

A reassessment of *Asterolasia correifolia* (Rutaceae), with descriptions of the newly recognised *A. exasperata* and *A. sola*.

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Abstract

Asterolasia correifolia (A.Juss.) Benth. (Rutaceae) is revised and a narrower circumscription adopted; it is now considered to be endemic to New South Wales (NSW). Plants from the Northern Tablelands (NSW) and the Carnarvon Range (Queensland) represent two distinct species, newly described as *A. exasperata* P.R.Alvarez & Duretto and *A. sola* Duretto & P.R.Alvarez respectively. Descriptions, illustrations, ecological and conservation notes are provided for *A. correifolia*, *A. exasperata*, and *A. sola* along with a key to the species of *Asterolasia* in eastern Australia.

Introduction

Asterolasia F.Muell. (Rutaceae) is a southern Australian genus of 19 species and seven subspecies (Wilson 2013; McDougal et al. 2016; Orme & Duretto 2017; Wege 2017; species number includes the additional two species described below). Fourteen species are endemic to eastern Australia (South Australia [SA], Victoria [Vic.], New South Wales [NSW], the Australian Capital Territory [ACT] and Queensland [Qld]), and five are endemic to south-west Western Australia (WA). Though the genus is widespread and sometimes locally common, populations are often widely spaced and highly localised and in eastern Australia are often confined to near water courses. Many species, especially in eastern Australia, are represented in herbaria by very few collections. NSW is the centre of diversity for *Asterolasia* with 12 species (eight endemic) and six subspecies (three endemic). Many taxa have restricted distributions, and some are listed as threatened including three under the NSW *Biodiversity Conservation Act 2016*.

Asterolasia correifolia (A.Juss.) Benth. is the most widespread species in the genus (see Wilson 2013) and is found in coastal areas and tablelands from Jervis Bay (NSW) to, but not crossing, the NSW–Qld border, and then disjunctly, c. 600 km to the north-west, at Carnarvon Range in central Qld. *Asterolasia correifolia* displays significant morphological variation across its range. Plants from near-coastal areas and in the Central and Southern Tablelands of NSW have small to large, lanceolate to ovate leaves with bluntly acute tips, large stellate hairs (rays to 1.5 mm long) that are often clearly stalked, an inflorescence of four to many flowers, petals (4.5–)5.5–7.5 mm long, and a densely indumented ovary. Plants from the Northern Tablelands (NSW) have small, elliptic to oblanceolate to obovate leaves with an obtuse or rounded apex, very small stellate hairs (rays

to 0.25 mm long and not or indistinctly stalked), an inflorescence of up to three flowers, smaller flowers than other plants from NSW, and ovaries with an indumentum of stellate hairs with distinct areas that are glabrous. The only Qld population of *A. correifolia* occurs in the Carnarvon Range and is known from five collections (two made in 2018). These have small leaves that are slightly obovate to oblanceolate with obtuse or rounded tips, small stellate hairs (rays to 0.5 mm long that are not or indistinctly stalked), an inflorescence of three to five flowers with large petals (similar to typical *A. correifolia*) and sparsely indumented fruit.

These three forms warrant taxonomic recognition. The type of *Asterolasia correifolia* is from Parramatta (W Sydney, NSW) and so the form from near-coastal NSW and the Central and Southern Tablelands retains that name. The type of *Actinostigma lanceolatum* Turcz. also matches this form and remains a synonym of *Asterolasia correifolia*. *Asterolasia correifolia* is endemic to NSW. Plants from the Northern Tablelands (NSW) are formally described below as *A. exasperata* P.R.Alvarez & Duretto while plants from the Carnarvon Range (i.e. all collections of *A. correifolia* from Qld) are formally described as *A. sola* Duretto & P.R.Alvarez, the only representative of the genus in Qld.

Taxonomy

Asterolasia correifolia (A.Juss.) Benth., *Fl. Austral.* 1: 350 (1863)

Basionym: *Phebalium correifolium* A.Juss., *Mem. Soc. Hist. Paris* 2: 130, t. 10 (1825), as *correaefolium*

≡ *Eriostemon correifolius* (A.Juss.) F.Muell., *Fragm.* 1: 105 (1859).

