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Taxonomy of *Alangium* section *Conostigma* (*Alangiaceae*)

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Key words

Alangiaceae
Alangium sect. *Conostigma*
Malesia
new species
taxonomy

Abstract *Alangium* Lam. sect. *Conostigma* Bloemb. is largely confined to the Malesian area and contains 19 species. By using the characters as found in the original species-descriptions, and with emphasizing the nature of the indument of the leaf bud, the confusingly variable *Alangium javanicum* s.l.-complex could be dismantled for a great part. Four new species: *A. ledermannii*, *A. pallens*, *A. plumbeum*, and *A. subcordatum*, and two new varieties: *A. meyeri* var. *macilentum* and *A. ebenaceum* var. *insignis* are recognised. Two taxa are raised to specific status: *A. nobile* subsp. *denudatum* to *A. denudatum* and *A. javanicum* var. *minahassicum* to *A. minahassicum.* A key to the species is presented, and the concerned taxa are enumerated, referenced, described and some are figured.

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INTRODUCTION

The section *Conostigma* is one of the four sections recognised in *Alangium* by Bloembergen (1935, 1939). His division into sections was later corroborated with anatomical and molecular characters (Eyde 1968, Feng et al. 2009), and still holds to date. The unique characteristic of sect. *Conostigma* is the conical shape of the apical stigmatic part of the style. In addition, the section is distinguished by the combination of isomerous flowers and in essence compound inflorescences, however, usually without a terminal bud, and often the inflorescences appear as simple, presumably by reduction. For explanation see De Wilde & Duyfjes (2016). All species of sect. *Conostigma* have pinnate leaf venation, except *A. nobile* and *A. denudatum* with venation palmate at base. The sect. *Conostigma* is almost confined to the Malesian region and contains 19 species, among which *A. javanicum* and its close relatives. The species of the latter group, the so-called '*javanicum*-complex' (Berhaman 1994) pose persistent disagreement in circumscription and status. By Bloembergen (1935, 1939), these species were lumped into one large species *A. javanicum*; only one species, *A. ridleyi*, was kept separate with some doubt. However, this solution was integrally rejected by later authors (e.g. Kochummen 1970, 1972) who saw tremendous variation pointing to various species. This is a problem particularly on Borneo, where forest botanists (Cockburn 1980, Ashton 1988) recognised within *A. javanicum* s.l. 'groups' indicated as 'A', 'B', 'C'. For Peninsular Malaysia (Kochummen 1972) and Sabah and Sarawak (Berhaman 1994, 1995) taxonomic decisions have been published, but we cannot agree with these either, because the proposed solutions only cover restricted areas of the vast distribution of *A. javanicum* as accepted by Bloembergen (1935, 1939), ranging from Indo China to the Solomon Islands, and the whole area was to be examined again. For details about the distinction of forms or varieties in Sarawak and Sabah, in either *A. ebenaceum* or *A. javanicum*, also taking into account the putatively preferred vegetation types, see Anderson (1963), Cockburn (1980), Ashton (1988), and Berhaman (1994).

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In the present paper we propose to re-instate the majority of names of species formerly described in this complex of *A. javanicum* s.l., but later on sunk into synonymy. Also, some new taxa are proposed. Unfortunately, occasional specimens remain difficult to determine, and some of the species accepted seem to intergrade with others, especially so among *A. meyeri* and *A. oblongum*. With the enumeration of species these situations are briefly discussed.

All taxa are fully described. In *A. borneense* and *A. denudatum* the fruits are described for the first time, in *A. kayuniga* and *A. minahassicum* the flowers are described for the first time.

As regards the descriptions of the flower it is noted that the petals of some species are somewhat carnose or in *A. subcordatum* even woody; data of measurements are obtained from dried flowers, boiled or not boiled.

