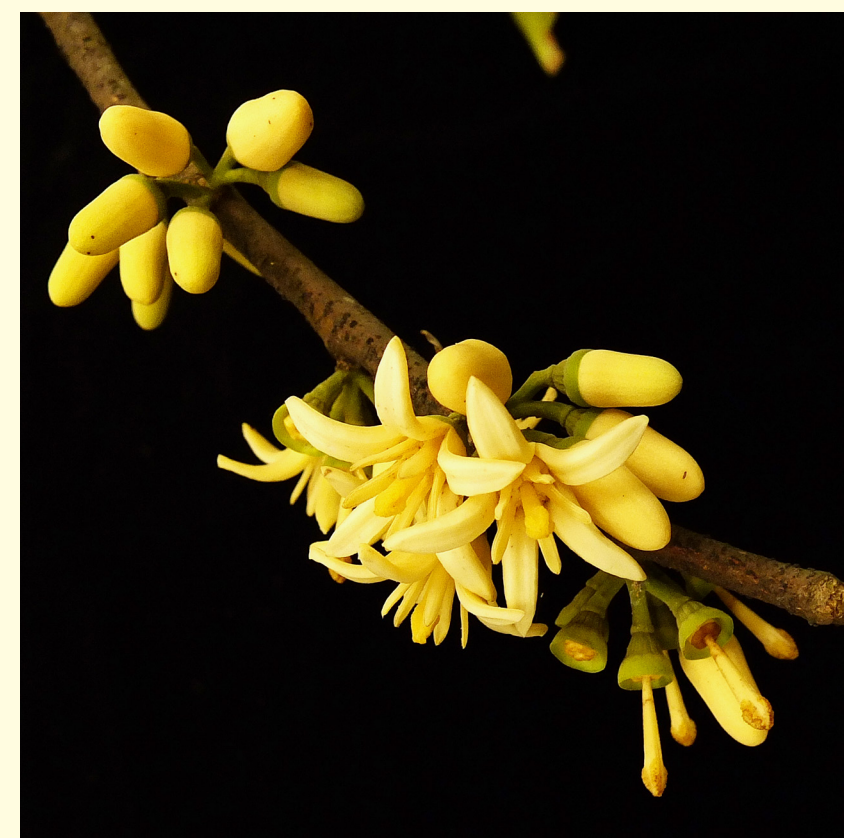


Volume 24 — 2020

Cornaceae – 2



Series I – Seed Plants

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Flora Malesiana

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(W.J.J.O. de Wilde & B.E.E. Duyfjes)

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ABSTRACT

Flora Malesiana. Series I, Volume 24 (2020) iv + 1–66, by W.J.J.O. de Wilde & B.E.E. Duyfjes, published by Naturalis Biodiversity Center, The Netherlands, under the auspices of Foundation Flora Malesiana.¹

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Contains a taxonomic revision of Cornaceae for Malesia, i.e., the area covering the countries Malaysia, Singapore, Indonesia, Brunei Darussalam, The Philippines, East Timor, and Papua New Guinea.

W.J.J.O. de Wilde & B.E.E. Duyfjes, **Cornaceae – 2**, pp. 1–66.

In Malesia there are two native genera. The largest genus *Alangium*, with 4 sections, comprises 36 species, the genus *Mastixia* (Cornaceae) with 10 species has been formerly treated in Flora Malesiana (see list of revised families).

The introductory part contains a chapter on wood anatomy (by P. Baas). The genus, section, and species treatments comprise keys, references, synonyms, typifications, descriptions, distributions, notes on habitat & ecology, and miscellaneous notes.

The treatment is illustrated with 19 line drawings, 1 map, and 1 plate.

Index to accepted names and synonyms, pp. 67–68.

List of revised families in Flora Malesiana, pp. 69–70.

¹ Desk-editing: C.G.G. Baak.

CORNACEAE – 2

(part II, former Alangiaceae)¹

(W.J.J.O. de Wilde & B.E.E. Duyfjes, Leiden, The Netherlands)

Cornaceae Bercht. & J.Presl, *Prir. Rostlin* 2 (23) (1825) 91, 92, nom. cons. — Type: *Cornus* L.

Alangiaceae DC., *Prodr.* 3 (1828) 203, nom. cons. — Type: *Alangium* Lam., nom. cons.

Trees or shrubs (rarely rhizomatous herbs), rarely scandent. *Leaves* simple, alternate (*Alangium*) or opposite, margin entire (rarely lobed), pinnately or palmately veined, exstipulate, petiolate. *Inflorescences* terminal or lateral; flowers small, in cymose (thyrsoid) panicles, rarely in umbels or heads. *Flowers* hermaphroditic (rarely dioecious), regular, 4–6-merous; *calyx* adnate to ovary (ovary inferior), campanulate, smooth or ribbed, *limb* (free part of calyx) 4–10-dentate or -lobed (or entire); *petals* free or coherent at base, alternate with calyx lobes, valvate; *stamens* 4 or more (many), in one whorl, alternating with petals when few, filaments free, filiform or broader, anthers 2-thecate, dehiscing lengthwise, basifixed or dorsifixed; disc pulvinate, around base of style; *ovary* inferior, 1- or 2- (or 3-)locular, style 1, filiform or broader, stigma capitate, conical or truncate or deeply 2-lobed, ovules 1 in each locule, apical, pendulous. *Fruit* drupaceous, (sub)globose or ellipsoid, endocarp (stone) smooth or ribbed, 1- or 2- (or 3-)locular, the fruit with 1 or 2 seed(s). *Seeds* oblong, albumen carnosous, cotyledons leaf-like, radicle terete.

DISTRIBUTION

Two genera (see next paragraph), *Cornus*, c. 60 species world-wide, but not in Malesia, and *Alangium*, c. 50 species in Africa and SE Asia, to east into the Pacific.

The distribution of Cornaceous fossils, known from the northern hemisphere, was summarized by Kubitzki (2004). Fossils of *Alangium* (Eyde et al. 1969) are from North America and E Asia (Eocene), and from there the genus probably dispersed to Africa and Madagascar. The present main diversification of *Alangium* is in SE Asia (and east into the Pacific to Fiji and New Caledonia). The here accepted four sections (see below) in *Alangium* were mainly conceived by Bloembergen (1939) and corroborated by Eyde (1968). All 4 sections have a wide distribution within the overall genus distribution, but they are not similar. All occur in Malesia.

Bloembergen (1939) published distribution maps of the sections, including distributions of the species. In Fig. 1 the areas of the four sections are indicated. Only the sections *Alangium* and *Marlea* (Roxb.) Baill. reach into Africa (with few species, the status of the dioecious *A. grisolleoides* Capuron from Madagascar is not considered). Section *Rhytidandra* (A.Gray) Baill. is clearly eastern and sect. *Conostigma* Bloemb. is largely in the centre of the overall genus distribution.

1) Part I: K.M. Matthew, *Flora Malesiana* ser. 1, 8 (1977) 85–97: *Mastixia*, now part of Nyssaceae.

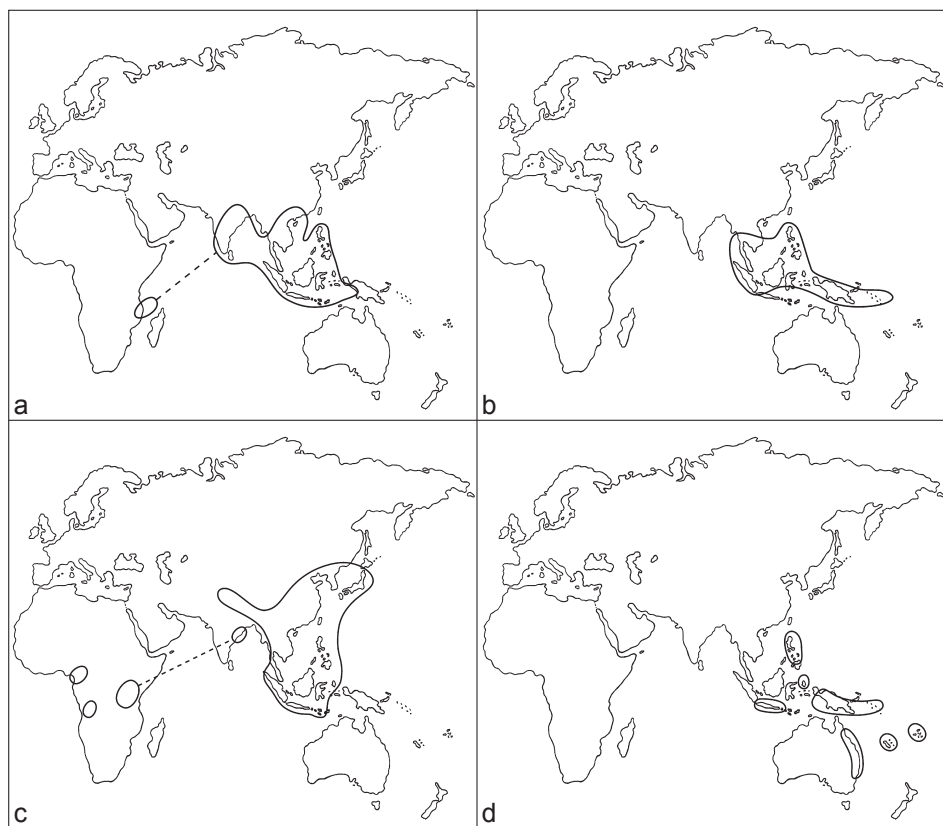


Fig. 1. Distribution areas of the 4 sections in *Alangium* Lam. a. Sect. *Alangium*; b. sect. *Conostigma* Bloemb.; c. sect. *Marlea* (Roxb.) Baill.; d. sect. *Rhytidandra* (A.Gray) Baill. Drawn by Jan van Os.

According to Eyde (1968: f. 10) sect. *Conostigma* is likely basal to the other three sections. Notably, the islands of Java and the Philippines, harbour representatives of all four sections. If the sections are really monophyletic then the genus seemingly experienced a checkered history (the wood anatomy of *Alangium* shows sect. *Conostigma* to be distinct from the other sections, see below).

References: Bloembergen, S., A revision of the genus *Alangium*, Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 139–235. — Eyde, R.H., Flowers, fruits, and phylogeny of Alangiaceae, J. Arnold Arbor. 49 (1968) 167–192. — Eyde, R.H., A. Bartlett & S. Barghoorn, Fossil record of *Alangium*, Bull. Torrey Bot. Club 96 (1969) 288–314. — Kubitzki, K., Cornaceae, in: K. Kubitzki (ed.), Fam. Gen. Vasc. Pl. 6 (2004) 82–90. Springer-Verlag, Berlin, etc.

TAXONOMY

The former variable content of the family Cornaceae was summarized in the paragraph Phylogeny in Kubitzki (2004: 85), who accepted a broad concept with 7 genera (including the SE Asian *Alangium*, *Mastixia* Blume and *Nyssa* L.). However, several classifi-

cations of these genera exist. Wasscher (1948) treated Nyssaceae with as single genus *Nyssa* (one species). Matthew (1977) concluded that for the Malesian area Cornaceae comprised only the genus *Mastixia* (10 species). According to APG (2016), Cornaceae s.lat. falls apart into two subclades, which can be regarded as families, viz. Nyssaceae with *Nyssa* and *Mastixia* (as accepted by Chung 2006) and Cornaceae with *Cornus* and *Alangium*, comprising in Malesia only the genus *Alangium*. Hence, Cornaceae in the present Flora Malesiana instalment differs from that by Matthew (1977).

References: APG (Angiosperm Phylogeny Group), An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV, Bot. J. Linn. Soc. 181 (2016) 1–20. — Chung, R.C.K., Nyssaceae, in: R. Kiew, R.C.K. Chung, L.G. Saw & E. Soepadmo (eds.), Guide to preparing manuscripts for the Flora of Peninsular Malaysia (2006) 27–39. Forest Research Institute Malaysia, Kepong. — Kubitzki, K., Cornaceae, in: K. Kubitzki (ed.), Fam. Gen. Vasc. Pl. 6 (2004) 82–90. Springer-Verlag, Berlin, etc. — Matthew, K.M., Cornaceae, in: C.G.G.J. van Steenis (ed.), Fl. Males., Ser. I, 8 (1977) 85–97. Sijthoff & Noordhoff International Publishers, Alphen aan den Rijn. — Wasscher, J., Nyssaceae, in: C.G.G.J. van Steenis (ed.), Fl. Males., Ser. I, 4 (1948) 29–31. Noordhoff-Kolff N.V., Djakarta.

1. ALANGIUM

Alangium Lam., Encycl. 1 (1783) 174, nom. cons.; C.B.Clarke in Hook.f., Fl. Brit. India 2 (1879) 741 (as Cornaceae); Wangerin in Engl., Pflanzenz. 41.IV.220b (1910) 6 (as Alangiaceae); Ridl., Fl. Malay Penins. 1 (1922) 892 (as Cornaceae); Evrard in Lecomte et al., Fl. Indo-Chine 2 (1923) 1184 (as Cornaceae); Craib, Fl. Siam. 1 (1931) 805 (as Alangiaceae); Bloemb., Blumea 1 (1935) 241; Bull. Jard. Bot. Buitenzorg, sér. 3, 16, 2 (1939) 140 (as Alangiaceae); Backer & Bakh.f., Fl. Java 2 (1965) 160 (as Alangiaceae); Tardieu in Aubrév. & Tardieu, Fl. Cambodge, Laos & Vietnam 8 (1968) 36 (as Alangiaceae); Hewson, Fl. Australia 22 (1984) 11 (as Alangiaceae); P.H.Hô, Ill. Fl. Vietnam 2, 1 (1992) 137 (as Alangiaceae); Berhaman in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 5 (as Alangiaceae); S.Gardner et al., Forest trees of northern Thailand (2000) 213; H.N.Qin & Phengklai in C.Y.Wu et al., Fl. China 13 (2007) 304 (as Alangiaceae); S.Gardner et al., Forest trees of southern Thailand 1 (2015) 386 (as Cornaceae); Kubitzki, Fam. & Gen. Vasc. Pl. 6 (2004) 89 (as Cornaceae); W.J.de Wilde et al. in Chyam. & Balslev, Fl. Thailand 14 (2018) 14 (as Cornaceae). — Type: *Alangium decapetalum* Lam., typ. cons. (= *Alangium salviifolium* (L.f.) Wangerin).

Kara-angolam Adans., Fam. Pl. 2 (1763) 84, 532 ('*karangolam*'), nom. rej. — *Karangolum* Kuntze, Revis. Gen. Pl. 1 (1891) 272, orthographic variant. — Type: *Alangium hexapetalum* Lam. (= *Alangium salviifolium* (L.f.) Wangerin subsp. *hexapetalum* (Lam.) Wangerin).

Angolam Adans., Fam. Pl. 2 (1763) 85, 518, nom. rej. — Type: '*H.M. 4 t. 17*'. (= *Alangium decapetalum* Lam.) (= *Alangium salviifolium* (L.f.) Wangerin).

Marlea Roxb., Pl. Coromandel 3 (1820) 80; C.B.Clarke in Hook.f., Fl. Brit. India 2 (1879) 742. — Type: *Marlea begoniifolia* Roxb. ('*begonifolia*') (= *Alangium chinense* (Lour.) Harms).

Diacicarpium Blume, Bijdr. 13 (1826) 657. — Type: *Diacicarpium tomentosum* Blume (= *Alangium rotundifolium* (Hassk.) Bloemb.).

Rhytidandra A.Gray, Proc. Amer. Acad. Arts 3 (1853) 3. — Type: *Rhytidandra vitiensis* A.Gray (= *Alangium vitiense* (A.Gray) Baill.).

Pseudalangium F.Muell., Fragm. 2, 13 (1860) 84. — Type: *Pseudalangium polyosmoides* F.Muell. (= *Alangium polyosmoides* (F.Muell.) W.J.de Wilde & Duyfjes).

Trees, (scandent) shrubs, or lianas; trunk with buttresses and/or stilt-roots, thorns sometimes present; twigs usually hairy towards apex, hairs simple or stellate. *Leaves* alternate, simple; petiole often at both ends drying joint-like (sect. *Marlea*); lamina: margin

entire, rarely $\pm$ lobed; venation completely pinnate or 3–5(–7)-veined from the base; domatia sometimes present; stipules absent. *Inflorescences* axillary, essentially cymose, either a single peduncled cyme, or compound, without or with a terminal bud, with 1 or 2 short peduncles; bracts small, sometimes caducous or absent. *Flowers* sweetly scented, (4–)5 or 6(–9)-merous, regular, bisexual (but *A. grisolleoides* dioecious, Madagascar); pedicel articulated at apex; *calyx* infundibuliform, comprising the somewhat tapering inferior ovary, at apex confluent with free *calyx limb* with margin truncate or 4–10-lobed; *corolla* in bud elongate; petals white or creamy (also dark yellow or orange outside Malesia), 4–10, linear, valvate, becoming recurved, free or coherent at base; stamens equal in number to petals or 2–4 times as many as petals, (shorter or) nearly as long as petals, in one whorl, filaments straight or geniculate, free or slightly connate at base, usually $\pm$ hairy inside, anthers basifixed, 2-locular, linear, opening lengthwise, connective glabrous or hairy; disc intrastaminal, half-globose or ring-shaped; ovary inferior, 1- (or 2-)locular, each locule with 1 apical pendulous ovule, style single, mostly nearly as long as petals, stigma capitate and lobed, or conical, with 4 longitudinal stigmatic bands, or 2-branched. *Fruit* a drupe, ripening yellow, red, blue or purple, with remnants of calyx limb and disc at apex, ovoid, ellipsoid, or $\pm$ fusiform, flattened or not, often with longitudinal grooves or ribs; endocarp 1- or 2-seeded; embryo nearly as long as the seed, cotyledons foliaceous, radicle straight; endosperm copious, oily.

Distribution — A tropical and subtropical genus with about 50 species; in Africa (2 species), Madagascar (1 species, *A. grisolleoides*), India, Sri Lanka, north to Japan & China through SE Asia to Australia and the Pacific; in *Malesia* 36 species.

Uses — Wood used for house construction (*A. minahassicum* (Bloemb.) W.J.de Wilde & Duyfjes) and canoe building (*A. oblongum* Craib). Of some species the fruits are reported as edible, e.g., those of *A. oblongum* in Central Kalimantan.

MORPHOLOGY

1. *Modes of growth and ramification* — Bloembergen (1935, 1939) distinguished three different modes of growth, but basically there are only two, viz., monopodial and sympodial. These modes appear to correlate with the division in sections (for the sections see the next chapter Taxonomy). Monopodial growth is prevalent in the sections *Alangium* and *Conostigma*, sympodial growth in the sections *Marlea* and *Rhytidandra*, but these assertions need further research.

In spiny plants, which occur in sect. *Alangium*, the spines (thorns) are formed by the terminal bud, and the ramification then occurs from the terminal bud in the compound axillary inflorescence, as explained under ‘Inflorescences’.

2. *Domatia* — Quite distinct domatia are frequent in most species of the sections *Alangium* and *Rhytidandra*; apparently, they are absent in the sections *Conostigma* and *Marlea*. The character is casually mentioned in the species descriptions, but an overall knowledge of their occurrence in *Alangium* is still lacking.

3. *Inflorescences* — Basically, the sole inflorescence unit is a peduncled cyme with numerous flowers, solitary in the axil of a leaf. This is typical for all species in the sec-

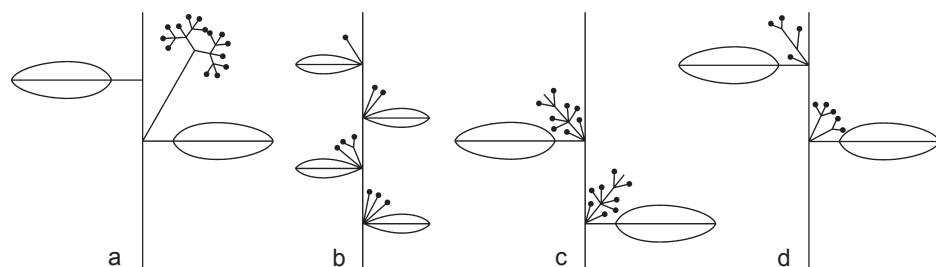


Fig. 2. Schematic presentation of inflorescences as found in the four sections of *Alangium*, illustrating putative phylogenetic morphological development. a. Simple single peduncled cyme, axillary to leaves (sect. *Marlea*, *Rhytidandra*); b. hypothetic stage towards compound inflorescence derived from picture a. by contraction; c. compound inflorescence (as in sect. *Alangium*); d. ditto (as in sect. *Conostigma*). Drawn by Jan van Os.

tions *Marlea* and *Rhytidandra*. In the other sections, viz., *Alangium* and *Conostigma*, the inflorescence looks quite different. We assume that the structure of the inflorescence is determined and caused by evolutionary reduction of the numerous-flowered cymes into cymes of only one or a few flowers, which are then tightly compressed into an axillary short-shoot with minute bracts and with a (dormant) terminal bud. This latter form of inflorescence, which by further reduction may become few-flowered, is called *compound*, a term used in the key to the species and in the species descriptions. In practice, in the key to the species, the presence of a single long-pedicelled multi-flowered cyme is a *single* inflorescence, whereas in a compound inflorescence the flowers are usually few in number and subsessile, or only short-peduncled, with one or few peduncle(s) per leaf axil. The differences are schematically visualized in Fig. 2.

4. *Flowers* — In *Alangium*, as well as in related genera in Cornaceae s.lat., the ovary is completely inferior. The calyx is described as adnate to the ovary (Bloembergen 1935, Kubitzki 2004), except for a saucer- or cup-shaped free limb of which the margin at the apex is straight, toothed, or lobed, as depicted in Fig. 3. In living and dried specimens, the part of the calyx containing the ovary smoothly passes into the limb and commonly these parts show up as one whole. Here, in the species descriptions, however, the parts to be described are named *ovary* (called calyx tube by Bloembergen 1935, 1939), *limb*, and *lobes*. What we call the calyx tube, i.e., the part below the limb, is a hypanthium fused with the ovary as it carries at its apex the calyx (here [calyx] limb and lobes), the petals and the stamens. In longitudinal anatomical sections (Eyde

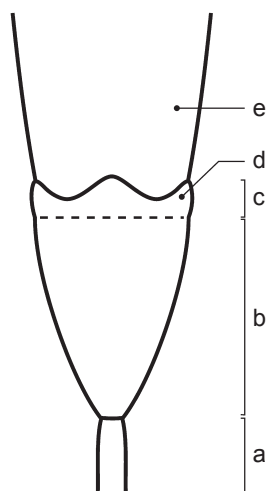


Fig. 3. Schematic lateral view of basal part of flower bud with calyx to illustrate the parts as used in the species descriptions. a. Apical part of pedicel, jointed at apex; b. calyx tube; c. free calyx limb; d. (calyx) lobes; e. petals. Drawn by Jan van Os.

1968: f. 4a) it can be seen that the thick outer wall of the ovary, which passes into the limb, the petals and the stamens, with separate vascular supplies for each, starting from near the base of the ovary.

References: Bloembergen, S., The genus *Alangium* in the Netherlands Indies, *Blumea* 1 (1935) 241–350. — Bloembergen, S., A revision of the genus *Alangium*, *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 139–235. — Eyde, R.H., Flowers, fruits, and phylogeny of *Alangiaceae*, *J. Arnold Arbor.* 49 (1968) 167–192. — Kubitzki, K., *Cornaceae*, in: K. Kubitzki (ed.), *Fam. Gen. Vasc. Pl.* 6 (2004) 82–90. Springer-Verlag, Berlin, etc.

TAXONOMY

Following Bloembergen (1939: 144) there are four sections in the genus *Alangium*, all are represented in Malesia. Their names, definitions, and numbers of species in Malesia are as follows:

1. sect. *Alangium*

Alangium sect. *Alangium*: W.J.de Wilde & Duyfjes, *Thai Forest Bull.*, Bot. 44 (2016) 74. — *Alangium* Lam. sect. *Eualangium* Harms in Engl. & Prantl, *Nat. Pflanzenfam.* 3, 8 (1898) 261, nom. illeg. — Type: *Alangium decapetalum* Lam., typ. cons. (= *A. salviifolium* (L.f.) Wangerin). *Angolam* Adans., *Fam.* 2 (1763) 85, 518, nom. rej. — *Alangium* Lam. sect. *Angolam* (Adans.) Baill., *Hist. Pl.* 6 (1876) 270 ('*Angolum*'); Bloemb., *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 148. — Type: '*H.M. 4 t. 17*'. (= *Alangium decapetalum* Lam.) (= *Alangium salviifolium* (L.f.) Wangerin).

Scandent or erect shrubs or trees; thorns absent or present. *Inflorescence* compound (but sometimes few-flowered), sessile or with a single short peduncle, (essentially) with terminal bud. *Flowers*: petals free; stamens 2–4 times as many as petals; filaments about as long as or longer than anthers; stigma capitate, 4-lobed. *Fruits* few per infructescence, subglobose, not flattened. *Endosperm* superficially grooved; radicle at least half as long as cotyledons.

Distribution — In *Malesia* 2 species: *A. frutescens* Zoll. & Moritzi, *A. longiflorum* Merr.

Note — Thorns are only found in sect. *Alangium*, e.g., *A. indochinense* W.J.de Wilde & Duyfjes, *A. salviifolium* (both not in Malesia), *A. frutescens*, *A. longiflorum*.

2. sect. *Conostigma* Bloemb.

Alangium Adans. sect. *Conostigma* Bloemb., *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 210; W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 29. — Lectotype (here designated): *Alangium ridleyi* King.

Shrubs or trees; thorns absent. *Inflorescence* compound, without (or with) terminal bud, with 1 or 2 short peduncles. *Flowers*: petals free; stamens equal in number to petals; filaments shorter than anthers; stigma conical, with 4 longitudinal stigmatic stripes. *Fruits* few per infructescence, ovoid-ellipsoid, ± flattened. *Endosperm* smooth; radicle (much) shorter than half the length of the cotyledons.

Distribution — In *Malesia* 19 species.

3. sect. *Marlea* (Roxb.) Baill.

Alangium Adans. sect. *Marlea* (Roxb.) Baill., Hist. Pl. 6 (1876) 270; Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 162. — *Marlea* Roxb., Pl. Coromandel 3 (1820 '1819') 80. — *Alangium* Adans. sect. *Eu-Marlea* (Roxb.) C.B. Clarke in Hook.f., Fl. Brit. India 2 (1879) 742, nom. illeg. — Type: *Marlea begoniifolia* Roxb. ('*begonifolia*') (= *Alangium chinense* (Lour.) Harms).
Alangium Adans. sect. *Marleopsis* Baill., Hist. Pl. 6 (1876) 270. — Type: not indicated.

Scandent or leaning shrubs (*A. scandens* Bloemb.) or trees; thorns absent. *Inflorescence* a simple, single, peduncled cyme. *Flowers*: petals free; stamens equal in number to petals; filaments shorter or longer than anthers; stigma capitate, 4-lobed. *Fruits* several per infructescence, ellipsoid, mostly $\pm$ flattened. *Endosperm* smooth; radicle shorter than half the length of the cotyledons.

Distribution — In *Malesia* 5 species.

4. sect. *Rhytidandra* (A.Gray) Baill.

Alangium Adans. sect. *Rhytidandra* (A.Gray) Baill., Adansonia 5 (1864–1865) 193; Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 197; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 75. — *Rhytidandra* A.Gray, U.S. Expl. Exped., Phan. (1854) 302, t. 28. — Type: *Rhytidandra vitiensis* A.Gray (= *Alangium vitiense* (A.Gray) Baill.).
Alangium Adans. sect. *Diplalangium* Baill., Hist. Pl. 6 (1876) 270. — Type: not indicated.
Pseudalangium F.Muell., Fragm. 2, 13 (1860) 84. — *Alangium* Adans. sect. *Pseudalangium* (F.Muell.) C.B. Clarke in Hook.f., Fl. Brit. India 2 (1879) 742. — Type: *Pseudalangium polyosmoides* F.Muell. (= *Alangium polyosmoides* (F.Muell.) W.J.de Wilde & Duyfjes).

Shrubs or trees; thorns absent. *Inflorescence* a simple, single, peduncled cyme. *Flowers*: petals free or connate at base; stamens equal in number to petals; filaments longer or shorter than anthers; stigma 2-armed, stigmatic on the inside. *Fruit* several per infructescence, ellipsoid or ovoid, $\pm$ flattened. *Endosperm* smooth; radicle shorter than half the length of the cotyledons.

Distribution — In *Malesia* 10 species.

Reference: Bloembergen, S., A revision of the genus *Alangium*, Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 139–235.

WOOD ANATOMY

(P. Baas)

The wood anatomy of *Alangium* is well-known (Metcalfe & Chalk 1950, Noshiro & Baas 1998, Sosef et al. 1998, InsideWood (2004 onwards, and literature cited therein, accessed in February 2018). The following information is mainly taken from Noshiro & Baas (1998), who not only gave a detailed wood anatomical description, but also a microscopic wood identification key to species groups and a cladistic analysis of the limited but informative anatomical diversity in Cornaceae and putative allies. Wood anatomically *Alangium* appears nested in the Cornaceae as a well-supported monophyletic group, sister to the genus *Curtisia* Aiton from South Africa. Subgenus *Conostigma* is distinct on account of its exclusively scalariform vessel perforations; the other three subgenera only differ in minor characters (vessel element length; ratio of fibre to vessel element length; presence or absence of crystals; amount of paratracheal parenchyma).

Growth rings usually absent or indistinct and wood diffuse-porous in most Malesian taxa, but wood semi-ring-porous in most specimens and species of sect. *Marlea*. *Vessels* solitary and in radial multiples. *Vessel perforations* exclusively simple in sections *Alangium*, *Marlea*, and *Rhytidandra*; exclusively scalariform in sect. *Conostigma*, with 7–16 bars per perforation. *Intervessel pits* alternate and dense, small in sect. *Conostigma*, large (up to 16 µm in tangential diameter) in the other sections. *Vessel-ray pits* with much reduced borders to simple, round to elongate, horizontal to vertical. *Helical thickenings* absent. *Fibres* very thick-walled and with simple pits in sect. *Conostigma* and thin- to medium-thick-walled with minutely bordered pits in the other sections. *Axial parenchyma* typically diffuse and diffuse-in-aggregates or in narrow tangential lines; in sect. *Marlea* additionally with scanty paratracheal to vasicentric and marginal parenchyma; in many-celled strands. *Rays* heterocellular, 1–5(–8) cells wide and up to 1.4(–2.5) mm tall; composed of procumbent body cells and 2–9 rows of square and upright marginal cells; sheath cells are present but rare in *A. javanicum* (Blume) Wangerin and *A. platanifolium* (Siebold & Zucc.) Harms. *Prismatic crystals* usually present in axial and ray parenchyma. Druses sometimes present in sect. *Marlea*. Silica bodies present in ray and axial parenchyma of *A. javanicum* and *A. nobile* (C.B. Clarke) Harms.

Wood properties and uses of *Alangium* species have been summarized in Sosef et al. (1998). Fossil woods of *Alangium* have been reported from the Eocene of Oregon, USA (Wheeler & Manchester 2002) and the Miocene/Pliocene of India (as *Alangioxylon*, Insidewood 2004 onwards).