Type citation: 'in Herbario Musei Parisiensis, in quo praeter specimina plura ex porto Jackson relata, exat aliud e Paramata.... (ex notula manuscripta Reidlei)'

Type: 'Paramata, Voyage aux Terres-Australes. Capitaine Baudin 1801' (holotype: P 00337615; image seen, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00337615>; possible isotype P 00337614, image seen, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00337614>).

= *Actinostigma lanceolatum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 32(1): 259 (1859). Type: Nova Hollandia [Australia], Brogden (holo: KW 001000135, image seen, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.kw001000135>).

Erect shrub to 2.5 m tall. Stems with a dense indumentum of rusty to orange-brown stellate hairs; stellate hairs often stalked, rays usually 1.0–1.5 mm long. Leaves simple, alternate: petiole 5–11 mm long; lamina ovate, lanceolate or elliptic, 20–120 mm long, 11–45 mm wide, apex bluntly acute, base cuneate, margins entire; abaxial surface densely stellate-tomentose, with 1 or 2 layers a lighter coloured layer of smaller hairs overtopped by larger pigmented stalked hairs, stellate hairs with rays to 1.5 mm long, epidermis obscured or nearly so; adaxial surface sparsely stellate-hairy, glabrescent, becoming smooth. Inflorescence an axillary umbel of 4–10+ flowers; peduncle absent or to 5.0 mm long; pedicels (5–)7–20 mm long. Flower 5-merous. Calyx inconspicuous. Petals (4.5–)5.5–7.5 mm long, cream to yellow; abaxial surface with hyaline stellate hairs; adaxial surface glabrous. Stamens 10; filaments glabrous; anthers 1.0–1.5 mm long. Carpels 5; ovary densely hairy with coarse stellate hairs; style glabrous. Cocci 3.5–4 mm long, 2.5–3 mm wide; densely hairy, beak obscured by hairs. Seed black, smooth. (Fig. 1)

Diagnosis: Differs from *Asterolasia exasperata* and *A. sola* by having obviously stalked, stellate hairs with rays to 1.5 mm long on the stems and abaxial surface of the leaves (versus hair stalks absent or not obvious and rays to 0.5 mm long), ovate, lanceolate to elliptic leaves (versus elliptic to oblanceolate to obovate), an inflorescence of 5–10+ flowers (versus 1–5 flowers) and densely hairy fruit (versus sparsely hairy).

Typification: Jussieu (1825) cited only one specimen when describing *Phebalium correifolium*. A herbarium specimen collected on the 1801 Baudin Expedition and lodged at Muséum national d'Histoire naturelle Paris (P00337615) was collected at 'Paramata' (sic) and is a good match for to the description and plate and can be considered to be the holotype. Another collection at Paris (P00337614) has a standard label indicating it was also collected on the 1801 Baudin Expedition but has no additional data or text. The two specimens look similar and may be part of the same gathering.

Distribution: *Asterolasia correifolia* is endemic to NSW and is widely distributed in the North Coast and Central Coast, and on the Central and Southern Tablelands.

Habitat: The species is usually found in wet forests in gullies or more shaded areas; populations tend to be very localised and the species can be locally dominant.



Fig. 1. *Asterolasia correifolia*: leaf and inflorescence variation. a-b Parramatta (Central Coast; *Caley s.n.* [NSW 654446]); c-d - Kuring-gai [Chase] NP (Central Coast; *Dunn 6* [NSW 433972]); e - Narrabeen (Central Coast; *Taylor 295* [NSW262343]); f-g - Conglomerate SF (North Coast; *Harden 93036*; NSW 277520); h - Bagawa SF [North Coast; *Bean 2435* [BRI AQ501652]]; i-j - Bulahdelah (North Coast; *Rupp s.n.* [NSW 374577]). a, c, e, f, h & i - habit, scale bar = 5 cm; b, g & j, detail abaxial leaf surface, scale bar = 0.25 cm; d, flower, scale bar = 0.66 cm.

Flowering and Fruiting: Flowering material has been collected in July, September and October, and fruiting material from October to December.