KEY TO THE SPECIES OF ALANGIUM SECT. CONOSTIGMA

1. Lamina (sub)circular, glabrous. — Borneo (Sarawak) . . . . . 2. *A. circulare*
1. Lamina usually longer than broad, glabrous or hairy 2
2. Lamina cordate at base. Venation 3(–5)-plinerved at base 3
2. Lamina subcordate, rounded or attenuate at base. Venation pinnate 4
3. Corolla in bud 18–20 mm long. Lamina glabrous or short hairy below. — Peat swamp forest . . . . . 3. *A. denudatum*
3. Corolla in bud 10–15 mm long. Lamina conspicuously long-hairy below. — Dry land forest . . . . . 14. *A. nobile*
4. Lamina asymmetric at base. Calyx teeth distinct. Style and lower portion of filaments densely hairy. — Peat swamp forest, Borneo (Brunei, Sarawak) . . . . . 5. *A. havilandii*
4. Lamina not or weakly asymmetric at base. Calyx limb (sub)-truncate or with low teeth. Style and lower portion of filaments hairy or glabrous 5
5. Twigs, leaf bud(s), inflorescence, flowers and fruit all conspicuously hairy; hairs stellate-dendroid, 0.3–0.5(–1) mm long . . . . . 10. *A. maliliense*
5. Twig, leaf bud, inflorescences, flowers and fruit glabrous or hairy; hairs not stellate, to 0.5 mm long 6

6. Petiole long, 2–4.5 cm long. Twigs towards apex conspicuously rusty-hairy. Fruit conspicuously hairy. — Papua New Guinea (Morobe Prov.) . . . . . 19. *A. subcordatum*
6. Petiole shorter. Twigs, flowers, fruit glabrous or hairy . . 7
7. Plant from Indochina or W Malesia (incl. Philippines). Filaments ± hairy. Leaves generally drying greenish or brown 11
7. Plant from E Malesia (Sulawesi, Moluccas, New Guinea) or the Pacific (Solomon Isl.). Filaments (sub)glabrous or hairy. Leaves often drying blackish or leaden grey 8
8. Corolla in bud (12–)15–20 mm long. Filaments at apex densely hairy . . . . . 13. *A. minahassicum*
8. Corolla in bud 8–9 mm long. Filaments glabrous or hairy9
9. Hairs obvious, c. 0.3 mm long, rendering twigs, inflorescence and flowers hairy. Twigs c. 5 mm diam . . . . . 9. *A. ledermannii*
9. Hairs inconspicuous, c. 0.1 mm long, rendering twigs, inflorescences and flowers (sub)glabrous. Twigs 2–4 mm diam 10
10. Petals glabrous inside. Filaments glabrous. — New Guinea . . . . . 6. *A. hollrungii*
10. Petals hairy inside. Filaments hairy. — Solomon Isl. . . . . 17. *A. plumbeum*
11. Twigs stout, 5–10 mm diam 12
11. Twigs more slender, 1.5–5 mm diam 13
12. Buds usually acute at apex. Fruit 20–30 mm long, fewer and less deeply ribbed, or hardly ribbed. Lamina drying purplish below . . . . . 4. *A. ebenaceum*
12. Buds usually blunt. Fruit (25–)30–40 mm long, conspicuously, deeply (10–)12(–14)-ribbed. Lamina not drying purplish below . . . . . 18. *A. ridleyi*
13. Plant (including leaf bud) almost completely glabrous (some sparse, minute downy scales 0.1 mm long on leaf bud excepted). Twigs slender, 2 mm diam; leaves small, 15 cm long or less. — Dry land forest northern Borneo . . . . . 8. *A. kayuniga*
13. 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. Twigs slender or thicker, to 5 mm diam 14
14. Apex of twigs, leaf bud, inflorescences, and flowers densely (appressed) hairy, hairs 0.3–0.5(–1) mm long. Fruit rounded at base, 15–20(–25) mm long, drying grey or brown (W Java, Sumatra, Peninsular Malaysia, Borneo), or fruit narrowed at base, 20–30 mm long, drying yellow-green (Borneo) 15
14. Apex of twigs, leaf bud, inflorescences, and flowers minutely hairy, sometimes appearing as glabrous; hairs (much) less than 0.3 mm long. Fruit ± rounded at base 17
15. Inflorescences (sub)sessile, or with peduncle to 0.3(–1) cm long. Fruit ovoid-ellipsoid, 15–20(–25) mm long. Flowers small, corolla in bud 8–10 mm long. — W Java, (E) Borneo . . . . . 7. *A. javanicum*
15. Inflorescences peduncled. Fruit ± fusiform, narrowed at base, 20–30 mm long. Flowers longer, corolla in bud 12–17 mm long. — Borneo 16
16. Leaf bud in-curved, hairs longer, 0.5 mm long . . . . . 1. *A. borneense*
16. Leaf bud straight, hairs shorter, 0.2–0.3 mm long . . . . . 12. *A. mezianum*
17. Twigs stout, 3–10 mm diam. Lamina large, 15–50 cm long, often drying purplish brown below . . . . 4. *A. ebenaceum*
17. Twigs more slender, 1.5–6 mm diam. Lamina not drying purplish brown below 18
18. Twigs pale, contrasting with blackish brown drying petioles and peduncle of inflorescences . . . . . 16. *A. pallens*
18. Twigs, petioles and peduncle brown 19
19. Aspect of specimen less robust: twigs 1.5–4 mm diam; lamina 8–18 cm long, with 6–10 veins at each side; corolla in bud 8–14 mm long; fruit 2–4 per infructescence, 20–25 mm long. — Widespread in W Malesia . . . . 11. *A. meyeri*
19. Aspect of specimen more robust: twigs 2–4(–5) mm diam; lamina 12–25(–35) cm long, with 8–15 veins at each side; corolla in bud 12–15 mm long; fruit 1–3 per infructescence, 20–30(–35) mm long. — Widespread in W Malesia, but not in the Philippines . . . . . 15. *A. oblongum*

