowers January to July, the dried petals persisting; fruits September to December but persisting until the next season or occasionally longer.

Conservation status. Often recorded as common or abundant and occurring in several national parks.

Typification. Of the four type specimens seen, the LD specimen is chosen as the lectotype as it matches the protologue and is the one most likely to have been seen by Schauer.

Notes. A variable species with several apparently disjunct populations. The populations from West Cape Howe and Peak Head are almost glabrous, with larger bracts, larger more prominently long-acuminate bracteoles and longer more narrowly acute sepals up to 2 mm long. The specimens from other populations are more variable, usually with slightly shorter sepals up to 1.5 mm long that may be glabrous or with sparse to moderately dense appressed hairs and usually with less prominently acuminate and hairier bracteoles. Some specimens from Mt Willyung, the Porongurups and the Two Peoples Bay area have narrower and more laterally curved bracteoles only 0.9–1.2 mm wide and also have subacute and often hairy sepals. The extensive variation found within populations prohibits the discrimination of intraspecific taxa based on morphology alone.

Affinities. Most similar to *T. juniperina* with which it shares the acute sepals and fairly broad bracteoles, but differs in habit, habitat, leaf shape and length (leaves shorter and almost flat in *T. juniperina*). Many specimens are superficially very similar to *T. callistachys*, differing in sepal size and shape (slightly smaller, more obtuse and usually more densely hairy in *T. callistachys*), bracteole size and shape (shorter, narrower and more distinctly laterally curved in *T. callistachys*) and also slightly in leaf shape. Both species have narrow leaves and are tapered to a similarly acute apex, but the widest part of the leaf in *T. callistachys* is above the middle so that it is extremely narrowly obovate.

Hybrids. Possible hybrids with *T. parviceps* have been noted from West Cape Howe and Betty's Beach (*J.R. Wheeler* 4049, 4050, 4051, 4055) and at Mt Mason (*E.J. Croxford* 987). Possible hybrids with *T. linearifolia* have been seen from the Porongurups (*I. Abbott s.n.*). Possible hybrids with *T. conspicua* subsp. *conspicua* have been recorded from Mt Willyung (*D. Davidson s.n.* and *J.R. Wheeler & N.G. Marchant* JRW 3904), with somewhat broader leaves to 2 mm wide. Possible hybrids with *T. marginata* have been recorded from Mt Manypeaks (*S. Barrett* 126G, *D. Davidson s.n.*).

Taxandria callistachys J.R. Wheeler & N.G. Marchant, *sp. nov.*

Species in forma folii *T. angustifoliae* similis sed bracteolis erio-pilosis, sepalis multo pilosis, plerumque florum fasciculis grandioribus et fructibus multi persistens differt.

Typus: Growing naturally on the edge of Helms Arboretum, Norseman Rd, north of Esperance, 33° 43' S, 121° 50' E, Western Australia, 4 September 2000, *J.R. Wheeler* 4057 (*holo:* PERTH 06458076; *iso*: AD, CANB, K, MEL, NSW).

Shrub erect to 2.5 m high; branchlets usually glabrous, rarely with tiny appressed hairs. *Leaves* single or occasionally clustered on short axillary shoots, usually spreading, sessile to subsessile, linear to very narrowly obovate-elliptic, distinctly concave above and convex below, 10–25 mm long, 0.8–1.8(–2.2) mm wide, glabrous or minutely hairy towards base of upper surface and usually with fine appressed marginal hairs, midrib only evident on lower surface, base gradually tapered, apex acute and shortly mucronate. *Flower clusters* usually axillary or sometimes terminating short axillary shoots, globular, 7–10 mm across, sterile basal bracts few. *Bract* broadly ovate and somewhat hooded, 1.5–2 mm long, verrucose, usually shortly woolly with short curved hairs particularly in distal half but sometimes glabrous apart from the ciliolate margin, apex obtuse. *Bracteoles* narrowly oblong to narrowly elliptic, distinctly laterally curved, 1–2 mm long, 0.4–0.5 mm wide, woolly in the distal half and on the keel, apex subacute to obtuse. *Flowers* white-petalled, 5–7 mm across. *Floral tube* 1.5–2 mm long, puberulous particularly in the distal half, scarcely extended for up to 0.2 mm above the ovary. *Sepals* triangular, (0.7–)1–1.2 mm long, usually sparsely hairy to hairy but sometimes glabrous apart from occasional apical hairs or ciliolate margin, apex subacute to obtuse. *Petals* (1.5–)2–2.5(–3) mm long including a distinct claw *c.* 0.5 mm long. *Stamens*: filament subulate to triangular, *c.* 0.5 mm long; anther ellipsoid, 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 1–1.5 mm long. *Infructescence* globular and 6–8 mm across to ellipsoid and 8–12 mm long. *Capsule* very broadly ovoid, 2–2.5 mm across, puberulous but often glabrescent. (Figure 3F–J)

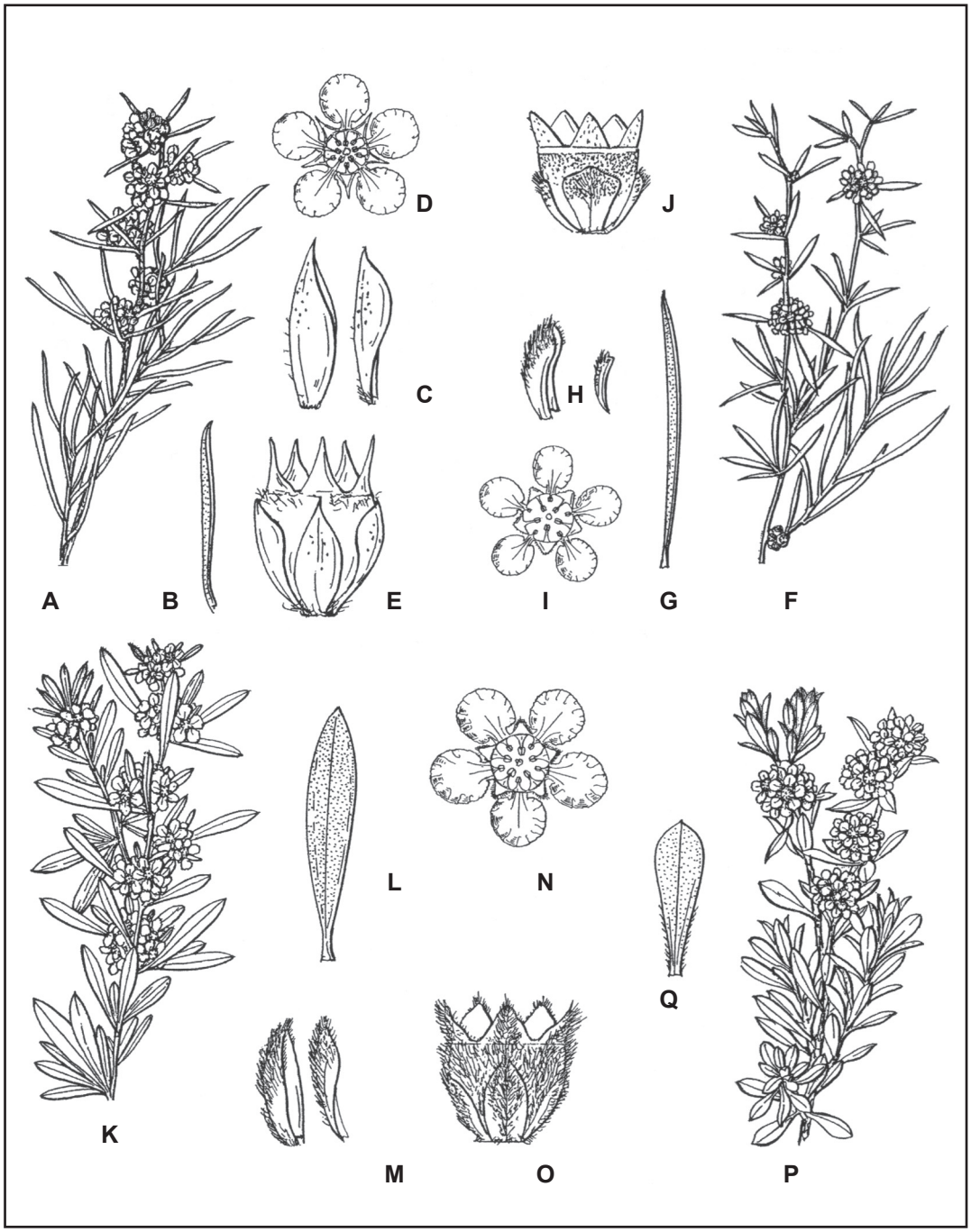

Figure 3. A–E. *Taxandria angustifolia*. A – flowering branch (×0.75), B – leaf (×1.5), C – bract and bracteole (×9), D – flower (×3), E – flower with petals removed (×6); F–J. *Taxandria callistachys*. F– flowering branch (×0.75), G – leaf (×1.5), H – bract and bracteole (×9), I – flower (×3), J – flower with petals removed (×6); K–O. *Taxandria conspicua* subsp. *conspicua*. K – flowering branch (×0.75), L – leaf (×1.5), M – bract and bracteole (×9); P, Q. *Taxandria conspicua* subsp. *abrupta*. P – flowering branch (×0.75), Q – leaf (×1.5).

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Lucky Bay, E of Esperance, 10 Sep. 1966, *E.M. Bennett* 892A; *c*. 100 metres N of NE corner of Thistle Cove Beach, Cape Le Grand National Park, 19 Oct. 1989, *B.J. Conn* & *J.A. Scott* BJC3441 (AD, MEL, MO, NSW all *n.v.*); 7 km NE of Le Grand Beach on the Cape Le Grand Rd, Cape Le Grand National Park, 27 Nov. 1985, *D.B. Foreman* 1293 (AD, CANB, MEL, NSW all *n.v.*); Old Gabotich Ruins, Cape Arid, 30 Oct. 1990, *G.J. Keighery* 11707; Duke of Orleans Bay, N of Caravan Park, 62 km due E of Esperance, 28 Apr. 1980, *N.G. Marchant* 80/53 (NSW *n.v.*); Ravensthorpe, June 1924, *Ralph* & *Stamford s.n.*; Coramup Hill area, *c*. 30 km NE of Esperance (via Condingup Rd, Myrup Rd and Coramup Rd), 7 Nov. 1983, *P.S. Short* & *L. Haegi* PSS2338 (AD, MEL all *n.v.*); Cape Le Grand National Park, 1 km NE of Le Grand Beach, 6 Nov. 1982, *A. Strid* 21201; Frenchman Peak, Cape Le Grand National Park, 11 Sep. 2000, *J.E. Wajon* 186; Junction of Cape Le Grand Rd and Merrivale Rd, E of Esperance, 4 Sep. 2000, *J.R. Wheeler* 4060 (CANB, K).

Distribution. South West Botanical Province, IBRA region of Esperance Plains. Occurs from Esperance to Cape Paisley, with a western outlier recorded from Ravensthorpe. (Figure 4A)

Habitat. Occurs in heath or shrubland, usually associated with swamps or winter-wet areas near granitic outcrops.

Phenology. Flowers mostly March to September, the petals persisting for several months; fruits mostly September to January but often persisting for 2 or 3 years.

Conservation status. Widespread and quite common on the south coast.

Etymology. Derived from Greek, – *calli* beautiful and – *stachys* spike, with beautiful spikes.

