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A key to *Aglaia* (Meliaceae) in Australia, with a description of a new species, *A. cooperae*, from Cape York Peninsula, Queensland

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Abstract

An introduction and a key to the 12 species of *Aglaia* Lour. known from mainland Australia are presented. *Aglaia cooperae*, endemic to vine thicket on sand on Silver Plains in the Cape York Peninsula of Queensland, is described as new, illustrated and named after the author and naturalist, Wendy Cooper.

Introduction

The genus *Aglaia* Lour., with 120 species currently recognised, is the largest in the family Meliaceae. It occurs in Indomalesia, Australasia and the Western Pacific, from India to Samoa and from southwest China to northern Australia (Pannell 1992). Twelve species of these small to medium sized, dioecious, tropical trees have been recorded in northern and north-eastern tropical Australia, mainly on the eastern side of the far north of Queensland, where four or five species are endemic, but also in Kimberley, Arnhem, Carpentaria, Burdekin and Dawson. All 12 species are found in Queensland, two are also found in the Northern Territory and one in the Kimberley region of Western Australia. During preparation of the *Flora of Australia* account, a new species, *A. cooperae*, has been recognised. It is described here and named in honour of Wendy Cooper, whose book, illustrated by William T. Cooper, superbly evokes the fruits of the Queensland rainforest.

Amoora is included in *Aglaia* (Pennington & Styles 1975). Dehiscence of the fruit is the only constant distinguishing feature between the two genera (dehiscent in *Amoora* and indehiscent in *Aglaia*), but since this is not consistently correlated with any other more frequently available character, identification of the separate genera, if they were maintained, would often not be possible. However, molecular investigation of the genus thus circumscribed, suggests that it is paraphyletic and that it encompasses three monophyletic lineages, section *Amoora*, section *Neoaglaia* and section *Aglaia* (Muellner et al. 2005). This investigation also places '*Aglaia tomentosa*' from Australia in a different clade from specimens of that species from western Malesia, in spite of their morphological similarity. *Aglaia ferruginea* is therefore recognised as distinct from *A. tomentosa* and endemic to Australia in the present account. Additional publications on the phylogeny, history and biogeography of *Aglaia* are in press and in preparation, but they do not affect the names of any other Australian *Aglaia* species.

The small or tiny flowers are complex in structure and highly perfumed, especially in male plants. All species have a fleshy aril. This usually completely surrounds the seed, but in *A. elaeagnoidea* from the Kimberley region, it is vestigial and the pericarp is fleshy. The fruits or arillate seeds are eaten, and the cleaned seeds dispersed,

Fig. 1. Holotype of *Aglaia cooperae* Pannell (*P.I.Forster PIF 17031* BRI).

Key to Australian species of *Aglaia*

C&C indicates a page reference to watercolour illustrations of fruits and to line-drawing of leaves in Cooper & Cooper (2004).

1. Indumentum solely or partly of peltate scales, visible with a hand lens

2. Scales white or pale brown, numerous or densely covering the lower leaflet surface

3. Scales thickly coating lower leaflet surface, completely concealing the lamina . . . . . **A. argentea** Bl.
Northern Queensland, Thailand to Solomon Islands — C&C 284

3: Scales few to numerous but rarely overlapping on lower leaflet surface

4. Leaflets (1–) 3–7; scales large, numerous on lower leaflet surface . . . . . **A. elaeagnoidea** (A.Juss.) Benth.
North and east Queensland, north-east Western Australia, Indomalesia to New Guinea, Vanuatu, Samoan Islands and New Caledonia — C&C 285

4: Leaflets (5–) 13–19; scales scattered on midrib and occasional elsewhere on lower leaflet surface . . . . . **Aglaia sp. Iron Range (Legge 21)** Pannell
Northern Queensland, *A.silvestris* occurs from Andaman Islands to Solomon Islands — C&C 286, as *A. silvestris* (M.Roem.) Merr.

2: Scales dark reddish- or purplish-brown, mainly on midrib and scattered elsewhere on lower leaflet surface

5. Flowers with 2 or 3 petals; fruits 3-locular, dehiscent . . . . . **A. australiensis** Pannell
North-east Queensland — C&C 284

5: Flowers with 4, 5 or 6 petals; fruits 2-locular, indehiscent

6. Undersurface of midrib with stellate scales absent or sparse amongst the peltate scales; staminal tube with 5 deep lobes, the margins densely hairy and the anthers inserted on the inside . . . . **A. euryanthera** Harms
North-east Queensland, New Guinea — C&C 285

6: Undersurface of midrib with numerous stellate scales amongst the peltate scales; staminal tube not deeply lobed, anthers not hairy