References: Insidewood database. <http://insidewood.lib.ncsu.edu> (2004 onwards). — Metcalfe, C.R. & L. Chalk, *Anatomy of the Dicotyledons* (1950) 1500. Clarendon Press, Oxford. — Noshiro, S. & P. Baas, *Systematic wood anatomy of Cornaceae and allies*, IAWA J. 19 (1998) 43–97. — Sosef, M.S.M., L.T. Hong & S. Prawirohatmodjo (eds.), *Plant Resources of South-East Asia* 5, 3. Timber trees: Lesser-known timbers (1998) 859. Backhuys Publishers, Leiden. — Wheeler, E.A. & S.R. Manchester, *Woods of the Eocene nut beds flora, Clarno Formation, Oregon*, IAWA J. Supplement 3 (2002) 180.

FLORISTICS

For facilitating the naming of a specimen, the species known to occur in the following 7 partial areas are listed below.

1. Peninsular Malaysia & Singapore — 12 species

5. *Alangium denudatum*
6. *A. ebenaceum* (var. *ebenaceum*)
8. *A. frutescens* (var. *frutescens*)
11. *A. griffithii*
16. *A. kurzii*
18. *A. longiflorum* (var. *hirsutum*)
20. *A. meyeri* (var. *meyeri*)
23. *A. nobile*
24. *A. oblongum*
25. *A. pallens*
28. *A. ridleyi*
29. *A. rotundifolium*

2. Sumatra — 13 species

5. *Alangium denudatum*
6. *A. ebenaceum* (var. *ebenaceum*)
8. *A. frutescens* (var. *frutescens*)
11. *A. griffithii*
16. *A. kurzii*
18. *A. longiflorum* (var. *hirsutum*)
20. *A. meyeri* (var. *meyeri*)
23. *A. nobile*
24. *A. oblongum*
25. *A. pallens*
28. *A. ridleyi*
29. *A. rotundifolium*
30. *A. scandens*

3. Java & Lesser Sunda Islands — 7 species

3. *Alangium chinense*
8. *A. frutescens* (var. *frutescens*)
11. *A. griffithii*
14. *A. javanicum*
26. *A. pilosum*
29. *A. rotundifolium*
35. *A. villosum*

4. Borneo — 18 species

1. *Alangium borneense*
4. *A. circulare*
5. *A. denudatum*
6. *A. ebenaceum* (var. *ebenaceum*, var. *insignis*)
8. *A. frutescens* (var. *frutescens*)
11. *A. griffithii*
12. *A. havilandii*
14. *A. cf. javanicum*
15. *A. kayuniga*
18. *A. longiflorum* (var. *longiflorum*, var. *hirsutum*)
20. *A. meyeri* (var. *meyeri*, var. *macilentum*)
21. *A. mezianum*
23. *A. nobile*
24. *A. oblongum*
25. *A. pallens*
28. *A. ridleyi*
29. *A. rotundifolium*
30. *A. scandens*

5. Philippines — 5 species

- 3. *Alangium chinense*
- 8. *A. frutescens* (var. *palawanense*)
- 18. *A. longiflorum* (var. *longiflorum*)
- 20. *A. meyeri* (var. *meyeri*)
- 26. *A. pilosum*

6. Sulawesi & Moluccas — 6 species

- 8. *Alangium frutescens* (var. *frutescens*)
- 11. *A. griffithii*
- 18. *A. longiflorum* (var. *longiflorum*)
- 19. *A. maliliense* (var. *maliliense*, var. *celatum*)
- 22. *A. minahassicum*
- 36. *A. warburgianum*

7. New Guinea (incl. Bougainville Is.) — 14 species

- 2. *Alangium brassii*
- 7. *A. ferrugineum*
- 8. *A. frutescens* (var. *frutescens*)
- 9. *A. glabrum*
- 10. *A. gracile*
- 13. *A. holtrungii*
- 17. *A. ledermannii*
- 18. *A. longiflorum* (var. *longiflorum*)
- 19. *A. maliliense* (var. *celatum*)
- 27. *A. plumbeum* (Bougainville Is.)
- 31. *A. solomonense* (Bougainville Is.)
- 32. *A. strigosum*
- 33. *A. subcordatum*
- 34. *A. velutinum*

KEY TO THE SECTIONS AND SPECIES OF ALANGIUM

- 1a. Specimen with flowers 2
- b. Specimen with fruits 5
- 2a. Stamens equal in number to petals 3
- b. Stamens 2–4 times as many as petals 10 (sect. 1. *Alangium*)
- 3a. Stigma capitate or subglobose or conical, either broader than long, or about as long as, or longer than broad 4
- b. Stigma consisting of 2 (or 3) long style arms 34 (sect. 4. *Rhytidandra*)
- 4a. Stigma longer than broad, conical, with 4 longitudinal stigmatic stripes, not lobed 11 (sect. 2. *Conostigma*)
- b. Stigma about as broad as long or broader than long, capitate or subglobose, $\pm$ 4-lobed 30 (sect. 3. *Marlea*)

- 5a. Leaves palminerved or 3–7-plinerved at base 6
- b. Leaves entirely penninerved 8
- 6a. Inflorescence¹ (infructescence) compound, i.e., sessile, composed of one or more than one partial inflorescence, each sessile or with a short peduncle. Fruit subglobose or ovoid or ellipsoid, not flattened 7
- b. Inflorescence¹ simple, with single distinct peduncle. Fruit ovoid or ellipsoid, usually $\pm$ flattened 30 (sect. 3. *Marlea*)
- 7a. Fruit subglobose or ovoid, very minutely hairy (hairs c. 0.1 mm long or less) or glabrous 10 (sect. 1. *Alangium*)
- b. Fruit ovoid, short hairy (hairs > 0.1 mm long) 11 (sect. 2. *Conostigma* (*A. denudatum*, *A. nobile*))
- 8a. Inflorescence¹ simple, i.e., with one single (short or) long common peduncle, (0.5–) 2 cm long or more. Fruits not or hardly flattened 9
- b. Inflorescence (infructescence) essentially compound, with (1 or) 2 (or more) peduncles or single flowers from the leaf axil, *or* with one short (up to 2 cm long) peduncle from the leaf axil. Fruit usually somewhat flattened 11 (sect. 2. *Conostigma*)
- 9a. Scandent or leaning shrub 30 (sect. 3. *Marlea* (*A. scandens*))
- b. Erect shrub or tree 34 (sect. 4. *Rhytidandra*)

Section 1. *Alangium*

- 10a. Shrub-like climber or liana **8. *A. frutescens***
- b. Shrub or tree **18. *A. longiflorum***

Section 2. *Conostigma*

- 11a. Lamina subcircular or broadly ovate, glabrous. — Borneo (Sarawak) **4. *A. circulare***
- b. Lamina usually longer than broad, glabrous or hairy 12
- 12a. Lamina (broadly rounded to) cordate at base. Venation 3(–5)-plinerved at base 13
- b. Lamina (sub)cordate, rounded, cuneate or attenuate at base. Venation pinnate 14
- 13a. Lamina glabrous or short hairy below (hairs c. 0.1 mm long). Peat swamp forest **5. *A. denudatum***
- b. Lamina conspicuously long-hairy below (hairs 0.3–0.5(–1) mm long). Dry land forest **23. *A. nobile***
- 14a. Lamina asymmetric at base. Calyx lobes distinct. Style and lower portion of filaments densely hairy. — Peat swamp forest, Borneo (Brunei, Sarawak) **12. *A. havilandii***
- b. Lamina not or (weakly) asymmetric at base, if asymmetric then no calyx lobes. Calyx limb (sub)truncate or with low lobes. Style and lower portion of filaments hairy or glabrous 15

1) See explanation under morphology.

- 15a. Twigs, leaf bud, inflorescence, flowers and fruit all conspicuously hairy; hairs stellate-dendroid, 0.3–0.5(–1) mm long **19. *A. maliliense***
- b. Twigs, leaf bud, inflorescence, flowers and fruit glabrous or short-hairy; hairs simple, not obviously stellate, to 0.5 mm long 16
- 16a. Petiole long, 2–4.5 cm long. Twigs towards apex conspicuously rusty-hairy. Fruit conspicuously hairy. — E New Guinea (Morobe Prov.) . . **33. *A. subcordatum***
- b. Petiole shorter, 0.4–2.5 (to exceptionally 3) cm long. Twigs, flowers, fruit glabrous or hairy. 17
- 17a. Plant from E Malesia (Sulawesi, Moluccas, New Guinea) or the Pacific (Solomon Is.). Filaments (sub)glabrous or hairy. Leaves often drying blackish or leaden grey 18
- b. Plant from Indochina or W Malesia (incl. Philippines). Filaments usually $\pm$ hairy. Leaves generally drying greenish or brown 21
- 18a. Corolla in bud (12–)15–20 mm long. Filaments hairy . . **22. *A. minahassicum***
- b. Corolla in bud 7–11 mm long. Filaments glabrous or hairy. 19
- 19a. Hairs obvious, c. 0.3 mm long, rendering twigs, inflorescence and flowers hairy. Twigs c. 5 mm diam. **17. *A. ledermannii***
- b. Hairs inconspicuous, c. 0.1 mm long, rendering twigs, inflorescences and flowers (sub)glabrous. Twigs 1–4 mm diam. 20
- 20a. Petals glabrous inside. Filaments glabrous. — New Guinea . . **13. *A. hollrungii***
- b. Petals hairy inside. Filaments hairy. — Solomon Is., Bougainville **27. *A. plumbeum***
- 21a. Stem of twigs stout, 5–10 mm diam. 22
- b. Stem of twigs relatively slender, 1.5–6 mm diam. (preferably check several twigs) 23
- 22a. Corolla in bud usually acute at apex. Fruit 20–30 mm long, smooth or inconspicuously lowly 10-ribbed. Leaves drying purplish below **6. *A. ebenaceum***
- b. Corolla in bud usually blunt. Fruit 30–40 mm long, conspicuously, deeply 10–12(–14)-ribbed. Leaves drying pale brown or greenish brown below **28. *A. ridleyi***
- 23a. Plant (including leaf bud) almost glabrous (minute scales-like hairs less than 0.1 mm long on leaf bud excepted). Stem between the leaves slender, c. 2 mm diam.; leaves small, up to 15 cm long. — Dry land forest northern Borneo **15. *A. kayuniga***
- b. Plant minutely or obviously hairy, at least on leaf bud and apex of young twigs, hairs either c. 0.1 mm long or hairs 0.1–0.5(–1) mm long. Stem between the leaves slender or thicker, to 5 mm diam.; leaves generally (much) longer than 15 cm. 24
- 24a. Apex of twigs, leaf buds, inflorescences, and flowers densely (appressed) hairy, hairs 0.3–0.5(–1) mm long. Fruit either rounded or short-cuneate at base, 1.5–2(–2.5) cm long, drying grey-brown (W Java, Sumatra, Peninsular Malaysia, Borneo), or fruit narrowed at base, 2–3 cm long, drying yellow-green (Borneo) 25

- b. Apex of twigs, leaf buds, inflorescences, and flowers minutely hairy, sometimes appearing as glabrous; hairs less than 0.3 mm long. Fruit $\pm$ rounded (or broadly narrowed) at base, 1.5–3 cm long, drying dark brown or blackish 27
- 25a. Inflorescence (sub)sessile, or with peduncle to 3(–10) mm long. Fruit ovoid-ellipsoid, 15–20(–25) mm long, not narrowed at base. Flowers small, corolla in bud 8–11 mm long. — (Sumatra?), W Java, E Borneo **14. *A. javanicum***
- b. Inflorescence with 1–10 mm long peduncle. Fruit $\pm$ fusiform, narrowed at base, 20–30 mm long. Flowers longer, corolla in bud 12–15 mm long. — Borneo 26
- 26a. Leaf bud in-curved, hairs longer, c. 0.5 mm long **1. *A. borneense***
- b. Leaf bud straight, hairs shorter, 0.2–0.3 mm long **21. *A. mezianum***
- 27a. Twigs stout, 3–5 mm diam. Lamina large, 15–50 cm long, often drying purplish brown below **6. *A. ebenaceum***
- b. Twigs generally relatively slender, 1.5–5 mm diam. Lamina smaller, < 35 cm long, drying (greenish) brown below 28
- 28a. Twigs pale brown or whitish, contrasting with blackish brown drying petioles and peduncle of inflorescences **25. *A. pallens***
- b. Twigs, petioles and peduncle similarly brown (two species difficult to separate) 29
- 29a. Aspect of specimen less robust; twigs 1.5–4 mm diam.; lamina 8–18 cm long, with 6–10 secondary veins at each side; corolla in bud 8–14 mm long; fruits (1–)2–4 per infructescence, 15–25 mm long. — Widespread in W Malesia **20. *A. meyeri***
- b. Aspect of specimen more robust: twigs 2–4(–5) mm diam.; lamina 12–25(–35) cm long, with 8–15 secondary veins at each side; corolla in bud 12–15 mm long; fruits 1–3 per infructescence, 20–30(–35) mm long. — Widespread in W Malesia, but not in Philippines **24. *A. oblongum***

Section 3. Marlea

- 30a. Scandent or leaning shrub. Veins all pinnate **30. *A. scandens***
- b. Erect (shrub or) tree. Veins plinerved at base 31
- 31a. Inflorescence dense, (10–)20–40(–60)-flowered. Lamina at least two times longer than broad **11. *A. griffithii***
- b. Inflorescence loose, (2–)5–20-flowered. Lamina less than two times longer than broad 32
- 32a. Corolla in bud 18–30 mm long, usually swollen at base. Connective conspicuously hairy. Lamina conspicuously hairy below (sometimes glabrescent or truly glabrous, but hair-tufts in nerve-axils often present) **16. *A. kurzii***
- b. Corolla in bud 8–15 mm long, not or slightly swollen at base. Connective glabrous or (sparsely) hairy. Lamina (sub)glabrous below 33
- 33a. Connective glabrous. Twigs grey. Fruit 6–10 mm long **3. *A. chinense***
- b. Connective (sparsely) long-hairy inside. Twigs dark brown. Fruit 16–20(–25) mm long **29. *A. rotundifolium***

Section 4. *Rhytidandra*

- 34a. Flowers larger; corolla in bud (8?–)10 mm long or more. — New Guinea . . . 35
 b. Flowers smaller; corolla in bud 9 mm long or less — Java, Philippines, Lesser Sunda Islands, Moluccas (Bacan Isl.), Bougainville, Solomon Is. 40
- 35a. Ovary and calyx in bud reddish brown hairy. Leaves drying reddish brown . . 36
 b. Ovary and calyx in bud whitish, grey-brown or yellow-brown hairy. Leaves drying (brownish) greenish 38
- 36a. Corolla in bud slender, c. 1 mm diam. Peduncle c. 0.5 mm diam. Style glabrous. Fruit 15–20 mm long **10. *A. gracile***
 b. Corolla in bud rather thick, c. 1.5 mm diam. Peduncle 1–2 mm diam. Style (sparingly) hairy or glabrous. Fruit 15–35 mm long 37
- 37a. Lower lamina surface densely hairy but not velutinous. Style (sparingly) hairy. Fruit long-narrowed towards apex, 30–35 mm long. — Lowland forest to 400 m **7. *A. ferrugineum***
 b. Lower lamina surface velutinous. Style glabrous. Fruit relatively short-narrowed at apex, c. 15 mm long. — Montane forest, 1400–2600 m altitude **34. *A. velutinum***
- 38a. Calyx lobes shorter than limb, in fruit hardly visible (rim of calyx almost straight), and not connivent **2. *A. brassii***
 b. Calyx lobes about as long as or longer than limb, in fruit connivent 39
- 39a. Twigs glabrescent (hairs less than 0.5 mm long). Fruit (25–)30 mm long **9. *A. glabrum***
 b. Twigs towards apex brown-hairy, hairs 0.5–1 mm long. Fruit 12–15 mm long **32. *A. strigosum***
- 40a. Calyx lobes long-triangular, c. 1.5 mm long. — Bacan Is. (Philippines) **36. *A. warburgianum***
 b. Calyx lobes $\pm$ triangular, c. 0.5 mm long or lobes almost absent. 41
- 41a. Corolla in bud 6–7 mm long. — Philippines, Lesser Sunda Islands **26. *A. pilosum***
 b. Corolla in bud 6–8 mm long 42
- 42a. Twigs towards apex, leaves, inflorescences, and flowers (sub)glabrous, hairs c. 0.1 mm long. Style hairy. — Solomon Is. **31. *A. solomonense***
 b. Twigs towards apex, leaves, inflorescences, and flowers densely hairy. Style glabrous. — Java **35. *A. villosum***

IMPORTANT — With the presentation of the species below not all combinations and references are mentioned, due to the large incidence of differing opinions and interpretations of the species circumscriptions. Only the literature relevant for nomenclature or better understanding of the species is given. Additional data can be found in Bloembergen (Bull. Jar. Bot., Buitenzorg, sér 3, 16, 2 (1939) 139–235).

1. *Alangium borneense* Merr. (sect. 2 *Conostigma*)

Alangium borneense Merr., J. Straits Branch Roy. Asiat. Soc. 86 (1922) 342; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 30. — Lectotype (designated here): *Agama 1022* (lecto L (L0009820); isoelecto A, BM, K, P, PNH†), Malaysia, Borneo, Sabah, Batu Lima.

Alangium javanicum (Blume) Wangerin var. *javanicum* auct. non Berhaman: Berhaman, Sandakania 4 (1994) 36; in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 10, p.p., excluding the type from Java.

Trees, to 18 m tall; bole occasionally with stilt-roots and buttresses; bark smooth; *twigs* brown, 3–4 mm diam., at apex hairy; *leaf bud* incurved, densely hairy, hairs c. 0.5 mm long. *Leaves*: *petiole* 0.5–1 cm long; *lamina* drying greenish brown, veins (sparsely) hairy below, narrowly elliptic, 10–23 by 3–6(–8) cm, base almost symmetric, (rounded or) short-cuneate, apex acute and apiculate to 1 cm; venation pinnate, secondary veins 10–15 on each side, loop-veined at least in upper third of blade, tertiary venation thin, (sub)scalariform. *Inflorescences* hairy, per leaf axil 1 or 2 (or 3) main branches (peduncles), each few-branched, 2–7-flowered; *peduncle(s)* 1–10 mm long. *Flowers* densely appressed hairy; *pedicel* 3–5 mm long; *corolla in bud* 12–15 mm long, base not swollen, apex acute; *ovary* 3–4 mm long, ribbed; *calyx limb* (sub)erect 1–1.5 mm long, at margin c. 4 mm wide, (sub)truncate or obscurely toothed; *petals* 5 or 6, inside glabrous, 10–17 mm long; *stamens* 5 or 6, filament glabrous, c. 5 mm long, somewhat flattened, without thickened portion near base, anther 5–9 mm long, connective glabrous; *style* densely appressed hairy for the larger part, 7–15 mm long, stigma conical. *Fruit* edible, 1 (or 2) per infructescence, green, ripening pink or red, yellow-green when dry, densely minutely hairy (hairs yellowish green, c. 0.1 mm long), (narrowly) ellipsoid, narrowed at base and apex ($\pm$ fusiform), 20–30 by c. 14 mm, finely ribbed; *calyx remnant* narrow, often contracted, subtruncate.

Distribution — Borneo (Brunei, Sarawak, Sabah (most collections), W & E Kalimantan).

Habitat & Ecology — Lowland mixed dipterocarp forest, flat land or undulating country, along rivers and hillsides, also in swampy forest; basalt, sandy clay, podsol, and (yellow) sandy soil. Altitude: from sea-level to 600 m. Flowering and fruiting: all year round.

Vernacular names — *Malesia*: Borneo: Sarawak: Midong (Iban), Aru (Kayal); Sabah: Kagukapan (Sungei Kinabatangan), Kondolon, Satu Inchi.

Uses — Wood used for canoe paddles.

Note — *Alangium borneense* resembles *A. meizianum*; the latter is generally stouter in all parts (but not the fruit), its tomentum of twig apex and leaf bud is shorter (hairs 0.2–0.3 mm only), its leaf bud is (almost) straight, and its filaments are hairy at apex. In *A. borneense* the leaf bud is characteristically strongly incurved and densely woolly hairy, obscuring the juvenile lateral veins, and the filaments are glabrous.

2. *Alangium brassii* W.J.de Wilde & Duyfjes (sect. 4 *Rhytidandra*)

Alangium brassii W.J.de Wilde & Duyfjes, Blumea 62 (2017) 76. — Type: *Brass* 22578 (holo L), Papua New Guinea, Milne Bay Province, north slopes of Mt Dayman, Maneau Range.

Slender treelets, 1–5 m tall; *twigs* 1.5–2.5(–4) mm diam., dark brown, at apex and leaf bud(s) with (dense) golden or greyish brown hairs, 0.1–0.3 mm long. *Leaves*: *petiole* 0.4–0.6 cm long, late glabrescent; *lamina* subcoriaceous, drying greenish, glabrescent (except midrib at base below), elliptic, 7–12 by 2.5–5 cm, base asymmetric, attenuate, apex acute to acuminate; venation pinnate, secondary veins 4 or 5 at each side, tertiary venation reticulate, ultimate areoles small, distinct. *Inflorescences* hairy as the twigs, glabrescent, simple, 2–5-flowered, peduncle 5–10 mm long. *Flowers* yellow, minutely (pale) greyish brown-hairy, hairs c. 0.1 mm long; *pedicel* 2–3 mm long; *corolla in bud* 10–12 mm long, c. 1.5 mm diam., base not swollen, apex obtuse; *ovary* c. 1.5 mm long, not ribbed, greyish or yellowish brown-hairy, *calyx limb* c. 1 mm long, at margin c. 2 mm wide, unlobed (straight) or faintly lobed, not spreading; *petals* 4, inside glabrous, except minutely hairy at base, connate into a tube, 0.5–1 mm long; *stamens* 4, filament c. 3 mm long, minutely hairy, anther c. 6 mm long, thecae slightly sagittate at base, connective glabrous; *style* glabrous, c. 6 mm long; stigma 2-lobed, lobes 1.5–2 mm long. *Fruits* 1–3 per infructescence, ripening colour unknown, glabrous, obovoid-ellipsoid, 13–15 by 6–7 mm, finely 8–10-ribbed, base $\pm$ narrowed, apex nearly rounded; *calyx remnant* minute, lobes hardly visible, not connivent.

Distribution — *Malesia*: Papua New Guinea (Milne Bay, north slopes of Mt Dayman).

Habitat & Ecology — Abundant in undergrowth in dryish forest of slopes, occasional in mossy forest. Altitude: 2000–2230 m. Flowering and fruiting: May, June.

Notes — 1. *Alangium brassii* is known from two collections, both from about the same locality, viz. the type, *Brass* 22578 ‘abundant in undergrowth, dryish forest of slopes’ at 2000 m alt. and *Brass* 22698 (L) ‘occasional in mossy forest undergrowth’ at 2230 m alt.

2. In species of sect. *Rhytidandra* domatia are commonly present in the axils of the lateral veins, however, in *A. brassii* there are no real domatia but rather distinct round glands at some distance from the vein axils.

3. *Alangium chinense* (Lour.) Harms (sect. 3 *Marlea*)

Alangium chinense (Lour.) Harms, Ber. Deutsch. Bot. Ges. 15 (1897) 24 (non Rehder 1916); Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 169; Evrard in Lecomte et al., Fl. Indo-Chine 2 (1923) 1187; Craib, Fl. Siam. 1 (1931) 805; Verdc. in Turrill & Milne-Redh., Fl. Trop. E. Africa (1958) 3, f. 1; Backer & Bakh.f., Fl. Java 2 (1965) 161; Tardieu in Aubrév. & Tardieu, Fl. Cambodge, Laos & Vietnam 8 (1968) 43, pl. 4: 6–10; S.Gardner et al., Forest Trees of northern Thailand (2000) 214, f. 465; H.N.Qin & Phengkhai in C.Y.Wu et al., Fl. China 13 (2007) 305; W.J.de Wilde & Duyfjes in Chayam. & Balslev, Fl. Thailand 14 (2018) 19. — *Stylidium chinense* Lour., Fl. Cochinch. 1 (1790) 221. — *Alangium chinense* (Lour.) Rehder in Sarg., Pl. Wilson. 2 (1916) 552, nom. superfl. — Lectotype (designated here): *Loureiro s.n.* (lecto BM (BM000944974)), Vietnam.

Marlea begoniifolia Roxb., Pl. Coromandel 3 (1820 ‘1819’) 80, pl. 283 (‘*begoniifolia*’). — *Alangium begoniifolium* (Roxb.) Baill., Hist. Pl. 6 (1876) 270 (‘*begoniaefolium*’); Wangerin in Engl., Pflanzenr. 41.IV.220b (1910) 20. — Lectotype (designated by Verdcourt 1958): *Roxburgh’s drawing* No. 2228 (lecto K), drawn from a cultivated plant probably from India, Assam, Khasia Hills, Silhet.

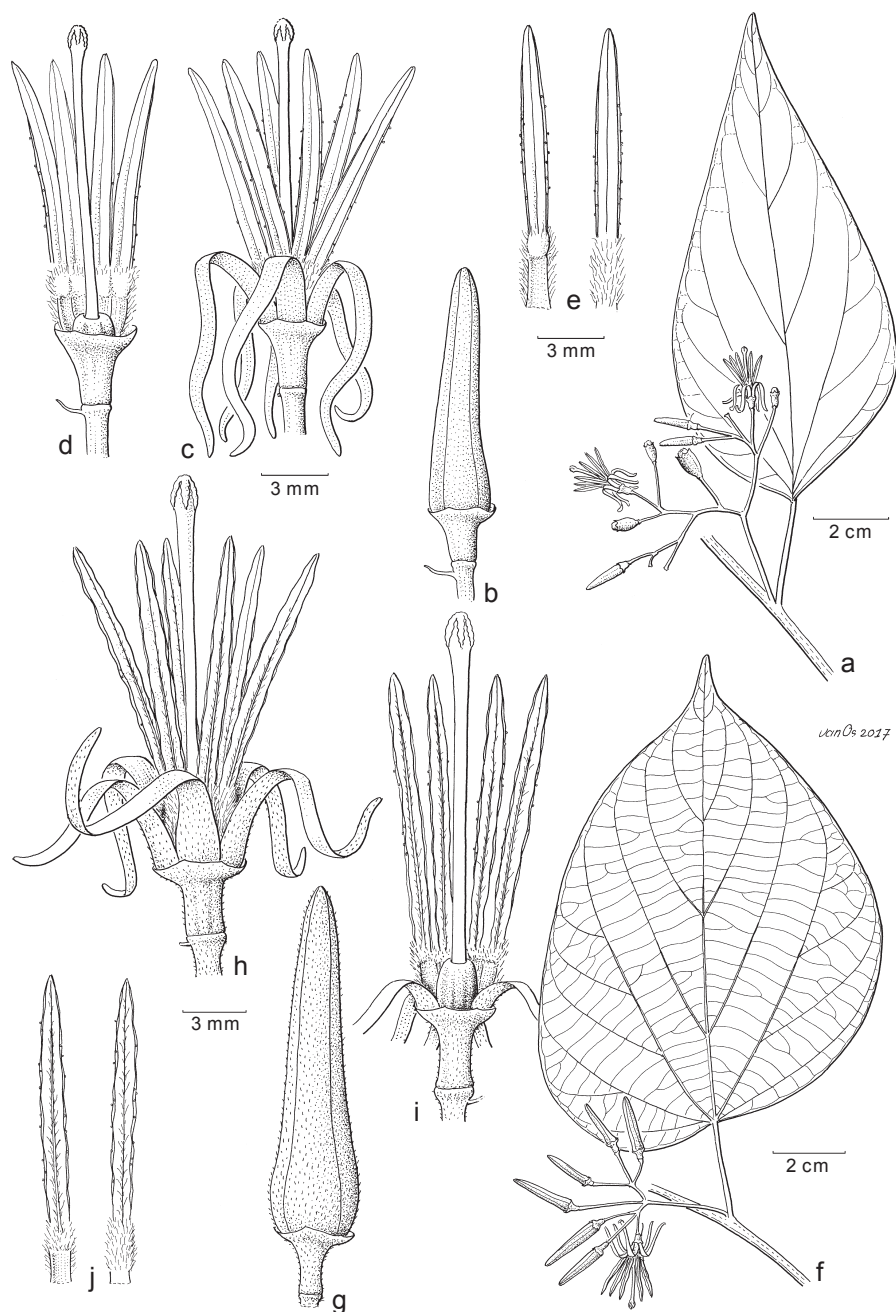


Fig. 4. a–e. *Alangium chinense* (Lour.) Harms. a. Portion of flowering branch; b. flower bud; c. open flower; d. ditto, petals removed; e. stamens, inside and outside, respectively, note connective glabrous. — f–j. *Alangium rotundifolium* (Hassk.) Bloemb. f. Portion of flowering branch; g. flower bud; h. open flower; i. ditto, one petal removed; j. stamens, inside and outside, respectively, note connective hairy (a–e: PNH (Edaño) 17791, f–j: Bakhuizen van den Brink 1561; all L). Drawn by Jan van Os.

Marlea unilocularis Griff., Notul. Pl. Asiat. 4 (1854) 679, p.p. — Type: not indicated.

Alangium cordifolium Zoll. & Moritz, Syst. Verz. 3 (1855) 63; Zoll., Natuurk. Tijdschr. Ned.-Indië 14 (1857) 157. — *Marlea virgata* Zoll., Natuurk. Tijdschr. Ned.-Indië 14 (1857) 157, nom. superfl.

— Lectotype (here designated): *Zollinger II* 2292 (lecto L (L.2497358); iso BM, W n.v.), Indonesia, Java.