Affinities. Appears to be most similar to *T. linearifolia* from which it differs in its leaf shape and sepal shape and size. *Taxandria linearifolia* has flat, often broader and widely spreading leaves, small flowers, smaller petals, sepals that are more obtuse and often slightly shorter.

Superficially similar to *Taxandria angustifolia.* The leaves of *T. callistachys* although similarly channelled above are somewhat narrowly obovate-elliptic, usually widest in the distal half, whereas those of *T. angustifolia* are more linear to very narrowly elliptic and widest at about the middle.

T. callistachys also differs in its smaller, much narrower and distinctly laterally curved bracteoles that are not or scarcely widened towards the apex and which are quite prominently woolly-hairy in the distal half. *T. angustifolia* has bracteoles that are broader, more obovate and less conspicuously hairy.

Hybrids. Possible hybrids with *T. marginata* occur over coastal granitic rocks near Esperance (*C.D. Turley* 2/793) and Cape Le Grand National Park at Frenchman's Peak (*A.S. Weston* 8968) and Thistle Cove (*C. Turley s.n.*).

Note. Some specimens from Lucky Bay to Thistle Cove have been recorded with flatter and somewhat broader leaves to 2.5 mm wide, bracts almost glabrous apart from the ciliolate margin and almost glabrous sepals.

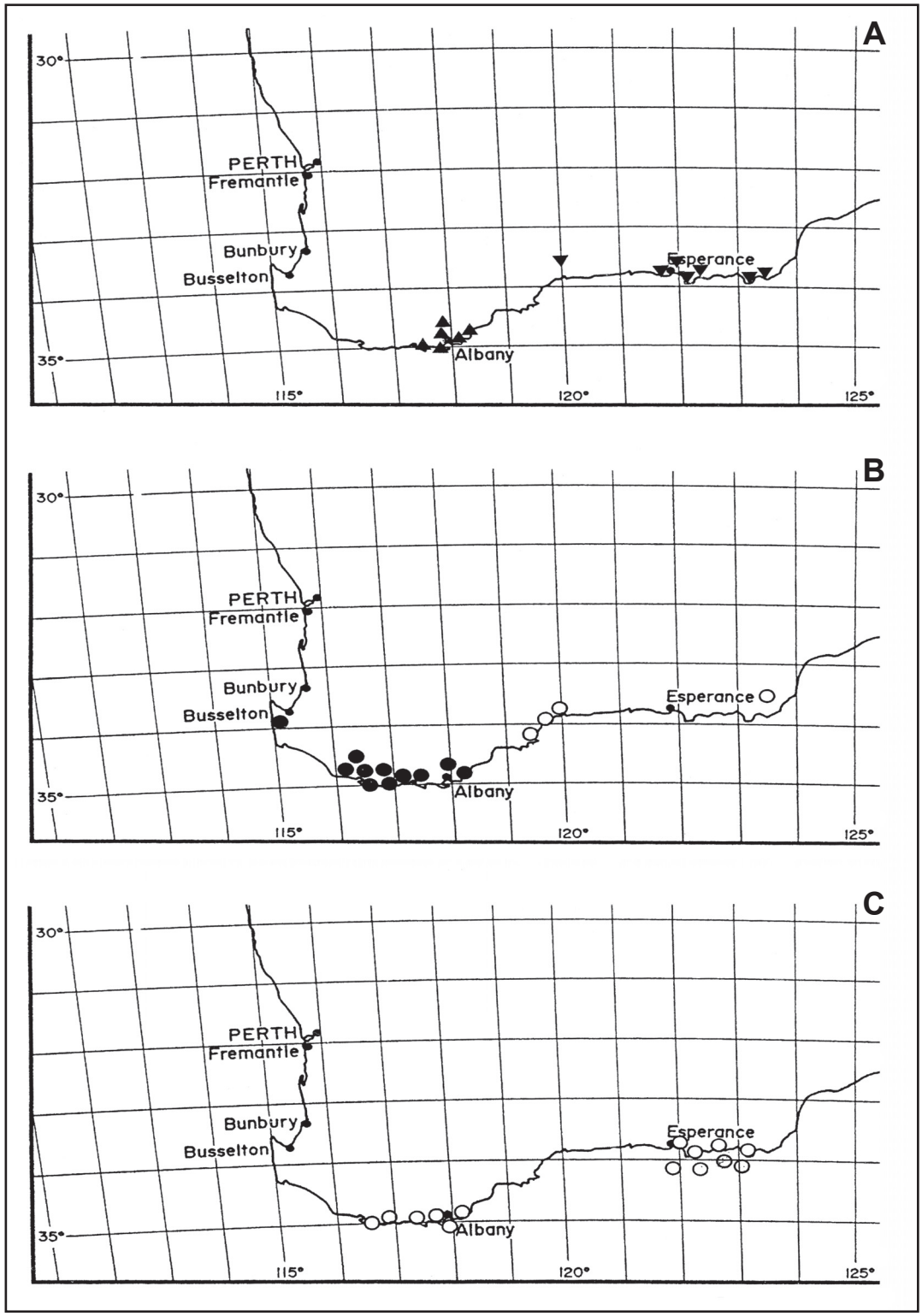

Figure 4. Distribution of *Taxandria* species. A – *T. angustifolia* ▲ and *T. callistachys* ▼; B – *T. conspicua* subsp. *conspicua* ● and *T. conspicua* subsp. *abrupta* ○; C – *T. marginata*.

Taxandria conspicua (Schauer) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Agonis conspicua Schauer in Lehm., Pl. Preiss. 1: 118 (1844). – *Agonis linearifolia* var. *conspicua* (Schauer) Domin, *Vestn. Krasl. Ceske Spolecn. Nauk. Tr. Mat.- Prir.* (*Mem. Soc. Roy. Sci. Boheme Prague*) 2: 85 (1923). *Type:* "In rupestribus summitalis montis Wuljenup (Plantagenet)", [Mt Willyung, Western Australia], 13 December 1840, *Preiss* 150 *ex parte* (*lecto*: LD, here designated; *isolecto:* KW, MEL 3374 & 3378, MO).

Shrub usually to 2.5 m high, erect; branchlets sericeous to puberulous, sometimes glabrescent or glabrous. *Leaves* usually single, subsessile or with a poorly defined petiole up to 3 mm long; blade very narrowly to narrowly elliptic or obovate-elliptic or elliptic to obovate, 7–25 mm long, 2–5(–6) mm wide, very slightly to slightly concave above and convex below, gradually to abruptly tapered towards the tip and towards the base, quite thick especially towards the tip, longitudinal veins rarely evident apart from the midrib, apex acute and shortly but bluntly mucronate, glabrous or with sparse appressed hairs towards base of upper surface, sparse appressed marginal hairs apparent in at least the young leaves. *Flower clusters* axillary or terminating short axillary shoots, 7–10 mm across, sterile basal bracts few. *Bract* oblong and concavo-convex, 1.5–2 mm long, shortly and often densely hairy, apex obtuse. *Bracteoles* narrowly oblong to oblong, slightly to distinctly laterally curved, 1–2 mm long and 0.5–1 mm wide, hairy on keel and in distal half, apex obtuse. *Flowers* white-petalled, 4–9 mm across. *Floral tube* 1.5–2 mm long, sericeous, extending for 0.5–0.8 mm above the ovary. *Sepals* ovate-triangular, 0.8–1.2 mm long, sericeous or with spreading hairs, apex more or less obtuse. *Petals* 1.5–3 mm long including a distinct claw *c.* 0.5 mm long. *Stamens*: filament 0.3–0.8 mm long; anther 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 1–1.5 mm long. *Infructescence* globular and 6–10 mm across or ellipsoid to cylindric and 10–15 mm long and 8–10 mm wide. *Capsule* broadly cup-shaped to turbinate, 2–3 mm across, shortly hairy to glabrous.

a. Taxandria conspicua (Schauer) J.R. Wheeler & N.G. Marchant **subsp. conspicua**

Shrub to 1.5 m high; branchlets usually glabrous or glabrescent. *Leaves* subsessile, erect to slightly spreading, very narrowly to narrowly elliptic or obovate-elliptic, 10–25 mm long, 1.5–4(–6) mm wide, very slightly to slightly concave above and convex below, gradually tapered towards the tip and towards the base, quite thick especially towards the tip, apex acute and shortly but bluntly mucronate. *Flower clusters* usually axillary, *c.* 10 mm across. *Bract* broadly oblong, 1.5–2.5 mm long, concavo-convex, apex obtuse, shortly hairy. *Bracteoles* oblong and slightly laterally curved, 1.5–2 mm long, 0.5–1 mm wide, hairy particularly down the centre. *Flowers* 5–9 mm across. *Sepals* 0.7–1.3 mm long, with spreading hairs, apex obtuse. *Petals* 2–3 mm long. *Infructescence* globular and *c.* 10 mm across or ellipsoid to cylindric and 10–15 mm long and 8–10 mm wide. (Figure 3K–O)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Devils Slide Porongurup Range, 25 Apr. 1952, *W.A. Atkins* 98; Walpole, Frankland State Forest, 8 Oct. 1989, *B.J. Conn & J.A. Scott* BJC3350 (MO *vide*, MEL, NSW both *n.v.*); 1.5 km NW of Shannon on the Manjimup - 1.4 km on Chesapeake Rd from Junction with Springbreak Rd, 25 Feb. 1997*, C. Godden & N. Casson* W132.1; Denmark Shire, Mt Lindesay walk track, just above first large granite, *c.* 2.5 km E from Denmark River, 14 Apr. 1992, *B.G. Hammersley* 577; Lookout Rocks, 2 km SSE of Mt Chudalup, *c*. 4 km N of Windy Harbour, 19 Feb. 1982, *G.J. Keighery* 4490; Last Bottle Rock, W of Shannon River townsite, South West Highway, 6 July 1979, *N.G. Marchant* 79/59; Muirillup Rock, SE of Northcliffe, 6 July 1979, *N.G. Marchant* 79/62; *c*. 17 metres below summit on NE face of Mt Frankland, 29 km (by road) N of Yelverton FR 0883, 10 Dec. 1986, *G.S. McCutcheon* 1485A; Walpole Rd, 14 Aug. 1979, *J.M. Powell* 1162 (CANB, K, L, MEL, NSW all *n.v.*); Walpole–Nornalup National Park, Nuyts Wilderness, Mt Hopkins, 22 Sep. 1992, *J.R. Wheeler* 3249.

Distribution. South West Botanical Province, IBRA regions of Warren and Jarrah Forest. Scattered from south of Pemberton to Walpole and east to the Porongurups and Mt Willyung, with an isolated record from Yelverton near Busselton. (Figure 4B)

Habitat. Apparently restricted to winter-wet areas of granitic outcrops.

Phenology. Flowering irregular, recorded for February to April and also July to September; fruits persisting for at least one year.

Conservation status. Quite common on granitic outcrops near the south coast.

Typification. Of the five type specimens seen, the LD specimen is chosen as the lectotype as it matches the protologue and is the one most likely to have been seen by Schauer.

Affinities. Differs from *T. conspicua* subsp. *abrupta* in leaf shape, with its leaves usually longer, usually more elliptic in shape and more gradually tapered at each end. Subsp. *conspicua* also differs from subsp. *abrupta* in its slightly larger flower clusters. The flowers of subsp. *conspicua* have slightly larger petals, slightly broader and less conspicuously laterally curved bracteoles and often slightly larger sepals. The infructescences of subsp. *conspicua* are also often larger.