7. Pits absent or few on leaflet surfaces; staminal tube obovoid with a pin-prick aperture; anthers 5, included . . . . . **A. brassii** Merr. & L.M.Perry
North-east Queensland, New Guinea, Solomon Islands — C&C 284

7: Pits numerous on one or both leaflet surfaces

8. Indumentum of peltate scales only; leaflet margins recurved; staminal tube subglobose with 3 anthers . . . . . **A. cooperae** Pannell
North-east Queensland — C&C 286, as *Aglaia* sp. Silver Plains

8: Indumentum of peltate scales and stellate hairs; leaflet margins not recurved; staminal tube shallowly cup-shaped with 5 anthers . . . . . **A. sapindina** (F. Muell.) Harms
North-east Queensland and northern Northern Territory, Maluku to Bougainville — C&C 285

1: Indumentum of stellate scales or hairs, visible with a hand lens

9. Flowers with 3 petals; fruits 3-locular, dehiscent

10. Leaflets with reticulation not subprominent and barely or not at all visible; hairs and scales conspicuous, dark reddish-brown; fruits small, maximum 2.5 cm in diameter . . . . . **A. meridionalis** Pannell
North-east Queensland — C&C 285

10: Leaflets with reticulation subprominent or visible on lower surface when dry; hairs and scales inconspicuous, pale brown; fruits large, maximum 8 cm in diameter . . . . . **A. spectabilis** (Miq) Jain & Bennet
North Queensland, India, through Indomalesia and Melanesia to Santa Cruz — C&C 286

9: Flowers with 4 or 5 petals; fruits 1- or 2-locular, indehiscent

11. Indumentum of mainly stellate hairs, numerous on lower leaflet surface, sometimes with fewer stellate scales interspersed

12. Hairs with some arms much longer than the rest; reticulation brown on lower leaflet surface when dry . . . . . **A. ferruginea** C.T.White & W.D.Francis
North-east Queensland — C&C 286, as *Aglaia tomentosa* Teijsm. & Binn.

12: Hairs with arms all of similar lengths; reticulation usually white or pale brown on lower leaflet surface when dry . . . . . **A. brownii** Pannell
North-east Queensland, northern Northern Territory, New Guinea — C&C 285

11: Indumentum mainly of stellate scales, sparse to numerous on lower leaflet surface, sometimes with stellate hairs interspersed

13. Scales numerous on lower leaflet surface . . . . . **A. brownii** Pannell
North-east Queensland, northern Northern Territory, New Guinea — C&C 285

13: Scales sparse to densely covering the midrib and scattered on the rest of lower leaflet surface

14. Pits numerous on the lower leaflet surface; staminal tube shallowly cup-shaped with a wide aperture . . . . . **A. sapindina** (F.Muell.) Harms
North-east Queensland and northern Northern Territory, Maluku to Bougainville — C&C 285

14: Pits absent or few on the lower leaflet surfaces; staminal tube obovoid with pin-prick aperture . . . . . **A. brassii** Merr. & L.M.Perry
North-east Queensland, New Guinea, Solomon Islands — C&C 284

by birds such as the Cassowary, *Casuarius casuarius* (Linnaeus, 1758)[1], Pied Imperial Pigeon, *Ducula bicolor* (Scopoli, 1786)[2], Victoria's Riflebirds, *Ptiloris victoriae* (Gould, 1850)[3], Spotted Catbirds, *Ailuroedus melanotis* (G.R.Gray, 1858)[4] and Wompoo Fruit-doves, *Ptilinopus magnificus* (Temminck, 1821)[5]. King Parrots, *Alisterus scapularis* (Lichtenstein, 1818), feed on fruits of *Aglaia ferruginea*[6], but they are likely to destroy the seeds.

Taxonomy

***Aglaia* Lour.**

Fl. Cochinch., 173 (1790), nom. cons. — **Type:** *A. odorata* Lour.

Amoora Roxb., Pl. Coromandel 3: 54, t. 258 (1820). — **Type:** *A. cucullata* Roxb.

Nemedra A.Juss., Bull. Sci. Nat. Géol. 23: 239 (1830). — **Type:** *N. elaeagnoidea* A.Juss.

Beddomea Hook.f. in Benth. & Hook.f., Gen. Pl. 1(1): 336 (1862). — **Type:** *B. indica* Hook.f. = *Aglaia edulis* (Roxb.) Wall.

Hearnia F.Muell., Fragm. 5: 55 (1865). — **Type:** *H. sapindina* F.Muell.

