
Three New Species, Two New Subspecies and Five New Combinations at the Subspecific Level in *Aglaia* Lour. (Meliaceae)

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Three new species, two new subspecies and five new combinations at the subspecific level in *Aglaia* Lour. (Meliaceae)

C. M. Pannell¹

Summary. The genus *Aglaia* (Meliaceae) is well represented in Borneo, with 60 species now recognised for the island. Twelve of these are endemic, of which three are described in this paper. Most of the remainder are also found in Peninsular Malaysia and Sumatra. Pannell's monographic revision of *Aglaia* was confined to treatment at the species level; no subspecies were recognised. For a regional flora, however, it is desirable to describe infraspecific variation in more detail. Seven subspecies for Borneo are recognised here, two of which require new names. All but one of these subspecies are included in the account of *Aglaia* submitted to the editors of the 'Tree Flora of Sabah and Sarawak'.

Resolution of infraspecific variation in *Aglaia* for Borneo

The first of Pannell's (1980, 1989) regional accounts of *Aglaia* were for the Malay Peninsula and pre-dated publication of the monograph of the genus (Pannell 1992). Forty four species were recognised in the *Tree Flora of Malaya* (Pannell 1989). Six of these were not maintained in the monograph. Four are also found in Borneo. These are *A. glabriflora* Hiern (a synonym of *A. leptantha* Miq. in Pannell 1992), *A. cordata* Hiern (a synonym of *A. tomentosa* Teijsm & Binn.), *A. meliosmoides* Craib (a synonym of *A. simplicifolia* (Bedd.) Harms) and *A. oligocarpa* Miq. (a synonym of *A. lawii* (Wight) C. J. Saldanha ex Ramamoorthy). Two of these (*A. glabriflora* and *A. meliosmoides*) are reinstated to the rank of species in the account of the genus for the *Tree Flora of Sabah and Sarawak* (Pannell submitted). The other two are assigned to the rank of subspecies. An additional seven species are either reinstated or described as new. The variable simple-leaved species *A. simplicifolia* is resolved into five species. Three (*A. neotenica* Kosterm., *A. sterculioides* Kosterm. and one new species) are endemic to Borneo, *A. simplicifolia* occurs from India to Borneo, whilst *A. meliosmoides* is found in Thailand, Sumatra, Peninsular Malaysia, Singapore and Borneo. The rheophytic Bornean endemic, *A. lancifolia* Hook. f., is removed from synonymy with *A. elliptica* Blume and recognised as a distinct species endemic to Borneo. *A. beccarii* C. DC. is removed from synonymy with *A. lawii*. The recognition of another new species endemic to

Borneo completes the resolution of *A. leptantha* Miq. for Borneo. Five more subspecies are recognised. All but one of these are endemic to Borneo.

New species in *Aglaia*

***Aglaia bullata* C. M. Pannell sp. nov.** Foliola usque ad 21, laminae 6.5–12 × 1.5–2.8 cm. Vena laterales 10–16. *A. bullata* a *A. exstipulata* (Griff.) W. Theobald aspectu foliolorum siccorum differt: pagina superior foliolorum inter venas et reticulationem convexe curvatur, pagina inferior pariter concave curvatur. Typus: Sarawak, 7th Div., Kapit, Sut, right bank of Ulu Sg. Apah, Bt Goram, fr. 6 March 1975, Ilias Paie S. 36269 (holotypus FHO!; isotypi FRI, K!, L, MO, SAR).

Tree 10 m tall, circumference 35 cm. Bark surface smooth, greyish-brown, latex white. Twigs slender, greyish-brown, densely covered with reddish-brown compact stellate hairs and scales. Leaves imparipinnate, 40–75 × 24–30 cm, narrowly obovate in outline; petiole 9.5–13 cm, the petiole, rachis and petiolules densely covered with hairs and scales like those on the twigs. Leaflets 13–21, the laterals alternate to subopposite, all 6.5–19 × 1.2–3 cm, lanceolate, the margin wavy and recurved when dry, tapering to a long acumen, with the acute acumen up to 15 mm long, cuneate at base, with compact reddish-brown stellate hairs and paler stellate scales interspersed occasional on the upper leaflet surface

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and numerous on the lower leaflet surface, with numerous pits on the upper and lower leaflet surfaces; veins 10–16, ascending, curved upwards and nearly or quite anastomosing near the margin, midrib, lateral veins and reticulation depressed on the upper surface, the midrib and lateral veins prominent and the reticulation subprominent below, the leaflet surface between the reticulations concavely curved on the upper leaflet surface and convexly curved on the lower surface; petiolule 1–5 mm.

Flowers unknown.

Infructescence 15–20 × 4–7 cm, peduncle 8–12 cm, peduncle, densely covered with stellate hairs like those on the twigs. Fruits 1.3–1.5 × 1.2–1.5 cm, subglobose, with 3 loculi, each containing 0–1 seed, stalk 4–10 mm. Pericarp brownish-yellow, densely covered with, reddish-brown compact stellate hairs.