Taxandria conspicua subsp. *conspicua* differs from *T. marginata* in its leaves that have less obvious more appressed marginal hairs and lack obvious longitudinal veins apart from the midrib. *Taxandria marginata* occurs in similar granitic areas to *T. conspicua* subsp. *conspicua*, but is usually closer to the coast. *Taxandria linearifolia* differs in its flatter, more spreading leaves and smaller flowers.

Notes. *Taxandria conspicua* subsp. *conspicua* was previously known by the informal name '*Agonis* sp. Last Bottle Rock'.

As well as the differences of leaf shape and flowers, the two subspecies of *T. conspicua* also differ in habitat, subsp. *conspicua* being apparently restricted to winter-wet areas of granite whereas subsp. *abrupta* occurs on a variety of soil types in heath or shrubland. There is apparently no overlap in distribution of the two subspecies.

Hybrids. Possibly hybridising with *T. linearifolia* at Last Bottle Rock (west of Shannon) and Muirillup Rock, with *T. angustifolia* at Mt Willyung (*D. Davidson s.n*. and *J.R. Wheeler & N.G. Marchant* JRW 3904) and with *T. parviceps* at Mt Chudalup (*R.J. Cranfield* 10330) and elsewhere where both taxa occur and plants intermediate in various characters may be found.

b. Taxandria conspicua subsp. **abrupta** J.R. Wheeler & N.G. Marchant, *subsp. nov***.**

Taxandriae conspicuae subsp. conspicuae affinis sed foliis brevioribus et in quoque extremo abrupte angustis, fasciculis florum minoribus et petalis minoribus differt.

Typus: SE side of East Mount Barren above first car park, W of ranger's residence 33° 55' 06" S 120° 00' 48" E [Western Australia] Shrub to 1.5 m. On rocky clay flat. Growing with *Agonis obtusissima*, 3 December 1979, *N.G. Marchant* 79/86 (*holo*: PERTH 4034694).

Agonis spathulata var. *angustifolia* Benth., Fl. Austral. 3, 97 (1867). *Type*: East Mount Barren, [Western Australia], *Maxwell* (*holo*: *n.v.*; *iso*: ?MEL 977).

Shrub to 2.5 m high; branchlets sericeous and glabrescent to glabrous. *Leaves* with a somewhat poorly defined petiole, erect to slightly spreading, usually obovate to obovate-elliptic and sometimes somewhat narrowly so, 6–15(–25) mm long and (2–) 2.5–5 mm wide, slightly concave above and convex below, usually abruptly tapered towards the tip and base, apex abruptly acuminate and shortly but bluntly mucronate. *Flower clusters* axillary or terminal, 7–10 mm across. *Bract* usually oblong to broadly oblong, rarely ovate, 1.5–2 mm long, concavo-convex, apex obtuse, shortly and densely hairy. *Bracteoles* narrowly oblong and distinctly laterally curved, 1–1.5 mm long and *c.* 0.5 mm wide, densely hairy. *Flowers* 4–7 mm across. *Sepals* 0.8–1 mm long, densely sericeous, apex obtuse. *Petals* 1.5–2.5 mm long. *Infructescence* globular and 7–10 mm across, the shoot often growing out. (Figure 3P,Q)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Mt Ragged, 26 Sep. 1995, *S. Barrett* 490; Mt Ragged Range, 2.5 km S of Tower Peak, 6 Jan. 1979, *M.D. Crisp* 4813 (CBG, NSW all *n.v.*); 5 km WNW West Mt Barren, 12 Mar. 1996, *R. Davis* 520; Fitzgerald River National Park, summit area of Mt Drummond, 31 Jan. 1986, *J.M. Fox* 86/127 (CANB *n.v.*) West Mt Barren, 29 Nov. 1960, *A.S. George* 1803; on slopes of Whoogarup Range, 2 Dec. 1960, *A.S. George* 1953; On southern face of East Mt Barren, 1 Dec. 1970, *B.R. Maslin* 951; Mt Maxwell, car park to the summit track, 16 Sep. 1992, *C.J. Robinson* 934; Thumb Peak, Fitzgerald River National Park, 23 Oct. 1970, *R.D. Royce* 9267.

Distribution. South West Botanical Province, IBRA region of Esperance Plains. A disjunct distribution, being recorded from Fitzgerald River National Park and Mt Ragged. (Figure 4B)

Habitat. Occurs in heath or shrubland, on sandy, loamy or rocky soil. Often found with *T. spathulata*.

Flowering period. Flowers recorded July to September but also March to April; fruits persist for at least one year.

Conservation status. Relatively widespread and occurs in two large national parks.

Etymology. Derived from Latin *abruptus* (abruptly) referring to the more abruptly tapered leaf apex and base of most of the specimens of this subspecies. The varietal epithet *angustifolia* was not used because the leaves of this variety are wider than the typical variety and this name could be confused with the epithet of another species of *Taxandria*.

Affinities. Differs from *T. conspicua* subsp. *conspicua* in leaf shape, in having usually shorter leaves, usually more distinctly obovate and more abruptly tapered at each end. Subsp. *abrupta* also differs from subsp. *conspicua* in its slightly smaller flower clusters. The flowers of subsp. *abrupta* have slightly smaller petals, slightly narrower and more conspicuously laterally curved bracteoles and slightly smaller sepals. The infructescences of subsp. *abrupta* are also usually somewhat smaller. Differs from *T. linearifolia* in habitat (*T. linearifolia* grows along watercourses) and also in leaf shape.

Hybrids. No hybrids have been recorded involving *Taxandria conspicua* subsp. *abrupta*.

Notes. This subspecies varies in habit from a wind-pruned shrub less than 0.5 m high to a more robust shrub to 2.5 m high in gullies or areas receiving roadside drainage run-off. These latter plants (e.g.

J.R. Wheeler 4104) approach *T. conspicua* subsp. *conspicua*. There is considerable variation in leaf size and flower cluster size from plants in differing habitats. Some collections from West Mt Barren (*C.J. Robinson* 916) and Cape Arid (*R.D. Royce* 9897) have leaves that are unusually long, slender and subsessile, but other specimens from West Mt Barren (*J.R. Wheeler* 4082) have more the usual, shorter obovate-elliptic leaves.

Taxandria floribunda (Turcz.) J.R. Wheeler & N.G. Marchant**,** *comb. nov***.**

Agonis floribunda Turcz., *Bull. Soc. Nat. Mosc.* 22(2): 20 (1849). *Type*: [Western Australia], *Drummond* IV n. 56 (*holo:* KW; *iso:* K, MEL 987, NY, P).

Shrub to 2 m high, erect, usually single-stemmed; main stems and branches thickened towards the base; branchlets softly hairy with long spreading hairs but glabrescent. *Leaves* single, sometimes crowded but not clustered except around flower heads, subsessile or with petiole up to 2 mm long; blade obovate or obovate-elliptic, sometimes narrowly so, often undulate or twisted and often recurved towards the apex, (3.5–)5–15(–18) mm long and 1.5–4.5(–7) mm wide, with 1 or 3 longitudinal veins, softly hairy when young but glabrescent, tapered to the base, margin usually minutely and irregularly indented, apex obtusely acuminate and mucronate. *Flower clusters* axillary or terminating short shoots, 5–10 mm across, often few-flowered, surrounded by a conspicuous and persistent involucre of sterile bracts. *Bracts*: outer sterile bracts numerous, broadly ovate, 1.5–2 mm long, the inner fertile bracts ovate-elliptic to elliptic and 3.5–5 mm long and 3–3.5 mm wide, apex obtuse or obtusely acuminate, usually with soft hairs towards the apex. *Bracteoles* linear to very narrowly elliptic, not or scarcely laterally curved, 3–4 mm long and 0.2–0.5 mm wide, with dense spreading white hairs particularly towards the apex and down the centre. *Flowers* white or pale pink-petalled, 3–6 mm across. *Floral tube* obconic to cylindric, 2–3 mm long, usually softly hairy, clearly extended above the ovary surface for *c.*1 mm. *Sepals* ovate-triangular, 1.5–2 mm long, densely white-sericeous, the hairs exceeding the more or less acute apex. *Petals* obovate-spathulate, 2–3.5 mm long including a distinct claw 1–1.5 mm long. *Stamens*: antisepalous stamens nodding and with a slender filament *c.* 0.5 mm long; antipetalous stamens erect with a thickened filament 1–1.5 mm long and fused to the base of the petal; anther 0.2-0.3 mm long. *Ovary* summit glabrous or with a few hairs; ovules 2 per cell. *Style* 2–3 mm long, capitate. *Infructescence* small surrounded by the persistent involucre of bracts. *Capsule* cylindric, 2–3 mm long, 2–2.5 mm wide, sericeous but sometimes glabrescent. (Figure 5A–E)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Mondurup (218), Stirling Range, Albany East, 31 Oct. 1994, *S. Barrett* 257; Hume Peak, Stirling Range, 8 May 1995, *S. Barrett* 327.8; West Cranbrook, 16 Oct. 1966, *H.E. Daniels s.n.*; Stirling Range National Park, on hill 5.5 km due W of junction of Stirling Range Drive and Red Gum Pass Rd, 9 Oct. 1988, *J.M. Fox* 88/278 (CANB, MEL both *n.v.*); Stirling Range National Park, Stirling Range Drive, 37 km from Chester Pass Rd, lookout SW of Baby Barnett Hill, 23 Oct. 1991, *W. Greuter* 23168; base of Peak Donnelly, Stirling Ranges, 7 Nov. 1977, *G.J. Keighery* 1254; between Quarry Track and West Track, far SW corner of Stirling Range National Park, 5 Dec. 1979, *N.G. Marchant* 79/101; Mt Trio, 26 Oct. 1985, *E. & S. Pignatti* 1596; Red Gum Springs, Stirling Range, Oct. 1963, *W. Rogerson* 49; Base of Bluff Knoll, south face, Stirling Range National Park, 27 Oct. 1959, *R.D. Royce* 6050.

Distribution. South West Botanical Province, junction of IBRA regions of Jarrah Forest, Avon Wheatbelt and Esperance Plains. Apparently restricted to the Stirling Range National Park and near Cranbrook. (Figure 6A)

Habitat. Occurs in heath or mallee-heath on lower and upper slopes of mountain peaks, on sand or sandy clay over quartzite or on stony ground, occasionally on peaty sand associated with swamps or winter-wet depressions.

Phenology. Flowers recorded mostly October but extending to December. Fruits persist for several years.

Conservation status. Restricted in distribution, but quite widely scattered through a large national park.

Notes and affinities. *Taxandria floribunda* is unusual in this genus in a number of features, the most striking of which is the presence of a persistent involucre of numerous sterile bracts that closely surround the inflorescence concealing the fruits. The flowering shoots continue to grow after fruiting resulting in branches having several successive years' fruits (still surrounded by their involucres). The flowers are commonly pale pink rather than white-petalled. The bracteoles are unusually long (3.5–4 mm) and slender. The antipetaline staminal filaments are almost twice the length of the antisepaline filaments and appear to be fused to the base of the petal claw.

Taxandria floribunda is distinctive in an otherwise quite cohesive and uniform genus. However with available morphological evidence it is considered that the species is best placed in *Taxandria.* The *species* resembles *T. spathulata*. Both taxa have a distinct extension of the floral tube beyond the ovary of *c.* 1 mm, a little longer than in other species of *Taxandria*. Both have particularly long petal claws (up to 1.5 mm long in *T. floribunda* and 1 mm long in *T. spathulata)* and both also have somewhat narrower capsules than is usual for the genus.

Hybrids. No hybrids involving *T. floribunda* have been recorded.