Trees, dioecious, indumentum of stellate hairs and or stellate or peltate scales. Leaves in spirals, usually (always in Australia) imparipinnate, sometimes simple (not in Australia). Inflorescences axillary panicles, male larger than female. Flowers unisexual, male smaller than female; similar in structure but male lacks viable ovules and female lacks pollen. Petals usually 3 or 5, rarely 2, 4 or 6, free, aestivation imbricate or quincuncial, staminal tube cup-shaped, subglobose or obovoid, with an entire or lobed margin, usually without hairs or scales, rarely with stellate hairs on the inside of the staminal tube (*A. cooperae*, *A. euryanthera*) or simple hairs on the margins of the anthers (*A. euryanthera*); anthers 3, 5 or 6 (rarely to 21 outside Australia), inserted inside staminal tube, sessile, included or protruding through the aperture of the staminal tube. Disc absent. Ovary with rarely 1, usually 2 or 3 locules (rarely 10 outside Australia), each with 1 or 2 ovules; style absent, stigma sessile, either ovoid with 2 or 3 (rarely 4 outside Australia) apical lobes or depressed-globose. Fruits with fibrous pericarp, either a dehiscent loculicidal capsule with 3 locules (rarely 4 outside Australia) or indehiscent with 1 or 2 locules (rarely 10 outside Australia). Seeds plano-convex in shape, 0 or 1 per locule (rarely 2 outside Australia); aril rarely vestigial, usually almost or completely surrounding the seed.

A genus of 120 species distributed in Indomalesia, Australasia and the Western Pacific, from India to Samoa and from southwest China to northern Australia (Pannell 1992).

The fruits are often more useful than the tiny flowers for identifying species of *Aglaia*, but mature fruits are rarely collected. References to watercolour illustrations of the fruits and to line-drawing of the leaves in Cooper & Cooper (2004) are indicated in the key to Australian species (see opposite page).

One species in the key, referreed to as *Aglaia* sp. Iron Range (*Legge 21*), is known from only one fruiting specimen. More material, including flowers, might show that this specimen belongs to the species *A. silvestris*, which is widespread and variable outside Australia or that it is a new species, endemic to Australia.

General references

Benth., Fl. Austral. 1: 382–383 (1863); Miq. (as *Amoora*, *Aglaia* & *Aglaiopsis*), Ann. Mus. Bot. Lugd. Bat. 4: 34–59 (1868); A.DC. (as *Amoora*, *Beddomea*, *Aglaia* & *Hearnia*), in A.DC & C.DC, Monogr. Phan. 1: 578–592, 599–633 (1878); T.D.Penn. & Styles, A Generic Monograph of the Meliaceae, Blumea 22: 481–483 (1975); Pannell, A Taxonomic Monograph of the Genus *Aglaia* Lour. (Meliaceae), Kew Bull., Addit. Ser. 16 (1992).

Aglaia cooperae* Pannell, *sp. nov.

Affinis A. brassii *Merr. & L.M.Perry sed foliolis magis coriaceis margine recurvo et faciebus foliolorum ambabus conspicue foveolatis, flore petalis et antheris tribus tantum proviso et tubo staminali apertura latiore instructo differt.*

Holotypus: Queensland. Cook District: Silver Plains, S of Scrubby Creek and W of Colmer Point, 27 June 1995, *P.I. Forster PIF 17031* (BRI, Fig. 1).

Aglaia sp. (Silver Plains L.J.Webb+ 9734): Jessup in R.J.F.Hend., Queensl. Pl. Names & Distrib. 111 (1997); Jessup in Bostock & A.E.Holland, Cens. Queensl. Fl. 107 (2007). — *Aglaia* sp. Silver Plains: B.Hyland et al., Austral. Trop. Rain Forest Pl. (2003); W.Cooper & W.T.Cooper, Fruits Austral. Trop. Rainforest 286 (2004).

Illustration. W. Cooper & W.T. Cooper, loc. cit., as *Aglaia* sp. Silver Plains (leaf and leaflet only).

Small tree or multi-stemmed shrub 3–6 m high; bark pale reddish-brown, flaking in thick oblong scales. Twigs, petioles, rachis and petiolules, inflorescences, infructescences, calyces and fruits densely covered with, dark reddish-brown peltate scales, which have a fimbriate margin, numerous to dense on midrib of leaflets below, absent or few on rest of lower surface. Leaves 6.5–20.5 cm long, 8–20 cm wide; petiole 1.5–7 cm. Leaflets 5–7, elliptical, 2.5–9 cm long, 1–3 cm wide, coriaceous, margin slightly recurved, cuneate at base, rounded or acuminate at apex, the obtuse acumen to c. 5 (–10) mm long; lateral veins 9–11, curved upwards near the margin and anastomosing, reticulation usually subprominent below and sometimes above; upper and lower leaflet surfaces with numerous pits. Inflorescence 2.5–3 cm long. Flowers 2.5–3 mm long, 2.5–3 mm wide, pedicel c. 2 mm long. Calyx cup-shaped, divided into 5 rounded lobes. Petals 3, densely

[1] *A. australiensis*: Stocker & Irvine (1983), Cooper & Cooper (2004); *A. meridionalis*: Cooper & Cooper (2004); *A. argentea*: Cooper & Cooper (2004); *A. sapindina*: Cooper & Cooper (2004).