Trees, 2.5–15 m tall; bark smooth, grey; *twigs* smooth, grey, subglabrous (hairs 0.1–0.3 mm long), 2–4.5 mm diam. *Leaves*: *petiole* sparsely hairy, glabrescent, 2–5 cm long, articulate at both ends or not; *lamina* (sparsely) pubescent, glabrescent (hairs remaining in basal nerve axils), (ovate or) broadly ovate or subcircular, occasionally coarsely toothed, (8–)10–20 by (5–)7.5–15.5 cm, base asymmetric, broadly cordate, apex (long) acute to acuminate; venation 5(–7)-plinerved; secondary veins 3(–5) per side; intercostal venation thin, $\pm$ scalariform-coarsely reticulate. *Inflorescences* pendulous at lower side of branches, subglabrous (rarely hairy), simple, dichasial, 2–4-branched, (2–)5–10(–20)-flowered; *peduncle* (1.5–)2–2.5(–3) cm long. *Flowers*:

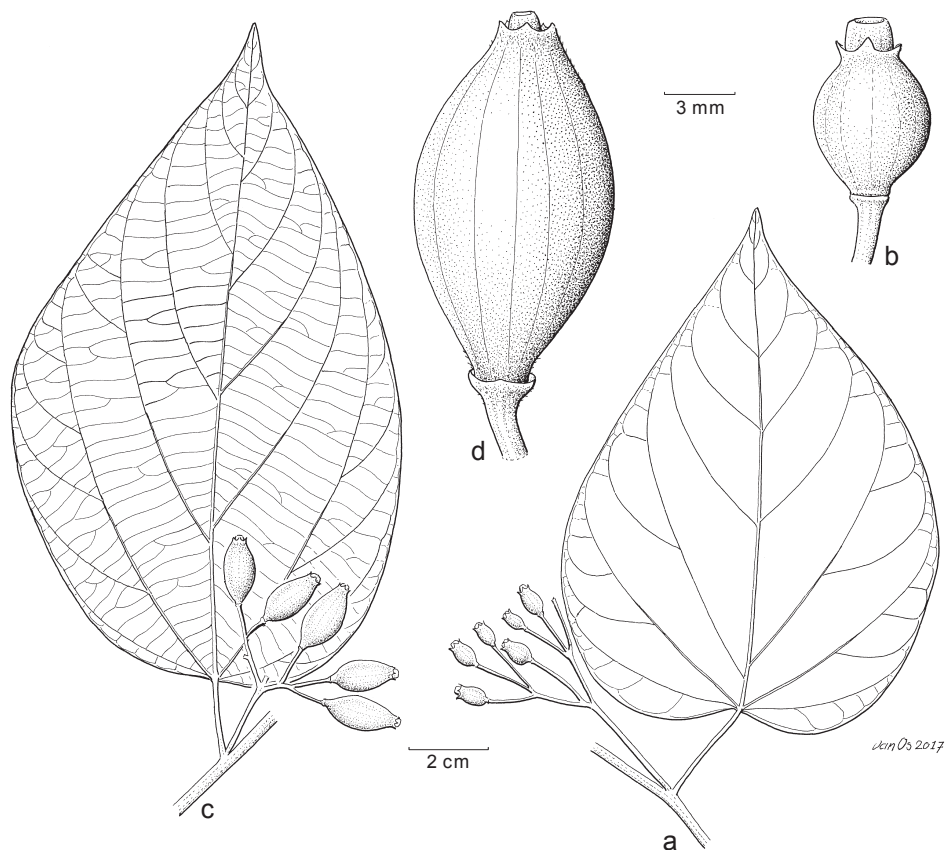


Fig. 5. a, b. *Alangium chinense* (Lour.) Harms. a. Portion of fruiting branch; b. fruit. — c, d. *Alangium rotundifolium* (Hassk.) Bloemb. c. Portion of fruiting branch; d. fruit (a, b: PNH (Mendoza) 12222, c, d: SAN (Taipin) 47957; all L). Drawn by Jan van Os.

pedicel 3–5(–10) mm long; *corolla in bud* 8–10 mm long, base not swollen; *ovary* sparsely hairy, 2.5(–3.5) mm long, *calyx limb* c. 0.5 mm long, 2–3 mm wide, 6- or 7-lobed, lobes c. 0.5 mm long, acute; *petals* white, 6 or 7, short-hairy, glabrous inside, 8–12 mm long; *stamens* 6 or 7, filament thickened, inside hairy, c. 3 mm long, anther yellow or orange, 6–9 mm long, connective glabrous; *style* glabrous or sparsely hairy, c. 10 mm long, stigma subglobose. *Fruits* 2–10 per infructescence, ripening blackish purple, (sub)glabrous, ovoid, (6–)8–10 mm long, hardly flattened, superficially ribbed; *calyx remnant* small. — **Fig. 4a–c, 5a, b; Plate 1a, b.**

Distribution — Widespread: Africa, India (not in Sri Lanka) east to China and Japan, southeast through Indochina into Malesia; in *Malesia*: Java, Philippines (Palawan, Luzon, Mindoro, Negros), Lesser Sunda Islands (Flores, W Sumbawa); not known from Peninsular Malaysia, Sumatra, Borneo, Sulawesi.

Habitat & Ecology — In open secondary and primary forest, on black soil. Altitude: 100–1500 m (to 3000 m in China). Flowering: all year round; fruiting: January to March, June to September.

Uses — Shadow tree in coffee plantations.

Vernacular names — Java: Goprak, Opas-Opassan, Timangan. Lesser Sunda Islands: Sumbawa: Kaju gadung; Flores: Mberutu.

Note — See note 1 under *A. kurzii*.

4. *Alangium circulare* B.C.Stone & Kochummen (sect. 2 *Conostigma*)

Alangium circulare B.C.Stone & Kochummen, *Blumea* 22 (1975) 219, f. 1, 2; Berhaman in Soepadmo & K.M.Wong, *Tree Fl. Sabah & Sarawak* 1 (1995) 7; W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 30. — Type: *S (Saleh ak Nantah)* 24325 (holo SAR n.v.; iso A, BO, K, KEP, L, SAN n.v., SING), Malaysia, Borneo, Sarawak, Kuching, Bukit Siol.

Trees, c. 9 m tall; *twigs* dark brown, c. 3 mm diam., towards apex with minute hairs, glabrescent; *leaf bud* minutely hairy, hairs c. 0.1 mm long. *Leaves*: *petiole* 0.5–1.5 cm long; *lamina* drying greenish, glabrous, subcircular or broadly obovate, 4.5–9.5 by 3.5–8.2 cm, base symmetric, short-cuneate, apex broadly rounded and somewhat emarginate; venation pinnate, secondary veins 4 or 5 on each side, looped near margin; tertiary venation coarsely reticulate-scalariform. *Inflorescences* sparsely fine-hairy, 1 (or 2) main branches (peduncles) from the leaf axil, each 1- or 2-flowered; *peduncle(s)* c. 10 mm long. *Flowers* finely minutely hairy (hairs c. 0.1 mm long); *pedicel* 2–3 mm long; *corolla in bud* 20–22 mm long, base slightly swollen, apex (sub)obtus; *ovary* 3.5(–4.5) mm long, ribbed; *calyx limb* spreading, c. 1.5 mm long, at margin c. 7 mm wide, truncate or hardly lobed; *petals* 5, inside somewhat short-hairy, 22–25 mm long; *stamens* 5, filament 10–11 mm long, thickened and hairy towards base, anther 10–12 mm long, connective glabrous; *style* c. 20 mm long, densely hairy (hairs c. 0.5 mm long), stigma small, conical. *Fruits* not known.

Distribution — *Malesia*: Borneo (Sarawak), only known from the type.

Habitat & Ecology — Disturbed primary heath forest; white podsolised soil. Flowering: October.

Notes — 1. As mentioned by Stone & Kochummen (1975) the ovary locules inside are somewhat minutely hairy, visible under high magnification.

2. According to the Sarawak botanist Julia Sang (in litt.) the locality Bukit Siol has been converted into a human settlement (now within Kuching town) but in 1964, when *A. circulare* was collected, the forest type was heath forest on podsolised white soil.

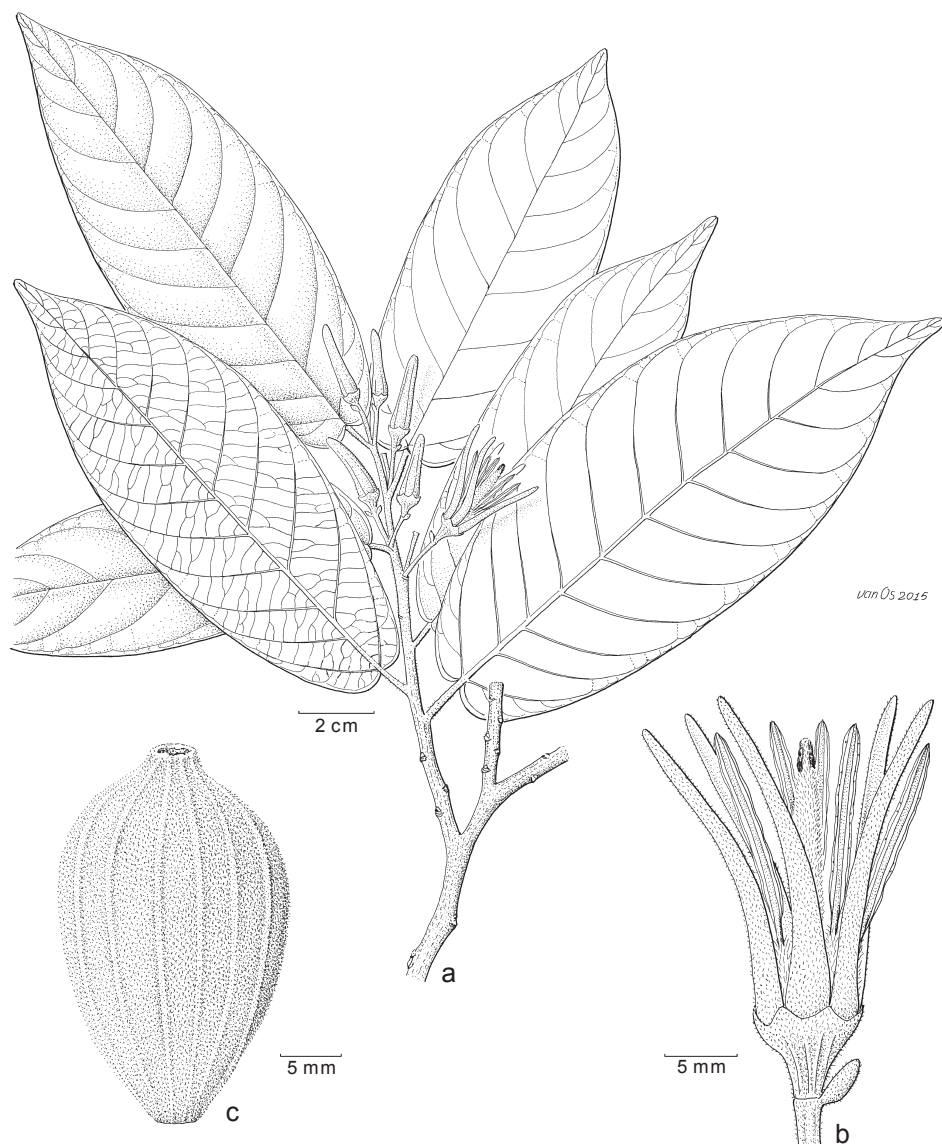


Fig. 6. *Alangium denudatum* (Bloemb.) W.J.de Wilde & Duyfjes. a. Flowering twig; b. flower showing hairy filaments and style and conical stigma; c. fruit (all: *SFN (Kiah) 37708; L.*). Drawn by Jan van Os.

5. *Alangium denudatum* (Bloemb.) W.J.de Wilde & Duyfjes (sect. 2 *Conostigma*)

Alangium denudatum (Bloemb.) W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 32, f. 1. — *Alangium nobile* (C.B.Clarke) Harms var. *denudatum* Bloemb., *Blumea* 1 (1935) 276; *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16, 2 (1939) 212, f. 9f. — Type: *Béguin* 582 (holo BO; iso L, SING, U 2 sheets), Indonesia, Sumatra, Bengkalis.

Trees, 20–33 m tall; stilt-roots to 2 m high and 1.2 m spreading; *twigs* dark brown, 2–3(–4) mm diam., densely minutely rusty hairy (hairs 0.1–0.2 mm long), late glabrescent; *leaf bud* minutely hairy (hairs c. 0.1 mm long). *Leaves*: *petiole* 0.5–1.2 cm long; *lamina* drying brown, glabrous, except minute hairs on midrib and veins below, ovate-elliptic or elliptic(-oblong), 7–18 by 4–6(–7) cm, base symmetric, (broadly rounded or) narrowly cordate, apex (blunt or) acute or acute to acuminate; venation seemingly completely pinnate but (faintly) 3–5-plinerved at base, secondary veins 8–12 at each side, usually loop-veined; tertiary venation thin, finely (reticulate-)scalariform. *Inflorescences* compound, densely minutely hairy, with 1 or 2 (or 3) flowers, axillary in extant leaf, sessile (rarely 1 or 2 flower(s) on a *peduncle* to 5 mm long). *Flowers* fragrant, minutely hairy (as twigs); *pedicel* 8–10 mm long; *corolla in bud* 18–20 mm long, base swollen, apex blunt; *ovary* 3–4 mm long, finely ribbed; *calyx limb* c. 2 mm long, at margin 5–6 mm wide, lobes 5 (or 6), conspicuous, triangular; *petals* 5 (or 6), inside densely long rusty hairy (hairs c. 0.4 mm long), 18–20 mm long; *stamens* 5, filament c. 2 mm long, the lower half not much thickened, densely (setose) hairy, the upper portion slender, glabrous, anther 10–15 mm long, connective glabrous; *style* densely hairy, c. 18 mm long, stigma conical. *Fruits* 1 (or 2?) per infructescence, ripening colour not recorded, densely rusty hairy (hairs 0.2–0.3 mm long), (ovoid-)ellipsoid, 27–30 by 16–20 mm, 10-ribbed; *calyx remnant* as calyx in flower. — **Fig. 6.**

Distribution — *Malesia*: Singapore (Mandai Road), E Sumatra (Bengkalis), Borneo (Kalimantan: Sampit; not recorded from Brunei, Sarawak, Sabah).

Habitat & Ecology — Marsh forest (mixed peat swamp forest), at sea-level. Flowering: January, July; fruiting: April, July.

Vernacular name — Sumatra: Mara le pang.

Note — The somewhat deviating Beccari specimens from Sarawak (*Beccari* PB 2477, PB 2927, and PB 3611; all K) discussed by Bloembergen (1939) under *A. nobile*, are here not included in *A. denudatum*, but in *A. nobile*.

6. *Alangium ebenaceum* (C.B.Clarke) Harms (sect. 2 *Conostigma*)

Alangium ebenaceum (C.B.Clarke) Harms in Engl. & Prantl, *Nat. Pflanzenfam.* 3, 8 (1898) 262; King, *J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 71, 1 (1902) 78; Kochummen in Whitmore, *Tree Fl. Malaya* 1 (1972) 57; W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 32. — *Marlea ebenacea* C.B.Clarke in Hook.f., *Fl. Brit. India* 2 (1879) 742; Ridl., *Fl. Malay Penins.* 1 (1922) 893. — *Alangium javanicum* (Blume) Wangerin var. *ebenaceum* (C.B.Clarke) Berhaman, *Sandakania* 4 (1994) 33; in Soepadmo & K.M.Wong, *Tree Fl. Sabah & Sarawak* 1 (1995) 10. — Lectotype (designated by Berhaman 1994): *Griffith* (KD) 3383 (lecto K; isolecto P, U), Peninsular Malaysia, Melaka ('Malacca').

Alangium sessiliflorum Merr., *Univ. Calif. Publ. Bot.* 15 (1929) 232. — Lectotype (designated here): *Wood* 2252 (lecto K; isolecto UC n.v.), Malaysia, Borneo, Sabah, Batu Lapan.

Trees, 2.5–20 m tall; bole smooth, brown, sometimes recorded as provided with stilt-roots or buttresses; *twigs* (blackish) brown, (3–)4–10 mm diam., at apex (incl. leaf bud) minute greyish, hairs less than 0.1 mm long, early glabrescent. *Leaves*: *petiole* 1–2(–2.5) cm long; *lamina* drying (green-)brown above, usually purplish below, glabrous, coriaceous, elliptic-oblong, 15–50 by 3–18 cm, base almost symmetric, rounded or short (to long) cuneate, apex acute to acuminate; venation pinnate, secondary veins (8–)10–15 on each side, (sub)loop-veined; tertiary venation thin, reticulate-scalariform. *Inflorescences* glabrous (early glabrescent, hairs minute, less than 0.1 mm long), simple or 2 main branches (peduncles) from the leaf-axil, each (5–)10–20-flowered, *peduncle(s)* 10(–15) mm long. *Flowers* sweetly scented, (minutely) densely hairy; *pedicel* to 5 mm long; *corolla in bud* minutely greyish hairy, (10–)12–16 mm long, base not swollen, apex frequently narrowed, acute; *ovary* 1.5–2 mm long, faintly ribbed or not ribbed; *calyx limb* broadly cup-shaped or saucer-shaped, spreading, 1.5–3 mm long, at margin 3.5–5 mm wide, entire or faintly lobed; *petals* 5 (or 6), inside minutely hairy, except narrowed apex, 12–15 mm long; *stamens* 5 (or 6), filament 3–5 mm long, broadened, inside near apex swollen and hairy (hairs c. 0.4 mm long), anther 9–11 mm long, connective glabrous; *style* appressed hairy, 6–9 mm long, stigma narrowly conical. *Fruits* 1 or 2 per infructescence, edible (fruit pulp whitish, juicy, with sour taste), ripening pinkish red or purplish black, glabrous, broadly ovoid-ellipsoid, 20–30 mm long, smooth or lowly 10-ribbed; *calyx remnant* 2–4 mm long, narrow or broad, up to 9 mm wide.

Note — See note under *A. pallens*.

KEY TO THE VARIETIES

- 1a. Twigs 3–5 mm diam. Lamina (sub)coriaceous, 15–26(–28) by (3–)5–9 cm.
— Peninsular Malaysia, Sumatra, Borneo **a. var. *ebenaceum***
- b. Twigs 5–10 mm diam. Lamina coriaceous, 30–50 by 9–18 cm. — Borneo (Sarawak: Miri and (partly) Kapit Div. (formerly 4th and 7th Div., respectively)). . . .
. **b. var. *insignis***

a. var. *ebenaceum*

Twigs 3–5 mm diam. *Lamina* (sub)coriaceous, 15–26(–28) by (3–)5–9 cm. *Infructescences* usually in axils of leaves. *Fruit* 15–30 mm long; calyx remnant truncate, 3.5–5 mm wide.

Distribution — *Malesia*: Peninsular Malaysia (Perak, Selangor, Negeri Sembilan, Melaka, Terengganu, Pahang, Johor), Sumatra (Palembang, Bangka), Borneo (Sarawak, Sabah, W and E Kalimantan).

Habitat & Ecology — Primary and secondary forest, on hillside, ridges, and along rivers; granitic sand, sandy loam, clay, yellow podsol soil, and basalt bedrock. Altitude: from sea-level to 1500 m altitude. Flowering and fruiting: all year round.

Vernacular names — Peninsular Malaysia: Mentulang or Mentulas, Lidah lidah. Borneo (Sarawak: Midong or Medong (Iban); E Kalimantan: Bankala (Banjar-Malay), Beremkulat, Ridan).

b. var. insignis W.J.de Wilde & Duyfjes

Alangium ebenaceum (C.B.Clarke) Harms var. *insignis* W.J.de Wilde & Duyfjes, Blumea 62 (2017) 32. — Type: *S (Yi)* 70936 (holo L; iso K n.v., KEP, MO n.v., SAR n.v.), Malaysia, Borneo, Sarawak, 4th Div., Anap Forest Reserve.

Twigs 5–10 mm diam. *Lamina* coriaceous, 30–50 by 9–18 cm. *Infructescences* borne on the twigs below the leaves. *Fruit* 30–50 by 15–18 mm, calyx remnant large, truncate, 6–9 mm wide.

Distribution — *Malesia*: Borneo (Sarawak, Miri (former 4th) Div. (Tinjar) and Kapit (former 7th) Div. (Ulu Belaga)).

Habitat & Ecology — Mixed dipterocarp forest, thick (old) secondary forest on steep slope of river-valley, on fertile loamy ground. Altitude: 50–160 m. Fruiting: February, August, September.

Vernacular names — Upai (Brawan), Midong or Medong (Iban).

7. Alangium ferrugineum C.T.White (sect. 4 *Rhytidandra*)

Alangium ferrugineum C.T.White, J. Arnold Arbor. 10 (1929) 248; Bloemb., Blumea 1 (1935) 272, f. 3g, h; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 76, f. 1. — *Alangium villosum* (Blume) Wangerin subsp. *ferrugineum* (C.T.White) Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 206, f. 6f, 7m, n. — Lectotype (designated here): *Brass* 1066 (lecto BRI; isolecto L, P), Papua New Guinea, Gulf Province, Aroara, Vailala River.

Trees, 5–10 m tall; *twigs* brown, 2–3 mm diam., yellowish or reddish hairy, hairs c. 0.5 mm long. *Leaves*: *petiole* 0.5–1.5 cm long, hairy; *lamina* drying reddish brown, densely hairy (not velutinous below), (ovate-)elliptic, 11–18 by 5–8.5 cm, base asymmetric, rounded or (short) cuneate, apex acute to acuminate; venation pinnate, secondary veins 5–8 at each side, tertiary venation thin, (sub)scalariform. *Inflorescences* hairy as the twigs, simple, 2–8-flowered, *peduncle* 5–15 mm long, 1–1.5 mm diam. *Flowers* white, densely hairy; *pedicel* c. 3 mm long; *corolla in bud* c. 12 mm long (c. 15 mm long when fresh), c. 1.5 mm diam., base not swollen, apex subobtusate; *ovary* c. 1.5 mm long, not constricted below the limb, not ribbed, red-brown hairy; *calyx limb* c. 1 mm long, not spreading, with 5 obtuse lobes of c. 0.5 mm long; *petals* 5, inside glabrous, c. 12 mm long, connate at base into a tube of c. 2 mm long; *stamens* 5, filament 3–5 mm long, hairy, anther 8(–10) mm long, connective glabrous; *style* 6–10 mm long, (sparingly) hairy, stigma 2-lobed, lobes curved, c. 3 mm long. *Fruits* 1 or 2 (or 3?) per infructescence, ripening yellow (?), densely (red-)brown hairy, ovoid and longly narrowed towards apex, 30–35 mm long, (10–)15–20 mm diam., not ribbed; *calyx remnant* small, narrow, subtruncate. — **Fig. 7.**

Distribution — *Malesia*: Moluccas (Aru Is.: Pulau Kobroor), Papua, Papua New Guinea (Madang, Gulf).

Habitat & Ecology — Alluvial forest, foothill forest, secondary forest; clayey soil, coral stone. Altitude: sea-level to 400 m. Flowering: February, August; fruiting: February, July to November.

Vernacular name — Ala po'u (Aru Is.).

Uses — Seemingly a handsome tree, perhaps of ornamental value.

Note — See note under *A. gracile*.

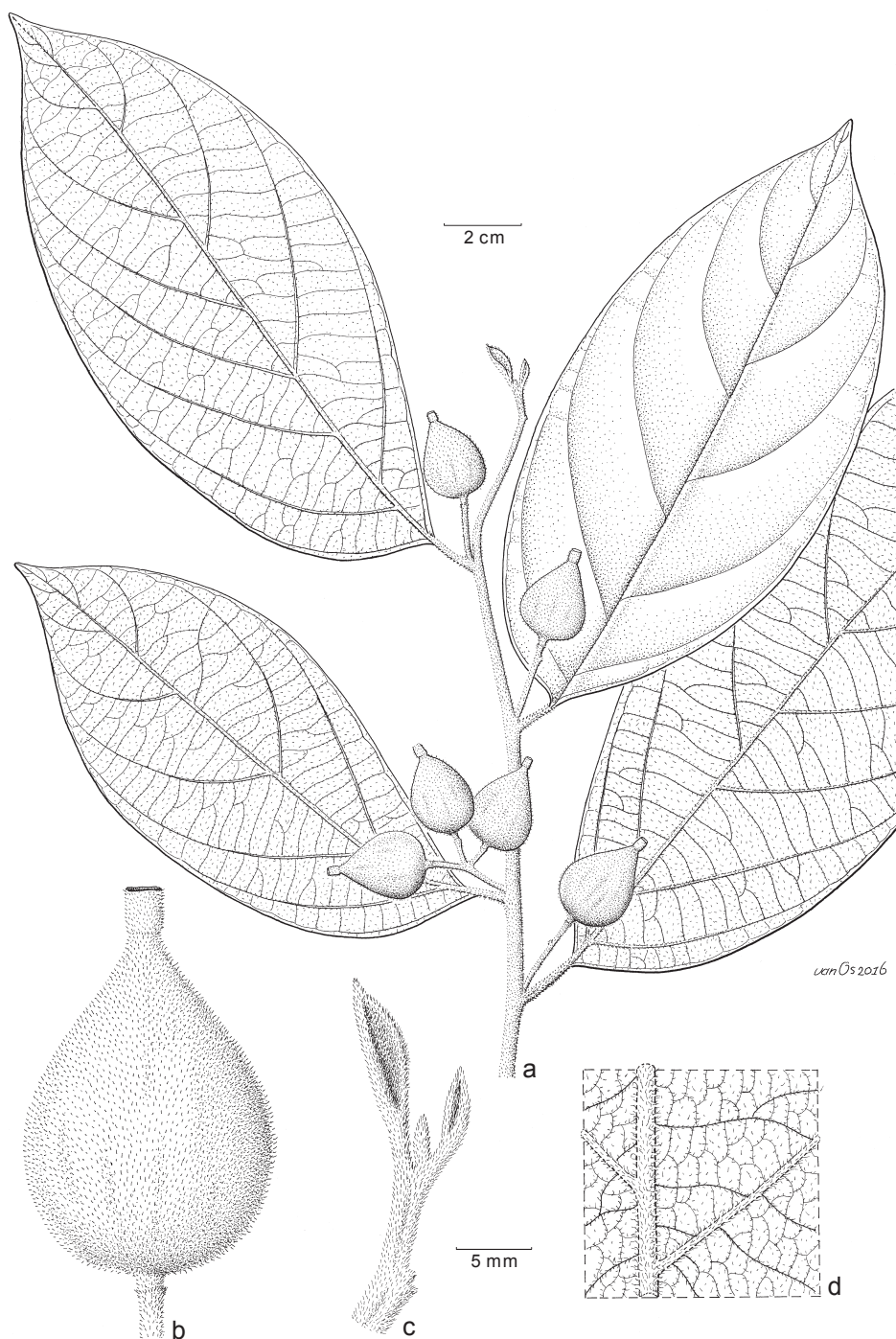


Fig. 7. *Alangium ferrugineum* C.T.White. a. Fruiting twig; b. fruit; c. twig apex; d. detail of lower lamina surface (all: *Nooteboom 5773*; L). Drawn by Jan van Os.

8. *Alangium frutescens* Zoll. & Moritz (sect. 1 *Alangium*)

Alangium frutescens Zoll. & Moritz in Zoll., Syst. Verz. 3 (1855) 63; W.J.de Wilde & Duyfjes, Thai Forest Bull., Bot. 44 (2016) 78, f. 3e, 4c–e. — Lectotype (designated here): *Zollinger II* 2289 (lecto P (P04552557); isolecoto BM 2 sheets, BO, K, L 2 sheets, P), Indonesia, Java, Madjang tenga.

Alangium sundanum Miq., Fl. Ned. Ind. 1 (1856) 774. — *Alangium salviifolium* (L.f.) Wangerin subsp. *sundanum* (Miq.) Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 156, p.p. — Lectotype (designated here): *Horsfield s.n.* (lecto U (U0000160); isolecoto K (K001096813), L (L.2500181)), Indonesia, Java, Surabaya (Soerabaja).

Alangium salviifolium (L.f.) Wangerin subsp. *hexapetalum* auct. non (Lam.) Wangerin: Wangerin in Engl., Pflanzenz. 41.IV.220b (1910) 9, p.p. (excl. type); Backer & Bakh.f., Fl. Java 2 (1965) 160.

Shrub-like climbers or lianas, to 10(–40) m long, thorns absent, partly deciduous or evergreen; twigs 2–4 mm diam., often scattered lenticellate, hairs 0.1–0.2 mm long, glabrescent. *Leaves*: *petiole* 0.7–1.5 cm long; *lamina* (sub)glabrous, elliptic or (ob)ovate, 5–15 by 3–6 cm, base (broadly) rounded, not or slightly asymmetric, apex acuminate; venation 3-plinerved at base, reaching to (halfway or) two-thirds, secondary veins 2 or 3 on each side, intercostal venation reticulate; domatia present. *Inflorescences* compound, subsessile or to 8 mm peduncled, usually axillary to in axils of extant foliage leaves, hairy or glabrescent, (1–)several-flowered, terminal bud of the compound inflorescence remaining dormant or developing into a lateral shoot. *Flowers*: *pedicel* 3–8 mm long, bracteole subapical, minute; *corolla in bud* 15–18 mm long; *ovary and calyx* (2–)3 mm long, hairs c. 0.1 mm long, *calyx limb* short, c. 3 mm wide, lobes 6, blunt, c. 0.5 mm long; *petals* (5 or) 6, outside finely hairy, 15–18(–20) mm long; *stamens* 10–15, shorter or as long as petals, filament c. 10 mm long, straight, slender, with a warty knob at one third to halfway from the base, finely hairy on knob and below, anther c. 5 mm long; *style* glabrous, about as long as petals, stigma small, capitate, 1–2 mm wide. *Fruits* 1–3 per infructescence, ripening red, broadly ellipsoid, 10–15 mm long, smooth or finely ribbed, greyish or brown hairy (hairs ≤ 0.1 mm); *calyx remnant* minute. — **Fig. 12c–e.**

KEY TO THE VARIETIES

- 1a. Terminal bud of inflorescence usually dormant. Ovaries and fruits grey-brown hairy. **a. var. *frutescens***
- 1b. Terminal bud of inflorescence developing into a lateral shoot. Ovaries and fruits bright brown-hairy **b. var. *palawanense***

a. var. *frutescens*

Terminal bud of inflorescences dormant or occasionally developing into a lateral leafy shoot. *Flowers* as described for the species. *Fruit* (ovaries) grey-brown hairy, finely low-ribbed.

Distribution — Andaman Is. (no specimens seen); in *Malesia*: Peninsular Malaysia (doubtful), Singapore, Sumatra (incl. Simaloer), Borneo (2 collections: E Kalimantan, Sabah), Java, S Sulawesi, Lesser Sunda Islands, Moluccas, Papua (2 collections).

Habitat & Ecology — Primary lowland forest. Altitude: to 400 m. Flowering and fruiting: all year round.

Note — The collection *SFN (Corner) 31626* (KEP), in fruit, from Grik, northern Perak (Peninsular Malaysia), is deviating in minor respects and may belong to *A. glandulosum*, a species occurring in Peninsular Thailand. More material from the area concerned is needed to establish its proper identity.

b. var. *palawanense* W.J.de Wilde & Duyfjes

Alangium frutescens Zoll. & Moritz var. *palawanense* W.J.de Wilde & Duyfjes, Thai Forest Bull., Bot. 44 (2016) 79, f. 2: 2b. — Type: *SMHI (Ridsdale) 1506* (holo L (L.2500494); iso L), Philippines, Palawan (Pagdanan Range, Ibangley Brookside Hill).

Terminal bud of inflorescences developing into lateral leafy shoots. *Flowers* not known. *Fruit* (ovaries) bright brown pubescent, smooth, not ribbed.

Distribution — Philippines (Palawan, Balabac Is.), known from 5 collections.

Habitat & Ecology — Lowland rainforest, along streams; also on limestone.

9. *Alangium glabrum* W.J.de Wilde & Duyfjes (sect. 4 *Rhytidandra*)

Alangium glabrum W.J.de Wilde & Duyfjes, Blumea 62 (2017) 78. — Type: *NGF (Womersley & Williams) 37092* (holo L; iso A, BO, BRI, CANB, K, LAE, SING, SYD, all n.v.), Papua New Guinea, Southern Highlands Province, Sawmill at Ialibu.