VERNACULAR NAME. Seger (Iban).

DISTRIBUTION. Endemic to Borneo. Known only from Sarawak, 7th Div., Kapit, near Sg. Apa, Bt. Bakak and Bt. Goram.

REPRESENTATIVE SPECIMEN. SARAWAK. 7th Div., Bt Bakak, near Sg. Apa, 400 m, fr. 4 March 1975, *Paul Chai* S. 36221 (FHO!, K!, L, SAR).

ECOLOGY. In mixed dipterocarp forest, on hillside and ridge, sometimes on with yellow clay loam soil; to 420 m.

NOTES. *Aglaia bullata* differs from *A. exstipulata* in the appearance of the leaflets when dry: the leaflet surface is convex between the veins and reticulation on upper surface and correspondingly concave on the lower surface. This species is named *bullata* because of the bubble-like upper surface of the leaflets.

***Aglaia sessilifolia* C. M. Pannell sp. nov.** *A. simplicifoliae* (Bedd.) Harms similis sed foliis ad apicem caulis aggregatis non valde dispersis, laminis basi cordatis non cuneatis, petiolis carentibus vel brevioribus 5–7 non 10–25 mm longis basi folii occultis non valde manifestis differt. Typus: Sabah, Kinabatangan Distr., km 29, Jala Sukau, Bukit Goram, fl. 28 Feb. 1987, *George et al.* SAN 117676 (holotypus K!; isotypus SAN).

Tree to 12 m high, bole to 6 m, to 60 cm circumference. Bark greyish-brown or dark brown, slightly scaly; slash outer bark thin. Inner bark reddish-brown or whitish-brown, fibrous, sapwood pinkish-brown or pinkish-yellow; latex white. Twigs densely covered with yellowish-brown stellate hairs and scales and with compact reddish-brown stellate hairs interspersed.

Leaves crowded near the apex of the shoot, simple, to 12–32 × (3–)5.5–11.5 cm, dull pale yellowish-green when dry, obovate, tapering to a cordate base, apex acuminate, the acumen c. 10 mm

long, with few to numerous hairs and scales like those on the twigs on the the midrib below and scattered on the rest of that surface; lateral veins 17–30, ascending and curved upwards near the margin, not or quite anastomosing, midrib prominent, lateral veins subprominent and reticulation visible below, the midrib below with a 5–10 mm long pulvinus-like swelling 5–12 mm from the base of the leaf, leaves sessile or with a petiole 5–7 mm.

Inflorescence to 18 × 10 cm, peduncle 1–2 cm; the peduncle, branches and pedicels with numerous to dense yellowish-brown stellate hairs and scales. Flowers 2–2.7 × 1.7–2.4 mm; pedicel c. 1.5 mm; calyx cup-shaped, divided almost to the base into ovate lobes about 1 mm long, the pedicels and calyx with a few yellowish-brown stellate scales about 0.1 mm in diameter; petals 5, (c. 1.9 × 1.5 mm), yellow, obovate, aestivation quincunial; staminal tube 1–1.9 × 1–1.3 mm, obovoid, aperture c. 0.8 mm across, shallowly lobed, the inside thickened longitudinally between the insertion of the anthers; anthers 4 or 5, inserted on the margin of the tube and pointing towards the centre of the flower; ovary 0.3 mm high, 0.3–0.5 mm across, densely covered with scales like those on the calyx, 0.1–0.15 mm in diameter; style 0.2–0.5 × 0.2 mm; stigma 0.3–0.6 mm in diameter, subglobose, with four shallow lobes and darker depressed apical lobe c. 0.3 mm in diameter; ovary with 1 locule.

Infructescence (one only seen, SAN 90877) with 1 fruit. Fruit 2.5 × 1.6 cm, ellipsoid, peduncle 1.3 cm; the pericarp surface and peduncle with few yellowish-brown stellate hairs and scales.

DISTRIBUTION. Endemic to eastern Sabah.

REPRESENTATIVE SPECIMENS. SABAH. Sandakan Distr.: Sg. Binuang camp Kretam, fl. 24 June 1962, *Jaswir* SAN 30696 (K!); Sepilok F.R., fl. 12 June 1995, *Diwol S. & Donggop T.* SAN 135055 (K!); Sungai Gum-Gum, 8 m, fr. 15 Aug 1979, *Termiji Arshid* SAN 90877 (K!, SAN).

ECOLOGY. Lowland forest.

NOTES. *Aglaia sessilifolia* differs from *A. simplicifolia* in having the leaves crowded near the apex of the shoot. The markedly obovate leaves taper gradually to a deeply cordate base. The leaves are sessile, or the short petiole is obscured by the base of the leaf.