Taxandria fragrans (J.R. Wheeler & N.G. Marchant) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Agonis fragrans J.R. Wheeler & N.G. Marchant, *Nuytsia* 13(3): 567–570 (2001). *Type*: Marbellup Rd North, 6.2 km north of South Coast Highway, Western Australia, 26 July 2000, *J.R. Wheeler* 4044 (*holo*: PERTH 06315305; *iso*: AD, CANB, K, MEL).

Illustration: Wheeler *et al.* (2001: Figure 1).

Shrub up to 2.4 m high with rigid foliage and large clusters of flowers. *Flowers* characterised by their broad bracts, broad obtuse to emarginate bracteoles and glabrous acute sepals. For a complete description see Wheeler *et al.* (2001).

Selected specimens: see Wheeler *et al.* (2001).

Distribution. South West Botanical Province, IBRA regions of Warren and Jarrah Forest. Occurs from near Margaret River to east of Denmark near Redmond and Marbellup, with a single record from between Williams and Kojonup. (Figure 6B)

Habitat. Occurs in swamps on acid peaty sand and in the seasonally waterlogged margins of broad upper valleys, often in association with *Beaufortia sparsa* and *Homalospermum firmum*. *Taxandria fragrans* often occurs near *T. parviceps* (but usually at lower elevations) and the latter species is found in a greater variety of habitats. Also occasionally found growing near *T. juniperina.*

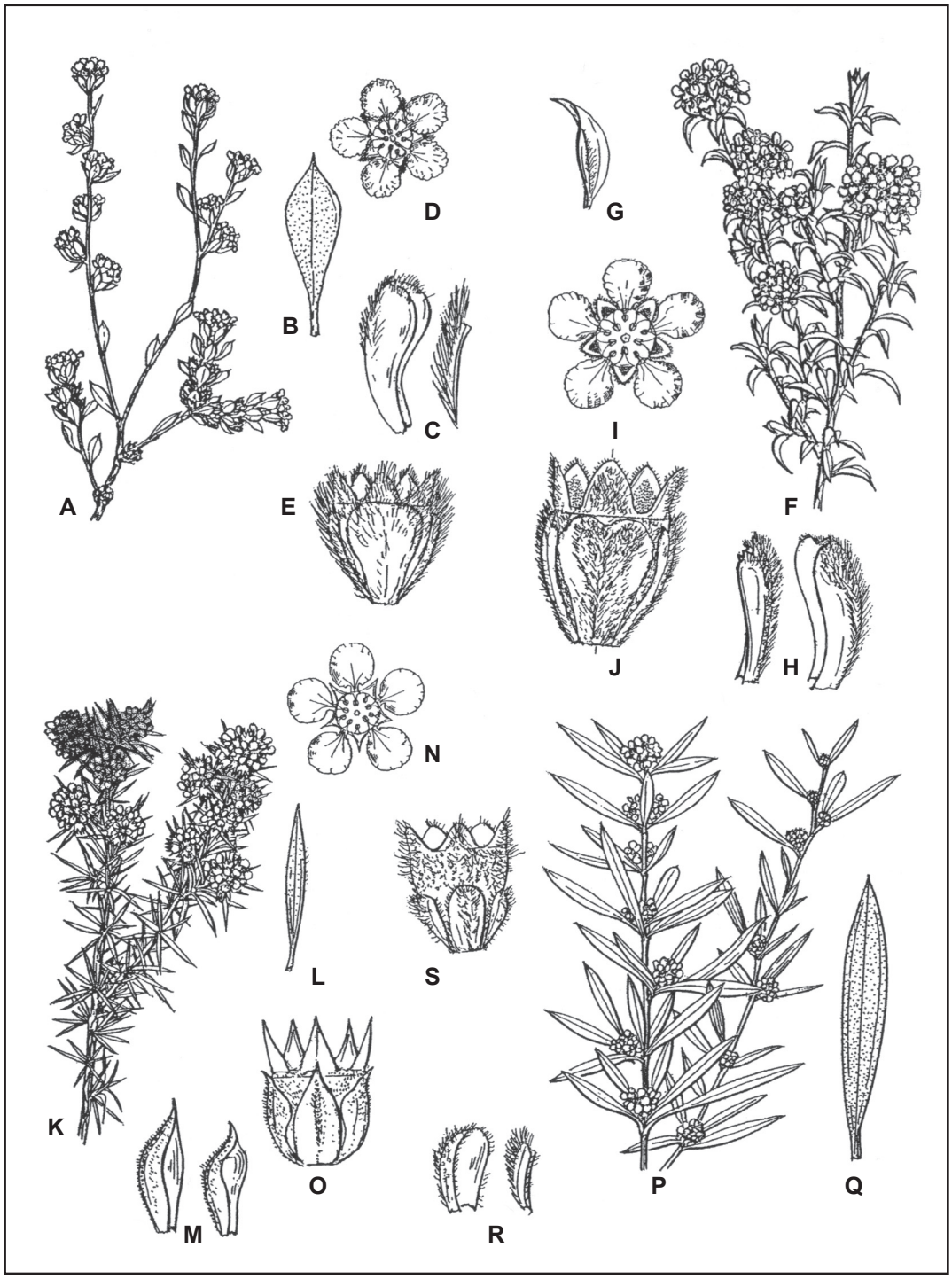

Figure 5. A–E. *Taxandria floribunda*. A – flowering branch (×0.75), B – leaf (×1.5), C – bract and bracteole (×9), D – flower (×3), E – flower with petals removed (×6); . F–J. *Taxandria inundata*. F – flowering branch (×0.75), G – leaf (×1.5), H – bract and bracteole (×9), I – flower (×3), J – flower with petals removed (×6); K–O. *Taxandria juniperina*. K– flowering branch (×0.75), L – leaf (×1.5), M – bract and bracteole (×9), N – flower (×3), O – flower with petals removed (×6); P–S. *Taxandria linearifolia*. P – flowering branch (×0.75), Q – leaf (×1.5), R – bract and bracteole (×9), S – flower with petals removed (×6).

Phenology. Flowers mostly February to May but petals persist until at least fruit matures; fruits May to November, usually persisting until the following season or longer.

Conservation status. Recorded from a number of localities over a wide area.

Affinities. Similar to *T. juniperina* and *T. parviceps*, from which it differs in its habit and flowering time as well as in its foliage and flowers. *Taxandria juniperina* has softer foliage, smaller flower clusters with slightly smaller bracts, bracteoles, sepals and petals. *Taxandria parviceps* has shorter somewhat recurved leaves, smaller flower clusters and flowers that have smaller emarginate bracts and bracteoles, smaller obtuse and somewhat hairy sepals and smaller petals.

Hybrids. Possible hybrids have been recorded between *T. fragrans* and *T. parviceps* near Margaret River (*R. Smith* 010) and near Walpole (*Gibson & Lyons* 449).

Taxandria inundata J.R. Wheeler & N.G. Marchant, *sp. nov*.

In forma foliorum, bractearum et bracteolearum *T. parvicipi* similis sed inomnino aspectibus grandioribus, multo dense pilosis et foliis 3–5-nervosis differt.

Typus: near Molloy Island, Augusta, Fisher Rd, 7.4 km from Kudardup, 34° 16' S, 115° 12' E, Western Australia, 6 September 1991, *J.R. Wheeler* 2652 (*holo*: PERTH 04418468; *iso*: K, MEL).

Shrub 0.5–2 m high, often with rather blackish stems; branchlets with dense appressed to erect white hairs. *Leaves* commonly in clusters but occasionally single, subsessile, spreading to recurved: blade obovate to elliptic, often broadly so or less often narrowly so, somewhat recurved towards apex, 6–14 mm long, (2–)3–6 mm wide, sparsely to densely hairy, with 3–5 longitudinal veins, apex acutely to obtusely mucronulate. *Flower clusters* terminating short stout axillary shoots, 8–15 mm across, very densely sericeous in bud, several-flowered, sterile basal bracts few. *Bract* broadly obovate or circular to depressed obovate, (2.2–)3–3.5 mm long, (2.5–)3–4 mm wide, densely sericeous, apex obtuse to emarginate. *Bracteoles* broadly obovate to very broadly obovate, slightly laterally curved, (2.2–)3–3.5 mm long, 2–3 mm wide, densely sericeous particularly on keel, the margins somewhat thinner and almost glabrous, apex obtuse or emarginate. *Flowers* 5–8 mm across. *Floral tube* cup-shaped, 2–2.5 mm long, usually densely hairy, slightly extended for up to 0.5 mm above the ovary. *Sepals* ovate-triangular, 1–1.7 mm long, densely hairy except in the membranous and almost glabrous distal third, apex obtuse to subacute. *Petals* 2.5–3.5 mm long including a distinct claw 0.2–1 mm long. *Stamens*: filament *c.* 0.5 mm long; anther 0.3–0.5 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 1–2 mm long. *Infructescence* globular to ovoid, 7–12 mm across. *Capsule* broadly cup-shaped to turbinate, 2.2–3 mm across, shortly hairy. (Figure 5F–J)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): *c*. 6 km N of Windy Harbour on road to Northcliffe, 1 Mar. 1995, *A.R. Annels* 5335; Boggy Lake, Walpole, Mar. 1957, *D.M. Churchill s.n.*; Weld River swamp, 4.5 miles [7.2 km] S of Shannons Mill, Mar. 1957, *D.M. Churchill s.n.*; Scott River Rd, Augusta, 23 Apr. 1981, *E.J. Croxford* 1481; 6 miles [9.6 km] S of Northcliffe, 10 Mar. 1967, *A.S. George* 8668; Denmark Shire, Boat Harbour, swamp on N side of 4WD track, 13 Oct. 1991, *B.G. Hammersley* 567; Scott River Rd just E of Johnson Rd, Scott National Park, *c*. 10 km E of Augusta, 28 Jan. 1988, *G.J. Keighery* 9614 (CANB *n.v.*); Lake Quitjup, 23 Apr. 1991, *C.J. Robinson* 562; E of Nillup on Brockman Highway, 21 Feb. 1973, *R.D. Royce* 10499; Lake Jasper, May 1967, *J.G.E. Schoneveld* 118.