Trees, c. 12 m tall; *twigs* brown, 1–2.5 mm diam., whole plant glabrescent from minute greyish brown hairs of c. 0.1 mm long. *Leaves*: *petiole* 0.6–0.8 cm long; *lamina* drying brownish green, elliptic, 8–11 by 3.5–5 cm, base (slightly) asymmetric, rounded or broadly short cuneate, apex long acute to acuminate; venation pinnate; secondary veins (3 or) 4 or 5 at each side, tertiary venation reticulate. *Inflorescences* minutely hairy as the twigs, glabrescent, simple, 2- or 3-flowered, *peduncle* (5–)10 mm long. *Flowers* densely minutely brown-hairy, hairs c. 0.1 mm long; *pedicel* c. 2 mm long; *corolla in bud* (only seen in immature flowers) presumably 8–10 mm long, 1(–1.5) mm diam., base not swollen, apex narrowly obtuse; *ovary* c. 2 mm long, coarsely 4–8-ribbed, minutely greyish brown-hairy; *calyx limb* c. 1.5 mm long, including 4 triangular lobes 0.7–1 mm long, somewhat spreading; *petals* 4, inside thinly hairy towards base; *stamens* 4, mature filament and anther not known; immature filament sparingly hairy, connective glabrous; *style* glabrous, stigma deeply 2-lobed. *Fruits* 1–3 per infructescence, ripening green (?), glabrescent (except at very apex), narrowly ellipsoid, broadest slightly below the middle and pointed (narrowed) at both ends, (25–)30 mm long, 10–11 mm diam., (when dry) shallowly 4- (or 8-)grooved and irregularly dimpled; *calyx remnant* small, narrow, with the 4 calyx lobes connivent.

Distribution — *Malesia*: The species is only known from the type: Papua New Guinea, Southern Highlands Province, Sawmill at Ialibu.

Habitat & Ecology — In *Nothofagus* dominated rain forest. Altitude: c. 2000 m. Flowering and fruiting: September.

Note — The fruiting pedicel is remarkably long, 5–7 mm.

10. *Alangium gracile* W.J.de Wilde & Duyfjes (sect. 4 *Rhytidandra*)

Alangium gracile W.J.de Wilde & Duyfjes, Blumea 62 (2017) 78. — Type: LAE (Forman et al.) 52499 (holo L; iso A, BRI, CANB, K, LAE, all n.v.), Papua New Guinea, ridge SW of Efogi Village, Central Province, Port Moresby Subdistrict, S9°10' E147°39'.

Shrubs or trees, 3–7(–15) m tall; *twigs* (dark) brown, 1.5–3(–5) mm diam., ferruginous or reddish brown hairy, hairs 0.2–0.5 mm long. *Leaves*: *petiole* 0.5–1 cm long, hairy; *lamina* drying reddish brown, hairy or late glabrescent, elliptic, 7–15(–17) by 3–6(–8) cm, base hardly asymmetric, cuneate, apex acute to acuminate; venation pinnate, secondary veins 5–8 at each side, tertiary venation (reticulate and) scalariform. *Inflorescences* hairy as the twigs, simple, 3–10-flowered, *peduncle* slender, 8–40 mm long, c. 0.5 mm diam. *Flowers* densely hairy, hairs reddish brown, 0.3–0.5 mm long; *pedicel* 1–3 mm long; *corolla in bud* c. 10 mm long, slender, c. 1 mm diam., base not swollen, apex subacute; *ovary and calyx* densely coarsely reddish brown hairy, *ovary* c. 2 mm long, constricted below the limb, not ribbed; *calyx limb* 0.5–1 mm long, spreading, with 5 low, obtuse lobes, less than 0.5 mm long; *petals* 5, inside glabrous (or hairs extremely minute), c. 10 mm long, connate at base into a tube of 1–1.5 mm long; *stamens* 5, c. 8 mm long, filament c. 3 mm long, long-hairy, anther c. 5 mm long, connective glabrous; *style* c. 8 mm long, glabrous, stigma lobes c. 1 mm long. *Fruits* 1(–3) per infructescence, ripening red or ochre suffused red, early glabrescent, ellipsoid-fusiform, 15–20 mm long, smooth or finely 5-ribbed; *calyx remnant* small, spreading, like calyx limb in flower, hairy or late glabrescent.

Distribution — *Malesia*: Papua New Guinea (Eastern Highlands, Central).

Habitat & Ecology — Montane forest; stream side, scattered in forest. Altitude: 1060–2600 m. Flowering: September to December; fruiting: September to November.

Note — *Alangium gracile* is vegetatively similar to *A. ferrugineum*, but differs in inflorescence and flowers more coarsely hairy, peduncle more slender, and fruits smaller; ovary and calyx limb differ also considerably, not constricted below the limb in *A. ferrugineum*. In *A. gracile* ovary and limb are reminiscent of those of *A. pilosum*, but in the latter these are much less conspicuously hairy. Like in *A. ferrugineum*, also in *A. gracile* the lateral veins are frequently tending to be 3-plinerved at base.

11. *Alangium griffithii* (C.B.Clarke) Harms (sect. 3 *Marlea*)

Alangium griffithii (C.B.Clarke) Harms in Engl. & Harms, Nat. Pflanzenfam. 3, 8 (1898) 262; Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 194; Backer & Bakh.f., Fl. Java 2 (1965) 160; Kochummen in Whitmore, Tree Fl. Malaya 1 (1972) 58; Berhaman, Sandakania 4 (1994) 32; in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 8; ; W.J.de Wilde et al. in Chayam. & Balslev, Fl. Thailand 14 (2018) 21, f. 3. — *Marlea griffithii* C.B.Clarke in Hook.f., Fl. Brit. India 2 (1879) 742. — Lectotype (designated by Berhaman 1994): *Griffith 3387* (lecto K (K000704843)), Peninsular Malaysia, Melaka ('Malacca').

Marlea densiflora Koord. & Valetton, Bull. Inst. Bot. Buitenzorg 2 (1899) 2. — *Alangium densiflora* (Koord. & Valetton) Wangerin in Engl., Pflanzenz. 41.IV.220b (1910) 17, f. 4a–e. — Lectotype (designated here): *Koorders 15691* (lecto L (L.2497273); iso L (L.2497277)), Indonesia, Java, Palaboeanratoc.

Alangium myrianthum Wangerin, Repert. Spec. Nov. Regni Veg. 4 (1906) 339. — Type: *Zollinger 3907* (holo W n.v.), Indonesia, Java, Blimbingan.

Alangium uniloculare auct. non (Griff.) King: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 71, 1 (1902) 77.

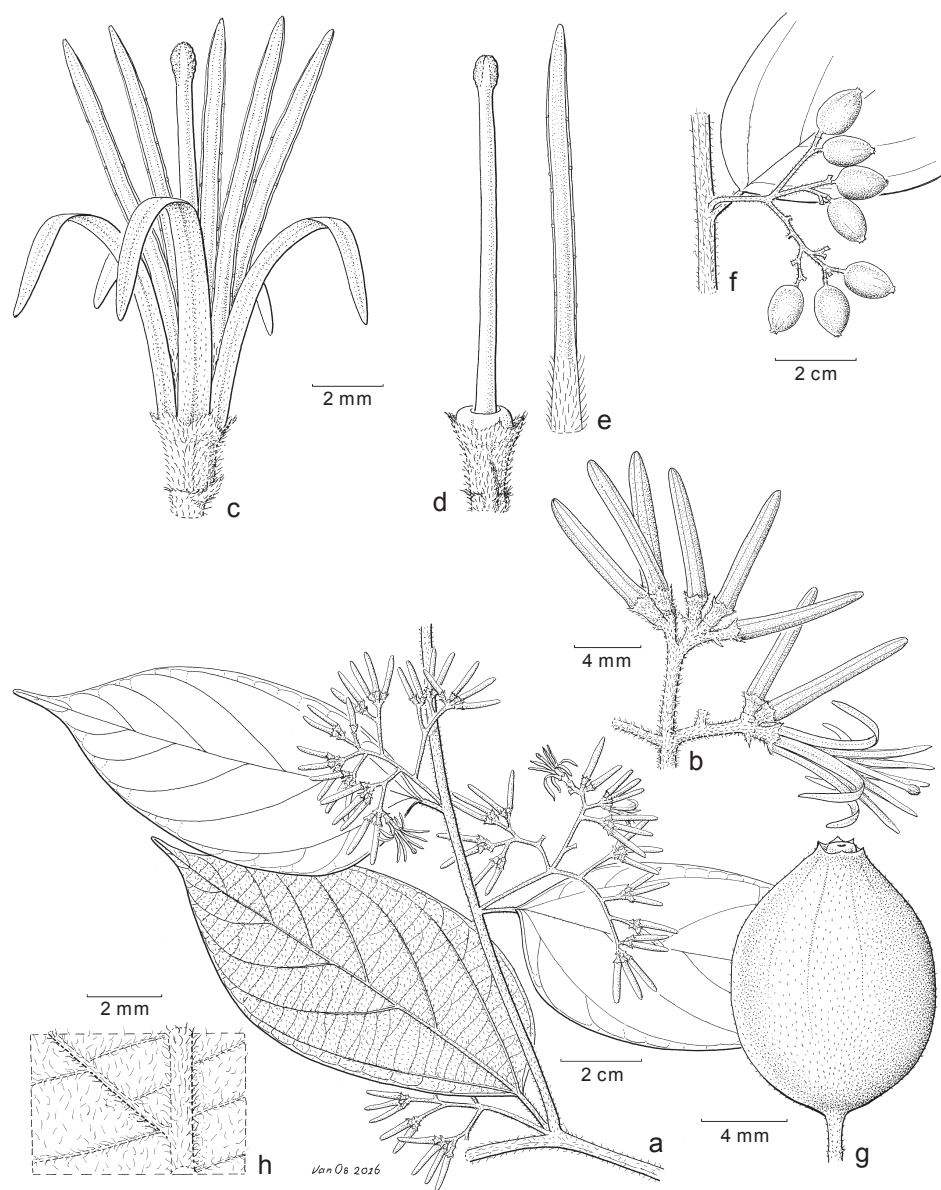


Fig. 8. *Alangium griffithii* (C.B. Clarke) Harms. a. Portion of flowering branch; b. part of inflorescence; c. open flower; d. ditto, petals and stamens removed, showing disc, style and stigma; e. stamen, note thickened lower portion; f. infructescence; g. fruit; h. detail of lower leaf surface (a–e, h: *Sidiyasa et al.* 3615, f–g: *KL (Teo & Pachiappan) 1051*; all L). Drawn by Jan van Os.

Trees, (5–)10–25(–30: *SAN (Madani) 144773*) m tall; bole sometimes shortly fluted; bark grey, brown or blackish, smooth, lenticellate, sometimes peeling off; *twigs* brown-black, sparsely or densely fine hairy, glabrescent, 2–5 mm diam. *Leaves*: *petiole* pubescent, 0.6–1.2 cm long; *lamina* sparsely (densely) hairy, especially on nerves, (narrowly) elliptic or ovate-oblong, 8–18 by 4–8 cm, base short-cuneate or rounded, conspicuously asymmetric, apex acute to acuminate; venation 3–5-plinerved at base; secondary veins 3–5 on each side; intercostal venation fine, scalariform. *Inflorescences* upwards directed (not hanging), (densely) short-hairy, simple, rather compact, subdichasially 3(–5)-branched, densely (10–)20–40(–60)-flowered, bracts and bracteoles small, caducous; *peduncle* 0.5–2 cm long. *Flowers* sweetly fragrant, white or cream; *pedicel* short (flowers subsessile); *corolla in bud* sparsely (or densely) hairy, (8–)10–12 mm long, hardly broadened at base; *ovary* minutely sparsely hairy, 1.5–2.5 mm long, *calyx limb* c. 0.5 mm long, 2.5–3 mm wide, 5-lobed, lobes 0.5–1 mm long, acute, $\pm$ spreading; *petals* 5 (or 6) with distinct midvein, 10–15 mm long; *stamens* as many as petals, 7–11 mm long, filament 3–4.5 mm long, in lower portion thickened and conspicuously whitish long-hairy, upper portion glabrous, anther 4–9 mm long, glabrous, connective glabrous; *style* glabrous, c. 9 mm long, stigma subglobose. *Fruits* edible, ripening cobalt blue or blackish, juicy, glabrescent, broadly ovoid, somewhat flattened, 15(–17) mm long, finely inconspicuously ribbed or smooth. — **Fig. 8; Plate 1d.**

Distribution — Peninsular Thailand; in *Malesia*: Peninsular Malaysia, Singapore, Sumatra, Java, Borneo, Sulawesi (Malili, 1 collection), N Moluccas (NW Seram, Bacan Is.).

Habitat & Ecology — Primary and secondary forest, peat forest, montane forest, hill dipterocarp forest, in hill and riverside, rocky and stony places; sandstone edge, brown and red soil and clay rich soil. Altitude: 30–500 m. Flowering: February to November; fruiting: January, February, May to November.

Note — Bloembergen (1939: 195) commented on specimens with smaller, sterile stamens and on a similar phenomenon in *A. salviifolium* subsp. *decapetalum* (now *A. indochinense*) from Thailand. Eyde (J. Arnold Arbor. 49 (1968) 186) remarks that sterile stamens may indicate a tendency to dioecism. *Alangium grisolleoides* from Madagascar is the only known dioecious species in *Alangium*.

12. *Alangium havilandii* Bloemb. (sect. 2 *Conostigma*)

Alangium havilandii Bloemb., Blumea 1 (1935) 277, f. 4g, h; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 213, f. 8, 9g, h; Berhaman in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 8; Argent et al., Man. non-Dipterocarp Trees C. Kalimantan 1 (1997) 4; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 33, f. 2. — Type: *Omar 54* (holo SING), Malaysia, Borneo, Sarawak, Gunung Sedilu Forest Reserve, Sadong.

Trees, 5–25 m tall; bole occasionally with low buttresses or stilt-roots; *twigs* dark grey or brownish black, 1.5–3 mm diam., densely minutely grey or brown hairy (hairs less than 0.1 mm long), late glabrescent; *leaf bud* minutely hairy. *Leaves*: *petiole* (0.5–)1 cm long; *lamina* drying (blackish) brown, often with a leaden-grey tinge, glabrous (veins glabrescent below), (ovate-)elliptic or oblong, 5–15 by 3–7 cm, base asymmetric, rounded or short cuneate, apex acute to acuminate; venation pinnate, secondary veins

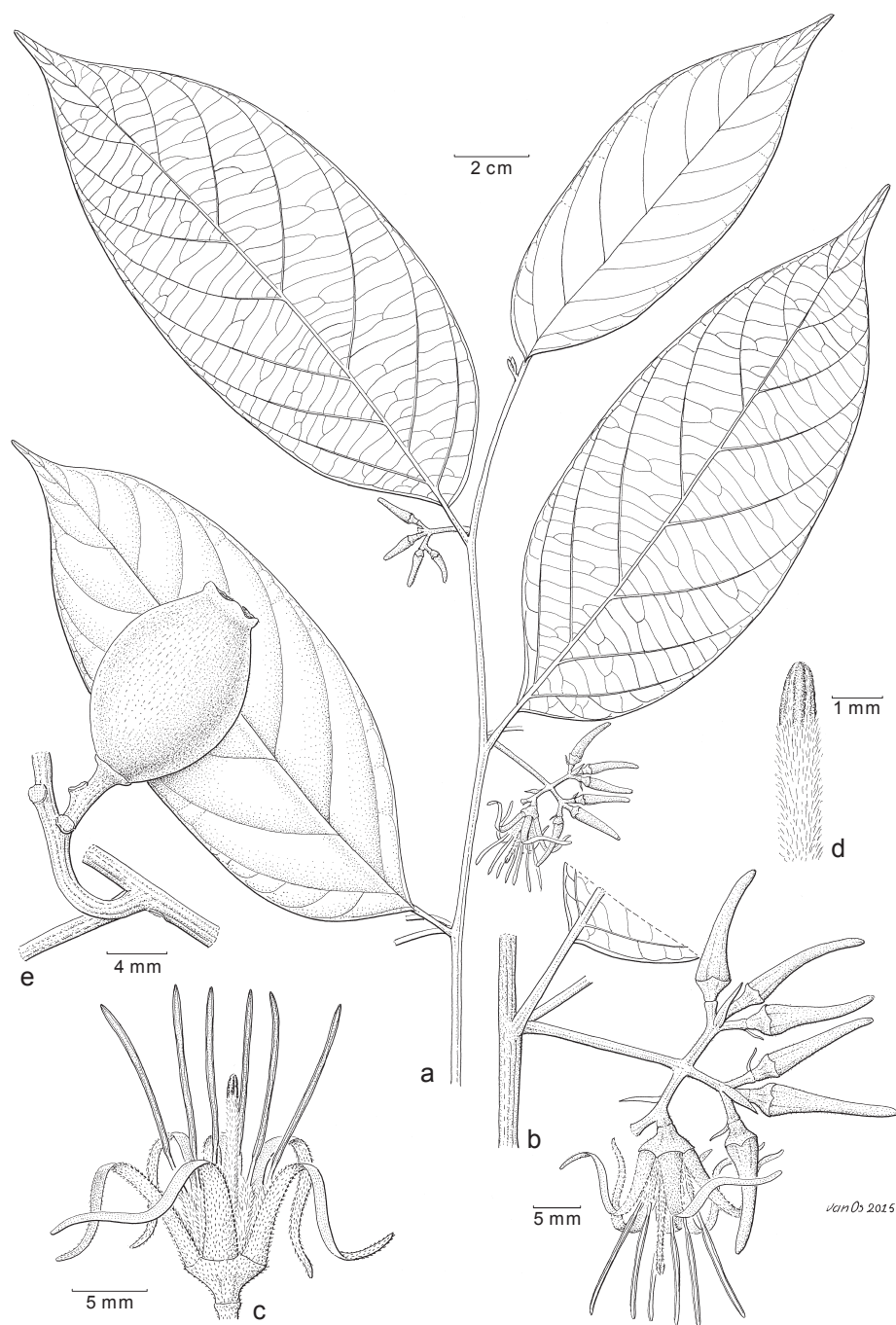


Fig. 9. *Alangium havilandii* Bloemb. a. Flowering twig; b. partial inflorescence; c. flower; d. apex of style with stigma; e. fruit (a–d: BRUN (Ariffin et al.) 17820, e: Anderson 8531; all L). Drawn by Jan van Os.

6–8 on each side; tertiary venation thin, reticulate-scalariform. *Inflorescences* minutely hairy, 1 or 2 (or 3) main branches (peduncles) from the leaf axil, each few-branched, 2–6(–8)-flowered; *peduncle(s)* 5–18 mm long. *Flowers* minutely hairy; *pedicel* 1–3 mm long; *corolla in bud* 12–16 mm long, base strongly swollen, apex acute; *ovary* 2.5–3 mm long, coarsely ribbed; *calyx limb* c. 1.5 mm long, at margin c. 4 mm wide, lobes (4 or) 5, conspicuous, acute; *petals* (4 or) 5, inside glabrous (except at very base), 15(–18) mm long; *stamens* (4 or) 5, filament c. 5 mm long, densely hairy in the thickened lower half, upper half slender, glabrous, anther 8–10 mm long, connective glabrous; *style* densely hairy, 10–15 mm long, stigma conical. *Fruits* 1–3 per infructescence, ripening pink, minutely hairy, ovoid-ellipsoid, compressed, c. 15 by 10 mm, smooth; *calyx remnant* small. — **Fig. 9.**

Distribution — *Malesia*: Borneo (Brunei, Sarawak).

Habitat & Ecology — Lowland peat swamp forest. Flowering and fruiting: all year round.

Vernacular names — Sarawak: Dadam or Jadam (Milanau).

13. *Alangium hollrungii* (K.Schum.) Melch. & Mansf. (sect. 2 *Conostigma*)

Alangium hollrungii (K.Schum.) Melch. & Mansf., Bot. Jahrb. Syst. 60 (1925) 163; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 33. — *Nyssa hollrungii* K.Schum. in K.Schum. & Lauterb., Nachtr. Fl. Schutzgeb. Südsee (1905) 334. — Type: *Hollrung 720* (holo B[†]), Papua New Guinea, Augustafluss; Neotype (designated by De Wilde & Duyfjes 2017): NGF (*Henty*) 49248 (neo L (L.2498017); isoneo L), Papua New Guinea, Brahman, Bundi subdistr., Madang Distr. S5°44' E145°25'.

Alangium papuanum Melch. in Melch. & Mansf., Bot. Jahrb. Syst. 60 (1925) 165. — *Alangium javanicum* (Blume) Wangerin var. *papuanum* (Melch.) Bloemb., Blumea 1 (1935) 284, f. 5y–aa; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 220, f. 10y–aa. — Lectotype (designated here): *Ledermann 8137* (lecto SING (SING0208277); isolecto B[†], BO), Papua New Guinea, Sepik, Bari-Schlucht.

Trees, 6–30 m tall; bole with buttresses to 1 m high; bark strongly peeling; *twigs* pale brown or (grey-)brown, 2–4 mm diam., glabrous (to early glabrescent, hairs less than 0.1 mm long); *leaf bud* subglabrous (early glabrescent). *Leaves*: *petiole* 0.6–1.2 cm long; *lamina* drying (dark) brown or blackish brown, glabrous, (narrowly) elliptic, 10–16 by 3.5–6.5 cm, base symmetric, cuneate, apex acute to acuminate; venation pinnate (or faintly plinerved at base), secondary veins c. 7 on each side; tertiary venation thin, reticulate(-scalariform). *Inflorescences* minutely pale brown hairy (hairs less than 0.1 mm long), 1 or 2 main branches (peduncles) from the leaf axil, each few-branched, (1–)4–7-flowered; *peduncle(s)* 1–4 mm long. *Flowers* minutely hairy; *pedicel* 1–2 mm long; *corolla in bud* 7–11 mm long, not swollen at base, apex (narrowly) rounded; *ovary* 2–2.5 mm long, finely ribbed; *calyx limb* c. 1.5 mm long, at margin 3–3.5 mm wide, unlobed (truncate); *petals* 5 or 6, inside glabrous, 10–13 mm long; *stamens* 5 or 6, filament 2–2.5 mm long, thickened in upper half, glabrous, anther 7–9 mm long, connective glabrous; *style* hairy, c. 10 mm long, stigma conical. *Fruits* not seen, according to the original description: blackish brown, minutely hairy, glabrescent, ovoid, 25–30 by 11–16 mm, presumably smooth; *calyx remnant* small.

Distribution — *Malesia*: New Guinea (northern Papua (Hollandia (= Jayapura)), Papua New Guinea (Madang, Sepik)).

Habitat & Ecology — In primary forest on sandy clayey soil, secondary forest on rocky clay, and dry land forest. Altitude: 75–180 m. Flowering: February, March, August; fruiting: August, September.

Vernacular names — Northern Papua: Ikoi, Joinawam, Kongmenem, Kwei, Soea-renenioe, Soerinemoe (all Kemtoek).

Note — Most collections are sterile.

14. *Alangium javanicum* (Blume) Wangerin (sect. 2 *Conostigma*)

Alangium javanicum (Blume) Wangerin in Engl., Pflanz. 41.IV.220b (1910) 14; Bloemb., Blumea 1 (1935) 281, p.p., for the type only (the rest belongs to various other species); Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 218, p.p., ditto; Backer & Bakh.f., Fl. Java 2 (1965) 161; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 33. — *Styrax javanicum* Blume, Bijdr. 13 (1826) 671. — *Marlea javanica* (Blume) Koord. & Valetton, Bull. Inst. Bot. Buitenzorg 2 (1899) 2; Bijdr. Boomsoort. Java 5 (1900) 76. — Lectotype (designated by De Wilde & Duyfjes 2017): *Blume 1343* (lecto L (L.2497141); isolecto BO, L (L.2497139, L.2497140), NY 2 sheets), Indonesia, West Java, 'Aug.'. *Marlea costata* Boerl., Handl. Fl. Ned. Ind. 1, 2 (1890) 654, p.p., type only. — *Alangium bogoriense* Wangerin, Repert. Spec. Nov. Regni Veg. 4 (1907) 338, nom. superfl.; in Engl., Pflanz. 41.IV.220b (1910) 11. — Lectotype (designated here): *Bogor Botanical Garden s.n.* (lecto L (L0009823); isolecto L 2 sheets), Indonesia, cultivated in Kebun Raya (Bogor Botanical Garden).

Trees, 10–30 m tall; *twigs* brown, 2–3 mm diam., at apex (late) glabrescent, hairs simple, c. 0.5 mm long; *leaf bud* ± straight, densely hairy, hairs c. 0.5 mm long. *Leaves*: *petiole* 0.8–1.5 cm long; *lamina* drying brown, glabrescent, elliptic-oblong, 10–20 by 4–5 cm, base subsymmetric, rounded or short-cuneate, apex acute to acuminate; venation pinnate, secondary veins c. 10 per side, somewhat loop-veined; tertiary venation faint, finely reticulate. *Inflorescences* hairy (hairs c. 0.5 mm long), with (1–)2–5 flowers, in axils of extant leaves, sessile or on a peduncle of 3(–10?) mm long. *Flowers* densely hairy (hairs c. 0.5 mm long); *pedicel* 1–2 mm long; *corolla in bud* 8–11 mm long, not swollen at base, apex subobtusate; *ovary* 2.5–3 mm long, finely ribbed; *calyx limb* c. 1 mm long, shallowly 6-lobed (toothed); *petals* 5 or 6, inside minutely hairy, 8–12 mm long; *stamens* 6, filament c. 3 mm long, at apex and margin hairy, without thickened portion near base, anther c. 8 mm long, connective glabrous; *style* appressed hairy, 6–7 mm long, stigma narrow-conical. *Fruits* 1 or 2 per infructescence, ripening red, drying grey-brown, minutely hairy, late-glabrescent, ovoid-ellipsoid, 15–20(–25) mm long, base ± rounded or short-cuneate, finely shallowly many-ribbed; *calyx remnant* short, shallowly lobed.

Distribution — *Malesia*: S Sumatra (?), W Java, E Borneo; but see note 2.

Habitat & Ecology — Dry lowland forest on low hills; sandy loam soil with lime. Altitude: to 250 m. Flowering: July, August; fruiting: July to February.

Notes — 1. *Alangium javanicum* is variable, possibly also in the length of the hairs on the leaf bud, but in general *A. javanicum* is best characterised by its relatively long hairs (as in *A. borneense*) of the leaf bud, and smallish fruits; see also the notes under *A. meyeri* and *A. oblongum*.

2. The distribution area of *A. javanicum* is determined as restricted to W Java and E Kalimantan (1 collection, *Kostermans 4365*, Sungei Riko, Balikpapan). According to Bloembergen (1939: 222) the type of the synonym *Marlea costata* originates from

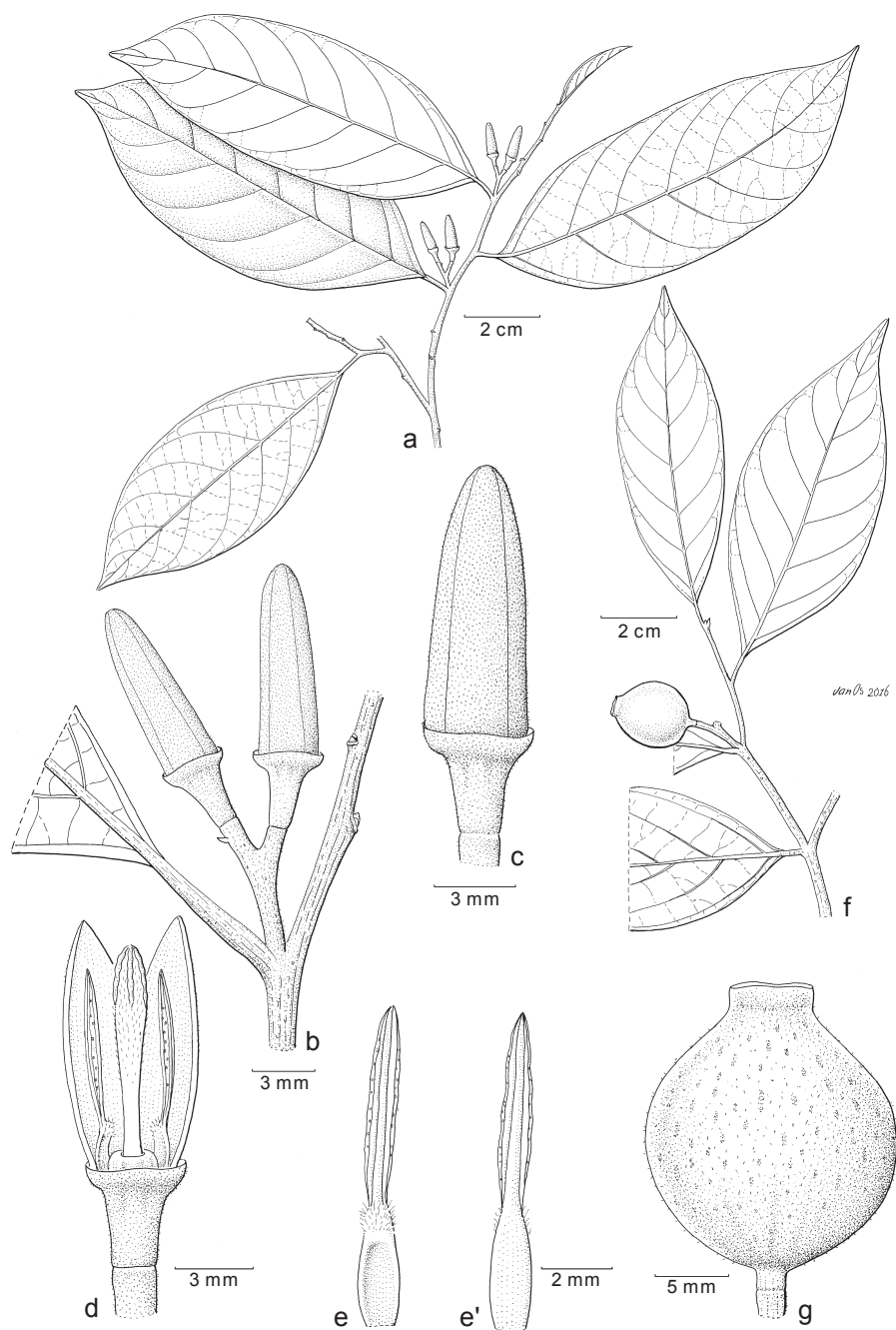


Fig. 10. *Alangium kayuniga* K.M.Wong. a. Flowering twig; b. inflorescence; c. mature flower bud; d. ditto, opened, some petals and stamens removed; e, e'. stamen, inside and outside, respectively; f. fruiting twig; g. fruit (a–e: *S* (Yii & Asah) 64913, e, e', f: *S* (Sibat ak Luang) 23684; all L). Drawn by Jan van Os.

Lampung, S Sumatra, cultivated in the Bogor Botanical Garden (from *Teijsmann 6717*); however, the annotation '*Teijsmann 6717*' on the lectotype of *M. costata* (L) is lacking and its provenance cannot be proven.

3. In addition there are in L three collections, all identified as *A. cf. javanicum*, from outside Java, which cannot be attributed to other species, but which also do not fully match the present concept of *A. javanica*: *bb 22406*, N Sumatra, Aceh, Gunung Agusan, fr.; *bb 26597*, SE Kalimantan, upper Mahakam River, fr. (fruit different from *bb 22406*); *Leighton 108*, E Kalimantan, Kutei, fr. More similar material from these areas is needed in order to name these collections.

4. See note under *Alangium meyeri* var. *macilentum*.

15. *Alangium kayuniga* K.M.Wong (sect. 2 *Conostigma*)

Alangium kayuniga K.M.Wong, Gard. Bull. Singapore 67, 1 (2015) 69, f. 1; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 35, f. 3. — Type: *BRUN (Yusop) 22161* (holo BRUN; iso SING), Malaysia, Brunei, Belait, Sungai Liang, Andulau Forest Reserve.