***Aglaia stellatopilosa* C. M. Pannell sp. nov.** a *A. leptantha* Miq. indumento pilorum stellatorum stellatis; apices virgularum dense vestiuntur pilis stellatis pallide brunneis vel aurantiaco-brunneis, brachia flexuosa habentibus et caducis, quibus delapsis squamae bediae peltatae deteguntur; calyx squamis stellatis dense obtegatur. Typus: Sarawak, 5th Div., Limbang, G. Pagon, Ulu Sg. Sipayan, 530 m, fl. 5 Aug. 1984, *D. Awa & B. Lee*, S. 47672 (holotypus FHO!; isotypi FRI, K!, L, SAN, SAR).

Tree to 8 m, diameter to 10 cm. Bark greyish-green, sometimes pale brownish-orange with V-shaped fissures and inner bark orange; latex white. Twigs densely covered with pale brown or orange brown stellate hairs with wavy arms, with numerous pits on the upper and lower leaflet surfaces. Leaflets (7–)9–13(–19); blades 2–6 × 1–1.8 cm, usually pale green when dry, sometimes blackish-green; lateral veins 4–6 pairs, darker or paler than the rest of blade when dry.

Flowers 1.5–1.9 × 1.2–1.8 mm; calyx densely covered with stellate scales; staminal tube 1–1.3 × 0.8–1 mm, aperture 0.5–0.6 mm diameter, anthers 0.5–0.6 × 0.3 mm, inserted vertically in the upper half of the tube; ovary ovoid, 0.3–0.4 × 0.3–0.4 mm, with 2 locules, stigma 0.3 × 0.2–0.3 mm.

Fruits c. 2.3 × 2 cm, subglobose, yellow, orange or deep yellowish-brown when ripe, without longitudinal ridge.

VERNACULAR NAME. Kela Buno (Kelabit), Segera (Iban).

DISTRIBUTION. Endemic to Borneo.

REPRESENTATIVE SPECIMENS. **SABAH.** Tenom Distr., E of Kg Kapulu, 1200 m, fr. 4 May 1972, *L. Saikeh* SAN 72091 (FHO!, K, L, SAN, SAR, SING); **SARAWAK.** 1st Div., Semengoh Arboretum, fr. 9 Sept. 1976, *Ilias & Bernard* S. 37961 (FHO!, FRI, K, L, SAN, SAR); 4th Div., Kelabit Highland, Bario, fl. 7 Nov. 1974, *Paul Chai* S. 35354 (FHO!, SAR).

ECOLOGY. Mixed dipterocarp forest, riparian and secondary semi-kerangas forest; to 1200 m.

NOTES. *Aglaia stellatopilosa* differs from *A. leptantha* in its indumentum of stellate hairs; the twig apices are densely covered with pale brown or orange brown stellate hairs which have wavy arms and are deciduous, exposing reddish-brown peltate scales; the calyx is densely covered with stellate scales.

New subspecies in *Aglaia*

Aglaia elliptica Blume subsp. **clementis** (Merr.) C. M. Pannell **comb. et stat. nov.**

Aglaia clementis Merr., Philipp. J. Sci. (Bot.) 13: 78 (1918).

Leaflets to 40 × 18 cm, either coriaceous and recurved at the margin, or like subsp. *elliptica*. The fruits are larger than in subsp. *elliptica*, to 5 × 4.8 cm, obovoid in shape, with an apical depression and longitudinal depressions between the seeds; the pericarp is up to 1.2 cm thick. Seeds 2.

VERNACULAR NAME. Segera (Iban).

DISTRIBUTION. Borneo (Sabah and Sarawak) and Sulawesi.

REPRESENTATIVE SPECIMENS. **SABAH.** Near Sandakan, Sepilok Forest Reserve, 15 m, fl. & fr. 23 Oct. 1963, *Pennington* 7922 (FHO!); Sandakan, Bukit Tangkunan, mile 81, Labuk Road, fl. 20 May 1974, *Mabberley* 1710 (FHO!); **SARAWAK.** 1st Div., Tebakang area, Bt Rawan, 630 m, fr. 23 Oct. 1986, *Dyg. Awa & I. Paie* S. 45286 (FHO!, FRI, K, L, SAN, SAR), & same loc., 635 m, 7 April 1983, *Dyg. Awa & I. Paie* S. 45599 (K!, L, SAR).

ECOLOGY. Lowland primary and secondary forest, including on limestone and dry sandy soils; to 635 m.

Aglaia exstipulata (Griffith) W. Theobald subsp. **brunneostellata** C. M. Pannell **subsp. nov.** Foliola 7–11, plerumque pauciora quam in subsp. *exstipulata*. Foliola sunt 4.5–10.5 cm longa et 2.5–6 cm lati, et minorum longitudinem pro ratione latitudinis quam in subsp. *exstipulata* habent. Typus: Sarawak, 3rd Div., Kapit, Bt Raya, 400 m, fl. 21 Oct 1965, *E. Wright* S. 23972 (holotypus FHO!; isotypi A, BO, FRI, K, L! SAN, SAR, SING).