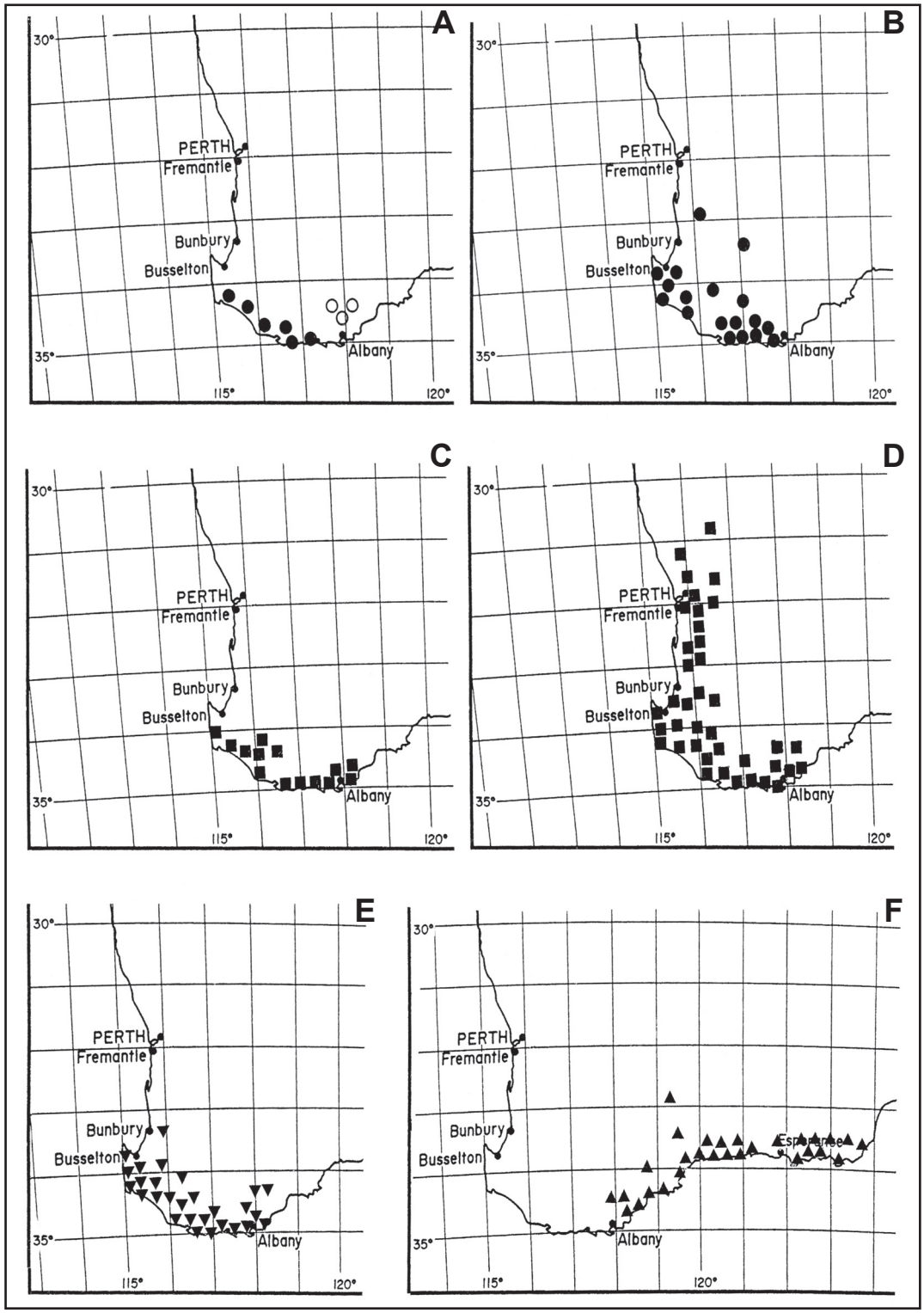

Figure 6. Distribution of *Taxandria* species. A – *T. floribunda* ○ and *T. inundata* ●; B – *T. fragrans*; C – *T. juniperina*. D – *T. linearifolia*; E – *T. parviceps*; F – *T. spathulata*.

Distribution. South West Botanical Province, IBRA region of Warren. Occurs from Augusta eastwards to Boat Harbour, west of Denmark. (Figure 6A)

Habitat. Occurs on lake margins or in seasonally to permanently waterlogged depressions in sedgeland or shrubland on sandy or clay soils.

Phenology. Flowers mainly January to June, with petals persisting until November; fruits mainly October to December, but old fruits persisting until the following season or occasionally longer.

Conservation status. Quite widespread in moist localities, in some cases reported as common.

Etymology. Derived from Latin *inundatus* – flooded, usually applied to places covered with water during part of the year and referring to the habitat of this species.

Affinities. *Taxandria inundata* is similar to *T. parviceps,* both having spreading to recurved leaves and emarginate bracts and bracteoles. *T. inundata* differs from *T. parviceps* in habitat preferences, its blackened stems, larger leaves and flowers, and in its more densely hairy bracts, bracteoles and sepals.

Notes. Previously known by the informal phrase name '*Agonis* sp. Lake Jasper (*B. Hammersley* 567)'.

Hybrids. No hybrids have been recorded involving *T. inundata*.

Taxandria juniperina (Schauer) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Agonis juniperina Schauer in Lehm., Pl. Preiss. 1: 118 (1844). *Type*: "In glareosis sterilibus promontorii Cape Riche", [Western Australia], 20 November 1840, *Preiss* 314 (*lecto*: LD, here designated; *isolecto*: MEL 3281).

Tree or tall shrub, erect to 27 m high; branchlets puberulous and pilose, rarely glabrous. *Leaves* usually in clusters that at length elongate into axillary shoots but occasionally single, subsessile, linear to very narrowly elliptic, flat to slightly or occasionally distinctly concave above and convex below, (4–)7–13(–15) mm long, 0.3–1.5 mm wide, glabrous apart from appressed and often sparse marginal hairs, with only the base of the midrib evident on the lower surface, base gradually tapered, apex acute and shortly mucronate. *Flower clusters* globular, terminating short axillary shoots, 6–8 mm across, sterile basal bracts few. *Bract* broadly ovate to broadly obovate, 1–2.5 mm long, 1–2(–2.5) mm wide, keeled, glandular-punctate and somewhat verrucose, glabrous or hairy particularly on the keel, apex acute to long-acuminate. *Bracteoles* broadly obovate to spathulate, 1.8–2.7 mm long, 1.2–2 mm wide, keeled, not or only very slightly laterally curved, glandular-punctate and usually somewhat verrucose, glabrous or hairy particularly on keel, apex obtuse to acute or obtusely but distinctly acuminate. *Flowers* white-petalled, 4–7 mm across. *Floral tube* 1.3–2 mm long, puberulous, slightly extended for up to 0.5 mm above the ovary. *Sepals* white, triangular, 1–2 mm long, glabrous, long-acute. *Petals* 1.5–2.5 mm long including a distinct claw 0.2–0.8 mm long. *Stamens*: filament slender, 0.5–0.8 mm long; anther *c.* 0.3 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 0.5–1.8 mm long. *Infructescence* globular to ellipsoid, 8–10 mm long and 8–10 mm across. *Capsule* broadly cup-shaped to broadly ovoid or somewhat 3-lobed, 2.5–3 mm across, glabrous to puberulous. (Figure 5K–O)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Lake Saide off Lower Denmark Rd, W of Albany, 18 June 1984, *D. Davidson s.n.*; Little Beach Walk Trail, Two Peoples Bay, 17 May 1999, *R. Davis* 8836; *J. Drummond* 4: 58 (NY as 58, P); Deep River, SW Western Australia, Dec. 1912, *S.W. Jackson s.n.*(CANB *n.v.*); Lake William, West Cape Howe, 25 km W of Albany, 27 Nov. 1986, *G.J. Keighery* 11621 (CBG *n.v.*); William Bay National Park, Jan. 1984, *C.V. Malcolm* 82 (CANB *n.v.*); South West, Plantagenet, Apr. 1901, *E. Pritzel* 324 (GH, MO, P); 0.5 km N of South West Highway, 5 km E of Kent Rd (Powell's property), 13 Nov. 1985, *A.N. Rodd & G. Fensom* ANR4945 (NSW *n.v.*); Forest Grove Rd, 5 km W of Bussell Highway, 19 Feb. 2000, *J. Scott* 195; Pemberton, *s. dat.*, *N.H. Speck s.n.*; 7 miles [11 km] W of Albany on the Elleker Road, 23 Mar. 1970, *M.D. Tindale* 335 & *B.R. Maslin* (NSW *n.v.*); Brennans Ford, bridge over Scott River, 6 Sep. 1991, *J.R. Wheeler* 2656 (MEL).

Distribution. South West Botanical Province, IBRA regions of Warren and Jarrah Forest. Occurs from Forest Grove and Scott River east to the Kalgan River and Waychinicup. See note under typification. (Figure 6C)

Habitat. Occurs on the margins of winter-wet or permanent swamps or watercourses, sometimes forming dense thickets. Colloquially known as "Wattie".

Phenology. Flowers mainly February to May, the petals persisting for several months; fruits mainly September to December and persisting until the following season or occasionally longer.

Conservation status. Widespread and common along the south-west coast and occurring in several national parks.

Typification. Of the two type specimens seen, the LD specimen is chosen as the lectotype as it matches the protologue and is the one most likely to have been seen by Schauer. The type locality of Cape Riche must be questioned as *Taxandria juniperina* is not known from that location. It may be that Preiss collected the species on the way to Cape Riche as it is known to occur nearby but closer to Albany.

Affinities. *Taxandria juniperina* is similar to *T. angustifolia* and *T. fragrans*, both of which have the similar acute sepals and broad bracteoles. *Taxandria fragrans* differs in habit, its larger flower clusters and the shape of the bracts (obtuse to obtusely acuminate in *T. fragrans*) and bracteoles (obtuse or emarginate in *T. fragrans*). *T. fragrans* also has much coarser more rigid foliage. *Taxandria angustifolia* differs from *T. juniperina* in habit, habitat preferences and in leaf length and shape (longer and distinctly concave above and convex below in *T. angustifolia*).

Immature trees of *Taxandria juniperina* superficially resemble *T. parviceps* and the two taxa have previously sometimes been confused. They clearly differ in leaf posture (somewhat recurved in *T. parviceps*), sepals (obtuse rather than acute in *T. parviceps*), bracts (emarginate to obtusely 2-lobed in *T. parviceps*) and bracteoles (narrower and more distinctly laterally curved as well as being obtuse to emarginate in *T. parviceps*) as well as their habitat preferences.

Hybrids. Possible hybrids have been recorded with *T. conspicua* at Shannon (*J.R. Wheeler* 2659).

Taxandria linearifolia (DC.) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Leptospermum linearifolium DC., Prodr. 3: 227 (1828) – *Agonis linearifolia* (DC.) Sweet, Sweet's Hort. Brit. ed 2, 209 (1830). – *Billottia linearifolia* (DC.) R. Br., *J. Roy. Geogr. Soc.* 1: 19 (1832). – *Billotia linearifolia* (DC.)G. Don, Gen. Hist. 2, 827 (1832). *Type*: In Nova Hollandia orient ad insulam Decres, ?*Leschenault* (*holo*: G *n.v.*, photograph seen).

Illustration. N.G. Marchant *et al.* (1987), Figure 139.