Trees, 10–15(–25) m tall; *twigs* pale brown, c. 2 mm diam., glabrous (only when young densely very short-hairy, hairs scale-like, less than 0.1 mm long); *leaf bud* densely short-hairy (hairs less than 0.1 mm long). *Leaves*: *petiole* 0.4–1.5 cm long; *lamina* drying (greenish) brown, glabrous, elliptic, 5–15 by 4–5.5 cm, base (slightly) asymmetric, cuneate, apex acute to acuminate; venation pinnate, secondary veins 7–9 on each side; tertiary venation thin, reticulate. *Inflorescences* minutely hairy, 1 main branch (peduncle) from the leaf axil, not or hardly branched, 1- or 2- (or 3?-)flowered; *peduncle* c. 4 mm long. *Flowers* minutely hairy; *pedicel* c. 2 mm long; *corolla in bud* 8–11 mm long, base not swollen, apex blunt or subacute; *ovary* c. 3 mm long, slightly ribbed; *calyx limb* c. 1 mm long, at margin c. 4 mm wide, truncate, not lobed; *petals* 4, inside glabrous, c. 11 mm long; *stamens* 4, filament 3–4 mm long, very fine densely hairy towards apex, somewhat broadened, anther c. 7 mm long, connective glabrous; *style* densely appressed short-hairy (except for the basal 2 mm), c. 6 mm long, stigma conical. *Fruits* 1 (or 2?) per infructescence, ripening reddish purple, juicy, glabrous, broadly ellipsoid, 18–22 by 12–16 mm, shallowly ribbed or not ribbed; *calyx remnant* small. — **Fig. 10.**

Distribution — *Malesia*: Borneo (Brunei, Sarawak, Sabah).

Habitat & Ecology — In forest intermediate between heath and mixed dipterocarp forest, forest on steep slopes and ridges; shallow shales, yellow clay with big sandstone rocks. Altitude: 50–900 m. Flowering: June, October; fruiting: March, April, August to October.

Vernacular names — Sarawak: Mediong, Midong (Iban).

Note — *Alangium kayuniga* is close to *A. meyeri* var. *macilentum*, which differs mainly in the presence of a minute but distinct indumentum.

16. *Alangium kurzii* Craib (sect. 3 *Marlea*)

Alangium kurzii Craib in Kerr, Bull. Misc. Inform. Kew (1911) 60; Fl. Siam. 1 (1931) 806; Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 183; Tardieu in Aubrév. & Tardieu, Fl. Cambodge, Laos & Vietnam 8 (1968) 41, pl. 4: 11–14; Kochummen in Whitmore, Tree Fl. Malaya 1 (1972)

58; P.H.Hô, Ill. Fl. Vietnam 2, 1 (1992) 138, f. 4011; S.Gardner et al., Forest Trees of northern Thailand (2000) 214, f. 465; H.N.Qin & Phengkklai in C.Y.Wu et al., Fl. China 13 (2007) 306; Fl. China Ill. 13 (2008) f. 330: 1–4; W.J.de Wilde et al. in Chayam. & Balslev, Fl. Thailand 14 (2018) 23, f. 4. — Lectotype (designated here): *Kerr 1172* (lecto K (K000704839); isolecto BM, K (K000704838)), Thailand, Doi Sooteh (Doi Suthep).

Marlea tomentosa auct. non Endl.: Kurz, Forest Fl. Burma 1 (1877) 545.

Trees, 10–21 m tall; bole with short buttresses; bark smooth, grey, lenticellate; branchlets drooping; *twigs* brown, 2–4 mm diam., towards apex densely hairy (hairs c. 0.5 mm long), late glabrescent; thorns absent. *Leaves*: *petiole* (0.5–)1–3(–5) cm long, articulate or not; *lamina* subglabrous or hairy above, densely hairy below (sometimes glabrescent or truly glabrous, but hair-tufts in nerve-axils often present), (broadly) ovate or ovate-oblong, 5–28 by 3.5–16 cm, base asymmetric, cordate, margin entire (not lobed), apex acute to acuminate; venation 5–7-plinerved at base; secondary veins 3(–5) on each side; tertiary venation (distinctly) scalariform. *Inflorescences* simple, dichasial, all hairy, 2–18-flowered; *peduncle* (0.5–)1–4.5 cm long. *Flowers*: *pedicel* 2–20 mm long; bracts to 4 mm long, caducous; *corolla in bud* 18–30 mm long, usually swollen at base, apex obtuse; *ovary* densely hairy (rarely subglabrous), 2–3 mm long, *calyx limb* c. 1 mm long, 3–5 mm wide, c. 9-lobed, lobes triangular, c. 0.5 mm long; *petals* white, fading to yellow with age (to orange in Thailand and China), (5–)9(–10), short-hairy, (15–)18–30 mm long; *stamens* as many as petals, 15–25 mm long, filament hairy, 4–8 mm long, thickened, anther linear, 9–17 mm long, connective (densely) long-hairy all along; *style* glabrous, 15–24 mm long, *stigma* subglobose. *Fruits* 2-seeded, ripening purple-black, glabrous or thinly hairy, ovoid, slightly compressed, 10–15 mm long, faintly ribbed. — **Fig. 11.**

Distribution — Myanmar, Thailand, China, Indochina; in *Malesia*: Peninsular Malaysia (Selangor, Negeri Sembilan), Sumatra, not known for Java and Borneo (see note 2).

Habitat & Ecology — Secondary forest, hillside, along rivers, in rocky places, often in open places, also planted near villages. Altitude: 100–1300 m. Flowering: December to August; fruiting: February, July, October.

Vernacular names — Sumatra: Kalimbangbang (Karobatak), Kajoe misang, Kalemisang, Kundur, Mohoe, Endeloepang.

Notes — 1. *Alangium kurzii* resembles *A. chinense* and *A. rotundifolium*, the latter two are always (sub)glabrous with smaller flowers (corolla in bud 8–15 mm long) and *A. chinense* has a glabrous connective and smaller fruits c. 10 mm long; while in *A. rotundifolium* the fruit is larger, 16–20(–25) mm long.

2. According to Berhaman (Sandakania 4 (1994) 31) *A. kurzii* is new for Borneo (Sabah), but the cited specimens rather concern *A. rotundifolium*.

3. *Alangium kurzii* in Thailand has larger flower buds. Its leaves are usually conspicuously hairy, though occasionally glabrous. The connective is always conspicuously long-hairy, with hairs c. 2 mm long. In Indochina (Tardieu 1968) and China (Qin & Phengkklai 2007) glabrous or less hairy specimens with hairy connectives, which could be named *A. kurzii*, belong to a group of plants which contains *A. handelii* Schnarf (described from China, with petals 22–25 mm long) and probably groups with the present *A. rotundifolium* (petals 15–18 mm long). This problem needs to be addressed more precisely.

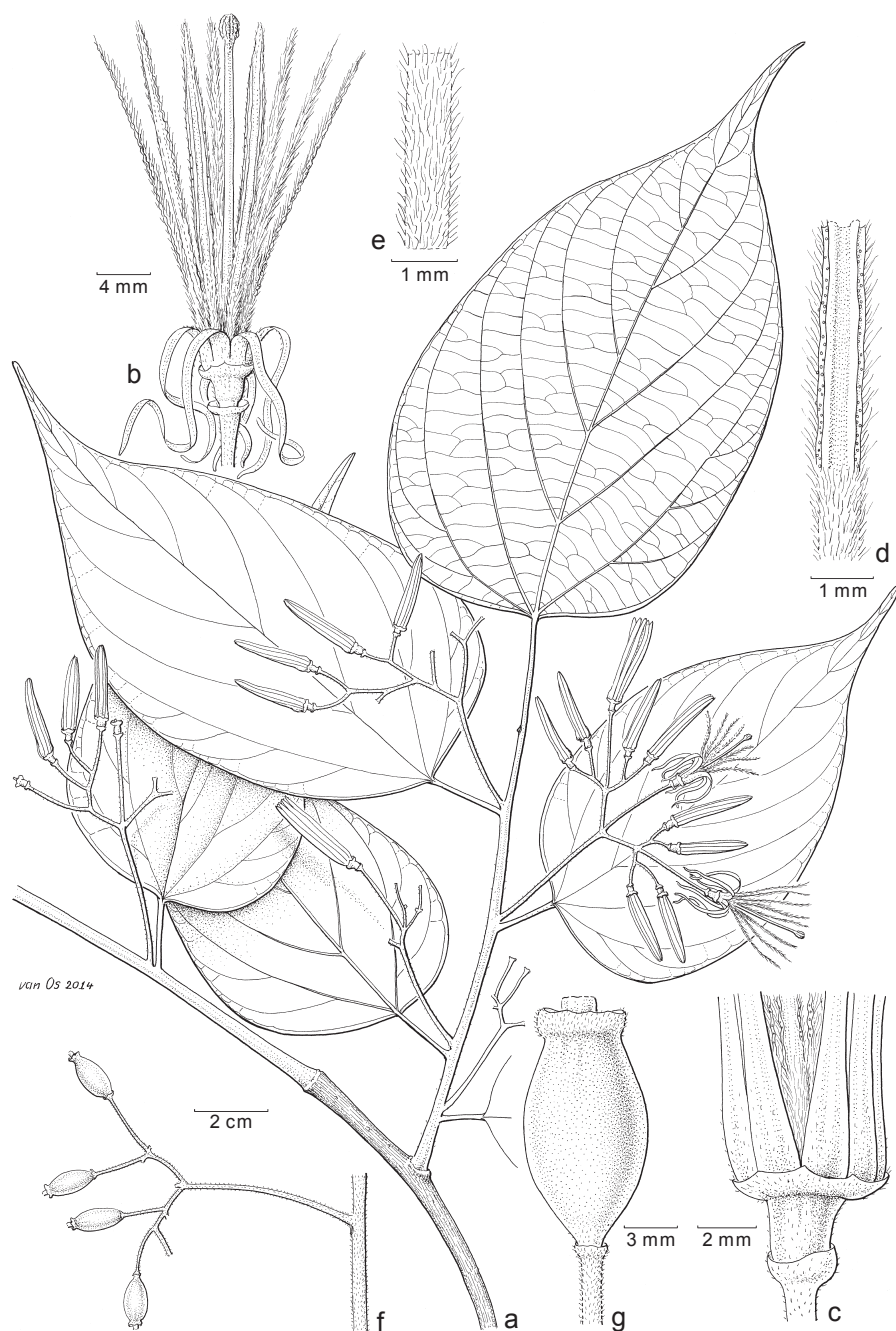


Fig. 11. *Alangium kurzii* Craib. a. Portion of flowering branch; b. flower; c. base of flower showing ovary, calyx, and base of petals; d, e. portions of stamen, at base and at the middle, respectively; f. infructescence; g. fruit, note persistent calyx and disc at apex (a–e: Van Beusekom & Phengklai 300, f, g: Maxwell 89-911; all L). Drawn by Jan van Os.

17. *Alangium ledermannii* W.J.de Wilde & Duyfjes (sect. 2 *Conostigma*)

Alangium ledermannii W.J.de Wilde & Duyfjes, Blumea 62 (2017) 35. — Type: *Ledermann* 9818 (holo L; iso B[†]), Papua New Guinea, April River.

Alangium meyeri auct. non Merr.: Melch. & Mansf., Bot. Jahrb. Syst. 60 (1926) 163.

Small or medium trees, 4–20 m tall; *twigs* dark grey-brown, c. 5 mm diam., with scurfy, simple hairs of c. 0.3 mm long, glabrescent; *leaf bud* not seen. *Leaves*: *petiole* 1(–1.4) cm long; *lamina* drying greenish brown, glabrous, elliptic, 9–12 by 4.5–7 cm, base slightly asymmetric, (broadly) rounded, apex shortly acute to acuminate; venation pinnate, secondary veins 8–12 on each side; tertiary venation finely scalariform-reticulate. *Inflorescences* densely finely hairy (hairs simple, 0.2–0.3 mm long), of 1 or 2 main branches (peduncles) from the leaf axils, 4–20-flowered; *peduncle(s)* 4–8 mm long. *Flowers* (submature buds) densely scurfy hairy; *pedicel* 1–2 mm long; *corolla in bud* 8–9 mm long, base not swollen, apex acute; *ovary* c. 3 mm long, *calyx limb* c. 1 mm long, at margin 2.5–3 mm wide, not or hardly lobed; *petals* 6, inside almost glabrous, c. 10 mm long; *stamens* 6; filament c. 1 mm long, glabrous, not thickened, anther c. 6 mm long, connective glabrous; *style* densely hairy, c. 4 mm long, stigma (short-)conical. *Fruits* not known.

Distribution — *Malesia*: Papua New Guinea (East Sepik).

Habitat & Ecology — Dense, moist primary rain forest with ferns and mosses. Altitude: 200–400 m. Flowering: November.

Note — *Alangium ledermannii* is only known from two collections from the Sepik area: *Ledermann* 9818, the type, and *Ledermann* 9795, both collected in 1912.

18. *Alangium longiflorum* Merr. (sect. 1 *Alangium*)

Alangium longiflorum Merr., Philipp. J. Sci., C 7 (1912) 319; Bloemb., Blumea 1 (1935) 253; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 159; Berhaman, Sandakan 4 (1994) 32; in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 12; W.J.de Wilde & Duyfjes, Thai Forest Bull., Bot. 44 (2016) 82. — Lectotype (designated by De Wilde & Duyfjes 2016): *FB (Darling)* 14773 (lecto L (L.2497730); isolecto BO, K, PNH[†]), Philippines, Luzon, Cagayan Province.

Shrubs or trees, 2–12 m tall, trunk with or without thorns, not deciduous or in the dry season deciduous; *twigs* pale, grey-brown or brown, 1.5–3 mm diam., hairy, hairs grey-brown, c. 0.2–0.5 mm long, glabrescent or late-glabrescent; *leaf bud* hairy. *Leaves*: *petiole* 0.5–1 cm long; *lamina* drying (green) brown, subglabrous or densely to sparsely hairy, (late) glabrescent or hairs persistent below on veins and at very base, elliptic-obovate or obovate-oblong, 6–15 by 2.5–7 cm, base subsymmetric or asymmetric, rounded to cuneate, apex long acute to acuminate; venation 3-plinerved at base, reaching to c. one third; secondary veins (3–)5–7 per side; tertiary venation thin, scalariform and reticulate in between; domatia often present but not distinct. *Inflorescences* 1–5-flowered, sessile, in axils of extant foliage leaves or leaf scars, terminal bud not obvious. *Flowers* completely pale or brown short-hairy; *pedicel* 1–8 mm long, with minute bracteole(s) about halfway and at apex; *corolla in bud* 20–50 mm long, not swollen at base, apex subobtusate; *ovary* 2.5–3.5 mm long, finely ribbed; *calyx limb* c. 0.5 mm long, at margin 2–3 mm wide, lobes 5 or 6, less than 0.5 mm long, subobtusate, not spreading; *petals* 5–7, inside glabrous except near base, white, 20–50 mm

long; *stamens* 14–17, filament slender, 10–35 mm long, straight, without knob, hairy in the lower (third to) half or at the middle, anther 6–10 mm long, slender, glabrous; *style* slender, glabrous, 20–30 mm long, stigma capitate, c. 1.5 mm diam. *Fruit* solitary, ripening pink or red, juicy, thinly hairy, hairs c. 0.1 mm long or less, subglabrescent, ellipsoid, 20–35 by 15–20 mm, not or faintly ribbed; *calyx remnant* small.

Distribution — *Malesia*: Peninsular Malaysia, Singapore, Sumatra, Borneo (Sabah), Philippines, Moluccas (Morotai), Papua.

Note — A variable species in which arbitrarily 2 varieties can be recognised.

KEY TO THE VARIETIES

- 1a. Inflorescence 2–5-flowered. Pedicel 1(–3) mm long. Corolla in bud (20–)30–50 mm long. **a. var. *longiflorum***
- b. Inflorescence 1- or 2- (or 3-)flowered. Pedicel (2–)4–8 mm long. Corolla in bud shorter, 20–30 mm long. **b. var. *hirsutum***

a. var. *longiflorum*

Alangium brachyanthum Merr., Philipp. J. Sci., C 7 (1912) 319; Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 162. — *Alangium longiflorum* Merr. var. *brachyanthum* (Merr.) W.J.de Wilde & Duyfjes, Thai Forest Bull., Bot. 44 (2016) 82. — Lectotype (designated here): *FB (Curran) 10341* (lecto NY(NY02684195); isolecto PNH⁺), Philippines, Luzon, Tabayas.

Shrubs or trees, possibly without thorns. *Leaves* not deciduous when flowering or deciduous in the dry season; *lamina* subglabrous, (ob)ovate-oblong, base attenuate, apex acute to acuminate, 3-plinerved at base. *Inflorescences* with several (2–5) flowers, in axils of leaf scars or extant foliage leaves; terminal bud not obvious. *Pedicel* 1(–3) mm long; *corolla in bud* (20–)30–50 mm long; *petals* 5; filaments filiform, straight, hairy at the middle. — **Fig. 12a, b.**

Distribution — *Malesia*: Borneo (Sabah), Philippines (Luzon, Samar, Leyte, Panay, Mindanao), Moluccas (Morotai), Papua (see note 2).

Habitat & Ecology — Primary forest. Altitude: sea-level to 300 m. Flowering: all year round; fruiting: February to May. Possibly prefers a monsoon climate.

Notes — 1. The disposition of *A. brachyanthum* into the synonymy of var. *longiflorum* is problematic. Whereas most of var. *hirsutum* and var. *longiflorum* seem clearly distinct, there remain specimens from the Philippines, Moluccas and Papua, mainly in fruit (but *Cuming 1716* (K) from Luzon, and *De Vogel 4508* (L) from Halmahera are in flower), that are more-or-less intermediate in habit, and difficult to assign to either of these two varieties. These specimens possibly belong to *A. brachyanthum*, originally

→

Plate 1. a, b. *Alangium chinense* (Lour.) Harms. — c. *Alangium rotundifolium* (Hassk.) Bloemb. — d. *Alangium griffithii* (C.B.Clarke) Harms. — e, f. *Alangium longiflorum* Merr. var. *hirsutum* (Bloemb.) W.J.de Wilde & Duyfjes. — g, h. *Alangium ridleyi* King. Photos: a–c, e, f by B. Duyfjes; d by Joseph Lai; g, h by Paul Leong.



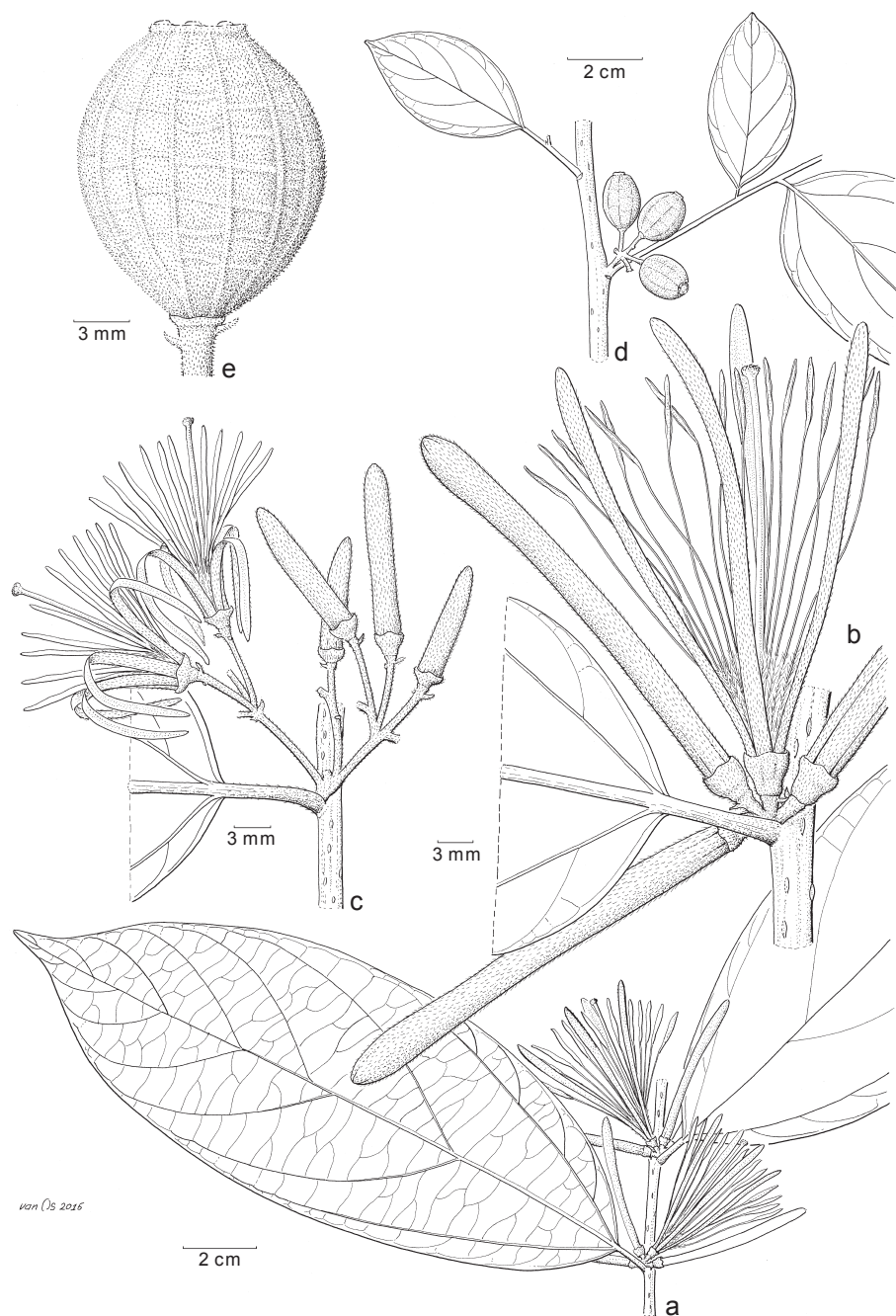


Fig. 12. *Alangium longiflorum* Merr. var. *longiflorum*. a. Portion of flowering branch; b. ditto, detail. — *Alangium frutescens* Zoll. & Moritzi var. *frutescens*. c. Portion of flowering branch; d. portion of fruiting branch; e. fruit (a, b: *Hernaez* 635, c: *Zollinger II* 2289, d, e: *Wirawan* 368; all L.). Drawn by Jan van Os.

described by Merrill (1912) from Luzon on a single, deciduous specimen, with flowers smaller (shorter) than those of *A. longiflorum*. The decision whether or not *A. brachyanthum* is a distinct species needs further study on more flowering material. Possibly, the type concerned a small-flowered specimen with immature flower buds ripened after collection.

2. The collection *Johns et al.* 8746 from the outlying locality Mimika Regency in Papua deviates in a large fruit (c. 25 mm long) on a long pedicel (c. 10 mm long).

b. var. *hirsutum* (Bloemb.) W.J.de Wilde & Duyfjes

Alangium longiflorum Merr. var. *hirsutum* (Bloemb.) W.J.de Wilde & Duyfjes, Gard. Bull. Singapore 72 (2020) 133. — *Alangium hirsutum* Bloemb., Blumea 1 (1935) 254; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 161; W.J.de Wilde & Duyfjes, Thai Forest Bull., Bot. 44 (2016) 80, f. 5e–f. — Type: *Hallier* 3238 (holo BO; iso L (L0009819)), Indonesia, W Kalimantan, Amai Ambit.

Low or medium high trees, trunk often with thorns. *Leaves* not deciduous in the dry season; *lamina* sparsely or densely hairy, (ob)ovate-oblong, base narrowly or broadly rounded, apex acute to acuminate, 3-plinerved at base. *Inflorescences* 1- or 2- (or 3-) flowered, in axils of extant leaves; terminal bud not obvious. *Pedicel* (2–)4–8 mm long; *corolla in bud* 20–30 mm long; *petals* 5–7; filaments straight, filiform, hairy at the middle. — **Fig. 13; Plate 1e, f.**

Distribution — *Malesia*: Peninsular Malaysia (Perak), Singapore, Sumatra, Borneo.

Habitat & Ecology — Primary and secondary lowland forest; basalt, sandstone, yellow loam, brown alluvial soil, shales and limestone. Altitude: sea-level to 700 m. Flowering: February to September, November; fruiting: December to February, July to August.

Note — Specimens from Singapore generally have smaller and more densely hairy leaves.

19. *Alangium maliliense* Bloemb. (sect. 2 *Conogstigma*)

Alangium maliliense Bloemb., Blumea 1 (1935) 286; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 214, f. 8, 10cc, dd; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 35. — Lectotype (designated by De Wilde & Duyfjes 2017): *Cel/V* 161 (= *Waturandang* 43) (lecto BO; isolecto L (L0009824)), Indonesia, Central Sulawesi, Malili near Kawata.

Trees, 15–35 m tall; bole with many buttresses; bark smooth, not peeling (var. *celatum*); *twigs* brown, 1.5–2.5 mm diam., with dense stellate-dendroid bright brown hairs 0.3–0.5(–1) mm long; *leaf bud* curved, similarly densely hairy. *Leaves*: *petiole* 0.4–1 cm long, densely hairy; *lamina* drying greenish or blackish (leadens) brown, hairy (but glabrescent above), (ovate or obovate) elliptic, 6–12 by 2.5–4.5(–6) cm, base (sub)symmetric, broadly rounded or faintly cordate (rarely short cuneate), apex short acute to acuminate; venation pinnate, secondary veins 7–11(–15) on each side, almost loop-veined; tertiary venation fine, thin-reticulate or subscalariform. *Inflorescences* few-flowered, densely hairy, consisting of 1 or 2 single flowers, or 1 or 2 main branches (peduncles) from the leaf axil, each few-branched, 1- or 2- (or 3-) flowered; *peduncle* 5–15 mm long. *Flowers* white, fragrant, densely stellate dendroid hairy, hairs

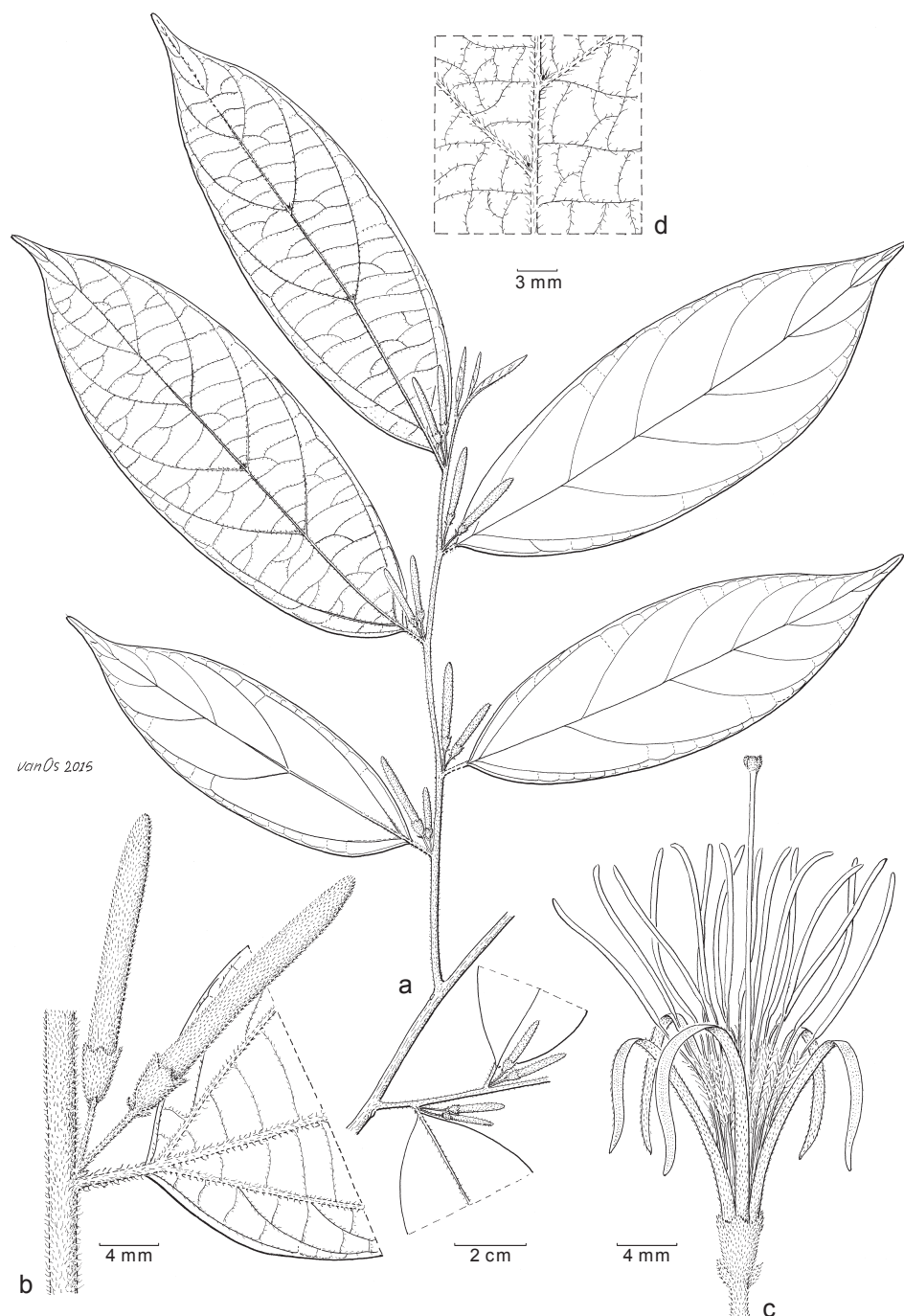


Fig. 13. *Alangium longiflorum* Merr. var. *hirsutum* (Bloemb.) W.J.de Wilde & Duyfjes. a. Habit; b. inflorescence; c. flower; d. detail of lower leaf surface (a, b, d: Sidiyasa et al. Berau 1222, c: Webb 3622; all L). Drawn by Jan van Os.

0.3–0.5(–1) mm long; *pedicel* 1–5 mm long; *corolla in bud* (10–)12–14 mm long, base somewhat swollen, apex rounded; *ovary* 2–3 mm long, not ribbed; *calyx limb* 1–1.5 mm long, not spreading, at margin 4–5 mm wide, with 5 (or 6) erect triangular lobes, c. 0.5 mm long; *petals* (4 or) 5 or 6, inside minutely appressed hairy, (10–)12–15 mm long; *stamens* 5 or 6, filament (3–)4–5 mm long, densely long-hairy, thickened inside at apex, anther 6–10 mm long, connective glabrous; *style* densely hairy, (8–)10–13 mm long, stigma narrow, conical. *Fruits* solitary or 2 (or 3) per infructescence, sweet and sour of taste, stellate-dendroid yellow-brown hairy as the flower, ellipsoid, 10–27 mm long; *calyx remnant* minute.

KEY TO THE VARIETIES

- 1a. Indumentum composed of hairs of c. 0.5(–1?) mm long. Fruits (according to the original description) 23–27 mm long. Leaves drying greenish, hairy or late-glabrescent below. — Sulawesi **a. var. *maliliense***
- b. Indumentum composed of hairs c. 0.3 mm long. Fruits (submature?) 10–13 mm long. Leaves drying (blackish) brown, early glabrescent below. — Moluccas, W New Guinea **b. var. *celatum***

a. var. *maliliense*

Indumentum composed of hairs of c. 0.5(–1?) mm long. *Leaves* drying greenish, hairy or late-glabrescent below. *Fruits* not seen, according to the original description: 1 (or 2?) per infructescence, ripening yellow-brown or yellow-orange, densely brown hairy, (narrowly) ellipsoid, 23–27 by 12–14 mm, coarsely irregularly ribbed; *calyx remnant* small.