Leaflets 7–11, usually fewer than in subsp. *exstipulata*. The leaflets are 4.5–10.5 × 2.5–6 wide, elliptic or oblong and have a smaller length/breadth ratio than in subsp. *exstipulata*. The lower leaflet surface has numerous compact stellate hairs evenly distributed so that they are visible to the naked eye as brown dots; the arms of adjacent hairs and scales do not overlap.

VERNACULAR NAME. Labanoh (Kelabit), Segera (Iban).

DISTRIBUTION. Endemic to Borneo (Sabah and Sarawak and Kalimantan).

REPRESENTATIVE SPECIMENS. **SABAH.** Near Ranau, Forest Reserve above Hot Springs, ♀ fl., 28 Nov. 1963, *Pennington* 7940 (FHO!); Labuk Sugut Distr., Ulu Sg. Ogan, ♂ fl. 25 Sept. 1984, *Sigin & Joseph* SAN 67586 (FHO!, FRI, L, SAN). **SARAWAK.** 4th Div., Baram Distr., Kelabit Highland, Bt Aru Damoh, fl. 16 April 1975, *Paul Chai*, S. 35481 (A, FHO!, K, L, MO, SAR); 7th Div., Kapit, Song, Katibas, Takalit, Bt Bakar between Ulu Sg. Bediri, Yong and Ulu Sg. Janang, c. 740 m, 14 March 1975, *Ilias Paie* S. 36392 (FHO!, FRI, K, L, MO, SAR). **KALIMANTAN.** Central, Sintang, HPH Km 70; NE of camp along main logging road and cutting block environs, 150 m, fl. 10 April, 1994, *Church, Mahyar, Indah, Ismail & Hamzah* 796 (K!).

ECOLOGY. Found in primary forest, secondary forest, lowland dipterocarp forest, semi-kerangas forest on yellow sandy soil and sandy clay; to 740 m.

NOTES. This subspecies is named *brunneostellata* because the reddish-brown stellate hairs on the lower leaflet surface are visible to the naked eye as evenly-spaced brown dots.

***Aglaia lawii* (Wight) C. J. Saldanha ex Ramamoorthy subsp. *oligocarpa* (Miq.) C. M. Pannell comb. et stat. nov.**

Aglaia oligocarpa Miq., Ann. Mus. Bot. Lugd. Bat. 4: 45 (1868). Synonym: *Amoora maingayi* Hiern in Hook. f., Fl. Brit. India 1: 562 (1875); *Aglaia trimera* Merr., Pl. Elmer. Born.: 128 (1929).

Aglaia subsp. *oligocarpa* resembles subsp. *lawii*, but differs in having less coriaceous leaflets and a sparser indumentum. It differs from *A. beccarii* in that the indumentum is of peltate scales only; the rachis is terete, not winged and the pericarp is not moulded around the seeds when dry.

VERNACULAR NAME. Segara (Iban)

DISTRIBUTION. Thailand, Malay Peninsula, Sumatra, Sarawak (mainly 1st and 3rd Divisions), Sabah, Brunei, Philippines.

REPRESENTATIVE SPECIMENS. THAILAND. Chanthaburi, Makham, Khao Kluea, c. 200 m, fl. *Smitinand* 3325 (K!). **PENINSULAR MALAYSIA.** Pahang, Krau Game Reserve, Kuala Lompat, fr. 3 July 1979, *Pannell* 1575 (FHO!); Selangor, Sungei Buloh Forest Reserve, 30 m, fr. 11 Sept. 1963, *Pennington* 7806 (FHO!). **SUMATRA.** Riau Province, Tigapulu Mts, 5 km W of Talanglakat on Rengat-Jambi road, Bukit Karampal area, 600 m, G. Lancang ridge, *Burley, Tukirin et al.* 1963 (K!). **SARAWAK.** 1st Div., 5 Miles SW of Kuching, Stapok Forest Reserve, c. 150 m, fr. 27 April 1974, *Mabberley* 1625 (FHO!); 4th Div. Miri, Lambir National Park, fl. 18 Sept. 1978, *Rena George* S. 40267 (E, FHO!, FRI, K, L, SAN, SAR); 7th Div. Kapit, Pelagus, fr. July 1981, *Bernard Lee* S.40238 (K!). **SABAH.** Mandakah Forest Reserve, c. 15 m, fr. 19 Jan. 1964, *Ampuria* SAN 41153 (K!); Semporna, Langas Is., c. 3 m, fl. & fr. 19 Aug. 1938, *Agama & Valera* in *North Borneo Forest Department* 9449 (K!). **BRUNEI.** Labuan, Pulau Burong, fr. 11 Jan. 1959, *Ashton* BRUN 5177 (K!). **PHILIPPINES.** Palawan, Langen (Malapakan) Island, S side of valley N of Malapakan Cove, fr. 16 April 1984, SMHI 859 (FHO!).