Shrub or small *tree* to 5 m high, sometimes weeping; branchlets glabrous or softly pilose to puberulous. *Leaves* usually single, sometimes clustered on short axillary shoots, well-spaced and usually widely spreading to deflexed, subsessile or with an indistinct petiole up to 2 mm long; blade very narrowly elliptic to narrowly obovate-elliptic, flat or almost so, 7–45 mm long, 0.5–4 mm wide, glabrous or minutely hairy towards base of upper surface or rarely finely pilose when young, midrib and also sometimes 2 more very faint longitudinal veins evident on lower surface, base tapered, sometimes with sparse appressed marginal hairs, apex acute and shortly mucronate or less often obtuse. *Flower clusters* axillary or occasionally terminating short axillary shoots, 5–9 mm across, sterile basal bracts few. *Bract* broadly oblong to broadly ovate, 1–1.5 mm long, shortly but quite densely hairy particularly in distal half, apex obtuse. *Bracteoles* narrowly oblong to narrowly spathulate, distinctly laterally curved, 1–1.5 mm long, 0.3–0.6(–0.8) mm wide, woolly-hairy on keel and in distal half, apex obtuse. *Flowers* white-petalled, 3.5–5 mm across. *Floral tube* 1–2 mm long, hairy particularly in distal half, extended for up to 0.5 mm above the ovary. *Sepals* broadly ovate to semicircular, 0.4–0.7(–1) mm long, woolly-hairy and usually quite densely so, apex obtuse. *Petals* 1.4–2.2 mm long including a distinct claw *c.* 0.5 mm long. *Stamens*: filament 0.3–0.8 mm long; anther 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 1–1.5 mm long. *Infructescence* globular to ellipsoid, 6–8 mm across. *Capsule* ovoid to cylindric, *c.* 2 mm across, shortly villous but often glabrescent. (Figure 5P–S)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): Porongurup Range, northern side, 30 Sep. 1991, *I. Abbott s.n.*; Port du Roi George, *Baudin s.n.* (P); Wongan Hills, 27 Nov. 1917, *J. Benkers s.n.*; 6 km N of Augusta near junction of Caves Rd and Green Hill Rd, 26 Oct. 1983, *M.G. Corrick* 8940 (CBG, HO, MEL all *n.v.*); *J. Drummond* 143 (P); near Denmark River on road to Mt Lindesay, *c.* 22 km N of Denmark, 4 Dec. 1985, *D.B. Foreman* 1472 (K *vide*, AD, CANB, K, MEL, NSW all *n.v.*); Preston River, Boyanup, 18 Oct. 1920, *C.A. Gardner* 437; Cookernup, 9 Apr. 1955, *J.W. Green* 326; opposite Golf Course, Rest Point, 5 km W of Rest [Point], 3 Nov. 1986, *G.J. Keighery* 8773; Stirling Ranges, 13 Nov. 1944, *R.J. Moir s.n.*; Tone River, Deeside Coast Rd crossing, 10 Nov. 1990, *R.W. Purdie* 4076 (CBG *n.v.*); Gull Rock Rd, (E of Albany), at Ledge Point turnoff, 24 Sep. 1982, *A. Strid* 20476; Bickley Reservoir, 8 Nov. 1978, *E. Wittwer* W2157 (CANB *n.v.*).

Distribution. South West Botanical Province, IBRA regions of Swan Coastal Plain, Avon Wheatbelt, Jarrah Forest, Warren and Esperance Plains. Extends from Gingin and Wongan Hills to the extreme south west of the state and east to the Stirling Range and Mt Manypeaks. (Figure 6D)

Habitat. Occurs bordering swamps and watercourses, on loam, clay or sandy soils in forest, woodland or shrubland.

Phenology. Flowers mostly September to December, occasionally March to May; fruits mostly December to February, falling quite quickly and rarely persisting to the next season.

Conservation status. Widespread and relatively common.

Affinities. Characterised by its widely spreading flat leaves and small clusters of small flowers. Similar to *Taxandria conspicua* subsp. *conspicua* from which it differs in leaf shape, flower cluster and flower size and in its less persistent fruits. *Taxandria conspicua* subsp. *conspicua* has narrowly elliptic to elliptic leaves that are very slightly concave above and convex below, flower clusters *c.* 10 mm across and larger flowers with petals 1.4–3 mm long. The infructescences of *T. conspicua* subsp. *conspicua* usually persist for 1 or 2 years whereas those of *T. linearifolia* have usually disintegrated by the following flowering season.

Hybrids. Possible hybrids with *T. parviceps* have been noted in several scattered localities – near Albany (*R.J. Chinnock* 3227), near Busselton (*A. Horan* 17 & *R.D. Royce* 3411), Kentdale (*J.R. Wheeler* 2665 & 2669), Kudardup (*G.J. Keighery* 1571), Milyeanup Nature Reserve (*R. Davis* 7560), Mount Barker (*K.F. Kenneally* 1225), Mullalyup (*N.F. Norris* 987), Muirillup Rock (*N.G. Marchant* 79/63) and Northcliffe (*L. Graham* 824).

Possible hybrids with *T. angustifolia* have been noted from the Porongurup Range (*I. Abbott s.n.*). Possible hybrids with *T. conspicua* subsp. *conspicua* have been noted from Last Bottle Rock.

Notes. The type locality, "Insulam Decres" (Kangaroo Island, South Australia), is regarded here as a label error. The specimen photograph from the De Candolle Herbarium (Prodr. 3: 227) is *Taxandria linearifolia* and is not known to occur east of Mt Manypeaks.

De Candolle (1841–42) illustrated *Leptospermum linearifolium* and it is presumably the same taxon as described earlier (De Candolle 1828). The illustration, that in all other respects agrees with *Taxandria linearifolia*, indicates 5 stamens in the floral diagram. However a longitudinal section of the flower illustrated shows 4 stamens in the half flower. It is likely that the floral diagram did not show all stamens that were present.

Taxandria linearifolia is a species with a variable leaf length. Long-leaved variants and short-leaved variants of *T. linearifolia* commonly grow together.

The species is documented as commonly resprouting after fire.

Taxandria marginata (Labill.) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Leptospermum marginatum Labill., Nov. Holl. Pl. Sp. 2: 10, t. 148, (1806). – *Agonis marginata* (Labill.) Sweet, Sweet's Hort. Brit. ed. 2, 209 (1830). – *Billottia marginata* (Labill.) R. Br., *J. Roy. Geogr. Soc.* 1: 19 (1932). – *Billotia marginata* (Labill.) G. Don, Gen. Hist. 2: 827 (1832). *Type:* in terrâ Van-Leuwin [Western Australia], *Labillardiere* (*holo*: FI *n.v.*; *iso*: MEL 3398, 3399, ?P).

Leptospermum marginatum var. *glabratum* DC., Prodr. 3: 226 (1828). – *Billotia marginata* var. *glabrata* (DC.) G. Don, Gen. Hist. 2, 827 (1832). *Type:* "ex hort. Berol" (*n.v.*, photograph seen G-DC).

Shrub to 2(3) m high; branchlets softly hairy with spreading to somewhat appressed fine hairs. *Leaves* single, not clustered; petiole 1–5 mm long; blade obovate or broadly obovate to elliptic or broadly elliptic, more or less flat, 9–28 mm long and 4–10 mm wide, with 3–5 longitudinal veins, softly

hairy when young, glabrescent or sparsely sericeous with long fine hairs and with a distinct band of appressed fine marginal hairs, base cuneate, apex obtuse or rarely obtusely acuminate. *Flower clusters* axillary or terminating short axillary shoots, 10–12 mm across, sterile basal bracts few. *Bract* broadly obovate to depressed obovate, 2–3 mm long, glandular-punctate and glabrous in lower half, hairy in distal half, ciliolate, apex obtusely truncate. *Bracteoles* narrowly obovate, distinctly laterally curved, 1.8–2.5 mm long and 0.5–1 mm wide, densely hairy in the distal half, apex obtuse. *Flowers* white -petalled, 5–9 mm across. *Floral tube* obconic, 2–3 mm long, glabrous proximally and hairy distally, slightly extended for up to 0.5 mm above the ovary. *Sepals* broadly ovate-triangular, 0.8–1.5 mm long, densely hairy, ciliolate, apex obtuse. *Petals* 1.5–3 mm long including a distinct claw *c.* 0.5 mm long. *Stamens:* filament 0.5–1 mm long; anther 0.2–0.4 mm long. *Ovary* summit glabrous or with hairs around base of style; ovules usually 2 per cell. *Style* 1.7–2.5 mm long. *Infructescence* globular to ellipsoid, 7–15(–20) mm long. *Capsule* cup-shaped to broadly turbinate, 2.5–3.5 mm across, glabrous in lower half and usually shortly hairy in distal half. (Figure 7A–E)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated):14 km W of Walpole, Woolbales area, 13 Feb. 1985, *A.R. Annels s.n.*; Isthmus Hill, [Torndirrup National Park], 11 Apr. 1979, *D. Davidson s.n.*; North Point, Two Peoples Bay, 28 May 1964, *A.S. George* 6279; Cape Le Grand National Park, SW of Lucky Bay along walk to Thistle Cove, 14 Oct. 1991, *W. Greuter* 22809; Summit of Mt Hopkins, Walpole–Nornalup National Park, 15 Aug. 1979, *L. Haegi* 1806 (NSW *n.v.*); lower slopes of Mt Arid, above Thomas Fishery, Cape Arid, 11 June 1985, *G.J Keighery* 7781; Port du Roi-georges, *Leschenault* 102 (P); William Bay National Park, Jan. 1984, *C.V. Malcolm* 74; King George's Sound, Sep. 1840, Preiss 141 (LD, MO, NY); SW Plantagenet, Sep. 1901, *E. Pritzel* 325 (GH, MO, P, WRSL); Albany, 23 Feb. 1955, *R.D. Royce* 5007 (CANB, K *n.v.*); Mondrain Island, Recherche Archipelago, 6 Feb. 1960, *R.D. Royce* 6229; extreme SE of Hassell Beach, Cheyne Bay, 22 Feb. 1994, *J.R. Wheeler & N.G. Marchant* JRW 3893 (AD, MEL).

Distribution. South West Botanical Province, IBRA regions of Warren, Jarrah Forest and Esperance Plains. Disjunct distribution, it occurs from Chatham Island and the Woolbale Hills west of Walpole along the coast to Cheyne Beach and also between Esperance and Cape Arid and the islands of the Recherche Archipelago. (Figure 4C)

Habitat. Occurs in association with granitic outcrops or boulders in coastal or near-coastal heath or woodland.

Phenology. Flowers mostly February to August. Fruits appear September to December and persist for up to 12 months.

Conservation status. Widespread on coastal granite and often recorded as common or abundant and occurring in several national parks.

Affinities. Similar to *Taxandria conspicua* from which it differs in its broader leaves with a dense marginal fringe of hairs.

Hybrids. Possibly hybridises with *T. angustifolia* at Mt Manypeaks where specimens have been found that are intermediate in leaf characters (*D. Davidson s.n.*, *S. Barrett* 126G). Possible hybrids with *T. callistachys* have been recorded near Esperance (C.D. Turley 2/793), Cape Le Grand at Frenchman's Peak (*A.S. Weston* 8968) and Thistle Cove (*C.D. Turley s.n.*). An early collection from the Albany area (*B.T. Goadby* 59) is a possible hybrid with *T. parviceps*.

Figure 7. A–E. *Taxandria marginata*. A – flowering branch (×0.75), B – leaf (×1.5), C – bract and bracteole (×9), D – flower (×3), E – flower with petals removed (×6); F–J. *Taxandria parviceps*. F – flowering branch (×0.75), G – leaf (×1.5), H – bract and bracteole (×9), I – flower (×3), J – flower with petals removed (×6); K–O. *Taxandria spathulata*. K– flowering branch (×0.75), L – leaf (×1.5), M – bract and bracteole (×9), N – flower (×3), O – flower with petals removed (×6).

Taxandria parviceps (Schauer) J.R. Wheeler & N.G. Marchant, *comb. nov*.

Agonis parviceps Schauer in Lehm., Pl. Preiss. 1: 119 (1844). *Type:* "In clivulo arenoso inter frutices densos prope vicum Albany", [Western Australia], 25 September 1840, *Preiss* 160 (*lecto*: LD, here designated*; isolecto:* KW, MEL 3400, 3401, 3402, 3403). *Paralecto:* Dec. 1839 *Preiss* 161, 1822 *Cunningham s.n*.