Distribution — *Malesia*: Central Sulawesi (Malili); known only from the type (3 collections from the same tree).

Habitat & Ecology — Apparently collected in forest remnant near village. Flowering: September; fruiting: November, December.

Vernacular name — Moroipo.

b. var. *celatum* W.J.de Wilde & Duyfjes

Alangium maliliense Bloemb. var. *celatum* W.J.de Wilde & Duyfjes, Blumea 62 (2017) 37. — Type: *De Vogel* 3867 (holo L; iso BO n.v.), Indonesia, Moluccas, Bacan, near Amasing Kali, S0°35' E127°28'.

Indumentum composed of hairs c. 0.3 mm long. *Leaves* drying (blackish) brown, early glabrescent below. *Fruits* 1–3 per infructescence, (dark) rusty brown, densely stellate-dendroid hairy (hairs 0.3–0.5 mm long), ellipsoid, 10–13 mm long, not ribbed, drying coarsely wrinkled; *calyx remnant* as calyx limb in flower.

Distribution — *Malesia*: N Moluccas (Morotai, Halmahera, Bacan), NW Papua (Vogelkop, Biak).

Habitat & Ecology — Primary forest, in flat terrain and on sloping hill sides; loamy soil with stones, sandy clay soil, rocky soil. Altitude: sea-level to 100 m. Flowering: November (one collection); fruiting: May, July, October, but most collections sterile.

Vernacular names — Morotai: Gahihi. NW Papua: Aibifor (Noemfoor), Mangoam (Biak), Semena (Mooi), Sewit (Karoon), Sigoeheel (Manikiong).

Note — The here recognised varieties are very similar, but have quite different appearances, especially in drying colour. Bloembergen (1939: 210) placed a number of sterile collections (*bb24863*, *bb24883*, *bb24884*, *bb24909*; all BO) of the present var. *celatum* in a new, but not formally described, subspecies of *A. villosum*.

20. *Alangium meyeri* Merr. (sect. 2 *Conostigma*)

Alangium meyeri Merr., Publ. Bur. Sci. Gov. Lab. 35 (1906) 54. — *Alangium javanicum* (Blume) Wangerin var. *meyeri* (Merr.) Berhaman, Sandakania 4 (1994) 34; in Soepadmo & K.M. Wong, Tree Fl. Sabah & Sarawak 1 (1995) 10; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 37. — Lectotype (designated by Berhaman 1994): *FB (Meyer)* 2284 (lecto BO; isolecto B†, K, NY, PNH†, SING, US), Philippines, Luzon, Bataan, Lamao River, Mt Mariveles.

Alangium tutela Ridl., J. Straits Branch Roy. Asiat. Soc. 61 (1912) 10; Fl. Malay Penins. 1 (1922) 894. — *Alangium ebenaceum* (C.B. Clarke) Harms var. *tutela* (Ridl.) Kochummen in Whitmore, Tree Fl. Malaya 1 (1972) 57. — Lectotype (here designated): *Ridley (Goodenough)* 5082 (lecto SING (SING0059171); isolecto BM), Singapore, Ponggol.

Trees, to 25 m tall; bole occasionally with thin buttresses; bark smooth, greyish; *twigs* brown, 1.5–4 mm diam., at apex (including *leaf bud*) minutely hairy (hairs simple, c. 0.1 mm long), glabrescent. *Leaves*: *petiole* 1–1.5 cm long; *lamina* drying brown, early glabrescent, (narrowly) elliptic or elliptic-oblong, (8–)10–18 by 4–7 cm, base almost symmetric, rounded or (short) attenuate, apex acute to acuminate; venation pinnate, secondary veins 6–10 on each side, loop-veined towards apex of lamina; tertiary venation reticulate-scalariform. *Inflorescences* minutely hairy (hairs c. 0.1 mm long), 1 or 2 main branches (peduncles) from the axils of extant leaves, each (1–)2–10-flowered, sessile or peduncle(s) to 20 mm long. *Flowers* white, fragrant, minutely hairy, *pedicel* 2–4 mm long; *corolla in bud* 8–14 mm long, base not swollen, apex (sub)obtus; *ovary* (1–)1.5 mm long, ± ridged; *calyx limb* ± spreading, 1–1.5 mm long, at margin 4–5 mm wide, subtruncate or usually shallowly lobed; *petals* 6 (or 7), inside short-hairy, 10–14 mm long; *stamens* 6 (or 7), filament c. 4 mm long, flattened, outside hairy or glabrous, at apex hairy, anthers 6–7 mm long, connective glabrous; *style* appressed short-hairy, 6–10 mm long, stigma narrowly conical. *Fruits* edible, sour, (1–)2–4 per infructescence, ripening red to purple, minutely hairy, ovoid-ellipsoid, slightly compressed, 15–25 by 12–15 mm, (6–)10–12-ribbed or not; *calyx remnant* 1–2 mm long, c. 4 mm wide, shallowly lobed.

Note — For convenience sake, to deal with the variation, 2 varieties are recognised.

KEY TO THE VARIETIES

- 1a. Twigs 2–4 mm diam. Lamina 10–18 cm long, secondary veins 6–10 on each side. Corolla in bud 10–14 mm long. Fruit 20–25 mm long **a. var. meyeri**
- b. Twigs 1.5–2(–2.5) mm diam. Lamina 8–15 cm long, secondary veins 6–8 on each side. Corolla in bud c. 8 mm long. Fruit 15–20 mm long . . . **b. var. macilentum**

a. var. meyeri

Trees, 10–25 m tall; *twigs* 2–4 mm diam., minutely hairy. *Lamina* 10–18 cm long, secondary veins 6–10 on each side. *Inflorescences* 2–10-flowered. *Corolla in bud* 10–14 mm long; *ovary* minutely hairy. *Fruits* 2–4 per infructescence, 20–25 mm long, glabrescent.

Distribution — *Malesia*: Peninsular Malaysia (Selangor, Pahang, Johor), Singapore, Sumatra, Borneo (Brunei, Sarawak, Sabah, E Kalimantan), Philippines (Luzon, Polilo, Mindoro, Mindanao).

Habitat & Ecology — Primary and secondary lowland forest, mixed dipterocarp forest, mountain forest, hillside and steep slopes; black and brown soil, granite, limestone, sandy loam soil and loam soil with lime. Altitude: sea-level to 1000(–1500) m. Flowering and fruiting: all year round.

Vernacular names — Sumatra: Bantoenan, Bidara oeding, Kaju Tas, Kaju manau, Taramajang oeding. Borneo: Sarawak: Ladjik, Midung (Iban), Ridan; Sabah: Indakarpus (Dusun); Kalimantan: Tengalim.

b. var. macilentum W.J.de Wilde & Duyfjes

Alangium meyeri Merr. var. *macilentum* W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 38. — Type: *Wood A 4101* (holo L; iso A n.v., BRI n.v., KEP, SING), Malaysia, Borneo, Sabah, Kalabakan, 30 miles WNW of Tawau.

Trees, 10–25 m tall; bole with small and low buttresses; *twigs* 1.5–2(–2.5) mm diam., minutely hairy (hairs 0.1 mm long or less). *Lamina* 8–15 mm long, secondary veins 8–10 on each side. *Inflorescences* 1- or 2-flowered. *Corolla in bud* c. 8 mm long; *ovary* minutely or hardly hairy. *Fruits* 1 (or 2) per infructescence, minutely hairy, not or late glabrescent, 15–20 mm long.

Distribution — *Malesia*: Borneo (Sarawak, Sabah, E Kalimantan).

Habitat & Ecology — Primary forest, ridge of mixed dipterocarp forest, presumably preferring poorer soils of ridges; dark brown soil, yellow and sandy clay. Altitude: sea-level to 200 m.

Note — *Alangium meyeri* var. *macilentum* differs from the type variety in the diminutive habit; it approaches *A. kayuniga*, from which it differs chiefly in almost lacking any indument. *Alangium meyeri* var. *macilentum* also links up with meagre specimens provisionally attributed to *A. javanicum* from SE Kalimantan, the latter is distinct in a much more conspicuous indumentum with longer hairs, c. 0.5 mm long, on twig apex and leaf bud; with magnification one can see that *A. meyeri* var. *macilentum* has a dense covering of minute hairs less than 0.1 mm long.

21. Alangium megianum Wangerin (sect. 2 *Conostigma*)

Alangium megianum Wangerin, *Repert. Spec. Nov. Regni Veg.* 4 (1907) 338; in Engl., *Pflanzenr.* 41.IV.220b (1910) 15, f. 3f, j; W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 38. — Type: *Hose (Haviland)* 2885 (holo L; iso BO, K 2 sheets, SING), Malaysia, Borneo, Sarawak, Kapit, Rejang.

(Shrubs or) trees, to 30 m tall; bole with buttresses and small or large stilt-roots; *twigs* brown, 3–5 mm diam., at apex short hairy; *leaf bud* straight, densely short-hairy, hairs

simple, c. 0.3 mm long. *Leaves*: *petiole* 1–2 cm long; *lamina* drying brown, glabrous (midvein below somewhat short-hairy), narrowly elliptic, (15–)20–30 by 6–12 cm, base symmetric, rounded or short-cuneate, apex rather broadly acuminate to c. 1 cm long; venation pinnate, secondary veins 10–15 on each side, loop-veined especially towards apex of lamina; tertiary venation thin, $\pm$ scalariform. *Inflorescences* minutely hairy (hairs c. 0.2 mm long), consisting of 1 (or 2) branches (peduncles) from leaf axils, each few-branched, 2–4-flowered; *peduncle(s)* (2–)5–10 mm long. *Flowers* minutely hairy (hairs c. 0.3 mm long); *pedicel* 2–3 mm long; *corolla in bud* c. 15 mm long, base not swollen, apex subacute; *ovary* 2–4 mm long, narrow, 6(–10)-ribbed; *calyx limb* not spreading, (sub-)erect, 2–3 mm long, at margin 2–2.5(–4) mm wide, truncate or inconspicuously toothed; *petals* 6, inside glabrous, c. 15 mm long; *stamens* 6, filament 4(–6) mm long, not thickened at base, flattened, hairy at apex and outside, anther c. 10 mm long, connective glabrous; *style* finely appressed hairy, c. 12 mm long, stigma narrowly conical. *Fruits* 1 or 2 per infructescence, ripening reddish (or purplish), when dry yellow-green and minutely yellow-greenish hairy, subovoid-ellipsoid, 20–30 mm long, narrowed at base and apex (base not rounded), finely (coarsely) ribbed; *calyx remnant* short or long (1–)4 mm high, mostly narrow (limb not spreading), truncate or toothed.

Distribution — *Malesia*: Borneo (Sarawak, Sabah (2 collections), W, C, and E Kalimantan).

Habitat & Ecology — Primary and old secondary lowland mixed dipterocarp forest, often near rivers; yellow, sandy, and red clay soil. Altitude: sea-level to 300–1000 (–1660: (SAN (Mikil) 41761, Trusmadi FR) m. Flowering and fruiting: all year round, but mainly in October.

Vernacular names — Sarawak: Midong (Iban); E Kalimantan: Ridan.

Notes — 1. *Alangium mezianum* resembles *A. borneense*, the latter generally has smaller dimensions of most parts, and differs especially in a more conspicuous indumentum of the curved (not straight) leaf bud.

2. *Alangium mezianum* appears to be a variable entity, even in the restricted sense as used here, especially in its general appearance. Besides the c. 30 collections studied, some 10 collections, all identified as *A. cf. mezianum*, are somewhat doubtful as they show traits intermediate with *A. borneense*, viz. Brunei: Suzuki & Miyamoto K 13266. – Sarawak: Hansen 918 & 943, Jacobs 5359, S (Luang) 21882, S (Luang) 22478, S (Paie) 28242, S (Chai) 34677, S (Abang) 48002. – Sabah: SAN (Mikil) 41761. – E Kalimantan: Church et al. 955 & 2018.

22. *Alangium minahassicum* (Bloemb.) W.J.de Wilde & Duyfjes (sect. 2 *Conostigma*)

Alangium minahassicum (Bloemb.) W.J.de Wilde & Duyfjes, Blumea 62 (2017) 38. — *Alangium javanicum* (Blume) Wangerin var. *minahassicum* Bloemb., Blumea 1 (1935) 284, f. 5w, x; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 220. — Lectotype (designated by De Wilde & Duyfjes 2017): Béguin 2262 (lecto L (L.2497856); isolecto BO), Indonesia, Moluccas, Halmahera, W Pitoe.

Trees, 10–30(–40) m tall; bole straight with prop roots, buttresses, and small stilt-roots; bark smooth; twigs grey or (dark) brown, 2–4 mm diam., early glabrescent, hairs simple, minute, less than 0.1 mm long; leaf bud minutely hairy. *Leaves*: *petiole*

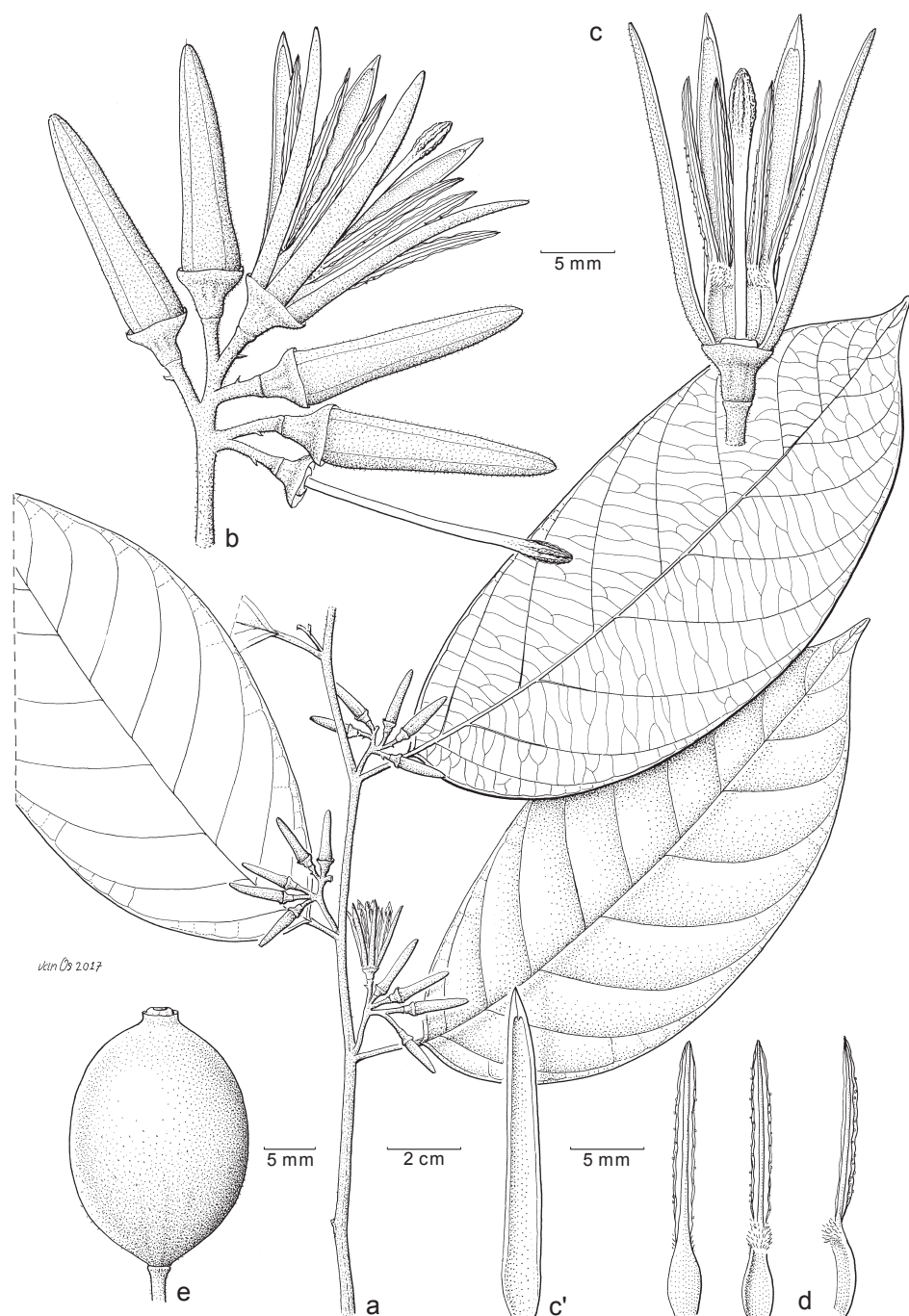


Fig. 14. *Alangium minahassicum* (Bloemb.) W.J. de Wilde & Duyfjes. a. Portion of flowering twig; b. inflorescence; c. flower, some petals and stamens removed; c'. petal; d. stamens, ad- and abaxial and lateral view; e. fruit (a, c–e: *De Vogel* 3698, b: *De Vogel* 4067; all L.). Drawn by Jan van Os.

0.5–1.2 cm long; *lamina* drying greenish or blackish brown, glabrous, (ovate-)elliptic, 8–18 by 3–8.5 cm, base not or hardly asymmetric, rounded or cuneate, apex acute to acuminate; venation pinnate, secondary veins 5–8 on each side; tertiary venation thinly (inconspicuously) scalariform. *Inflorescences* subglabrous (hairs less than 0.1 mm long), 1 or 2 main branches (peduncles) in the leaf axils, each shortly branched, 2–6-flowered; *peduncle(s)* 3–12 mm long. *Flowers* fragrant, minutely hairy; *pedicel* 2–3 mm long; *corolla in bud* (12–)15–20 mm long, apex (sub)acute; *ovary* 2.5–3.5 mm long, (faintly) ridged, *calyx limb* saucer-shaped, c. 1.5 mm long, at margin 4–6 mm wide, straight, unlobed or faintly lobed, or irregularly torn; *petals* 6, inside subglabrous, 12–18 mm long; *stamens* 6, filament 2–5 mm long, somewhat broadened at base, at apex densely hairy, anther c. 10 mm long, connective glabrous; *style* hairy, 10–15 mm long, stigma conical. *Fruits* 1 (or 2) per infructescence, drying black, minutely hairy, glabrescent, ovoid-ellipsoid, 25–35 by 15–18 mm, smooth; *calyx remnant* small. — **Fig. 14.**

Distribution — *Malesia*: Sulawesi (Menado), N Moluccas (Halmahera, Ternate, Bacan, Obi Is., Buru, Seram).

Habitat & Ecology — Primary forest, on hillsides, steep terrain, near river banks; loamy soil with little humus, sandy soil, clayey soil with stones, black volcanic soil, on shale quartzite bedrock, also on limestone. Altitude: sea-level to 700 m. Flowering and fruiting: predominantly October to December.

Vernacular names — Sulawesi: Lansabonti poete. Halmahera: Badu (Tobaro), Otuni (Tobaru), Wai Wai Bebedo.

Note — In the Leiden Herbarium there is a number of mainly sterile specimens from New Guinea, most of these collected by Boschwezen (BW), which obviously belong to, or are closely resembling *A. minahassicum*. These collections can be somewhat arbitrarily divided into two groups:

1. A group of 9 collections from north-western Papua, notably Warsamson valley, E of Sorong, which may represent a separate taxon, because of their relatively long petioles (1.5–)2.3 cm long. Among these, two collections are in fruit (fruits c. 25 mm long) which could be linked up with *A. hollrungii*. The collections are: *BW 2922* (fruit), *BW 2958*, *BW 8496* (200 km W of Hollandia), *BW 11175* (Japen Is.), *BW 12398*, *BW 12455*, *BW 12768*, *BW 13291*, *Vink 17571* (fruit). More fertile material is needed for a decision on their status.
2. A group of 4 collections, all sterile, from Adi Is. (limestone), may belong to *A. minahassicum*, but fertile material is needed to be certain. The collections are: *BW 9959*, *BW 10152*, *BW 10154*, *BW 10155*.

23. *Alangium nobile* (C.B.Clarke) Harms (sect. 2 *Conostigma*)

Alangium nobile (C.B.Clarke) Harms in Engl. & Prantl, Nat. Pflanzenfam. 3, 8 (1898) 262; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 71, 1 (1902) 79; Wangerin in Engl., Pflanzenr. 41.IV.220b (1910) 11; Ridl., Fl. Malay Penins. 1 (1922) 892; Bloemb., Blumea 1 (1935) 276, f. 4a–f; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 211, f. 9a–e (excl. var. *denudatum*); Kochummen in Whitmore, Tree Fl. Malaya 1 (1972) 58; Berhaman, Sandakania 4 (1994) 32; in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 13; Argent et al., Man. non-Dipterocarp Trees C. Kalimantan 1 (1997) 7, f. 3; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 40. — *Marlea nobilis* C.B.Clarke in Hook.f., Fl. Brit. India 2 (1879) 743. — Lectotype (designated by Berhaman 1994): *Griffith KD 3385* (lecto K (K000077038); isolecoto BM, C, P 2 sheets, U 2 sheets), Peninsular Malaysia, Melaka ('Malacca').

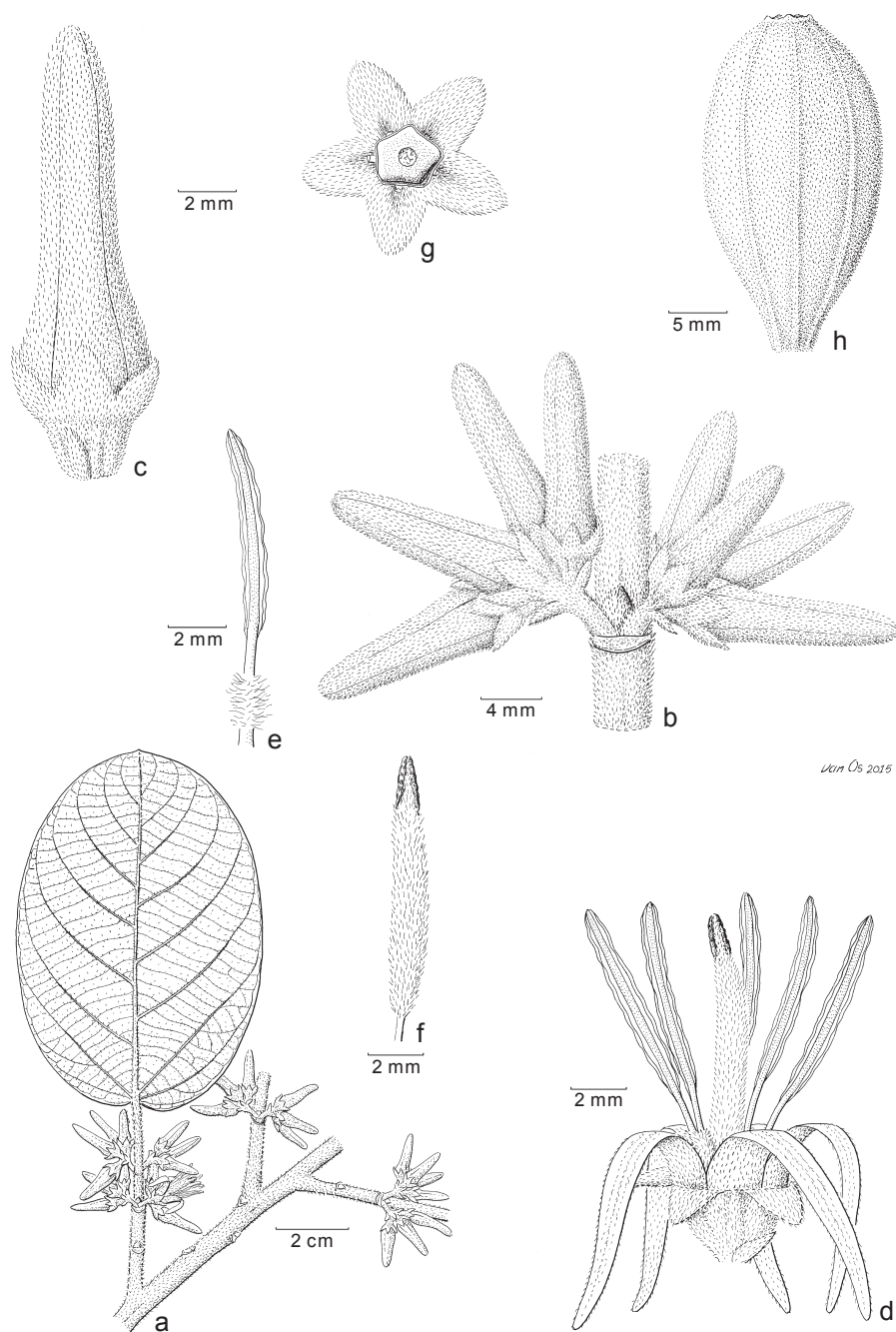


Fig. 15. *Alangium nobile* (C.B. Clarke) Harms. a. Portion of flowering branch; b. node with (compound) inflorescence; c. flower bud; d. open flower; e. stamen; f. style and stigma; g. view of calyx limb and disc on top of ovary, after removal of style; h. fruit (a–g: *KL* (Teo & Pachiappan) 3131, h: *Kostermans* 9971; all L). Drawn by Jan van Os.

Trees, 20–45 m tall; bole with plank buttresses, c. 2 m high, extending to 2 m over the ground, and fluted to 5 m; bark smooth, thin; *twigs* brown, irregularly angular, 3–8 mm diam., brown-hairy (hairs simple, 0.2–0.5 mm long), late glabrescent; *leaf bud* densely hairy, hairs c. 0.5 mm long. *Leaves*: *petiole* 1.5–4.5 cm long; *lamina* drying greenish brown or brown, glabrescent above, densely hairy below (hairs 0.3–0.5(–1) mm long), ovate or (broadly) elliptic or obovate, rarely subcircular, 6–35(–45) by 5–22 cm, base asymmetric, cordate (rarely $\pm$ rounded), apex broadly rounded, sometimes with a short acumen of c. 0.5 cm long; venation 3–5-plinerved at base, secondary veins 6–10 at each side, (not) neatly loop-veined; tertiary venation thin or stout, mostly distinctly scalari-form. *Inflorescences* densely hairy, of (1 or) 2 or 3 subsessile or stalked (peduncled) cluster-like cymes from the leaf axil, each 2–4-branched, (1- or) 2- or 3-flowered; *peduncle(s)* to 20(–30) mm long. *Flowers* densely hairy, subsessile; *pedicel* c. 1 mm long; *corolla in bud* 10–15 mm long, base swollen, apex blunt or subacute; *ovary* c. 2 mm long, coarsely 5-ribbed; *calyx limb* c. 2 mm long, at margin 4–6 mm wide, lobes 5 (or 6), stout, long-triangular, 1.5–2 mm long; *petals* 5 (or 6), 10–15 mm long, inside largely short grey-hairy; *stamens* 5, filament c. 1 mm long, densely hairy in lower half, glabrous in upper half, anther c. 5 mm long, connective glabrous; *style* densely hairy, c. 10 mm long, stigma narrowly conical. *Fruits* 1 or 2 (or more?) per infructescence, ripening (greenish) yellow or reddish, densely rusty hairy (hairs c. 0.5 mm long), ellipsoid, 25–30 by 15–20 mm, c. 10-ribbed; *calyx remnant* as calyx in flower. — **Fig. 15.**

Distribution — *Malesia*: Peninsular Malaysia (Kedah, Kelantan, Pahang, Johor), Singapore, Sumatra (Palembang), Borneo (Sarawak, Sabah, Kalimantan).

Habitat & Ecology — In lowland dry forest, mixed dipterocarp forest, ridge bamboo forest, hill slopes in kerangas forest, and along river banks; on sandstone, yellow clay, clayey soil, yellow sandy soil. Altitude: sea-level to 700 m. Flowering and fruiting: all year round.

Vernacular names — Sumatra: Mata oedang (Medang). Borneo: Sarawak: Midong (Iban); W Kalimantan: Malapang gunung.

Uses — Recorded as ‘a very handsome large tree’, perhaps of ornamental value. The fruits are edible.

Note — In the inflorescences the terminal bud (axillary to the subtending leaf) is usually obvious, and the bracts (bracteoles) are to 5 mm long.

24. *Alangium oblongum* Craib (sect. 2 *Conostigma*)

Alangium oblongum Craib, Bull. Misc. Inform. Kew (1930) 426; Fl. Siam. 1 (1931) 807; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 40, f. 5; W.J.de Wilde et al. in Chayam. & Balslev, Fl. Thailand 14 (2018) 25, f. 5. — Lectotype (here designated): *Kerr 17028* (lecto K (K000704837); isolecto BK, BM), Thailand, Ranong, Kampuan.

Alangium costatum auct. non (Boerl.) Boerl. ex King: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 71, 1 (1902) 78.

Alangium ridleyi auct. non King: Evrard in Lecomte et al., Fl. Indo-Chine 2 (1923) 1186; Tardieu in Aubrév. & Tardieu, Fl. Cambodge, Laos & Vietnam 8 (1968) 48.