Notes: *Asterolasia correifolia* shows substantial variation in leaf shape and size (Fig. 1). Leaf size may be dependent on the environment and/or age of the plants and different collections from the same area can be significantly different, for example at Bulahdelah. Plants from western Sydney to the Gosford and Glen Davis areas can have smaller, elliptic leaves with a very dense indumentum (epidermis not visible) on the abaxial surface (Fig. 1a-b). The holotype, protologue and associated plate of the species, and the type material of *Actinostigma lanceolatum* match this form. This form geographically overlaps with plants with larger, elliptic-lanceolate leaves (NE Sydney to the Myall River area; Fig. 1e, i-j), or medium-sized, lanceolate leaves (N Sydney to North Coast; Fig. 1c) that have a more open indumentum (epidermis visible) on the abaxial surface. In northern NSW, plants can have broadly ovate, small (Fig. 1f) to large (Fig. 1h) leaves with a dense or open indumentum on the abaxial surface. In addition, the number of flowers and length of the pedicels varies considerably (Fig. 1). Detailed population studies using morphological, ecological and molecular data would help resolve whether the variation seen warrants taxonomic recognition.

Conservation status: The species is widespread, well represented in reserves, and does not appear to be threatened.

Selected specimens (c. 75 seen): New South Wales; North Coast: Tweed River District, 28°20'S 153°22'E, Oct 1900, *R.A. Campbell s.n.* (NSW 374574); Yabbra Picnic area, S of Urbenville, 28°31'S 152°34'E, 16 Sep 2001, *A.R. Bean* 17960 (BRI, NSW); Above Sherwood Ck, Conglomerate SF, 30°05'S 153°03'E, 6 Sep 1993, *G.J. Harden* 93036 & *D.W. Hardin* (NSW); Bagawa SF, 12 km S of Glenreagh, 30°08'S 152°58'E, 10 Oct 1990, *A.R. Bean* 2435 (BRI); Bulahdelah, 32°25'S 152°12'E, 21 Nov 1913, *H.M.R. Rupp s.n.* (NSW 374577); Watagan SF, 0.95 km S of Hunters Lookout, 32°58'S 151°25'E, 17 Jul 2003, *J. Miles s.n.* (NSW 713775); Central Coast: Parramatta, *G. Caley s.n.*, 1801 (NSW 654446); Running Stream Creek, c. 3 miles ENE of Glen Davis, 26 Sep 1964, *E.F. Constable* 5111 (NSW); Wheeney Creek, Colo Shire, 33° 24'S 150° 45'E, 20 Oct 1984, *A. Gunnell* 16 & *W. Bishop* (NSW); In gully, beneath General St, Martin Drive, 2 km from turn off to West Head Road, Kuring-gai [Chase] NP, 33°40'S 151°15'E, 11 Oct 1984, *C. Dunn* 6 & *J. Thomas* (NSW); Deep Creek, Narrabeen, 33°43'E 151°22'E, 2 Oct 1984, *M.J. Taylor* 295 & *R.G. Coveny* (NSW, P).

***Asterolasia exasperata* P.R. Alvarez & Duretto, sp. nov.**

Diagnosis: Differs from *Asterolasia correifolia* by having elliptic to oblanceolate to obovate leaves (versus ovate, lanceolate or elliptic) with short (rays to c. 0.25 mm long), compact white hairs on the abaxial surface (versus uneven, long hair [rays to 1.5 mm long]), and an inflorescence with 1–3 flowers (versus 5 or more flowers), shorter pedicels (2–7 mm long versus 7–15 mm), smaller, cream to pale yellow petals (2–4 mm long versus 4–5 mm and white), and sparsely hairy fruit (versus densely hairy); and from *A. sola* by its shorter stellate hairs on the stems and leaves (rays to 0.25 mm long versus to 0.5 mm) and shorter petals (2–4.5 mm long versus 4–8 mm).

Type: AUSTRALIA: NEW SOUTH WALES: North Coast: 2 Mile Creek, running N-S, parallel with Mt Lindsay Highway, N of Tenterfield, c. 3.6 km NW of Boonoo Boonoo Trig., 28°54'S 152°06'E, 21 Oct. 1998, *B.J. Mole* 187 & *C.A. Mole* (holotype: NSW 682325; isotypes: BRI *n.v.*, CANB 580239, MEL 2208047, NE 98543).