Shrub, erect, to 3(–4)m high; branchlets terete, puberulous and pilose. *Leaves* usually in clusters forming short axillary shoots, rarely single, sessile, spreading to slightly recurved in distal half, narrowly obovate or narrowly elliptic, occasionally some leaves obovate to elliptic, thick, the upper surface flat to slightly concave, the lower surface slightly convex, 3–7(–9) mm long, 0.6–1.5(–2.5) mm wide, glabrous or occasionally minutely ciliolate particularly towards the leaf base, midrib only evident on the lower surface, apex obtuse to acute, often minutely bluntly apiculate. *Flower clusters* more or less globular, terminating short axillary shoots, sterile basal bracts few. *Bract* broadly obovate to almost circular, 1.2–2 mm long, 1–1.5(–2) mm wide, glandular-punctate, minutely hairy along the midrib and in the distal half, apex emarginate to obtusely 2-lobed. *Bracteoles* narrowly obovate to obovate, distinctly laterally curved, 0.8–1.5(–2) mm long, 0.7–1 mm wide, hairy particularly on keel and towards the apex, apex obtuse to emarginate or obtusely 2-lobed. *Flowers* white-petalled, 4–6 mm across. *Floral tube* 0.7–1.5(–2) mm long, glabrous or with irregular areas of sparse hairs, very slightly extended for up to 0.2 mm above the ovary. *Sepals* ovate-triangular, 0.5–1(–1.2) mm long, glabrous and minutely ciliolate or with sparse hairs in distal half, apex obtuse. *Petals* 1.5–2.2 mm long including a distinct claw 0.2–0.6 mm long. *Stamens*: filament 0.3–0.5 mm long; anther 0.2–0.3 mm long. *Ovary* summit glabrous; ovules 2 per cell. *Style* 1–1.8 mm long. *Infructescence* globular, *c.* 6 mm across. *Capsule* cup-shaped to broadly cup-shaped, 1.7–2.5 mm across, glabrous or hairy. (Figure 7F–J)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): N summit area of Mt Lindesay (*c*. 27 km by road N of Denmark) Denmark State Forest, 11 Oct. 1989, *B.J. Conn* & *J.A. Scott* BJC3377 (CHR, MEL, NSW all *n.v.*); 10 miles [16 km] E from Alexandra Bridge, 2 Nov. 1978, *R.J. Cranfield* 954; Mt Clarence, Albany, 11 Oct. 1962, *A.R. Fairall* 569; Sunny Glen Rd, 10 km E of Denmark (off South Coast Highway), 4 Dec. 1985, *D.B. Foreman* 1464; Stirling Range National Park, W ridge of Bluff Knoll, 22 Oct. 1991, *W. Greuter* 23095; S side of SW Highway along a powerline right-of-way, *c.* 0.95 km W of junction with Coalmine Beach road, less than 1 km E of Walpole, 8 Oct. 1999, *J.W. Horn* 2800 (DUKE *n.v.*); Kirrup (*sic*), Oct. 1910, *M. Koch* 2073 (P); Coastal zone near Cape Beaufort, 40 km E of Augusta, 16 Sep. 1976, *R. Story* 8251 (CANB *n.v.*); between Busselton and Nannup, 13 Sep. 1962, *F.W. Went* 83; Nornalup Rd, near junction with Gum Link Rd, 10 Aug. 1991, *J.R. Wheeler* 2671; between Cowaramup and Margaret River, Warren District, 6 Nov. 1974, *D.J.E. Whibley* 5047 (AD *n.v.*); 24 km SE of Pemberton on road to Northcliffe, 1 Oct. 1967, *P.G. Wilson* 6281 (CANB *n.v.*).

Distribution. South West Botanical Province, IBRA regions of Swan Coastal Plain, Warren and Jarrah Forest. Occurs from near Dardanup throughout the extreme south west of the state as far east as Two Peoples Bay; also recorded north to the Porongurup and Stirling Ranges. (Figure 6E)

Habitat. Occurs in heath, shrubland, woodland or forest, often on the margins of seasonally wet areas, mostly on sandy soils and often forming quite dense thickets. In the Stirling Range the species has been recorded on heavier soils at rocky sites.

Phenology. Flowers mostly July to October with petals persisting for several months after anthesis; fruits November onwards and persisting for up to a year.

Conservation status. Widespread, often recorded as common or abundant and occurring in several national parks.

Typification. *Preiss* 160 from Lund herbarium is here chosen as the lectotype as it agrees with the protologue and was most likely to have been seen by the author.

Affinities. Similar to *T. inundata, T. angustifolia* and *T. linearifolia*. *Taxandria parviceps* is most similar to *T. inundata* in the shape of the bracts and bracteoles and in the recurved nature of the leaves. *Taxandria inundata* however is larger in all respects and has a denser indumentum, particularly on the sepals. Habit preferences and flowering times also differentiate *T. inundata* from *T. parviceps*.

Taxandria parviceps differs from *T. angustifolia* and *T. linearifolia* in leaf shape and size, as well as in bract and bracteole shape. *T. angustifolia* and *T. linearifolia* both have longer leaves, obtuse rather than emarginate bracts and obtuse to acute bracteoles.

This species differs from *T. juniperina* in its habit, bracts, bracteoles and sepals. *Taxandria juniperina* is a large tree of seasonally inundated areas with bracts and bracteoles that are glabrous or slightly hairy and obtuse to acuminate, and sepals that are acute and more or less glabrous. The two may grow relatively close to each other but *T. juniperina* always grows in much wetter situations while *T. parviceps* occurs in better drained areas that dry out more quickly in spring.

Hybrids. Taxandria parviceps commonly hybridises with other *Taxandria* species. Hybrids have been recorded with *T. linearifolia, T. conspicua* and *T. angustifolia* (see note under those species).

Taxandria spathulata (Schauer) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Agonis spathulata Schauer in Lehm., Pl. Preiss. 1: 117 (1844). *Type:* "In glareosis sterilibus ad radices collium Konkoberup promontorii Cape Riche", [Mt Melville, Cape Riche, Western Australia], 19 November 1840, *Preiss* 324 (*lecto*: LD, here designated; *isolecto*: MEL 976).

Shrub to 2 m high, sometimes spindly, erect to spreading or procumbent, the main stems often thick; branchlets terete, somewhat hairy with long and often curled hairs. *Leaves* single not clustered, spathulate; petiole usually distinct, 0.5–1.5 mm long, shortly hairy; blade broadly to very broadly obovate, elliptic or almost circular, flat to very slightly concave above and convex below, often somewhat recurved towards apex, 2–6 mm long and 1.5–5 mm wide, glabrous apart from marginal hairs at least when young, venation not apparent or only the base of the midrib apparent on lower surface, very abruptly tapered at base, apex obtuse. *Flower clusters* terminal or terminating short shoots, hemispherical to globular, 8–10 mm across, sterile basal bracts few. *Bract* very broadly ovate to very broadly obovate, 1.5–2.5 mm long, glandular-punctate and verrucose, glabrous but ciliolate, apex very obtuse. *Bracteoles* narrowly oblong to narrowly obovate and laterally curved, 1.5–2 mm long and 0.5–0.7 mm wide, densely hairy down keel, ciliolate, apex obtuse. *Flowers* white-petalled, occasionally with pinkish claws, 4–8 mm across. *Floral tube* 1.5–2.5 mm long, extending up to 1 mm beyond the ovary surface, glabrous or with sparse hairs in distal half, often wrinkled or somewhat ribbed. *Sepals* ovate-triangular, 0.7–1 mm long, with sparse coarse hairs particularly towards apex, apex subacute to more or less obtuse, ciliolate. *Petals* 2.5–3.5 mm long including a distinct claw 0.5–1 mm long. *Stamens*: filament 0.3–0.6 mm long; anther 0.2–0.3 mm long. *Ovary* summit often with sparse short hairs around style; ovules 2 per cell. *Style* 1.4–2 mm long. *Infructescence* globular, (5–)7–8 mm across, the shoot usually continuing to grow. *Capsule* turbinate to cylindric, 2–2.5 mm across, glabrous or rarely with sparse hairs in distal half. (Figure 7K–O)

Selected specimens examined. WESTERN AUSTRALIA (all PERTH except where indicated): 25 km NE of junction of Ethel Daw Drive and Elverdton Rd, 12.5 km SE (by road) of Ravensthorpe, 14 Oct. 1989, *B.J Conn & J.A. Scott* BJC3404 (E, MEL, NSW *n.v.*); corner Old Ongerup Rd and Pingrup Rd, E of Gnowangerup, 16 Oct. 1986, *E.J. Croxford* 5233; 1849, *J. Drummond* 5: 131 (P); *c*. 14 km E of the mouth of the Oldfield River, Shire of Oldfield, 12 Oct. 1968, *Hj. Eichler* 20190 (AD *n.v.*); Cape Riche, 11 Oct. 1942, *C.A. Gardner* 6539; Fitzgerald River National Park, between Middle Mt Barren and Mt Drummond road, junction with telegraph line, 24 Sep. 1970, *N.G. Marchant* 70/453; Cape Le Grand National Park, 21 Oct. 1969, *R.D. Royce* 8615; Mt Ragged [Cape Arid] National Park, Roe District, 8 Sep. 1983, *J. Taylor & P. Ollerenshaw* JT1546 (AD, CBG, MEL *n.v.*); Dunn Rock Nature Reserve 36445, 25 Sep. 1995, *S. Walsh* 35 (CANB *n.v.*); Stirling Range National Park, Red Gum Pass, 11 Nov. 1991, *J.R. Wheeler* 2920 (CANB); 3 km W of Bremer Bay township, 1 Sep. 1966, *P.G. Wilson* 4318.

Distribution. South West Botanical Province, IBRA regions of Jarrah Forest, Avon Wheatbelt, Mallee and Esperance Plains. Occurs from the Stirling Range east to Israelite Bay, extending north to near Lake King. (Figure 6F)

Habitat. Occurs in a variety of habitats, most commonly on sandy soils in heath, shrubland, mallee-heath or woodland.

Phenology. Flowers mostly September to October; fruits November onwards, the fruits persisting for up to two years.

Conservation status. Widespread, often recorded as common or abundant and occurring in several national parks.

Typification. Of the two type specimens seen, the LD specimen is chosen as the lectotype because it matches the protologue and is the one most likely to have been seen by Schauer.

Hybrids. No hybrids have been recorded involving *T. spathulata* despite its frequent cohabitation with *T. conspicua* subsp. *abrupta* in Fitzgerald River National Park.

Paragonis J.R. Wheeler & N.G. Marchant, *gen. nov***.**

Genus novum, *Agoni* (DC.) Sweet affinis, sed floribus solitariis (vel inflorescentiis paucifloris) per bracteis imbricatis subtensis, staminibus longioribus in annulo continuo dispositis differt.

Type: Paragonis grandiflora (Benth.) J.R. Wheeler & N.G. Marchant.

Shrubs. *Leaves* spirally arranged in clusters forming short axillary shoots, sessile, glandular-punctate, concolorous. *Inflorescence* of solitary flowers or few-flowered clusters terminating or in the upper axils of short shoots; each flower or cluster subtended by several imbricate basal bracts and each individual flower subtended by a broad bract and 2 larger broad bracteoles. *Floral tube* adnate to the ovary and very slightly extended upwards above the ovary, glandular-punctate. *Sepals* 5, broadly elliptic to broadly ovate, hooded, glabrous, persistent. *Petals* 5, spathulate to obovate and gradually tapered to the base, not persisting. *Stamens* free, variable in number, 22–35 in a single continuous whorl; filament slender; anther versatile and dorsifixed, 2-celled, dehiscing by longitudinal slits, the connective with a small globular gland. *Ovary* inferior, 3-celled, each cell with 3–6 ovules. *Style* sunken in a central

depression of the ovary; stigma capitate and disc-like. *Fruit* a 3-celled woody capsule. *Seeds* black, more or less ellipsoid but slightly compressed, *c.* 1.5 mm long, with dense white hairs, usually only 1 maturing per cell, the remainder similar but withering early.

Distribution. A monotypic genus endemic to the south-west of Western Australia.