Trees, 10–30 m tall; bole with buttresses and occasionally with stilt-roots; bark whitish or whitish brown, smooth; *twigs* brown, 2–4(–5) mm diam., at apex with (dense) minute hairs, c. 0.1 mm long, early glabrescent; *leaf bud* straight, with short

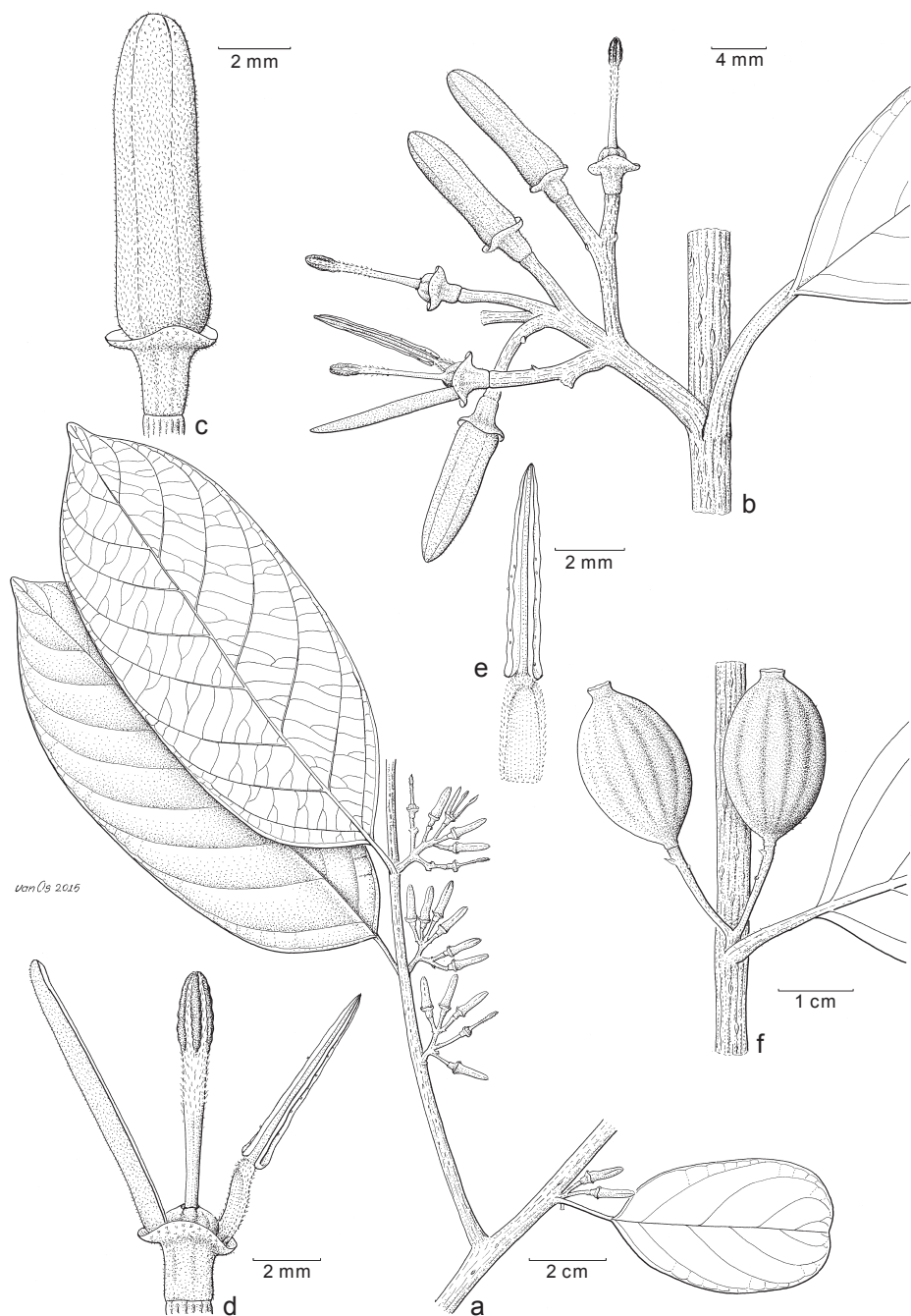


Fig. 16. *Alangium oblongum* Craib. a. Portion of flowering branch; b. inflorescence; c. flower bud; d. flower at anthesis showing ovary, calyx limb, disc, style, and conical stigma (petals and stamens removed, except one of each); e. stamen; f. fruit (a–d: Wongprasert s.n. (SN130168) (BKF), e: Suddee et al. 3509 (BKF), f: Poilane 10950 (Annam) (L)). Drawn by Jan van Os.

minute, scale-like hairs c. 0.1 mm long. *Leaves*: *petiole* 1.2–1.5 cm long; *lamina* drying (greenish) brown, glabrous (early glabrescent), elliptic or elliptic-oblong, 12–25(–35) by 4–10 cm, base symmetric, (rounded or) short or long-attenuate, apex acute to acuminate; venation pinnate, secondary veins 8–15 per side, loop-veined towards apex of lamina; tertiary venation reticulate or somewhat scalariform. *Inflorescences* glabrous (or minutely hairy), with 1–3 main branches (peduncles) per leaf axil, each few-branched, 1–5(–10)-flowered; *peduncle(s)* to 10 mm long. *Flowers* minutely hairy (hairs c. 0.1 mm long); *pedicel* 2–4 mm long; *corolla in bud* 12–15 mm long, not swollen at base, apex subobtusate; *ovary* 1.5–3 mm long, usually 10–12-ribbed; *calyx limb* ± spreading, 1(–2) mm long, at margin 3.5–4 mm wide, subtruncate with straight or (faintly) lobed margin; *petals* 6, minutely hairy inside, (appearing as glabrous) 12–15 mm long; *stamens* 6, filament c. 4 mm long, hairy in upper part, not thickened at base, anther c. 8 mm long, connective glabrous; *style* hairy, 8–10 mm long, stigma narrowly conical. *Fruits* 1–3 per infructescence, ripening purplish, (sub)glabrous, ovoid-ellipsoid, 20–30(–35) mm long, usually (irregularly) coarsely bluntly (6–)10–12-ribbed; *calyx remnant* short, c. 5 mm wide. — **Fig. 16.**

Distribution — India (Nicobar Is.), Myanmar, Thailand, Vietnam; in *Malesia*: Peninsular Malaysia (Perlis, Kedah, Selangor, Terengganu), Sumatra (Aceh, Lankat), Borneo (Sarawak, Sabah, Kalimantan (Natuna Is.)).

Habitat & Ecology — Primary forest, (mixed) dipterocarp forest on flat land, hill-sides, sandy ridges, and along rivers; yellow clayey soil. Altitude: 30–900 m. Flowering and fruiting: all year round.

Uses — Wood used for construction and canoes. Fruits edible, pulp sweet and juicy.

Vernacular names — Sumatra: Taramajang boeloeh (Aceh). Borneo: Sarawak: Jadam (Malay), Midong or Midung (Iban), Senumpul; Sabah: Indarakarpus (Malay); Kalimantan: Pangoron (Dayak).

Notes — 1. *Marlea costata* Boerl. was described on material cultivated in the Botanical Garden in Bogor, grown from seed said to be collected by Teijsmann (?) in S Sumatra. This material (in L) is at present attributed to *A. javanicum*.

2. *Alangium oblongum*, *A. meyeri*, and *A. ridleyi*, all considered as distinct species, may be exponents of one single species, only differing in sizes and appearance, as there seem to be sufficient intermediates to connect them. However, it is inconceivable to unite ‘typical’ *A. ridleyi* from Singapore, a plant with robust twigs, with *A. meyeri*, a plant of a much more delicate stature, from Luzon. On the other hand, also *A. javanicum* (a species with obvious hairy leaf buds, and small fruits of 15–20 mm length), seems to intergrade with *A. meyeri*, but the latter has an indumentum of minute scale-like hairs only.

25. *Alangium pallens* W.J.de Wilde & Duyfjes (sect. 2 *Conostigma*)

Alangium pallens W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 43, f. 6. — Type: *Kostermans 21328* (holo L; iso A n.v., BO, CANB n.v., G n.v., K, NY n.v., P, SAR n.v., SING, US n.v.), Indonesia, E Kalimantan, Berau, Mt Njapa on Kelai River.

Trees, 10–35 m tall; bole sometimes strongly fluted and with buttresses or stilt-roots; *twigs* pale brown or whitish, contrasting with blackish drying colour of petioles

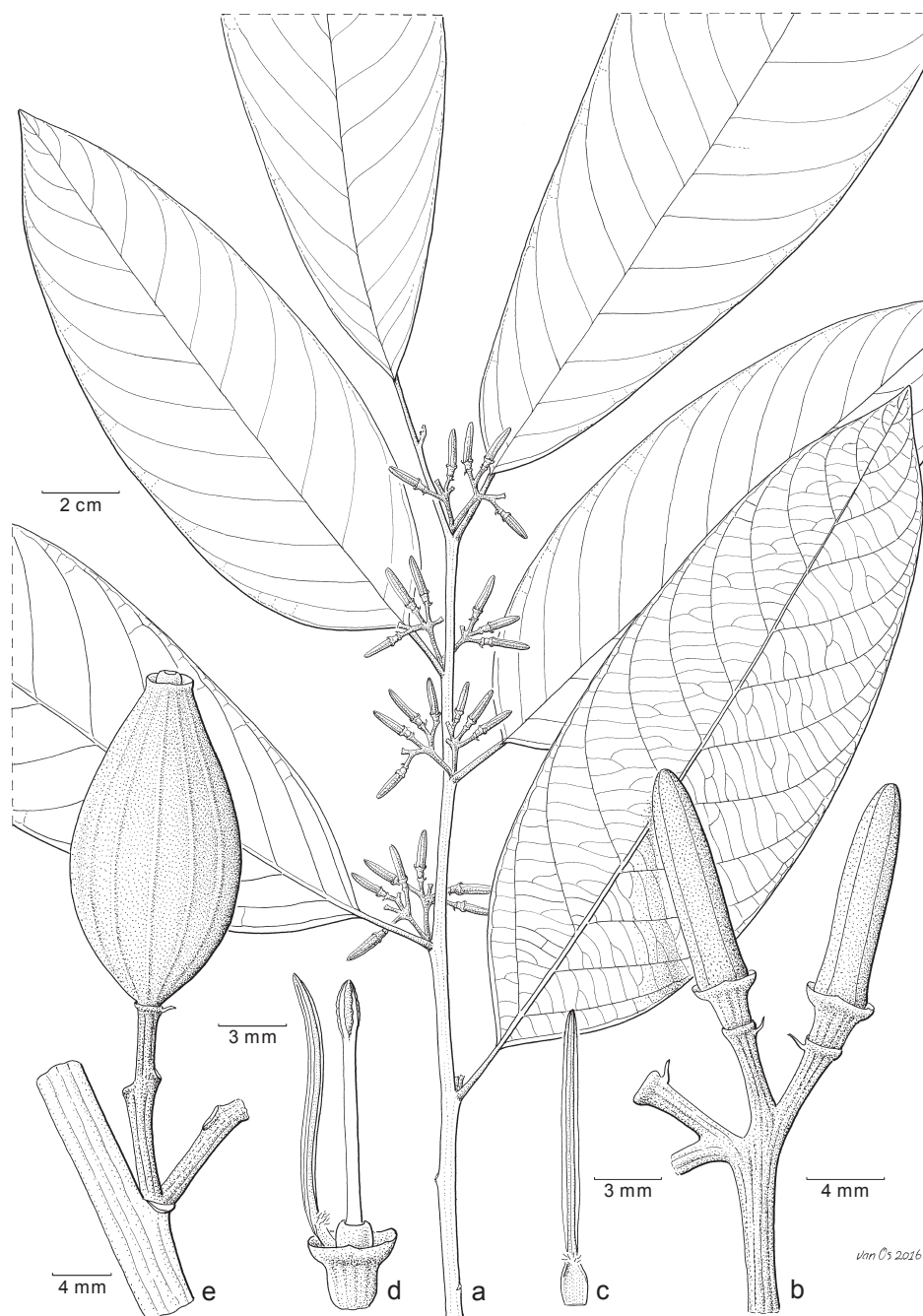


Fig. 17. *Alangium pallens* W.J. de Wilde & Duyfjes. a. Flowering twig; b. portion of inflorescence with mature buds; c. stamen seen from the inside; d. flower, corolla and stamens, except one, removed; e. infructescence with one fruit (a–d: SAN (Mariyoh *et al.*) 128850, e: SAN (Minjulu) 77013; all L). Drawn by Jan van Os.

and peduncles, 2–5 mm diam., appearing glabrous (hairs minute, simple), sometimes $\pm$ angular; *leaf bud* pale brownish hairy, hairs short or long, 0.1–0.3(–0.5) mm long. *Leaves*: *petiole* drying blackish, 0.6–2 cm long; *lamina* drying (greenish) brown, glabrous, elliptic or oblong, 10–23 by 4–9 cm, base (sub)symmetric, rounded or cuneate, apex acute to acuminate; venation pinnate, secondary veins 8–18 on each side, occasionally loop-veined; tertiary venation faintly scalariform. *Inflorescences* (sub)glabrous, drying blackish, 1 or 2 main branches (peduncles) per leaf axil, each few-branched, 1–4(–6)-flowered; *peduncle(s)* 5–15 mm long. *Flowers* (sparingly) minutely stellate-hairy; *pedicel* 1.5–3 mm long; *corolla in bud* 10–13 mm long, not swollen at base, apex $\pm$ blunt or (sub)acute; *ovary* 2–2.5 mm long, not or somewhat ribbed; *calyx limb* broadly saucer-shaped, c. 1.5 mm long, at margin 4–5 mm wide, not or hardly lobed; *petals* 5, inside sparingly hairy, 12–15 mm long; *stamens* 5, filament 1.5–3 mm long, inside near apex thickened and hairy, anther 8–10 mm long, connective glabrous; *style* (sparingly) hairy, c. 10 mm long, stigma blunt-conical. *Fruits* 1–3 per infructescence, ripening (pink or) red, drying blackish, glabrous, flattish, ovoid-ellipsoid, 20–32 by 13–20 mm, smooth or thinly lined; *calyx remnant* small, narrow. — **Fig. 17.**

Distribution — *Malesia*: Peninsular Malaysia (Terengganu, Pahang), (W) Sumatra, Borneo (Sarawak, Sabah, E Kalimantan).

Habitat & Ecology — Primary and secondary forest, on river banks, sandstone rocks; brownish sandy soil, and limestone. Altitude: sea-level to 700 m. Flowering: March, May, June, October; fruiting: March, May, July, August, December.

Vernacular names — Sabah: Kondolon (Dusun); E Kalimantan: Ladjik.

Uses — Fruits edible.

Note — Stout specimens may be confounded with *A. ebenaceum*, the latter differs in its dark brown twigs and leaves drying purplish below.

26. *Alangium pilosum* Merr. (sect. 4 *Rhytidandra*)

Alangium pilosum Merr., Philipp. J. Sci. 20 (1922) 417; Enum. Philipp. Fl. Pl. 3 (1923) 241. — *Alangium villosum* (Blume) Wangerin subsp. *pilosum* (Merr.) Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 205, f. 6d, 7h, i; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 79, f. 2. — Lectotype (designated by De Wilde & Duyfjes 2017): *FB* (*Ahern's collector*) 3307 (lecto US (US00127564); isolecto K n.v., PNH[†]), Philippines, Luzon, Rizal Prov.

Alangium pilosum Merr. var. *subglabrum* Merr., Philipp. J. Sci. 20 (1922) 418; Enum. Philipp. Fl. Pl. 3 (1923) 241. — Lectotype (designated by De Wilde & Duyfjes 2017): *FB* (*Contreras*) 23399 (lecto US (US00127565); isolecto K, PNH[†]), Philippines, Negros.

Alangium villosum (Blume) Wangerin var. *parviflorum* Bloemb., Blumea 1 (1935) 272. — *Alangium villosum* (Blume) Wangerin subsp. *parviflorum* (Bloemb.) Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 206. — Type: *bb 11370* (holo BO; iso L), Indonesia, Flores, Boehe Soge (Maoemere).

Shrubs or trees, 4–20 m tall; bark greyish; *twigs* brown, 1.5–3(–4) mm diam., grey or pale brown-hairy, hairs 0.1–0.3 mm long. *Leaves*: *petiole* 0.5–1 cm long, minutely hairy; *lamina* drying (greenish) brown, minutely hairy, mainly on veins below, narrowly or broadly elliptic, 6–13 by 2–4.5(–5) cm, base (strongly) asymmetric, cuneate, apex acute to acuminate; venation pinnate, secondary veins 4–7 at each side, tertiary venation reticulate (or partly scalariform). *Inflorescences* hairy (hairs 0.1–0.3 mm long), simple, a single peduncled compound cyme, (3–)5–20-flowered; *peduncle* slender, 10–25 mm

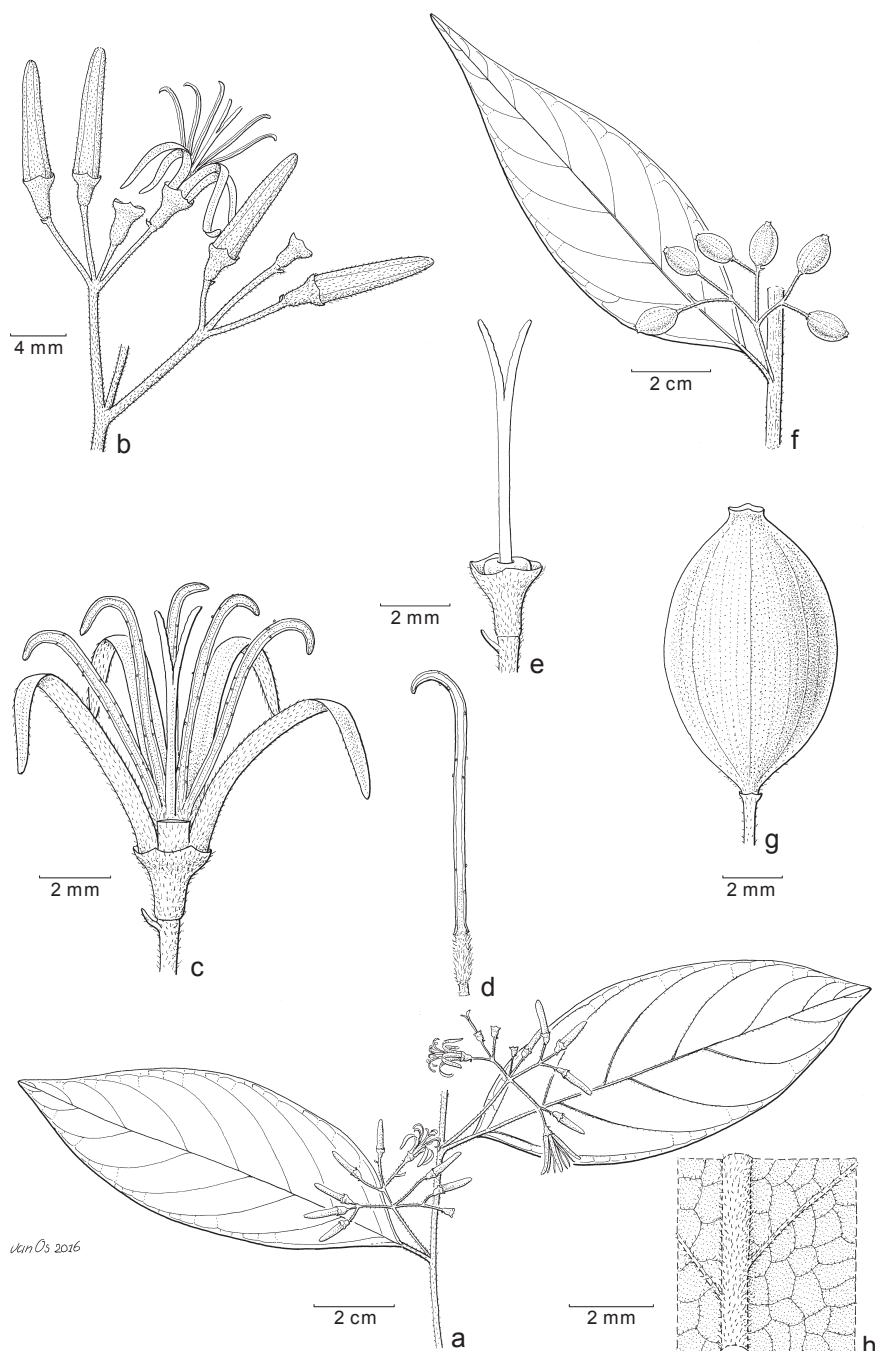


Fig. 18. *Alangium pilosum* Merr. a. Inflorescences; b. apical part of inflorescence; c. flower; d. stamen; e. style, note stigma deeply lobed; f. infructescence; g. fruit; h. lower leaf surface (a–e, h: Verheijen 1843, f, g: Kostermans & Wirawan 122; all L). Drawn by Jan van Os.

long. *Flowers* (densely) hairy, hairs 0.1–0.2 mm long; *pedicel* 2–5 mm long; *corolla in bud* 4–6(–7) mm long, base not swollen, apex subobtusate; *ovary* 1.5–2 mm long, finely whitish hairy, not ribbed; *calyx limb* narrowly cup-shaped, somewhat spreading, 0.5(–1) mm long, c. 1.5 mm wide, margin subentire or with 5 short lobes; *petals* (4–)5(–7), 5–7(–8) mm long, inside glabrous, connate at base for c. 0.5 mm; *stamens* 5, at base slightly connate to petals, filament c. 2.5 mm long, hairy, anther 4–5 mm long, connective glabrous; *style* c. 5 mm long, glabrous, stigma lobes 1–2 mm long. *Fruits* 1–8 per infructescence, yellowish green, ripening black, glabrous, broadly ovoid-ellipsoid, 8–12 mm long, smooth or faintly narrowly 5–10-ribbed; *calyx remnant* minute. — **Fig. 18.**

Distribution — *Malesia*: Philippines (Luzon, Leyte, Negros, Samar); Lesser Sunda Islands (Lombok, Sumbawa, Flores, Timor).

Habitat & Ecology — (Primary) forest. Altitude: 15–900 m. Flowering: all year round but mostly in February; fruiting: mostly in April and May.

Notes — 1. Plants from the Philippines are generally more densely and longer hairy (hairs 0.2–0.3 mm long) when compared with those of the Lesser Sunda Islands (hairs c. 0.1 mm long or plants occasionally subglabrous).

2. Two collections in L, from N Moluccas, Halmahera, viz. *De Vogel 4419* (fl.) & *4452* (fr.) may represent a new species. They key out as *A. pilosum*, but they look quite different because of the broader, more densely hairy leaves. The specimens are stored under *Alangium* aff. *pilosum*. An eventual description should wait for additional fruiting material.

3. See note under *A. gracile* and note 1 under *A. solomonense*.

27. *Alangium plumbeum* W.J.de Wilde & Duyfjes (sect. 2 *Conostigma*)

Alangium plumbeum W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 43. — Type: *BSIP* (*Gafui et al.*) 8666 (holo L; iso BSIP), Solomon Islands, N Kolombangara.

Trees, 6–20 m tall; bole with thin plank-like buttresses; *twigs* pale brown or grey, 1–3 mm diam., glabrous (or early glabrescent from simple hairs up to 0.1 mm long); *leaf bud* densely grey-brown hairy (hairs c. 0.1 mm long). *Leaves*: *petiole* 0.5–1 cm long; *lamina* drying blackish brown with a leaden grey tinge, glabrous, elliptic, 9–16 by 4–7 cm, base symmetric, cuneate or rounded, apex acute to acuminate; venation pinnate, secondary veins 5 or 6 on each side; tertiary venation thin, reticulate-scalariform. *Inflorescences* minutely hairy (hairs less than 1 mm long), 1 (or 2) branches (peduncle(s)) per leaf axil, each few-branched, with 1–4(–5) flowers; *peduncle(s)* 2–7 mm long. *Flowers* purple-white or cream, hairy as the inflorescences; *pedicel* 1(–2) mm long; *corolla in bud* 7–11 mm long, not swollen at base, apex subacute or narrowly rounded; *ovary* 2–3 mm long, finely ribbed; *calyx limb* c. 1.5 mm long, margin c. 3 mm wide, unlobed or minutely toothed; *petals* 5, inside minutely hairy, 11(–15) mm long; *stamens* 5, filament 1.5–3 mm long, broadened (except at apex), inside and at apex hairy, outside glabrous or hairy, anther 7–10 mm long, connective glabrous; *style* hairy (except towards base), 8–12 mm long, stigma short-conical. *Fruits* 1 (or 2?) per infructescence, green, drying blackish, minutely sparsely hairy, glabrescent, ellipsoid (slightly narrowed at base and apex), 25–30(–35) by 12–15 mm, smooth; *calyx remnant* small.

Distribution — Solomon Is., widespread; in *Malesia*: Papua New Guinea (Bougainville Is., where only known from *LAE (Gideon) 78669*, a sterile specimen).

Habitat & Ecology — Primary and secondary forest, also swamp forest; on sandstone. At low altitudes. Flowering: April to July; fruiting: November, January, May.

28. *Alangium ridleyi* King (sect. 2 *Conostigma*)

Alangium ridleyi King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 71, 1 (1902) 78; Wangerin in Engl., Pflanzenz. 41.IV.220b (1910) 12; Ridl., Fl. Malay Penins. 1 (1922) 893; Bloemb., Blumea 1 (1935) 278, f. 5a–i; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 215, f. 10a–i; Kochummen in Whitmore, Tree Fl. Malaya 1 (1972) 59; Wijedasa et al., Gard. Bull. Singapore 66 (2014) 233, f. 1–3; W.J.de Wilde & Duyfjes, Blumea 62 (2017) 45, f. 7; ; W.J.de Wilde et al. in Chayam. & Balslev, Fl. Thailand 14 (2018) 27, f. 6. — Lectotype (designated by Wijedasa et al. 2014): *Ridley 4941* (lecto SING; isolecto BM, CAL n.v., K, US), Singapore, Botanic Garden Jungle.

Marlea costata auct. non Boerl.: Valeton, Icon. Bogor. 2, 4 (1906) 267, t. 179. — *Alangium costatum* (Valeton) Wangerin in Engl., Pflanzenz. 41.IV.220b (1910) 12, f. 3a–e, nom. illeg. — Voucher specimen: *Hort. Bog. VIII H 17 (Unknown collector)* (BO, K (K000704829), L (L.2497595)), Indonesia, originally from Sumatra, Bangka.

Trees, to 25 m tall; bole occasionally with stilt-roots and buttresses; bark smooth; *twigs* brown, (4–)5–10 mm diam., at apex and *leaf bud* with dense minute scale-like hairs of c. 0.1 mm long, glabrescent. *Leaves*: *petiole* 1.5–2(–3, in exceptionally large leaves) cm long, *lamina* glabrous, drying greenish brown, elliptic or elliptic-obovate, 15–25(–40) by 10–12(–20) cm, base symmetric, (rounded or) short cuneate, apex short acuminate; venation pinnate, secondary veins 8–14(–18) per side, loop-veined especially towards apex of lamina; tertiary venation reticulate or faintly fine-scalari-form. *Inflorescences* glabrous or with scale-like hairs of up to 0.1 mm long, with 3–10 flowers, simple or 2 or 3 branches, sessile or peduncle to 5(–10) mm long. *Flowers* fragrant, minutely hairy; *pedicel* 1–4 mm long; *corolla in bud* (12–)15–18 mm long, not thickened at base, apex blunt (or acute), *ovary* 2–3 mm long, faintly 10–12-ribbed, *calyx limb* not or only somewhat spreading, 2(–3) mm long, at margin 4–5 mm wide, (sub)truncate; *petals* 5 or 6, finely hairy, ± carnose, c. 15 mm long (minutely hairy or) glabrous inside; *stamens* 5 or 6, filament c. 5 mm long, broad but not thickened at base, hairy at apex, anther 10–12 mm long, connective glabrous; *style* glabrous (Borneo) or hairy, cylindrical or obconical, c. 10 mm long, stigma conical. *Fruits* 1 or 2 per infructescence, ripening purple or black, with sour translucent juicy fruit pulp, minutely hairy, glabrescent, ellipsoid, 30–40 mm long, coarsely, deeply 10–12(–14)-ribbed, *calyx remnant* broad, subtruncate, 5–7 mm wide. — **Fig. 19; Plate 1g, h.**

Distribution — Peninsular Thailand (Pattani, Narathiwat); in *Malesia*: Peninsular Malaysia, Singapore, Sumatra (Simeuleu Is., Bangka, S Sumatra, Riau), Borneo (E Kalimantan; doubtful in C Kalimantan and Sabah).

Habitat & Ecology — Primary forest, mixed dipterocarp forest, hillsides, undulating country, flat land, rocky valleys, rocky ridge crests, rocky riverbanks; granite base rock. Altitude: sea-level to 550 m. Flowering: February to October; fruiting: January, May, July, October to November.

Vernacular names — Peninsular Malaysia: Mentulang (Malay). Sumatra: Medang mata oedang, Medang sengeh, Melepangan paja, Rengengit fatoeh, Taramajang pajo.

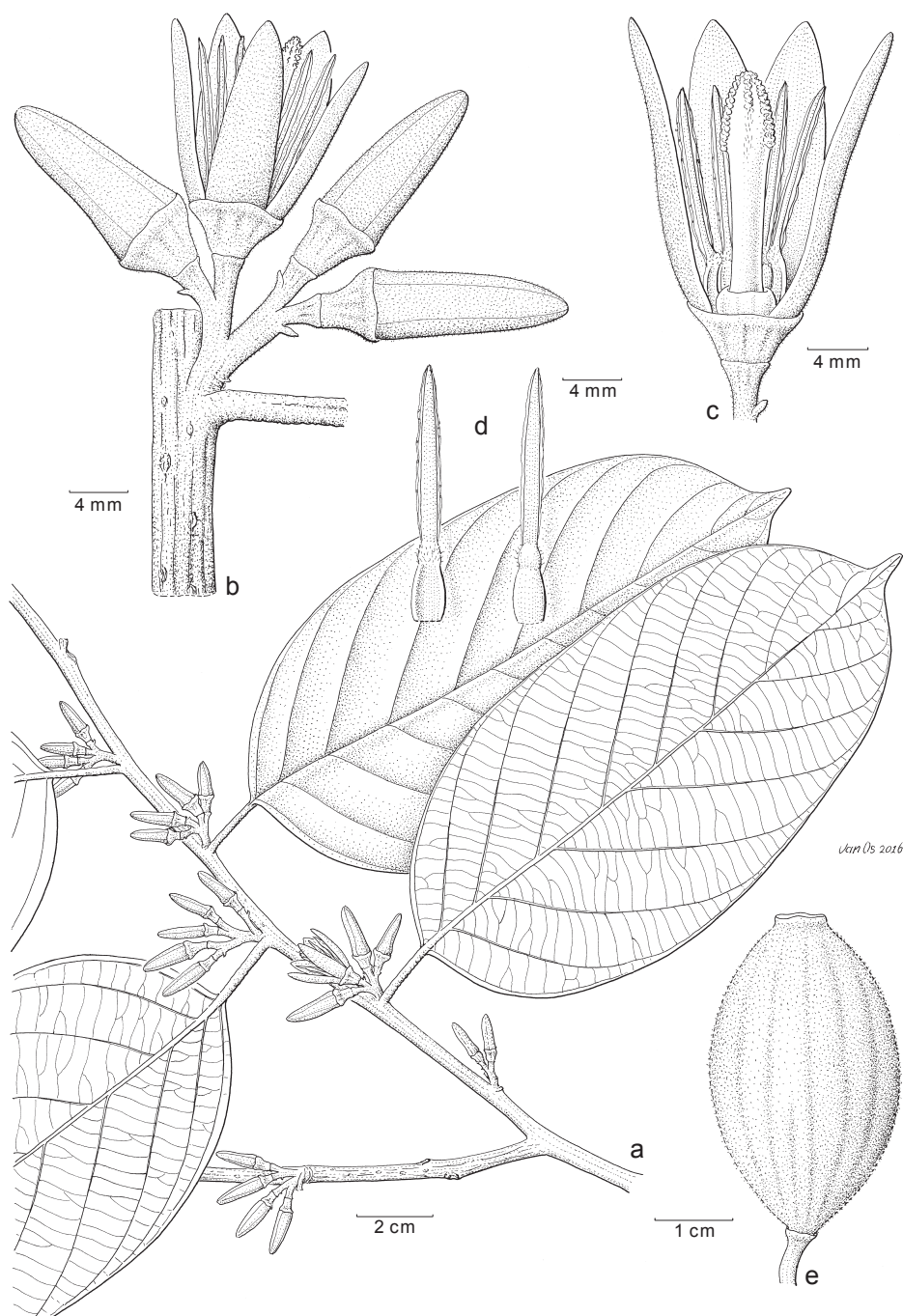


Fig. 19. *Alangium ridleyi* King. a. Habit of flowering twig; b. inflorescence; c. flower, some petals and stamens removed, note style glabrous; d. stamens; e. fruit (a–d: Ambriansyah & Arifin 395, e: Afriastini 2607; all L). Drawn by Jan van Os

Note — Material from Borneo, at present treated under *A. ridleyi*, could be erroneously regarded as belonging to *A. oblongum*. As noted under *A. oblongum*, the distinction between the two species is not easy and sometimes not clear. In *A. ridleyi*, however, the filaments are broader and hairy at the apex, in *A. oblongum* the filaments are narrower and hairy almost all over.