ENUMERATION OF SPECIES

1. *Alangium borneense* Merr.

Alangium borneense Merr. (1922) 342. — Type: *Agama 1022* (holo PNH†; iso BM BM000944961, K K000704827, L L0009820, P P04552684), Borneo, Sabah, Batu Lima, Nov. 1920, fl.

Tree to 18 m tall; *twigs* brown, 3–4 mm diam, at apex hairy; *leaf bud* in-curved, 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; veins pinnate, 10–15 on each side, loop-veined at least in upper third of blade, tertiary venation thin, (sub)scalariform. *Inflorescences* hairy, of 1 or 2 (or 3) main branches (peduncles) from the leaf axil, each few-branched, 2–7-flowered; *peduncle*(*s*) 1–10 mm long. *Flowers* densely appressed hairy; pedicel 3–5 mm long; *corolla in bud* 10–17 mm long, base not swollen, apex acute; *ovary and calyx* 4–6 mm long, ribbed; *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, 10–15 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* 1 (or 2) per infructescence, ripening pink or red, densely minutely hairy (hairs yellowish green, c. 0.1 mm long), (narrowly) ellipsoid, narrowed at base and apex (± fusiform), 20–30 by c. 14 mm, finely ribbed; *calyx remnant* narrow or contracted, subtruncate.

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

Habitat & Ecology — Lowland mixed dipterocarp forest, flatland or undulating country, along rivers and hillside, also in swampy forest; basalt, sandy clay, podsoil, and (yellow) sandy soil; from sea level to 600 m altitude; flowering and fruiting all year round.

Field-notes — Stilt-roots and buttresses recorded; bark smooth; fruits edible, green ripening pinkish or red.

Vernacular names — Kagukapan (Sungei Kinabatangan), Satu Inchi, Midong (Iban), Kondolon, Aru (Kayal), Jadam.

Note — *Alangium borneense* resembles *A. mezianum*; 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 in-curved and densely woolly hairy, not allowing to see the juvenile lateral veins, and its filaments are glabrous.

2. *Alangium circulare* B.C.Stone & Kochummen

Alangium circulare B.C.Stone & Kochummen (1975) 219, f. 1–2; Berhaman (1995) 7. — Type: *Saleh ak Nantah S 24325* (holo SAR n.v.; iso A n.v., BO, K K001096812, KEP n.v., L L0009818, SAN n.v., SING), Borneo, Sarawak, Kuching, Bukit Siol, 29 Oct. 1964, fl.

Tree c. 9 m tall; *twigs* dark brown, c. 3 mm diam, towards apex with minute hairs, glabrescent; *leaf bud* minutely hairy. *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; veins pinnate (at base plinerved), 4 or 5 on each side, loop-veined near margin; tertiary venation coarsely reticulate-scalariform. *Inflorescences* sparsely fine-hairy, of 1 (or 2) main branches (peduncles) from the leaf axil, each 1–2-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* c. 20 mm long, base slightly swollen, apex (sub)obtuse; *ovary and calyx* 5(–6) mm long, ribbed; *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 densely hairy (hairs c. 0.5 mm long), c. 20 mm long, stigma small, conical. *Fruit* not known.