ECOLOGY. Kerangas, mixed Dipterocarp forest, freshwater peat swamp forest; to 600 m. In Peninsular Malaysia, the seeds are eaten and thought to be dispersed by birds ranging in size from bulbuls (*Pycnonotidae*) to magpies (*Corvidae*) and hornbills (*Bucerotidae*).

USES. A source of timber. In the Philippines the leaves are used to treat headaches. Water in which the bark has been boiled is used to destroy lice.

NOTES. *Aglaia lawii* subsp. *oligocarpa* is the most widespread subspecies of *A. lawii* in Western Malesia. The two areas where greatest variability in the species is found are Indo-China and Borneo. The variation in Borneo has been resolved by recognising two subspecies and the species *A. beccarii* C. DC. The latter is almost confined to Borneo, there being one record from the Philippines.

***Aglaia lawii* (Wight) C. J. Saldanha ex Ramamoorthy subsp. *submonophylla* (Miq.) C. M. Pannell comb. et stat. nov.**

Aglaia submonophylla Miq., Ann. Mus. Bot. Lugd. Bat. 4: 40 (1868); C. de Candolle in A. & C. de Candolle, Monogr. Phan. 1: 620 (1878).

Aglaia lawii subsp. *submonophylla* is a tree not more than 5 m tall. It resembles subsp. *lawii* in that the indumentum is of peltate scales only and the rachis is terete, not winged. It differs from it in having simple leaves, or rarely leaves with 2–3 leaflets, less coriaceous leaves or leaflets, and the pericarp thin and moulded around the seeds when dry.

DISTRIBUTION. Known only from Kalimantan.

REPRESENTATIVE SPECIMENS. KALIMANTAN. Central Kalimantan, ODA-Kayu Mas logging area, KTR, near camp 92; along logging road from plot 2 to camp km 92, 130 m, fr. 24 Oct. 1996, *Kessler et al.* PK1482 (K!); Kalimantan Barat, Ketapang, Gunung Palung National Park, Cabang Panti Research Site, Trail TR3.40s1, 20 m, fl. 21 Oct. 1996, *Laman, Rachman & Mirmanto* TL49 (FHO!, K!); Kalimantan Barat, Ketapang, Gunung Palung National Park, Sungai Ayer Putih, 10 m, fl. & fr. 4 Nov. 1996, *Laman, Rachman & Mirmanto* TL299 (FHO!, K!).

ECOLOGY. Mixed Dipterocarp forest, sandy clay soil. TL299 was collected along a stream through freshwater swamp forest and was growing on a fallen tree at the riverside.

***Aglaia tenuicaulis* Hiern subsp. *semengohensis* C. M. Pannell subsp. nov.** a subsp. *tenuicauli* differt eo quod aetate matura altior est, ad 15 m, et ramosa. Pili stellati paginae inferioris foliolorum brachiis aequilongis ornantur. Typus: Sarawak, 1st Div., nr Kuching, Semengoh Forest Reserve, fl. & fr. 8 Nov. 1963, *T. D. Pennington* 7952 (holotypus FHO!).

Subsp. *semengohensis* differs from the typical subspecies in being taller at maturity, to 15 m, and branched, whereas the typical subspecies is unbranched. The stellate hairs on the lower leaflet surface have arms of equal length, whereas in subsp. *tenuicaulis* they are of different lengths.

DISTRIBUTION. Endemic to one locality in western Sarawak.

REPRESENTATIVE SPECIMENS. SARAWAK. 1st Div., nr Kuching, Semengoh Forest Reserve, Penrissen road, mile 12, fr. 7 March 1978, *Othman et al.* S. 36644 (FHO!, K!, SAR) & S. 36991 (FHO!, SAR); same loc., Penrissen road, mile 12, Block no. 22, fl. 6 Nov. 1981, *Ilias Paie* S. 40586 (FHO!, K!, SAR); 100 m, 8 May 1962, *Galau* S. 15630 (K!, SAR); 100 m, 5 April 1962, *Rosli* S. 15052 (K!, SAR).

ECOLOGY. Mixed dipterocarp forest, undulating lowland forest, hillside; 50 – 100 m.

NOTES. The name *semengohensis* refers to the Semengoh Forest Reserve, which is the only locality known for this subspecies.

***Aglaia tomentosa* Teijsm. & Binn. subsp. *cordata* (Hiern) C. M. Pannell comb. et stat. nov.**

Aglaia cordata Hiern in Hook. f., Fl. Brit. India 1: 557 (1875).

The leaflets of subsp. *cordata* are usually sessile and cordate at the base, whereas there is a short petiolule and the leaflets are cuneate or rounded at the base in subsp. *tomentosa*.