29. *Alangium rotundifolium* (Hassk.) Bloemb. (sect. 3 *Marlea*)

Alangium rotundifolium (Hassk.) Bloemb., Blumea 1 (1935) 258; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 179, f. 5i, k; Kochummen in Whitmore, Tree Fl. Malaya 1 (1972) 60; Berhaman in Soepadmo & Kochummen, Tree Fl. Sabah & Sarawak 1 (1995) 13. — *Diaecaecarpium rotundifolium* Hassk., Bonplandia 7 (1859) 172. — Neotype (designated here): *Winckel* 78 (neo L (L.2497570)); isoneo BO, L, U), Indonesia, Java, Preanger, Pasir Angin, Tjidadap.

Diacarpium tomentosum Blume, Bijdr. 13 (1826) 657; Hassk., Bonplandia 7 (1859) 173 ('*Diaecaecarpium*'). — *Marlea tomentosa* (Blume) Hassk., Flora 27, 2 (1844) 605; Koord. & Valetton, Bijdr. Boomsoort. Java 5 (1900) 79. — *Alangium begoniifolium* (Roxb.) Baill. subsp. *tomentosum* (Blume) Wangerin in Engl., Pflanzenr. 41.IV.220b (1910) 21. — Lectotype (designated here): *Blume s.n.* ('Ki lu tung, Salak, Aprili') (lecto L (L.2497747); isolecto L (L.2497805)), Indonesia, Java, see note 4.

Alangium rotundatum Ridl. ex Burkill & M.R.Hend., Gard. Bull. Straits Settlements 3 (1925) 380; Ridl., Fl. Penins. Malaysia 5 (1925) 213. — Lectotype (designated here): *Burkill & Haniff* 12851 (lecto K (K000704844); isolecto SING n.v.), Peninsular Malaysia, Perak, Maxwell's Hill.

Alangium tomentosum auct. non Lam.: Wangerin, Bot. Jahrb. Syst. 38 (Beibl. 86) (1906) 64.

Alangium kurzii auct. non Craib: Bloemb., Blumea 1 (1935) 262, p.p.; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 183, p.p.; Backer & Bakh.f., Fl. Java 2 (1965) 160; Berhaman, Sandakania 4 (1994) 31; in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 7.

Trees, 10–20(–30) m tall; bole straight, bark light grey, smooth; *twigs* 2–5 mm diam., dark brown, early or late glabrescent (hairs 0.1–0.5 mm long). *Leaves*: *petiole* 2–5.5 cm long; *lamina* drying (pale) brown, fine-hairy on the veins below (less so above), otherwise finely hairy or largely glabrous (except vein axils), or (subpersistently) hairy, subcircular or ovate, rarely $\pm$ lobed, 5.5–22 by 3.5–18 cm, base asymmetric, rounded or (sub)cordate or half-cuneate, apex obtuse or acute to acuminate; venation 5–7-plinerved at base and with 4–7 secondary nerves at each side of midrib, tertiary venation (thinly) reticulate-scalariform or scalariform. *Inflorescences*: a solitary simple cyme, (2–)5–20-flowered, finely hairy or (sub) glabrous; peduncle 15–50 mm long. *Flowers* fragrant, finely hairy, *pedicel* 6–15 mm long; *corolla in bud* (8–)10–15 mm long, somewhat swollen at base, apex obtuse; *ovary* 1–2 mm long, *calyx limb* spreading, c. 1 mm long, at margin c. 3.5 mm wide, lobes 0.3–0.5 (1–2 in Borneo) mm long; *petals* (6–)7(–9), free (or to c. 0.5 mm connate at base), inside long-hairy at base, and somewhat hairy at apex, (10–)15 mm long; *stamens* as many as petals, (8–)10–15 mm long, filament (1–)3–6 mm long, $\pm$ broadened in the middle, hairy, upper portion long-hairy, narrower, anther 5–12 mm long, connective (sparsely) long-hairy inside; *style* (6–)10–15 mm long, glabrous, stigma capitate. *Fruits* several per infructescence, ripening purple-blue, thin-hairy or glabrous, ovoid-ellipsoid, 16–20(–25) mm long, base cuneate or rounded, $\pm$ flattened, sometimes grooved; *calyx remnant* as calyx in flower (the disc exserted). — **Fig. 4f–j, 5c, d; Plate 1c.**

Distribution — *Malesia*: Peninsular Malaysia (Kedah, Perak, Pahang), Sumatra, Java, Borneo (Sabah), Lesser Sunda Islands (Bali).

Habitat & Ecology — In primary and secondary forest, forest edges, hillsides, along roads; on dark brown and black soil and lava flows. Altitude: 300–1520 m. Flowering: January to August; fruiting: April to July, November.

Vernacular names — Java: Ki Tjareuh (Sundanese), Gèdrèk. Borneo: Sabah: Mera-mpangi (Dusun-Kadazan). Lesser Sunda Islands: Bali: Kumbang.

Notes — 1. Specimens may be difficult to separate from more glabrous forms of *A. kurzii*, the latter with larger flowers and somewhat smaller fruits. *Alangium chinense*, *A. kurzii*, and *A. rotundifolium* all closely resemble each other.

2. Collections from Sabah deviate in exceedingly long calyx lobes, 1–1.5(–2) mm long, e.g., *SAN (Sundaling)* 83987.

3. Fruits in living plants are probably usually upwards directed in the infructescence, as seen in Plate 1c, photo taken in Java.

4. In the present circumscription of *A. rotundifolium*, the two names under *Diacar-pium* ('*Diaecarpium*') accepted by Hasskarl (1859), viz. *D. rotundifolium* and *D. tomentosum*, are regarded as representing one species, the difference being only the degree in hairiness of the lower leaf surface, including quite hairy. This means that *A. kurzii* does not occur in Java, as was assumed by Backer (1965).

30. *Alangium scandens* Bloemb. (sect. 3 *Marlea*)

Alangium scandens Bloemb., Blumea 1 (1935) 264, f. 2k, l; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 193, f. 5t–u; Berhaman, Sandakan 4 (1994) 32; in Soepadmo & K.M.Wong, Tree Fl. Sabah & Sarawak 1 (1995) 6. — Lectotype (designated by Berhaman 1994): *Endert* 4076 (lecto BO), Indonesia, East Kalimantan, Long Petah.

Scandent or leaning shrubs, to 10–20(–30) m long; *twigs* brown, 1.5–5 mm diam., hairy, glabrescent. *Leaves*: *petiole* 1–2.5 cm long; *lamina* drying greenish, hairy on veins below, ovate or ovate-oblong, or elliptic, 6–17 by 5–10 cm, base nearly symmetric, rounded or subcordate, rarely short cuneate, apex (abruptly) long acute to acuminate; venation pinnate, secondary veins 7–9 on each side, tertiary venation finely scalariform. *Inflorescences* simple, solitary peduncled cymes, 15–30-flowered; *peduncle* 10–40 mm long. *Flowers* finely hairy; *pedicel* up to 9 mm long; *corolla in bud* 10–13 mm long, swollen at base, apex obtuse; *ovary* 1.5–2 mm long, rather narrow, *calyx limb* 0.5–0.75 mm long, spreading, c. 2.5 mm wide, lobes c. 0.5 mm long; *petals* (5 or) 6 (or 7), free, 10–13 mm long, inside hairy near margin at base; *stamens* as many as petals, 8–11 mm long, filament 3–4 mm long, hairy, thickened towards apex, anther 4.5–7.5 mm long, connective hairy; *style* 7–10 mm long, glabrous, stigma capitate. *Fruits* several per infructescence, green-yellow, ripening purple-black, glabrescent, ovoid-ellipsoid, 11–13 mm long, base rounded, finely ribbed; *calyx remnant* short, 3.5–4 mm broad (the disc exserted). — **Fig. 20.**

Distribution — *Malesia*: N & W Sumatra, Borneo (Sarawak, Sabah, E Kalimantan).

Habitat & Ecology — Mostly along streams in primary forest; also on limestone. Altitude: sea-level to 1200 m. Flowering: February to July; fruiting: May, June. Bark and flowers are eaten by wild orang utans.

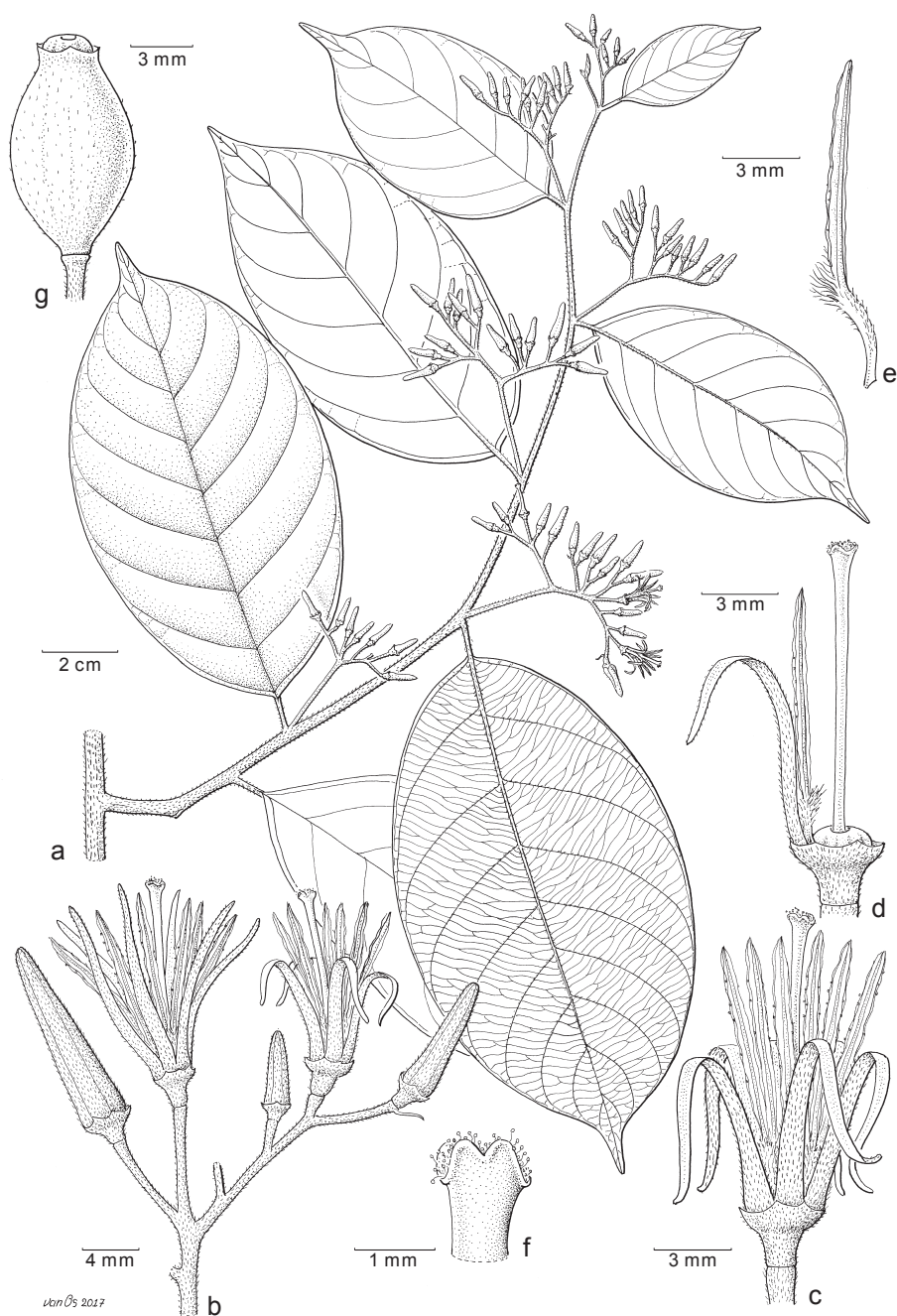


Fig. 20. *Alangium scandens* Bloemb. a. Flowering twig; b. portion of inflorescence; c. flower; d. ditto, most petals and stamens removed showing disc and style with subcapitate stigma; e. stamen, lateral view; f. stigma; g. fruit (a–f: De Wilde & Duyfjes 15638, g: De Wilde & Duyfjes 13938; all L). Drawn by Jan van Os.

Notes — 1. The mode of ramification of the inflorescence is similar to that in *A. griffithii*, i.e., a rather unequal dichasium.

2. *Alangium scandens* belongs in sect. *Marlea*, but differs readily from the other species in the section by its scandent growth habit and pinnately veined leaves.

31. *Alangium solomonense* (Bloemb.) W.J.de Wilde & Duyfjes (sect. 4 *Rhytidandra*)

Alangium solomonense (Bloemb.) W.J.de Wilde & Duyfjes, Blumea 62 (2017) 81. — *Alangium villosum* (Blume) Wangerin subsp. *solomonense* Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 207, f. 6g, 7o, p. — Lectotype (designated by De Wilde & Duyfjes 2017): *Brass* 3463 (lecto BO; isolecio A, BISH, L 2 sheets), Solomon Islands, Ysabel Is., Sigana.

Trees, 7–17 m tall; bole mostly without buttresses; *twigs* blackish brown, 1.5–3 mm diam., (sub)glabrous, (greyish) brown-hairy in the youngest part, hairs c. 0.1 mm long. *Leaves*: *petiole* (0.5–)0.8–1 cm long, hairy as the twigs; *lamina* drying greenish brown, early glabrescent from minute hairs less than 0.1 mm long, (ovate-)elliptic, 6–13 by 2–5 cm, base asymmetric, cuneate, apex acute to acuminate; venation pinnate, secondary veins 4–6 at each side, tertiary venation thin, reticulate. *Inflorescences* minutely hairy (hairs ± sparse, less than 0.1 mm long), simple, a single long peduncled compound cyme, 5–15-flowered; *peduncle* 5–12 mm long. *Flowers* densely pale brown-hairy, hairs c. 0.1 mm long; *pedicel* 3–7 mm long; *corolla in bud* 6–8 mm long, base not swollen, apex (sub)obtusate; *ovary* (1–)1.5 mm long, not ribbed; *calyx limb* narrowly cup-shaped, spreading, c. 0.5 mm long, c. 1 mm wide at margin, lobes 5 (or 6), triangular, c. 0.5 mm long; *petals* 5 or 6, inside glabrous, 7–8 mm long, at base (less than) 1 mm connate; *stamens* 5 (or 6), filament c. 2.5 mm long, hairy, anther 4–5 mm long, connective glabrous; *style* 4–6 mm long, hairy, stigma lobes 1–1.5 mm long. *Fruits* (1–)2–5 per infructescence, ripening yellowish green?, glabrescent, ovoid-ellipsoid, much narrowed towards apex, 17–22 mm long, faintly narrowly ribbed; *calyx remnant* narrow, small.

Distribution — Solomon Is., widespread; in *Malesia*: Papua New Guinea (Bougainville, where only known from *NGF* (Volk & Robinson) 590 (L)).

Habitat & Ecology — Common in well-drained primary rain forest, on flat plains, ridge sides and ridge tops; on brown sandy loam and coral soils. Altitude: sea-level to 300 m. Flowering and fruiting: all year round.

Notes — 1. *Alangium solomonense* resembles *A. pilosum*, the latter differing in a slightly smaller corolla, glabrous style, and smaller fruits.

2. The fruiting pedicel in *A. solomonense* is 5–10(–20) mm long, generally longer than in the other species of sect. *Rhytidandra*.

32. *Alangium strigosum* W.J.de Wilde & Duyfjes (sect. 4 *Rhytidandra*)

Alangium strigosum W.J.de Wilde & Duyfjes, Blumea 62 (2017) 81. — *Iodes ferruginea* Lauterb. & K.Schum., Fl. Schutzgeb. Südsee (1900) 418 (see note 1). — Lectotype (designated by De Wilde & Duyfjes 2017): *Lauterbach* 2387 (original holo B†; lecto WRS�; isolecio G-BOISS n.v., K, L 2 sheets), Papua New Guinea, Kaiser Wilhelmsland, Schumann Fluss, Lager II.

Trees, c. 10 m tall; *twigs* brown, 2–3.5(–6) mm diam., densely rusty or golden brown-hairy, hairs 0.5–1 mm long. *Leaves*: *petiole* 0.5–1 cm long, hairy; *lamina* drying

greenish, soft pale hairy below (glabrescent above), hairs 0.1–0.5 mm long, elliptic, 13–19 by 4–9 cm, base asymmetric, cuneate, apex acute to acuminate; venation pinnate, secondary veins 4–5(–7) at each side, tertiary venation wide-reticulate. *Inflorescences* hairy (hairs less than 0.5 mm long), simple, 5–10-flowered, *peduncle* 8–10 mm long. *Flowers* (only immature buds known) densely golden or greyish brown-hairy; *pedicel* c. 2 mm long; *corolla in bud* presumably c. 10 mm long, c. 1.5 mm diam., base not swollen, apex obtuse; *ovary* c. 3 mm long, not ribbed, yellowish or greyish brown-hairy; *calyx limb* c. 1 mm long, with lobes nearly 1 mm long, not spreading; *petals* 5, inside glabrous; *stamens* 5, filament c. 2 mm long, thinly hairy, anther c. 3 mm long, connective glabrous; *style* glabrous but hairy towards and on stigma lobes. *Fruit* c. 2 per infructescence, ripening red, glabrescent, ellipsoid, 12–15 by c. 10 mm, not ribbed, apex not narrowed; *calyx remnant* small, narrow, consisting of 4 (or 5) strigose, connivent lobes, c. 1 mm long.

Distribution — *Malesia*: Papua New Guinea (Madang, Sepik).

Habitat & Ecology — Rain forest, low hilly terrain; on clay and marl soil. Altitude: 50–250 m. Flowering: October; fruiting: June.

Vernacular names — Nagalmi (Angoram), Yirrkwin (Wewak).

Notes — 1. *Alangium strigosum* needed a new name, as the original epithet in *Iodes ferruginea* (in *Icacinaceae*), was already used under *Alangium* (*A. ferrugineum* C.T.White).

2. The lectotype, in WRS�, bears the number *Lauterbach* 387, but in the protologue the number is changed into *Lauterbach* 2387, presumably the number 2 was added to indicate that the collection was from 'Lager' (= camp) 2.

3. *Alangium strigosum* resembles *A. velutinum*, the latter is a montane species distinct by its conspicuous dense red-brown indument.

4. The species is known from two collections: the type and *Pullen* 1810 (L), Sepik (Wewak-Angoram Area).

33. *Alangium subcordatum* W.J.de Wilde & Duyfjes (sect. 2 *Conostigma*)

Alangium subcordatum W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 45. — Type: *NGF* (White) 10471 (holo SING; iso L, LAE), Papua New Guinea, Morobe Prov., Oomsis near Lae.

Trees, 10–40 m tall; bole strongly buttressed; bark grey brown or light grey, smooth, exfoliating in rounded flakes leaving a sculptured surface; *twigs* brown, 4–6 mm diam., in apical portion densely hairy, the hairs simple, rusty-brown, towards the apex grey, c. 0.5 mm long; *leaf bud* curved, with similar hairs. *Leaves*: *petiole* 2–4.5 cm long; *lamina* drying (dark) greenish brown, glabrous, except veins below, broadly elliptic, 14–27 by 7–12 cm, base symmetric, broadly rounded or slightly cordate, apex acute to acuminate; venation pinnate, secondary veins 8–15 on each side, (faintly) loop-veined; tertiary venation (reticulate-)scalariform. *Inflorescences* hairy as the twig and leaf bud, single, appearing as simple, few-branched, 1–3-flowered; *peduncle* 5–10 mm long. *Flowers* hairy, hairs c. 0.5 mm long; *pedicel* 2–3(–8) mm long; *corolla in bud* ± woody, 10–13 mm long, not swollen at base, apex subobtusate; *ovary* 3–5 mm long, faintly c. 10-ribbed; *calyx limb* not spreading, 1–2 mm long, at margin 3.5–5 mm wide, faintly 10-lobed; *petals* 6, inside glabrous, 10–13 mm long; *stamens* 6, filament 2.5–3 mm long, not thickened, glabrous, anther 9–10 mm long, connective glabrous; *style* densely

hairy (except towards base), 10–12 mm long, stigma narrowly conical. *Fruits* 1 (or 2?) per infructescence, ripening colour not recorded, conspicuously (yellow-)brown hairy, ovoid(-ellipsoid), laterally compressed, c. 30 by 20–22 mm, not ribbed; *calyx remnant* short, 2–2.5 by 5–6 mm.

Distribution — *Malesia*: Papua New Guinea (Morobe, known from 3 collections).

Habitat & Ecology — Primary rain forest, on sloping or flat ground. Altitude: 100–150 m. Flowering: January, March; fruiting: March, September.

34. *Alangium velutinum* W.J.de Wilde & Duyfjes (sect. 4 *Rhytidandra*)

Alangium velutinum W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 81. — Type: *Grubb & Edwards* 79 (holo L; iso CANB n.v.), Papua New Guinea, Eastern Highlands Province, W of Fatima River, Marafunga Mill, Goroka Sub-Dist., S6°05' E145°15'.

Trees, 5–13 m tall; *twigs* brown, 2–4 mm diam., reddish brown or rusty brown hairy, hairs 0.3–0.5 mm long. *Leaves*: *petiole* 0.6–1 cm long, hairy; *lamina* drying reddish brown, glabrescent above, reddish velutinous below all over, hairs c. 0.5 mm long, (obovate to ovate to) elliptic, 6–15 by 2.5–7 cm, base distinctly or indistinctly asymmetric, cuneate, apex acute to acuminate; venation pinnate, secondary veins 4 or 5 at each side, tertiary venation reticulate-scalariform. *Inflorescences* hairy as the twigs, simple, 4–10-flowered; *peduncle* 5–10 mm long, 1–2 mm diam. *Flowers* cream or white, densely hairy; *pedicel* 2–5 mm long; *corolla in bud* (fully mature bud not seen) 9–10 mm long, c. 1.5 mm diam., base not swollen, apex obtuse; *ovary* 2–3.5 mm long, not ribbed, reddish brown hairy; *calyx limb* c. 1 mm long, not spreading, with sub-acute lobes 0.5–1 mm long; *petals* 5, inside glabrous but somewhat hairy at very base, 9–10 mm long, connate at base into a tube c. 3 mm long; *stamens* 5, filament c. 4 mm long, hairy, anther c. 5 mm long, connective glabrous; *style* c. 4 mm long, glabrous, stigma lobes 1.5–2 mm long. *Fruits* 2–6 per infructescence, ripening red, glabrescent, ellipsoid, c. 15 mm long, apex acute, not narrowed; seed dark greyish brown with whitish spots; *calyx remnant* narrow, not spreading.

Distribution — *Malesia*: Papua New Guinea (Eastern Highlands, and Morobe (doubtful)).

Habitat & Ecology — Locally common in primary montane forest, low forest on creek bank. Altitude: 1400–2600 m. Flowering: June, November; fruiting: April, September, November.

Vernacular name — Monr (Marfunga Mill).

Note — *Alangium velutinum* resembles *A. strigosum*, which differs in the lamina drying green and being much less conspicuously soft hairy below.

35. *Alangium villosum* (Blume) Wangerin (sect. 4 *Rhytidandra*)

Alangium villosum (Blume) Wangerin, *Bot. Jahrb. Syst.* 38 (Beibl. 86) (1906) 61; *Bloemb.*, *Blumea* 1 (1935) 269, f. 3a, f; *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 198; *Backer & Bakh.f.*, *Fl. Java* 2 (1965) 160; W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 82. — *Styrax villosum* Blume, *Bijdr.* 13 (1826) 671. — Lectotype (designated by De Wilde & Duyfjes 2017): *Blume s.n.* (lecto L (L0009830); isolecto L (L0614166, L0614168, L0614169)), Indonesia, Java.

Alangium zollingeri Baill., *Adansonia* 5 (1864) 195. — *Karangolum zollingeri* (Baill.) Kuntze, *Revis. Gen. Pl.* 1 (1891) 273. — Type: *Zollinger 785Z* (holo P), Indonesia, Java.

Marlea vitiensis (A.Gray) Benth. var. *tomentosa* (F.Muell.) Benth. f. *salaccense* Koord. & Valeton, *Bijdr. Boomsoort. Java* 5 (1900) 75. — *Alangium villosum* (Blume) Wangerin var. *salaccense* (Koord. & Valeton) Bloemb., *Blumea* 1 (1935) 271. — *Alangium villosum* (Blume) Wangerin subsp. *salaccense* (Koord. & Valeton) Bloemb., *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 202. — Type: *Unknown collector* (holo BO n.v.; iso L (L.2500117), NY n.v.), Indonesia, 'Kitamiang', probably from W Java.

Alangium villosum (Blume) Wangerin subsp. *tomentosum* (F.Muell.) Bloemb. var. *javanum* Bloemb., *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 204, f. 6b, 7a, f. — Lectotype (designated by De Wilde & Duyfjes 2017): *Koorders 38191* (lecto L (L2500069); isolecto BO n.v.), Indonesia, Java, Pasoeroean, Mt Ardjoeno.

Alangium villosum (Blume) Wangerin var. *tomentosum* auct. non (F.Muell.) Bloemb.: Bloemb., *Blumea* 1 (1935) 271, f. 3a, f, p.p., for the Java specimens.

Trees, presumably of low stature (Backer & Bakhuizen van den Brink f. (1965): 10–20 m tall); *twigs* (1.5–)2–4 mm diam., densely (greyish) brown-hairy, hairs 0.2–0.5(–1) mm long. *Leaves*: *petiole* 0.3–1(–1.2) cm long, hairy; *lamina* drying brown, hairy like the twigs, glabrescent above, ovate-elliptic or (narrowly) elliptic, 6–14(–19) by 2–5(–7) cm, base little or strongly asymmetric, rounded or short- or long-cuneate, apex acute to acuminate; venation pinnate, secondary veins 5 or 6 at each side, tertiary venation reticulate, sometimes ± scalariform; domatia absent. *Inflorescences* solitary, peduncled, simple or compound cymes, hairy as the twigs, (2–)5–30-flowered; *peduncle* (3–)5–15 mm long. *Flowers* densely hairy like the twigs; *pedicel* 2–4 mm long; *corolla in bud* (6–)7–8 mm long, base not or little swollen, apex (sub)obtuse; *ovary* c. 1.5 mm long, not ribbed; *calyx limb* c. 0.5 mm long, at margin c. 2 mm wide, with 5 low triangular lobes, c. 0.5 mm long; *petals* (4–)5(–7), inside (sparingly or towards base strongly) hairy, not connate at base, c. 8 mm long; *stamens* 5, not adnate to petals, filament c. 3 mm long, hairy, anthers c. 4 mm long, connective glabrous; *style* 5–6 mm long, glabrous, stigma lobes c. 1 mm long. *Fruits* 2–7 per infructescence, ripening dark red (Backer & Bakhuizen van den Brink f. 1965), glabrescent, ovoid or broadly ellipsoid, (8–)10–15 mm long, smooth or inconspicuously ribbed; *calyx remnant* minute.

Distribution — *Malesia*: W and E Java.

Habitat & Ecology — Montane and lower montane forest. Altitude: (from lowland to) 700–1800 m. Flowering: August to December.

Vernacular name — Koeniran.

Notes — 1. Specimens from W Java (incl. the type) are rare and scanty and apparently more slender of stature (leaves narrower, inflorescences poorer flowered) as compared with those from E Java. Recent collections are not known.

2. According to Koorders & Valeton (1900) the bark and leaves are bitter.

36. *Alangium warburgianum* Wangerin (sect. 4 *Rhytidandra*)

Alangium warburgianum Wangerin in Engl., *Pflanzenr.* 41.IV.220b (1910) 18; W.J.de Wilde & Duyfjes, *Blumea* 62 (2017) 83. — *Alangium villosum* (Blume) Wangerin subsp. *warburgianum* (Wangerin) Bloemb., *Blumea* 1 (1935) 273, f. 3i–l; *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16 (1939) 205, f. 6e, 7j–l. — Lectotype (designated by De Wilde & Duyfjes 2017): *Warburg 18116* (original holo B†; lecto A (A00054249)), Indonesia, Moluccas, Bacan Is., Sibella.

Shrubs or treelets, 1.5–5 m high; *twigs* dark brown, 1.5–3 mm diam., glabrescent, at very apex with dense appressed rusty hairs (0.1–)0.2 mm long; *leaf bud* densely rusty hairy. *Leaves*: *petiole* 0.7–1.5 cm long, hairy like twig apex; *lamina* drying brown, early glabrescent, (narrowly) elliptic, 9–16 by 3–4 cm, base slightly asymmetric, cuneate, apex (long) acute to acuminate; venation pinnate, secondary veins 5–7 on each side, tertiary venation reticulate. *Inflorescences* sub-persistently hairy like twig apex, simple, 2–5-flowered, *peduncle* 5–10 mm long. *Flowers* densely reddish brown hairy, hairs 0.2–0.3 mm long; *pedicel* 2–3 mm long; *corolla in bud* 8–10 mm long, base not swollen, apex narrow, subobtusate; *ovary* densely hairy, 1–1.5 mm long, not ribbed; *calyx limb* c. 1.5 mm long, mainly consisting of 5 long-triangular lobes, c. 1.5 mm long, not spreading; *petals* (4 or) 5, inside glabrous, 9–10 mm long; *stamens* 5, c. 9 mm long, filament 2–3 mm long, hairy inside, anther 5–6 mm long, connective glabrous; *style* 5–6 mm long, (sparingly) hairy, stigma lobes c. 2 mm long. *Fruits* 1–3 per infructescence, ripening red, with whitish hyaline pulp, glabrescent, ovoid-ellipsoid or ellipsoid, narrowed at base and apex (longest at apex), 15–22 mm long, finely 5-ribbed or smooth; *calyx remnant* minute, the lobes $\pm$ connivent.

Distribution — *Malesia*: Moluccas (endemic to Bacan Is.).

Habitat & Ecology — Dense primary forest 20–35 m high, growing on hill ridge; clayey soil, bedrock grey schists. Altitude: 900–2000 m. Flowering and fruiting: August, October.

Notes — 1. *Alangium warburgianum* is known from four collections, all from Bacan Is., Gunung Sibela: *b.b.* 23243 (BO); *De Vogel* 3583 (L); *De Vogel* 3644 (L); *De Vogel* 3662 (L).

2. The peduncle is remarkably slender, comparable with the slender peduncle of *A. gracile* and *A. pilosum*.

DUBIOUS TAXON

Alangium javanicum (Blume) Wangerin var. *jaheri* Bloemb., Blumea 1 (1935) 284, f. 5: bb; Bull. Jard. Bot. Buitenzorg, sér. 3, 16 (1939) 221, f. 10bb. — Type: *Jaheri s.n.* (holo BO n.v.), Indonesia, Kai Is.

The variety was described as follows: “*Fruit* 32–33 mm long, 13–15 mm broad, 8–9 mm thick, with 10–12 thick and obtuse ribs, and deep grooves. *Flowers* unknown”.

Note — We have not found the *Jaheri* collection and we do not know whether Bloembergen, when describing the variety, had a leafy twig at hand or only fruits, but we assume that the described fruit, belongs to sect. *Conostigma*. The variety may belong to *A. minahassicum* (fruits smooth) or to *A. holhrungii* (fruits presumably smooth). When the described ribs are not an artefact, then it may represent a distinct taxon.

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