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

Habitat & Ecology — Disturbed primary heath forest; white podsolised soil; flowering in October.

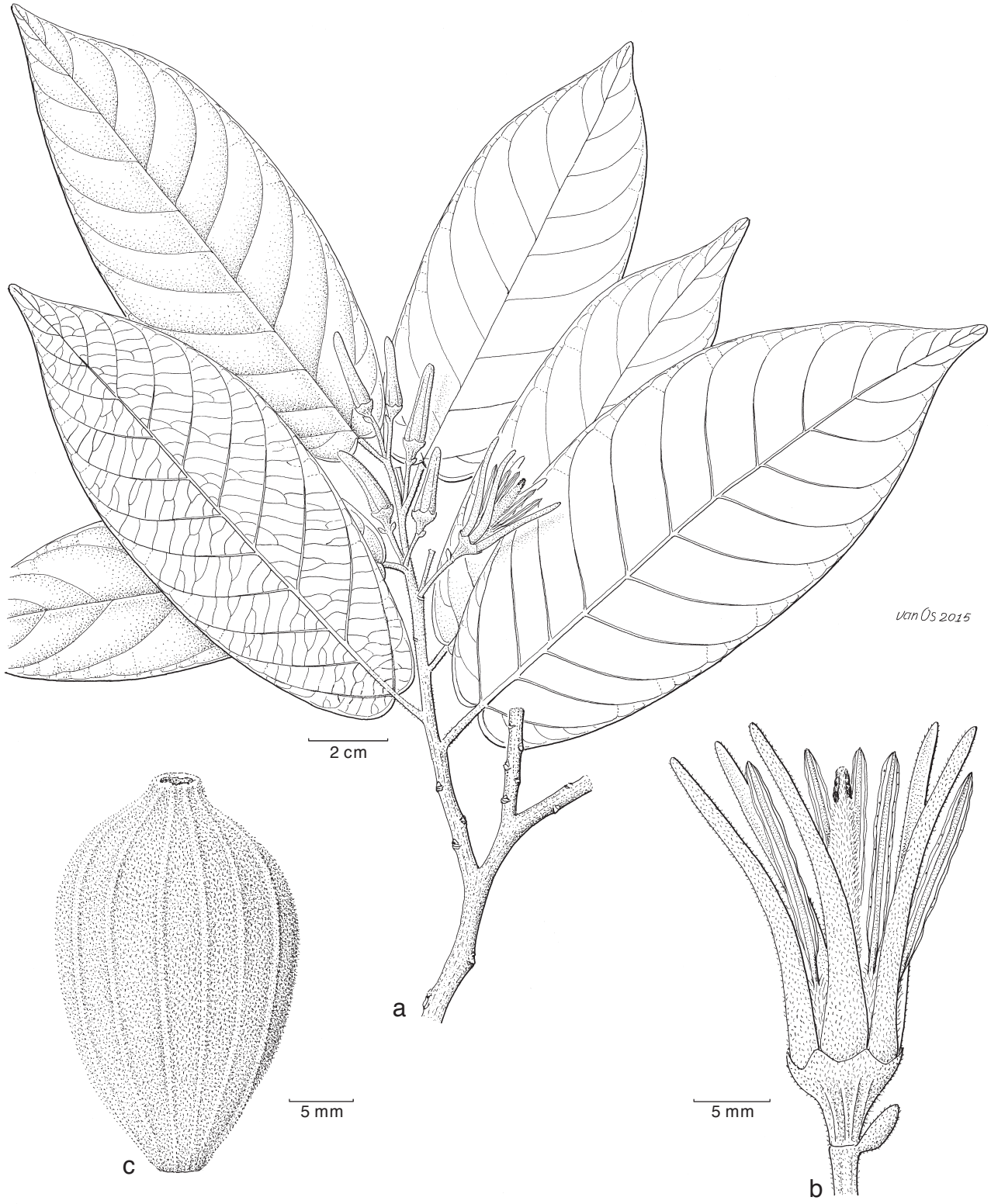

Fig. 1 *Alangium denudatum* (Bloemb.) W.J.de Wilde & Duyfjes. a. Flowering twig; b. flower showing hairy filaments and style, and conical stigma; c. fruit (all: *Kiah SFN 37708*, L). — Drawn by Jan van Os.