VERNACULAR NAMES. Medang berbulu. Punyau (Punan); Segeru (Iban).

DISTRIBUTION. Thailand, Peninsular Malaysia, Singapore, Sumatra, Anambas Islands, Java, Sabah and Sarawak, Brunei, Kalimantan, Philippines.

REPRESENTATIVE SPECIMENS. **THAILAND.** Peninsular District, Phangnga Province, Hill along new road c. 30 km E of Takua Pa, fl. 11 May 1968, *Beusekom & Phengkhlai* 703 (K!). **PENINSULAR MALAYSIA.** Pahang, near Temerloh, Jenkai Forest Reserve, 60 m, *Pennington* 7871 (FHO!). **SUMATRA.** Riau Province, Tigapulu Mts, 5 km W of Talanglakat on Rengat-Jambi Road, Bukit Karampal area, c. 100 m, yg fr. 4 Nov. 1988, *Burley, Tukirin et al.* 1122 (K!). **ANAMBAS ISLANDS.** Bunguran Island, Ulu Helling, G. Ranai, Brantian Forest Reserve, 150 m, fr. 9 April 1928, *van Steenis* 1101 (K!). **SABAH.** Tawau Distr., fl. 17 Dec. 1973, *F. Minjulu* SAN 79063 (FHO!, FRI, K, L, SAN, SAR); Tawau Distr., Tawau Road mile 42, c. 30 m, fr. 24 Feb. 1970, *Saikeh* SAN 64755 (FHO!, K, L, SAN, SAR, SING). **SARAWAK.** 1st Div., Datu Protected Forest, 90 m, ♂ fl. 24 Feb. 1980, *Bernard Lee* S. 41940 (FHO!, FRI, K, L, SAN, SAR); 2nd Div., S'ggang Road, mile 85, Ulu Sg. Silantek Kiri, Gg Silantek, 900 m, female fl. 24 Feb. 1981, *Ilias Paie* S. 42630 (FHO!, FRI, L, K, MO, SAN, SAR); 3rd Div., Hose Mts, Mujong, Ulu Temiai, c. 950 m, fr. 23 March 1964, *P. S. Ashton* S. 16532 (A, BO, FHO! FRI, K, L, MEL, SAN, SAR, SING). **BRUNEI.** Temburong, NE spur-ridge of Bukit Bebelong, opposite Sg. Tulan, Temburong R. catchment, Apoi Forest Reserve, fl. 16 July 1993, *Sands* 5829 (K!). **KALIMANTAN.** NE, N of Nunukan Island, 100 m, fl. 14 Dec. 1953, *Kostermans* 9041 (K!); Amai Ambit, fr. 1893 – 4, *Hallier* 3305 (K!).

ECOLOGY. Lowland to ridge and hill forest; to 650 m on a wide range of soils. Ants sometimes build black 'carton' tunnels on the under-surface of leaflets.

***Aglaia tomentosa* Teijsm. & Binn. subsp. *kabaensis* (Baker f.) C. M. Pannell comb. et stat. nov.**

Aglaia kabaensis Baker f., J. Bot. 62 Suppl.: 19 (1924).

The lower leaflet surface of var. *kabaensis* has fewer hairs than subsp. *tomentosa* and the fruits are pear-shaped.

VERNACULAR NAME. Langsung langsung (Malay).

DISTRIBUTION. Sumatra and Sabah, with one record from the west of Sarawak, Kalimantan.

REPRESENTATIVE SPECIMENS. **SUMATRA.** Foot of Kaba, fr. 1881, *Forbes* s.n. (K!). **SARAWAK.** 1st Div., at the foot of Mt Poi, *M. & J. Clemens* 21702 (field no. 6708). **SABAH.** Sandakan Distr., Sepilok Forest Reserve, fl. 11 June 1970, *P. P. Sam, Dewol & Kuntil* SAN 78268 (FHO!, FRI, K, L); Kota Merudu Distr., W of Bt Madalon, fr. 19 Nov. 1981, *Aban G.* SAN 94273 (FHO!, FRI, SAN, SAR). **KALIMANTAN.** C. Kalimantan, Sintang, HPH km 84, along new subsidiary logging road to W, 170 m, fr. 28 April 1994, *Church, Mahyar, Indah, Ismail & Hamzah* 1213 (K!); same locality, along main logging road and cutting block environs up to 100 m, fl. 8 April 1994, *Church, Mahyar, Indah, Ismail & Hamzah* 759 (K!).

ECOLOGY. Forest to 1600 m. Fruits edible.