Etymology: The epithet is derived from the Latin, *exasperatus* (covered with short hard points, roughened), and refers to the rough appearance of the stems and inflorescences relative to *A. correifolia* with its stalked and longer hairs giving it a soft appearance; and for the emotive expression of the principal author (and student) circumscribing their first novel species.

Erect shrub to 3 m tall. Stems with a dense indumentum of rusty to orange-brown stellate hairs; stellate hairs not or obscurely stalked, rays to 0.25 mm long. Leaves simple, alternate: petiole 3–9 mm long; lamina elliptic to oblanceolate to obovate, (12–)22–30(–62) mm long, (10–)12–16 mm wide, apex obtuse or rounded, base cuneate, margins entire; abaxial surface with a dense layer of white stellate hairs with rays 0.1–0.2 mm long, and scattered slightly larger red-brown stellate hairs, epidermis obscured; adaxial surface sparsely stellate hairy, glabrescent, becoming smooth. Inflorescence an axillary umbel of up to 3 flowers; peduncle absent; pedicels (2–)3–7(–9) mm long. Flower 5-merous. Calyx inconspicuous. Petals (2–)3–4.5 mm long, cream to pale yellow; abaxial surface with hyaline stellate hairs; adaxial surface glabrous. Stamens 10; filaments glabrous; anthers 1.0–1.5 mm long. Carpels 5; ovary generally densely hairy with coarse stellate hairs interspersed by glabrous areas; style glabrous. Cocci 2.5–3.0 mm long, 2.1–2.5 mm wide, glabrous or with scattered stellate hairs; beak glabrous. Seed not seen. (Fig. 2)



Fig. 2. *Asterolasia exasperata*: a - habit; b - leaf abaxial surface detail; c - stem detail; d - flower; e - habit; f - fruit. a-d Mole 187 (NSW 682325, Bald Rock NP); e-f Williams s.n. (NE80A, Gibraltar Range NP). Scale bar = 3 cm for a & e; 0.25 cm for b & c; 0.5 cm for d; 0.66 cm for f.

Distribution: *Asterolasia exasperata* is endemic to NSW and is found in Bald Rock National Park, the Washpool and Gibraltar Range areas, and disjunctly in the Gloucester area to the south.

Habitat: *Asterolasia exasperata* is usually found in gravelly or sandy soil in shrublands, woodland (*Callitris-Banksia* as well as *Eucalyptus*), dry and wet sclerophyll forest, usually on granite derived soils and often in riparian environments. Collection notes indicate the species is localised though often frequent where found.

Flowering and Fruiting: Flowering material has been collected from August to November; and fruiting material in November.

Conservation status: *Asterolasia exasperata* is known from few, widely dispersed collections and is found in a number of conservation areas including Bald Rock National Park. The data associated with most herbarium collections does not provide information on population size though the species was often noted to be locally common. Field surveys are required to accurately assess the conservation status of this species.

Additional specimens seen: New South Wales; Northern Tablelands: Bald Rock NP, southern Block, 28°52'S 152°05'E, Oct 1997, *L.M. Copeland 97-1009* (CANB *n.v.*, NSW, NE); Washpool NP, 2 km on Washpool Rd from Gwydir Hwy, 29°16'S 152°22'E, 15 Sep 1991, *J.B. Williams s.n.* (CANB *n.v.*, NSW, NE); Hayden's Trig., Washpool State Forest, 29°17'S 152°23'E, *A.G. Floyd 907*, 21 Apr 1978 (BRI, NE); Washpool NP, c. 2 km NW of Coombadjha Rd along Washpool Forest way, 29°28'S 152°18'E, 15 Aug 2003, *L.M. Copeland 3592 & P.J. Clarke* (CANB *n.v.*, MEL *n.v.*, NSW, NE); Road to Granites Lookout, Washpool NP, 29°29'S 152°20'E, 22 Oct 2014, *P. Sherringham 5* (NSW 988204); Track to Cedar Gully, Gibraltar Range NP, 29°28'S 152°21'E, 2 Nov 1999, *J.B. Williams* (NE); Track to Cedar Gully, Gibraltar Range NP, Coombadjha (Moogem) Road, 2 km N of Gwydir Hwy, 29°27'S 152°19'E, 12 Nov 1999, *J.B. Williams* (BRI, NE); Gibraltar Range NP, c. 67 km E of Glen Innes on the Gwydir Highway, 2 Oct 1969, *R. Coveny 2209* (NSW); 1 mile N of Berrico Trig, 11 miles SW of Gloucester, 32°09'S 151°53'E, 1 Nov 1968, *B.G. Briggs 2348* (NSW).