Proposed IUCN (2012) conservation assessment — Critically Endangered (CR), since the type locality no longer exists and the species is only known from the type collection.

Notes — 1. We checked the hairiness of the locule inside as mentioned by Stone & Kochummen (1975); with a magnification of ×60 we could detect some minute hairs.

2. The Sarawak botanist Julia Sang informed us that Bukit Siol (now within Kuching town) is converted into human settlement and that in 1964 when *A. circulare* was collected the forest type was heath forest on podsolised white soil.

3. *Alangium denudatum* (Bloemb.) W.J.de Wilde & Duyfjes, *stat. nov.* — Fig. 1

Alangium denudatum (Bloemb.) W.J.de Wilde & Duyfjes. — *Alangium nobile* (C.B.Clarke) Harms var. *denudatum* Bloemb. (1935) 276; (1939) 212, f. 9f. — Type: *Beguin 582* (holo BO; iso L L.1162840, SING, U 2 sheets U.1230478, U.1230480), Sumatra, Bengkalis, 6 m alt., 15 Jan. 1920, fl.

Tree 20–33 m tall; *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-acuminate; veins seemingly completely pinnate but faintly 3–5-plinerved at base, 8–12 at each side, usually loop-veined; tertiary venation thin, finely (reticulate-)scalariform. *Inflorescences* densely minutely hairy, of 1 or 2 (or 3) flowers, axillary to a leaf, sessile (rarely 1 or 2 flower(s) on a *peduncle* to 5 mm long). *Flowers* minutely hairy (as twigs); pedicel 8–10 mm long; *corolla in bud* 18–20 mm long, base swollen, apex blunt; *ovary and calyx* 5–6 mm long, finely ribbed; *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 c. 10 mm long, connective glabrous; *style* densely hairy, c. 18 mm long, stigma conical. *Fruit* 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.

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

Habitat & Ecology — Marsh forest (mixed peat swamp forest), at sea level; flowering in January and July; fruiting in April and July.

Field-notes — Stilt-roots 2 m high, spreading 1.2 m; flowers fragrant.

Vernacular name — Mara lepang.

Additional specimens studied. Sumatra, *Buwalda 295* (= *bb 28518*), Riouw en Ond. Indragirische bovenlanden, Belimbing, 6 m alt., 2 July 1939, st. – Singapore, *Kiah SFN 37708*, Mandai Road, low alt., 26 July 1940, fl., fr. – Kalimantan, *Kostermans 4659*, Sampit region, 5 m alt., Apr. 1948, fr.

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

4. *Alangium ebenaceum* (C.B.Clarke) Harms

Alangium ebenaceum (C.B.Clarke) Harms (1898) 262; King (1902) 78. — *Marlea ebenacea* C.B.Clarke (1879) 742; Ridl. (1922) 893. — *Alangium javanicum* (Blume) Wangerin var. *ebenaceum* (C.B.Clarke) Berhaman (1994) 33. — Lectotype (designated by Berhaman 1994): *Griffith 3383* (K K000704840; iso P P00542742, U U.1230474), Peninsular Malaysia, fl.

Alangium sessiliflorum Merr. (1929) 232. — Type: *Wood 2252* (holo UC n.v.; iso K K000704823), Borneo, Sabah, Batu Lapan, fl.

Tree 2.5–20 m tall; *twigs* (blackish) brown, (3–)4–10 mm diam, at apex (incl. leaf bud) early glabrescent from minute greyish hairs less than 0.1 mm long. *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 (long) cuneate, apex acute-acuminate; veins pinnate, (8–)10–15 on each side, (sub)loop-veined; tertiary venation thin, reticulate-scalariform. *Inflorescences* glabrous (early glabrescent from minute hairs less than 0.1 mm long), simple or of 2 main branches (peduncles) from the leaf-axil, each (5–)10–20-flowered, *peduncle*(*s*) 10(–15) mm long. *Flowers* (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 and calyx* 2–5 mm long, faintly ribbed or not ribbed; *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. *Fruit* 1 or 2 per infructescence, 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.

Distribution — Sumatra (Palembang, Bangka), Peninsular Malaysia, Borneo (Sarawak, Sabah, W & E Kalimantan).