Variation patterns in *Aglaia*

In her monograph of the genus *Aglaia*, Pannell (1992) recognised different kinds of species based on their degree of morphological isolation from other species and the level of variation within them. The taxonomically isolated species are distinct from all other species in the genus and usually exhibit little variation. The pairs or groups of species consist of two or more 'closely related' species (based on characters of the flower, fruit and indumentum), each of which is distinct, although morphologically similar, from the others in the group. Some species within these pairs or groups are variable in their morphology. In some species, the variation is so great that it is described as complex. In this paper most of the variation in the variable and complex species is resolved for Borneo and this is summarised in Table 1. The resulting modified version of the table from Pannell (1992: 26) is reproduced here (Table 2), with the species which occur in Borneo highlighted and their overall variability indicated.

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Table 1. Diagnostic differences between the subspecies of *Aglaia* species found in Borneo.

Species and subspecies	Distribution	Habit	Leaf	Petiole or rachis	Indumentum type	Indumentum density	Fruit
<i>Aglaia elliptica</i>							
subsp. <i>elliptica</i>	Myanmar, Thailand, Sumatra, Peninsular Malaysia, Borneo, Java, Nusa Tenggara (Bali & Flores), Sulawesi, Philippines	Tree varying greatly in height, to a maximum of 40 m	Imparipinnate	Rachis terete	Reddish brown, pale orange brown or yellowish-brown stellate hairs and scales	Hairs densely covering midrib and sometimes the lateral veins on lower leaflet surface, sparse elsewhere	Fruits to 3.4 × 2.7 cm, pericarp c. 3 mm thick
subsp. <i>clementis</i>	Borneo, possibly one record from Sulawesi	Tree to 25 m	Imparipinnate. Leaflets sometimes more coriaceous than in subsp. <i>elliptica</i> and recurved at the margin	Rachis terete	Reddish brown, pale orange brown or yellowish-brown stellate hairs and scales	Hairs densely covering midrib and sometimes the lateral veins on lower leaflet surface, sparse elsewhere	Fruit larger (to 5 × 4.8 cm), pericarp thicker to 1.2 cm thick
<i>A. exstipulata</i>							
subsp. <i>exstipulata</i>	Myanmar, Thailand, Vietnam, Peninsular Malaysia, Singapore, not in Borneo	Tree to 25 m	Imparipinnate. Leaflets 11 – 23, 6 – 16 × 1.5 – 4 cm	Rachis terete	Compact, reddish-brown stellate hairs	Numerous on the lower leaflet surface, with fewer, smaller, paler, stellate hairs or scales interspersed	Subglobose or pear-shaped
subsp. <i>brunneostellata</i>	Endemic to Borneo	Tree to 15 m	Imparipinnate. Leaflets 7 – 11, 4.5 – 10.5 × 2.5 – 6 cm, length/breadth ratio less than in the type subspecies	Rachis terete	The reddish-brown stellate hairs on the lower leaflet surface are darker than in the type subspecies	The darker stellate hairs are visible to the naked eye as evenly-distributed brown dots	Subglobose
<i>Aglaia lawii</i> group and <i>A. teysmanniana</i>							
<i>Aglaia lawii</i> subsp. <i>lawii</i>	India		Imparipinnate	Rachis terete	Peltate scales only	Numerous on lower leaflet surface	Pear-shaped

<i>Aglaia lawii</i> subsp. <i>oligocarpa</i>	Thailand, Sumatra, Peninsula Malaysia, Borneo, Philippines	Tree to 30 m	Imparipinnate	Rachis terete	Peltate scales only	Few to almost absent on lower leaflet surface	Subglobose
<i>Aglaia lawii</i> subsp. <i>submonophylla</i>	Endemic to Kalimantan	Small tree, not more than 5 m tall	Simple or compound with few leaflets	Petiole terete	Peltate scales only, those on the inflorescence often with a fimbriate margin	Few on leaves, mainly on midrib on lower side	The pericarp is thin and moulds around the one to three seeds when dry
<i>Aglaia beccarii</i>	Borneo and one record from the Philippines	Tree usually to 15 m, sometimes to 25 m	Imparipinnate	Rachis often narrowly winged	Variable mixture of peltate and stellate scales and stellate hairs	Few to numerous on lower leaflet surface	The pericarp is thin and moulds around the one to three seeds when dry
<i>Aglaia</i> <i>teysmanniana</i>	China, Vietnam, Thailand, Sumatra, Peninsular Malaysia, Borneo, Philippines, Java, Sulawesi	Tree to 20 m tall.	Imparipinnate	Rachis terete	Stellate hairs and scales only	Few to numerous on lower leaflet surface	subglobose

A. tenuicaulis

subsp. <i>tenuicaulis</i>	Thailand, Sumatra, Peninsular Malaysia, Singapore, Bunguran Is, Borneo, Philippines (Samar)	Small tree to 5 m, unbranched or with a few ascending branches	Imparipinnate, leaflets 7 – 9	Rachis terete	Stellate hairs often with arms of varying lengths	Numerous on lower leaflet surface	Fruits ellipsoid or globose
subsp. <i>semengohensis</i>	Endemic to western Sarawak	Larger, branched, tree to 15 m	Imparipinnate, leaflets 9 – 11	Rachis terete	Stellate hairs more compact, with arms of similar lengths	Numerous on lower leaflet surface	Fruits ellipsoid or subglobose