Asterolasia sola Duretto & P.R.Alvarez, sp. nov.

Diagnosis: Differs from *Asterolasia correifolia* by having elliptic to oblanceolate leaves (versus ovate, lanceolate or elliptic), with short (rays to c. 0.5 mm long), compact white hair on the abaxial surface (versus uneven, long hair [rays to 1.5 mm long]), an inflorescence of 3–5 flowers (versus 5 or more flowers), and larger petals (4–8 mm versus 4–5 mm); and from *A. exasperata* by the longer stellate hairs on the stems and leaves (to 0.5 mm long versus to 0.25 mm) and longer petals (4–8 mm long versus 2–4 mm).

Type: AUSTRALIA: QUEENSLAND; Leichardt District Coast: Carnarvon Gorge National Park, on side track to the Amphitheatre, 25°03'S 148°12'E, 17 July 2018, *M.F. Duretto 5001 & A.S. Jenz* (holotype: NSW 1006080; isotype: BRI).

Etymology: The epithet is derived from the Latin, *solus* (alone, single, sole), and refers to the isolated geographic nature of the species, being c. 600 km from other members of the genus, and it being the only species of *Asterolasia* found in Queensland.

Erect shrub to 3.5 m tall. Stems with a dense indumentum of rusty to orange-brown stellate hairs; stellate hairs not or obscurely stalked, rays to 0.5 mm long. Leaves simple, alternate: petiole 3–7 mm long; lamina elliptic to oblanceolate, 26–61 mm long, 8–16 mm wide, apex obtuse or rounded, base cuneate, margins entire; abaxial surface with a dense layer of white stellate hairs with rays 0.1–0.2 mm long, and scattered slightly larger red-brown stellate hairs with rays to 0.5 mm long, epidermis obscured; adaxial sparsely stellate hairy, glabrescent, becoming smooth. Inflorescence an axillary umbel of 3–5 flowers, usually 1 flower opening at a time; peduncle absent; pedicel 2–17 mm long, lengthening significantly as flower opens. Flower 5-merous. Calyx inconspicuous. Petals 4–8 mm long, white; abaxial surface with hyaline stellate hairs, red; adaxial surface glabrous. Stamens 10; filaments glabrous; anthers 1.0 mm long. Carpels 5; ovary densely stellate hairy; style glabrous. Cocci 3 mm long, 2 mm wide, beaked, with scattered stellate hairs. Seed not seen. (Fig. 3)

Distribution: Confined to the Carnarvon Range, Central Queensland. Most collections were collected near Carnarvon Creek in Carnarvon Gorge.

Habitat: The four more recent wild collections have habitat information and in all cases the plant was found in a creek or on slopes very near a creek. The species has been found growing in sandy loam amongst water-worn rocks in woodland dominated by *Casuarina cunninghamiana*, and in *Eucalyptus*–*Corymbia* woodland on sandstone slopes.

Flowering and Fruiting: Flowering material has been collected in July, September and October and fruiting material in July and October. A horticultural specimen collected at the Australian National Botanic Garden (Canberra) was flowering in May.

Conservation status: Overall population size is unknown though one collection (*Parris 9109*) indicated only one plant was seen, and in 2018 two populations of three and c. 20 plants were observed (*Duretto 5000, 5001*). Before an accurate conservation assessment can be made, surveys are required to ascertain the number of populations and individuals of this species. Although the known populations occur in Carnarvon Gorge National Park, they are found along heavily utilised tourist walking tracks that make the species potentially threatened by disturbance, weeds and pathogens. If current knowledge (two or three populations and < 30 plants) is the extent of this species, then it would be assessed as Critically Endangered (IUCN 2017).