Key to the varieties

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

a. var. ***ebenaceum***

Lamina (sub)coriaceous, 15–26(–28) by (3–)5–9 cm. *Twigs* 3–5 mm diam. *Fruit* 15–30 mm long.

Distribution — As the species.

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

Field-notes — Bole smooth, brown, stilt-roots and buttresses; flowers sweetly scented; fruit pinkish red or purplish black, edible.

Vernacular names — Mentulang, Ridan, Bankala (Banjar-Malay), Beremkulat, Lidah lidah, Midong or Medong (Iban).

b. var. ***insignis*** W.J.de Wilde & Duyfjes, *var. nov.*

Differs from the typical variety in robust habit, with twigs 5–10 mm diam, and leaf lamina 30–50 by 9–18 cm. Infructescences borne on the twigs below the leaves. Fruit c. 30 by 15–18 mm with calyx remnant large, truncate, 6–9 mm wide. Flowers as the species. — Type: *Yii S 70936* (holo L L.3716600; iso K n.v., KEP n.v., MO n.v., SAR n.v.), Borneo, Sarawak, 4th Div., Anap Forest Reserve, 160 m alt., 14 Feb. 1995, fr.

Etymology. The name *insignis* (Latin = remarkable) refers to the robust habit and remarkably big leaves.

Distribution — Borneo (Sarawak, 4th Div. (Tinjar) and 7th Div. (Ulu Belaga)).

Habitat & Ecology — Mixed dipterocarp forest, thick (old) secondary forest on steep slope of river-valley, on fertile loamy ground; 50–160 m altitude; fruiting in February, August, and September.

Field-notes — Fruit ripening deep purple, edible, 'aril' whitish, juicy, with sour taste.

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

Proposed IUCN (2012) conservation assessment — Data Deficient (DD), the collections date from 1963, 1972, and 1974, all from more or less the same locality; to *A. javanicum* var. *meyeri* auct. non (Merr.) Berhaman (1994) 35, p.p.

Additional specimens studied. Sarawak, 4th Div., *Fuchs 21208*, Tinjar, 50 m alt., 7 Aug. 1963, fr.; *Tong S 34940*, Tinjar, 29 Aug. 1974, fr.; *Chai S 31737*, Segan Forest Reserve, 17 Sept. 1972, fr.; 7th Div., *Hansen 685*, Ulu Belaga, Sungai Semawat, 18 Oct. 1981, fl.

5. *Alangium havilandii* Bloemb. — Fig. 2

Alangium havilandii Bloemb. (1935) 277, f. 4g, h; (1939) 213, f. 8, 9g, h; Berhaman (1995) 8; Argent (in Argent et al. 1997) 4. — Type: *Omar 54* (holo SING), Borneo, Sarawak, Gunung Sedilu Forest Reserve, 9 Apr. 1924, fl.

Tree 5–25 m tall; *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-acuminate; veins pinnate, 6–8 on each side; tertiary venation thin, reticulate-scalariform. *Inflorescences* minutely hairy, of 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 and calyx* c. 4 mm long, coarsely ribbed; *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. *Fruit* 1–3 per infructescence, ripening pink, minutely hairy, ovoid-ellipsoid, c. 15 by 10 mm, smooth; *calyx remnant* small.

Distribution — Borneo (Brunei, Sarawak).

Habitat & Ecology — Lowland peat swamp forest; flowering and fruiting all year round.

Field-notes — Low buttresses or stilt-roots recorded; fruit green, ripening (pale) pink.

Vernacular names — Dadam, Jadam (Milanau).

Note — With the original description of *A. havilandii* (Bloembergen 1935) only 3 flowering collections were known. At present there are over 20 collections.

6. *Alangium hollrungii* (K.Schum.) Melch. & Mansf.

Alangium hollrungii (K.Schum.) Melch. & Mansf. (1925) 163. — *Nyssa hollrungii* K.Schum. (1905) 334. — Type: *Hollrung 720* (holo B†), Papua New Guinea, Augustafluss, Sept. 1887, fr. — Neotype, here designated: *Henty NGF 49248* (L L.2498017; iso L L.2498018), Papua New Guinea, Brahman, Bundi subdistr., Madang Distr. S5°44' E145°25', 180 m alt., 17 Mar. 1972, fl. (see note).