[2] *A. elaeagnoidea*: Kenneally & McKenzie (1989).

[3] *A. sapindina* and *A. ferruginea* (as *A. tomentosa*): Cooper & Cooper (2004).

[4] *A. sapindina*: Cooper & Cooper (2004).

[5] *A. sapindina*: Cooper & Cooper (2004).

[6] Cooper & Cooper (2004), as *A. tomentosa*.

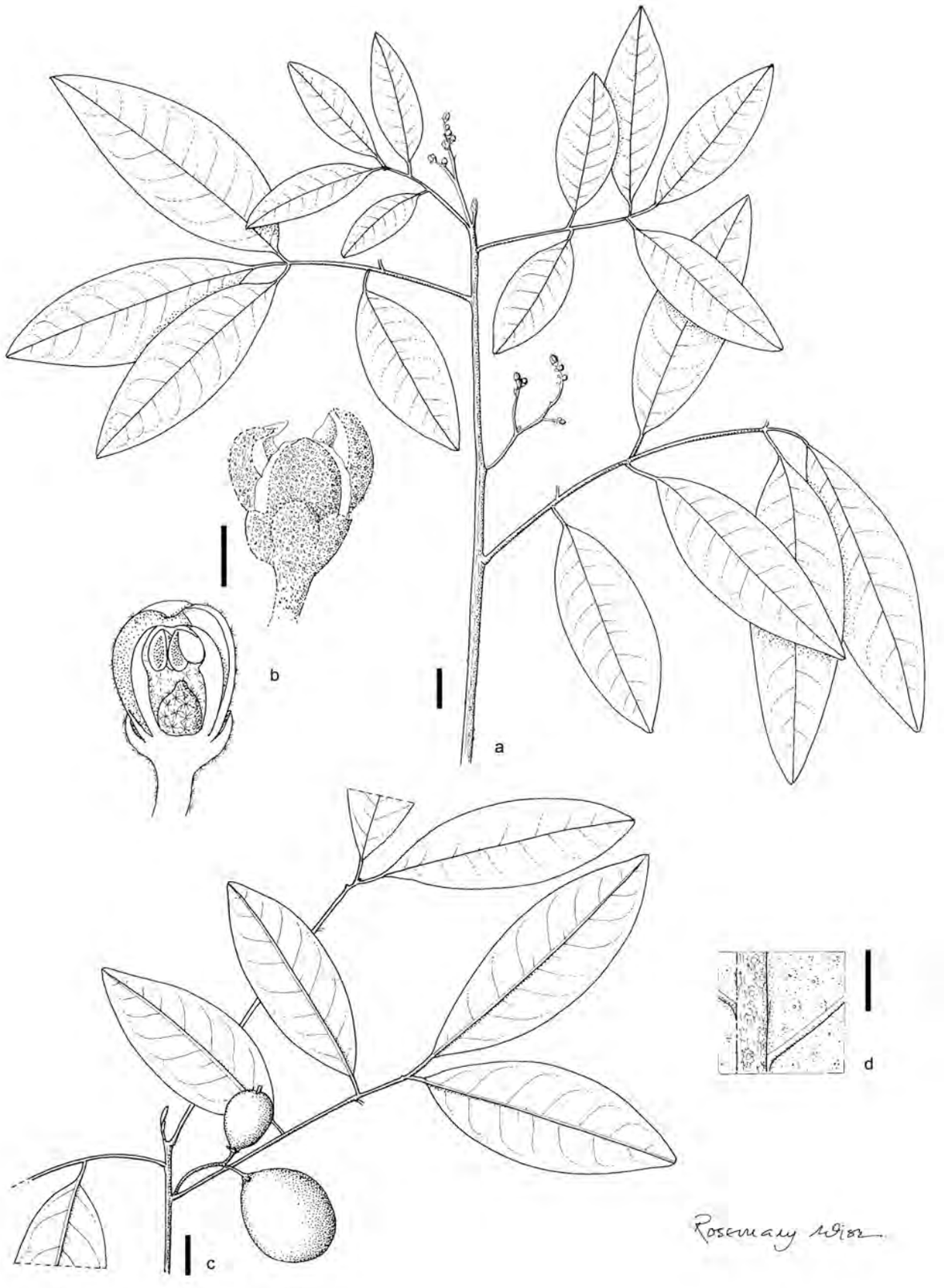

Fig. 2. *Aglaia cooperae*. a flowering branch; b flower; c fruiting branch; d lower leaf surface. Scale: a, c 1 cm; b, d 1 mm. a, b *P.I.Forster PIF 17031*; b, c *B.Hyland 10296*.