Specimens seen: Queensland; Leichardt District: Carnarvon Ranges, Sep 1938, *J.E. Young s.n.* (BRI AQ 1508430); Carnarvon Gorge NP, 25°00'S 148°10'E, Sep 1979, *W. Morley s.n.* (BRI AQ314438); Carnarvon Gorge NP, 25°03'S 148°13'E, *M. Parris 9109*, 21 Oct 1986 (CANB); Australian National Botanic Gardens (origin – cuttings from *M. Parris 9109*), 3 May 1996, *I.R. Telford 12088* (BRI *n.v.*, CANB, PERTH *n.v.*); Carnarvon Gorge National Park, at mouth of Boowinda Gorge, 25°02'12"S 148°10'24"E, 16 July 2018, *M.F. Duretto 5000 & A.S. Jenz* (BRI, NSW).



Fig. 3. *Asterolasia sola*: a - habit; b - flower; c - fruit; d - stem detail; e - leaf abaxial surface detail. a-e Duretto 5001 (NSW 1006080). Scale bar = 3 cm for a; 0.66 cm for b & c; 0.25 cm for d & e.

Key to the 14 species and seven subspecies of *Asterolasia* found in eastern Australia (SA, Vic., NSW, ACT, Qld)

This key is adapted from Orme & Duretto (2017) and the couplets leading to the subspecies of *A. trymalioides* are based on the key published by McDougal et al. (2016). Only *A. asteriscophora* subsp. *albiflora* (E Vic.; couplet 8), *A. muricata* (SA; couplet 1), *A. phebaliioides* (SA, W Vic.; couplet 15) and *A. sola* (Qld; couplet 6) do not occur in NSW.

All Western Australian species have 1–4 carpels and a key to these species is provided by Wilson (2013) which was modified by Wege (2017) to incorporate new species concepts.

- 1 Carpels 2, stellate-tomentose (SA) *A. muricata*
- 1: Carpels 5, glabrous or stellate-tomentose (SA; Vic.; NSW; ACT; Qld) 2