A. tomentosa

subsp. <i>tomentosa</i>	S. India, Vietnam, Laos, Thailand, Sumatra, Peninsular Malaysia, Singapore, Anambas Islands, Java, Borneo, Philippines, Sulawesi, Nusa Tenggara (Flores), New Guinea, Australia	Tree to 20 m tall	Imparipinnate. Leaflet base rounded or cuneate	Rachis terete	Stellate hairs numerous on lower leaflet surface	Arms of adjacent hairs overlap	Fruit usually subglobose
subsp. <i>cordata</i>	Thailand, Sumatra, Peninsular Malaysia, Singapore, Anambas Islands, Java, Borneo, Philippines	Tree to 20 m tall	Imparipinnate. Leaflet base cordate	Rachis terete	Stellate hairs numerous on lower leaflet surface	Arms of adjacent hairs overlap	Fruit subglobose
subsp. <i>kabaensis</i>	Sumatra, Borneo	Tree to 15 m tall	Imparipinnate. Leaflet base rounded or cuneate	Rachis terete	Hairs less numerous	Arms of adjacent hairs do not overlap	Fruit pear-shaped

Table 2. Species groups and variability recognised in *Aglaia*

Variable species are marked with an asterisk (*) and complex species with two asterisks (**). The species which occur in Borneo are in bold. Borneo endemics are marked (E), those species which are variable, occur in Borneo and are the subject of this paper are marked (V). (Based on Table 2 in Pannell (1992), with corrections).

Section *Amoora*

1. **A. cucullata**
2. *A. australiensis*
3. *A. flavida*, ***A. macrocarpa**, **A. malaccensis**
4. **A. rugulosa**, **A. erythrosperma**, ***A. spectabilis**
5. **A. multinervis**
6. *A. lepidopetala*, *A. meridionalis*
7. *A. densitricha*
8. **A. rubiginosa**
9. **A. penningtoniana*
10. ****A. lawii (V)**, **A. beccarii (E)**, ***A. teysmanniana**

Section *Aglaia*

1. ***A. grandis**, **A. ramotricha (E)**
2. **A. pachyphylla**, *A. bourdillonii*, ***A. eximia**, ***A. argentea**
3. **A. squamulosa**, **A. densisquama (E)**, *A. subcuprea*
4. **A. lancilimba**, *A. lepiorrhachis*
5. *A. chittagonga*
6. ****A. elaeagnoidea**, *A. smithii*
7. **A. variisquama**, **A. rimosa*, *A. costata*
8. **A. agglomerata*, ***A. speciosa**, ****A. korthalsii**, **A. apiocarpa*, **A. scortechinii**, **A. glabrata**
9. *A. flavescens*, *A. rubrivenia*, **A. samoensis*, *A. gracilis*, **A. vitiensis*, *A. unifolia*, *A. leucoclada*
10. ***A. silvestris**, *A. perviridis*, **A. glabriflora**, ***A. leptantha**, **A. stellatopilosa (E)**, *A. cremea*, **A. forbesii**, ***A. foveolata**
11. **A. crassinervia**, ***A. sexipetala**
12. *A. parviflora*, *A. heterotricha*, ***A. leucophylla**, ****A. edulis**, *A. macrostigma*
13. ***A. odoratissima**, **A. luzoniensis (E)**, *A. yzermannii*, **A. rivularis (E)**, *A. brassii*
14. *A. amplexicaulis*
15. **A. puberulanthera*, *A. euryanthera*, *A. polyneura*, *A. sapindina*, *A. ceramica*
16. *A. parksii*, **A. subminutiflora*, **A. basiphylla*, *A. evansensis*, **A. subsessilis (E)**, ****A. elliptica (V)**, **A. lancifolia**, *A. conferta*, *A. aherniana*, *A. barbanthera*,
17. **A. saltatorum*, **A. mariannensis*
18. **A. cumingiana**
19. **A. laxiflora (E)**
20. *A. pyriformis*
21. **A. coriacea**
22. *A. odorata*, *A. pleuropteris*
23. ***A. oligophylla**, **A. meliosmoides**, ***A. simplicifolia**, **A. neotenica (E)**, **A. sessilifolia (E)**, **A. sterculioides (E)**
24. **A. monozyga**
25. ***A. tenuicaulis (V)**, *A. membranifolia*, **A. rufinervis**, ***A. exstipulata (V)**, **A. bullata (E)**, **A. palembanica**, *A. fragilis*, *A. brownii*, ****A. tomentosa (V)**, *A. integrifolia*, **A. angustifolia**, **A. hiernii**, *A. cuspidata*, **A. rufibarbis**, *A. archboldiana*