covered with scales on the exposed surfaces. Staminal tube c. 2.2 mm long and c. 2.2 mm wide, subglobose, aperture triangular, c. 1 mm wide; tube thickened below anthers and with numerous pale brown stellate scales on the inner surface. Anthers 3, c. 0.5 mm long, c. 0.7 mm wide, ovoid, sessile, inserted in the uppermost 1/4 of the tube and just protruding. Ovary c. 1.2 mm long c. 1 mm wide, stigma sessile with two minute apical lobes, loculi two, each with two ovules. Infructescence 4.4–7.5 cm long, c. 1.5 cm wide. Fruit 1.7–2.5 cm long, 1–2 cm wide, subglobose, orange brown. Seed 1, enclosed in a brown aril. Fig. 2.

Distribution and habitat. Endemic to Australia. Occurs to the east of the McIlwraith Range on the Cape York Peninsula, Queensland, from the Nesbit River south of Iron Range to Massy Creek on Silver Plains, between latitudes 13°33' and 13°53' S. It is common in the Silver Plains area. Grows mainly in semi-deciduous or deciduous vine thickets, usually on (ancient) sand dunes, in evergreen notophyll thicket or rain forest, at altitudes between 20 and 70 m. Associated species recorded are: *Beilschmedia peninsularis* B.Hyland, *Canthium* spp., *Eugenia* spp., *Xanthostemon youngii* C.T.White & W.D.Francis and *Terminalia sericocarpa* F.Muell.

Note. *Aglaia cooperae* differs from *A. brassii* Merr. & L.M.Perry in that the leaflets are more coriaceous, the leaflet margins are recurved and both leaflet surfaces are conspicuously pitted. The flower differs from that of *A. brassii* in that there are only three petals, the staminal tube has a wider aperture and there are only three anthers. This species belongs to sect. *Aglaia*, because the fruit is indehiscent, but three petals are not found in any other species in this section and three anthers are not found in any other species in the genus. The bark, which is flaking in thick scales, is also unusual for sect. *Aglaia* (Fig. 3).

Etymology. The species is named after author and naturalist Wendy Cooper, who drew my attention to this species as distinct from *Aglaia brassii* (in litt.; Cooper & Cooper 2004).

Specimens examined

QUEENSLAND: **Cook District:** Scrubby Ck between the Rocky and Chester Rivers, Silver Plains Stn, 13 Nov 1990, *D.G.Fell 02249* (QRS); 4.5 km WSW of the Nesbit R. mouth, 57 km NE of Coen, Silver Plains SLPF, Cape York Peninsula, 17 Aug. 1993, *D.G.Fell, R.Jensen, G.Barnes DGF 3450* (BRI); 3 km N of Massey Ck Crossing, Silver Plains Stn, 15 June 1992, *P.I Forster, G.Sankowsky & M.C.Tucker PIF 10578* (QRS); Nesbit R. near mouth, Silver Plains, 4 July 1997, *P.I.Forster, R. Jensen, M.C.Tucker PIF 21373* (BRI); Between Massey Ck and Rocky R., 20 Feb. 1980, *B.Hyland 10296* (FHO, QRS); Silver Plains, 2 km N of Rocky R., 22 June 1999, *G.Sankowsky 01678* (QRS); 8 km N of crossing on Massey Ck, on road between Silver Plains Stn and Rocky R., Oct 1969, *L.J.Webb & J.G.Tracey 9734* (BRI, FHO).

Fig. 3. Bark of *Aglaia cooperae*, flaking in thick oblong scales, an unusual character for *Aglaia* sect. *Aglaia*. Photo by Wendy Cooper.

Acknowledgments

I am grateful to Wendy Cooper for her interest in the genus *Aglaia*, for persuading me that *A. cooperae* is distinct from *A. brassii*, and for her comments on the manuscript, to Rosemary Wise for preparing the line drawing, to Robert Mill (E) for translating the diagnosis into Latin and to Stephen Harris (OXF/FHO) for his comments on the manuscript.

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