- 2 Flowers white to pale yellow, pedicellate, in 1–9-flowered clusters;
leaves mostly >3 cm long, 5–30 mm wide, flat 3
- 2: Flowers usually bright yellow, sessile or pedicellate, solitary or in few-flowered clusters;
leaves usually <3 cm long, 2–10 mm wide, with margins slightly recurved to revolute..... 9
- 3 Leaf apex acuminate; petals 8–14 mm long *A. elegans*
- 3: Leaf apex obtuse to acute; petals 2–10 mm long 4
- 4 Petals 2–4.5 mm long; abaxial surface of leaves smooth in appearance,
hairs with rays to 0.25 mm long *A. exasperata*
- 4: Petals 4–10 mm long; abaxial surface of leaves hairy in appearance,
hairs with rays to 1.0 or 1.5 mm long 5
- 5 Leaves with adaxial surface glabrous at maturity, abaxial surface stellate-tomentose 6
- 5: Leaves with both surfaces stellate-tomentose at maturity 7
- 6 Leaves ovate, lanceolate or elliptic, apex bluntly acute;
hairs with rays to 1.5 mm long (NSW) *A. correifolia*
- 6: Leaves elliptic to oblanceolate, apex obtuse or rounded; hairs with rays to 0.5 mm long (Qld) *A. sola*
- 7 Petals 8–10 mm long; pedicels (5–)10–20(–30 with fruit) mm long;
branchlets rusty-tomentose (NSW: NWS - Warrumbungle area) *A. hexapetala*
- 7: Petals 4–7 mm long; pedicels 2–7(–15 in *A. asteriscophora*, Vic.) mm long;
branchlets fawnish tomentose (NSW: NT - Nundle area, Tamworth district; Vic.) 8
- 8 Leaves (6–)15–45(–55) mm long; inflorescence an umbel of 1–3 flowers,
usually only 1 opening at a time; petals 6–7 mm long (NSW) *A. beckersii*
- 8: Leaves 4–16 mm long; inflorescence an umbel of 3–5 flowers;
petals 4–6 mm long (Vic.) *A. asteriscophora* subsp. *albiflora*
- 9 Leaves narrow-oblong to oblong-cuneate (length:breadth ratio of 5–8:1),
adaxial surface muricate, margins recurved *A. rivularis*
- 9: Leaves elliptic to spatulate, ± circular or obcordate to obovate (length:breadth ratio of 1–3:1),
adaxial surface glabrous or stellate-hairy, margins recurved or flat 10
- 10 Flowers 1–8, pedicels 2–20 mm long at flowering; cocci beaked (Qld; NSW: NT, CT, ST; Vic.) 11
- 10: Flowers solitary, sessile or subsessile; cocci rounded or beaked (NSW: SC, CT, ST)..... 13
- 11 Leaves ± lanceolate to elliptic or oblanceolate, sometimes narrow-oblong, 4–35 mm long,
adaxial surface sparsely or densely stellate; petiole terete, 2–7 mm long, not appressed
to the stem; base of lamina often v-shaped on upper surface giving the appearance
of an extended petiole (Qld; E NSW; Vic.) *A. asteriscophora* subsp. *asteriscophora*
- 11: Leaves obcordate to obdeltate, 7–20 mm long, adaxial surface densely stellate-hairy,
shortly petiolate (<2 mm) or sessile; petiole when present somewhat thickened and flat,
often appressed to the stem (NSW: NT, CT) (*A. rupestris*) 12
- 12 Leaf margins not recurved (NSW: NT, Mt Kaputar NP; CT, Mt Canobolas)
..... *A. rupestris* subsp. *rupestris*
- 12: Leaf margins strongly recurved (NSW: NT, Armidale area) *A. rupestris* subsp. *recurva*
- 13 Ovary glabrous; leaves 5–18 mm long (NSW: CT, Hartley area) *A. buxifolia*
- 13: Ovary stellate-tomentose; leaves 3–10 mm long (SA; Vic.; NSW: S from Penrose) 14
- 14 Leaves broad-obovate or cuneate-obcordate, with margins not or slightly recurved,
adaxial surface dull, glabrous to densely stellate-hairy; cocci beaked 15
- 14: Leaves elliptic to circular, with margins recurved/revolute, adaxial surface glossy,
glabrous or sparsely stellate-hairy or hispidulous; cocci not beaked; south from the
A.C.T and the Budawang Ra. (E Vic.; ACT; NSW: SC, ST) (*A. trymalioides*) 16

- 15 Leaves scattered along branches, broad obovate, distinctly discoloured with the abaxial surface lighter and with a denser indumentum; cocci hirsute (NSW: CT) *A. buckinghamii*
- 15: Leaves congested at the ends of branches, cuneate-obcordate, not discoloured, densely tomentose on both surfaces; cocci glabrous (SA; W Vic.) *A. phebalioides*
- 16 Leaves, stems and especially new growth densely covered in stalked, stellate hairs up to 1.5 mm diam., with stalks up to 1.7 mm long and hair rays up to 1.5 mm diam., the stalks persisting as sparse to moderately dense tubercles or short bristles (ACT; NSW: ST, Tinderry Range; Vic.: Bowen Range) *A. trymalioides* subsp. *villosa*
- 16: Leaves and stems variously hairy when young but stalks of stellate hairs, when retained, mostly < 0.5 mm long (very rarely to 0.9 mm) and hair rays 0.3–0.9 mm diam., adaxial surface of leaves soon glabrous, but with scattered tubercles (NSW & Vic.: Australian Alps; NSW: also, Morton NP) 17
- 17 Erect shrub to 2 m tall; petals bright yellow, usually 7.5–10 mm long; recurved leaf margins usually covering up to 10% of the abaxial surface; style mostly >3 mm long; stigma to 0.8 mm diam. when fully expanded (NSW: Morton NP) *A. trymalioides* subsp. *areniticola*
- 17: Prostrate or low shrub; petals dull yellow, usually 5–6 mm long; recurved leaf margins covering c. 20% or more of the abaxial surface; style mostly <3 mm long; stigma > 1.3 mm diam. (NSW & Vic.: Australian Alps)..... *A. trymalioides* subsp. *trymalioides*

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