Etymology. Derived from Greek, *para* – alongside, close by, beside and *Agonis*, referring to the morphological similarity with *Agonis*.

Paragonis grandiflora (Benth.) J.R. Wheeler & N.G. Marchant, *comb. nov.*

Agonis grandiflora Benth., Fl. Austral. 3: 10 (1867). *Type*: Hampden, [Western Australia], *W. Clarke* (*holo*: K; *iso*: MEL 80031).

Shrub to 1.7 m high, erect and often straggly, multi-stemmed; branchlets sparsely to densely hairy with spreading and often curled hairs when young but glabrescent. *Leaves* in spirally arranged clusters forming short axillary shoots, sessile, linear but often somewhat semiterete, flat or concave above and convex below, 5–20 mm long and 0.5–1.2 mm wide, with spreading hairs when young, glabrescent, sometimes with sparse marginal hairs, venation not apparent, scarcely tapered at base, apex acute and shortly mucronulate. *Inflorescence* spike-like with short axillary spike-like leafy flowering shoots, flowers solitary or 2 or 3 together terminating or in the upper axils of extremely short axillary shoots. *Bracts: outer sterile bracts* subtending flower cluster or single flower transversely broadly ovate, 1–3 mm long and 3–4 mm wide, apex obtuse and often minutely apiculate; *inner fertile bract* elliptic, broadly elliptic, broadly obovate or circular, 3.5–5 mm long and 3–4 mm wide, glabrous, with a thin paler membranous margin, apex obtuse and often apiculate. *Bracteoles* obovate to broadly obovate or elliptic-obovate, 3.5–5.5 mm long and 2–4 mm wide, concavo-convex, glabrous, with a thin paler membranous margin, apex very obtuse and often minutely apiculate. *Flowers* usually white-petalled, often suffused pink, 12–17 mm across. *Floral tube* 3–4 mm long, often hairy in distal half, extended above the ovary for *c.* 0.5 mm. *Sepals* broadly elliptic to broadly ovate and somewhat hooded, 2–3 mm long, glabrous, central area slightly glandular-punctate, margin thinner and somewhat inrolled, apex acute to subacute. *Petals* spathulate to obovate, 6.5–8 mm long in total, gradually tapered to the base, sparsely glandular-punctate, apex obtuse. *Stamens* 22–35, forming a continuous whorl; filament variable in length, 2.5–4 mm long, incurved; anther *c.* 0.5 mm long. *Ovary* summit glabrous; ovules 3–6 per cell. *Style* 4–5 mm long. *Capsules* solitary or 2 or 3 together, broadly cup-shaped, 2.5–3 mm long, 3–3.5 mm wide, glabrescent. (Figure 8A,B)

Selected specimens examined WESTERN AUSTRALIA (all PERTH except where indicated): [locality uncertain], Oct. 1936, *W.E. Blackall* 3991 (CANB *n.v.*); Gavins Rd, 8.9 km E of Elgin Rd, W of Donnybrook, 22 Oct. 1997, *R. Davis* 4422; Barrington Quarry, 24 Sep. 1987, *H. Demarz* 11845; Harvey, Oct. 1943, *C.A. Gardner s.n.*; Fairbridge Farm School, Pinjarra, 13 Nov. 1931, *C.A. Gardner s.n.*; Ellis Brook, Darling Scarp, Gosnells, 1 Nov. 1971, *A.S. George* 11161 (CANB, K, MEL, NSW all *n.v.*); Victoria Forest Block, suburb of Martin, Gosnells, the SW corner of Victoria Reservoir catchment, 26 Jan. 1999, *F. Hort* 387; 4 km SE of North Dandalup on Dwellingup road, 24 Oct. 1980, *G.J. Keighery* 3468; Crooked Brook Rd, Boyanup to Dardanup, 6 June 1983, *G.J. Keighery* 6142; E of Boyanup, Crooked Brook Rd, 2.8 km E from Ironstone Rd (Ferguson Rd) turnoff, Darling District, 11 Nov. 1990, *R.W. Purdie* 4098 (CBG *n.v.*).

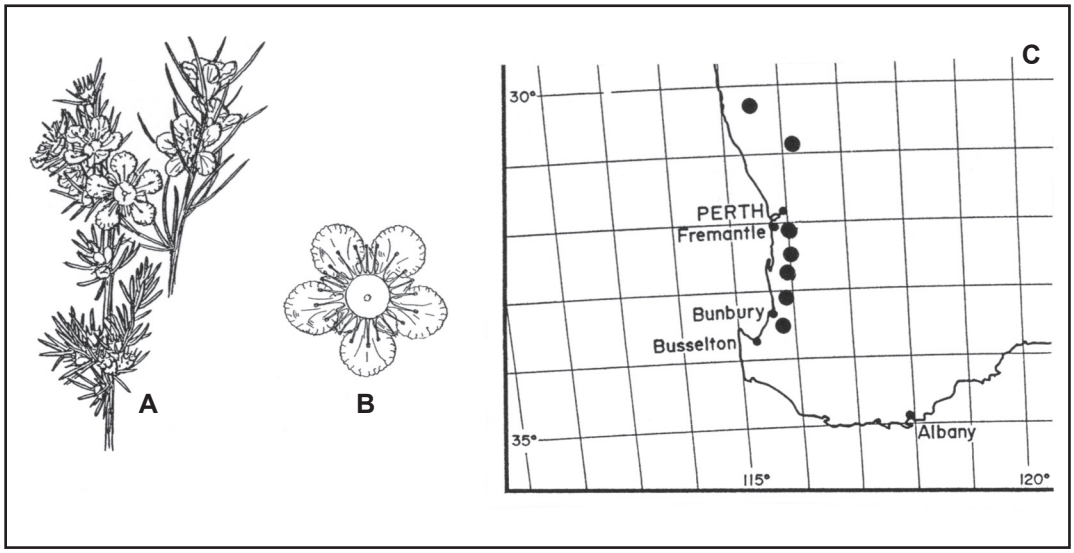

Figure 8. *Paragonis grandiflora*. A – flowering branch (×0.75); B – flower (×2); C – distribution.

Distribution. South West Botanical Province, IBRA regions of Avon, Swan Coastal Plain and Jarrah Forest and doubtfully from Geraldton Sandplains. The species occurs along the Darling Scarp extending from Piawaning south to near Boyanup, with an additional but dubious locality given as ?Badgingarra (*L. Steenbohm s.n.*). (Figure 8C)

Habitat. Occurs in eucalypt woodland and scrub on granitic, lateritic and doleritic soils.

Phenology. Flowers mainly September to November, but also recorded in January; fruits November to January but persisting for only a few months after seed is shed.

Conservation status. Restricted to a few localities on the Darling Scarp. Not currently considered to be endangered.

Affinities. *Paragonis grandiflora* differs from *Agonis* and *Taxandria* in its flowers being solitary or in 2- or 3-flowered clusters, each cluster or single flower surrounded by conspicuous bracts. It has larger flowers and the stamens are in a continuous whorl with staminal filaments almost twice the length of those found in *Agonis* or *Taxandria*.

List of excluded names

The following names do not form part of this study as they refer to eastern Australian taxa now considered to belong to *Astromyrtus*, *Leptospermum* and *Sinoga* (name derived from "agonis" in reverse). Refer to the Australian Plant Names Index (http://www.anbg.gov.au/cpbr/databases/apni.html).

Agonis abnormis C.T. White & W.D. Francis
Agonis elliptica C.T. White & W.D. Francis
Agonis elliptica Sweet
Agonis elliptica var. *angustifolia* C.T. White & W.D. Francis
Agonis elliptica var. *elliptica* C.T. White & W.D. Francis
Agonis ericoides F.M. Bailey
Agonis longifolia C.T. White & W.D. Francis
Agonis luehmannii (Bailey) C.T. White & W.D. Francis
Agonis lysicephala (Bailey) F.M. Bailey
Agonis ovalifolia Sweet
Agonis scortechiniana F. Muell.
Agonis speciosa (Schauer) C.T. White

Acknowledgements

The authors wish to thank the staff of the Western Australian Herbarium (PERTH), especially curatorial staff, the Directors of KW and MEL for the loan of type material and Alex Chapman for sorting material in MEL ready for dispatch to PERTH. We thank the Royal Botanic Gardens Kew for the assistance given to one of us (Neville Marchant) in searching for type material. Many thanks to Paul Wilson for translating the diagnoses into Latin and for valued nomenclatural advice and to both Paul and Barbara Rye for suggestions that improved the manuscript. Thanks also to Milton Andrews and Kath Trafalski for their illustrations and to Chris Robinson for many discussions on those species of *Taxandria* that are of particular interest to the essential oil industry. Thanks to colleagues in Adelaide, Robyn and Bill Barker, David Symon and Martin O'Leary who assisted in deliberations over the type of *Taxandria linearifolia* and other matters. Thanks also to Brendan Lepschi for allowing us access to a photo of the type of *Melaleuca baxteri*. Many people have made collections of *Agonis* and *Taxandria* on our behalf - we thank them all, but in particular Ian Abbott, Thelma Daniel, Doreen Davidson, Brenda Hammersley, Russell Smith and Coral Turley.

References

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

Blackall, W.E. & Grieve, B.J. (restructured and revised by B.J. Grieve) (1980). "How to know Western Australian Wildflowers." Part 3A. (University of Western Australia Press: Perth.)

Briggs, B.G. & Johnson, L.A.S. (1979). Evolution in the Myrtaceae – evidence from inflorescence structure. *Proceedings of the Linnaean Society of New South Wales* 102: 157–256.

Cranfield, R. (1999). A revision of the genus *Pericalymma* (Myrtaceae). *Nuytsia* 13(1): 7–23.

De Candolle, A.P. (1828). "Prodromus Systematis Naturalis Regni Vegetabilis." Vol. 3. (Treuttel & Wurtz: Paris).

De Candolle, A.P. (1841-42). Memoire sur la Famille des Myrtacee. Memoires de la Societe de la Physique et d'Histoire Naturelle de Geneve. 9: t. 12.

Don, G. (1832). "General History of Dichlamydeous Plants." Vol. 2.

Greuter, W. *et al.* (eds) (2000). International Code of Botanical Nomenclature (St Louis) (Koeltz: Konigstein Germany).

Lindley, J. (1839). Appendix to Edward's Botanical Register: A sketch of the vegetation of the Swan River Colony p. 10. (James Ridgway: London).

Marchant, N.G., Wheeler, J.R., Rye, B.L., Bennett, E.M., Lander, N.S. & Macfarlane, T.D. (1987). "Flora of the Perth Region". Vol 1. Department of Agriculture, Western Australia.

O'Brien, M.M., Quinn, C.J. & Wilson, Peter G. (2000). Molecular systematics of the *Leptospermum* suballiance (Myrtaceae). *Australian Journal of Botany* 48: 621–628.

Sweet, R. (1830). "Hortus Britannicus, A catalogue of plants indigenous or cultivated in the gardens of Great Britain." (James Ridgway: London).

Thackway, R. & Cresswell, I.D. (eds) (1995). An interim biogeographic regionalisation for Australia: a framework for establishing the national system of reserves, version 4.0. Published Report of the Australian Nature Conservation Agency: Canberra.

Thompson, J. (1989). A revision of the genus *Leptospermum* (Myrtaceae). *Telopea* 3 (3): 301–348.

Wheeler, J.R., Marchant, N.G. & Robinson, C.R. (2001). *Agonis fragrans* (Myrtaceae), a new species from Western Australia. *Nuytsia* 13(3): 567–570.