Alangium papuanum Melch. (in Melchior & Mansfeld 1925) 165. — *Alangium javanicum* (Blume) Wangerin var. *papuanum* (Melch.) Bloemb. (1935) 284, f. 5j–aa; (1939) 220, f. 10y–aa. — Type: *Ledermann 8137* (holo B†; iso BO, SING SING0208277), Papua New Guinea, Sepik, Bari-Schlucht, 3 Aug. 1912, fl. & fr.

Tree 6–30 m tall; *twigs* pale brown or (grey-)brown, 2–4 mm diam, glabrous (early glabrescent from 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-acuminate; veins pinnate (or faintly plinerved at base), c. 7 on each side; tertiary venation thin, reticulate(-scalariform). *Inflorescences* minutely pale brown hairy (hairs less than 0.1 mm long), of 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 and calyx* 3.5–4 mm long, finely ribbed; *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. *Fruit* 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 — 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; 75–180 m altitude; most collections sterile, flowering in February, March and August; fruiting in August and September.

Field-notes — Buttresses to 1 m high; bark strongly peeling. The ripening colour of the fruit is not recorded.

Vernacular names — Ikoi, Joinawam, Kongmenem, Kwi, Soearenenioe, Soerinemoe (all Kemtoek).

Additional specimens studied. Papua, *Iwanggin BW 9156*, Sekoli, 75 m alt., 18 Feb. 1960, st.; *Iwanggin BW 9164*, Sekoli, 75 m alt., 18 Feb. 1960, st.; *Schram BW 9372*, Sekoli, 75 m alt., 13 Nov. 1950, st.; *Schram BW 9415*, Sekoli, 150 m alt., 19 Feb. 1960, st.; *Schram BW 9432*, Sekoli, 75 m alt., 20 Feb. 1960, st.; *Schram BW 9455*, Sekoli, 75 m alt., 24 Feb. 1960, fl.; *Schram BW 9469*, Sekoli, 75 m alt., 25 Feb. 1960, st.; *Neth. Ind. For. Service bb 28956*, Berap, 9 Aug. 1939, st. – Papua New Guinea, *Henty NGF 49248*, Madang, Brahman, 180 m alt., 17 Mar. 1972, fl. (neotype).

Note — Because of the apparent absence of a duplicate of the destroyed holotype a neotype is herewith designated.

7. *Alangium javanicum* (Blume) Wangerin

Alangium javanicum (Blume) Wangerin (1910) 14. — *Marlea javanica* (Blume) Koord. & Valeton (1899) 2; (1900) 76; Bloemb. (1935) 281, p.p.; (1939) 218, p.p. — *Styrax javanicum* Blume (1826 '1825') 671. — Lectotype, here designated: *Blume 1343* (L L.2497141; iso L 2 sheets L.2497139, L.2497140; para BO, NY 2 sheets NY00334848, NY00334849), Java, 'Aug.'.

Marlea costata Boerl. (1890) 654, for the type only. — *Alangium bogoriense* Wangerin (1907) 338; (1910) 11, nom. superfl. — Type: cultivated in *Bogor Botanical Garden s.n.* (holo L L0009823).

Alangium arboreum Teijsm. & Binn., nom. nud., in sched. — Voucher specimen: cultivated in *Bogor Botanical Garden s.n.* (L L.2497852).

Tree 10–30 m tall; *twigs* brown, 2–3 mm diam, at apex (late) glabrescent from hairs c. 0.5 mm long; *leaf bud* ± straight, densely hairy, hairs c. 0.5 mm long. *Leaves*: *petiole* 0.8–1.5 mm long; *lamina* drying brown, glabrescent, elliptic-oblong, 10–20 by 4–5 cm, base rounded or short-cuneate, apex acute-acuminate; veins pinnate, 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 axillary to a leaf, sessile or on a peduncle 3(–10?) mm long. *Flowers* densely hairy (hairs c. 0.5 mm long); pedicel 1–2 mm long; *corolla in bud* 8–10 mm long, not swollen at base, apex subobtuse; *ovary and calyx* 3.5–4 mm long, finely ribbed; *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. *Fruit* 1 or 2 per infructescence, drying grey-brown, minutely hairy, late-glabrescent, ovoid-ellipsoid, (15–)20–23(–25) mm long, base ± rounded or short-attenuate, finely shallowly many-ribbed; *calyx remnant* short, shallowly lobed.

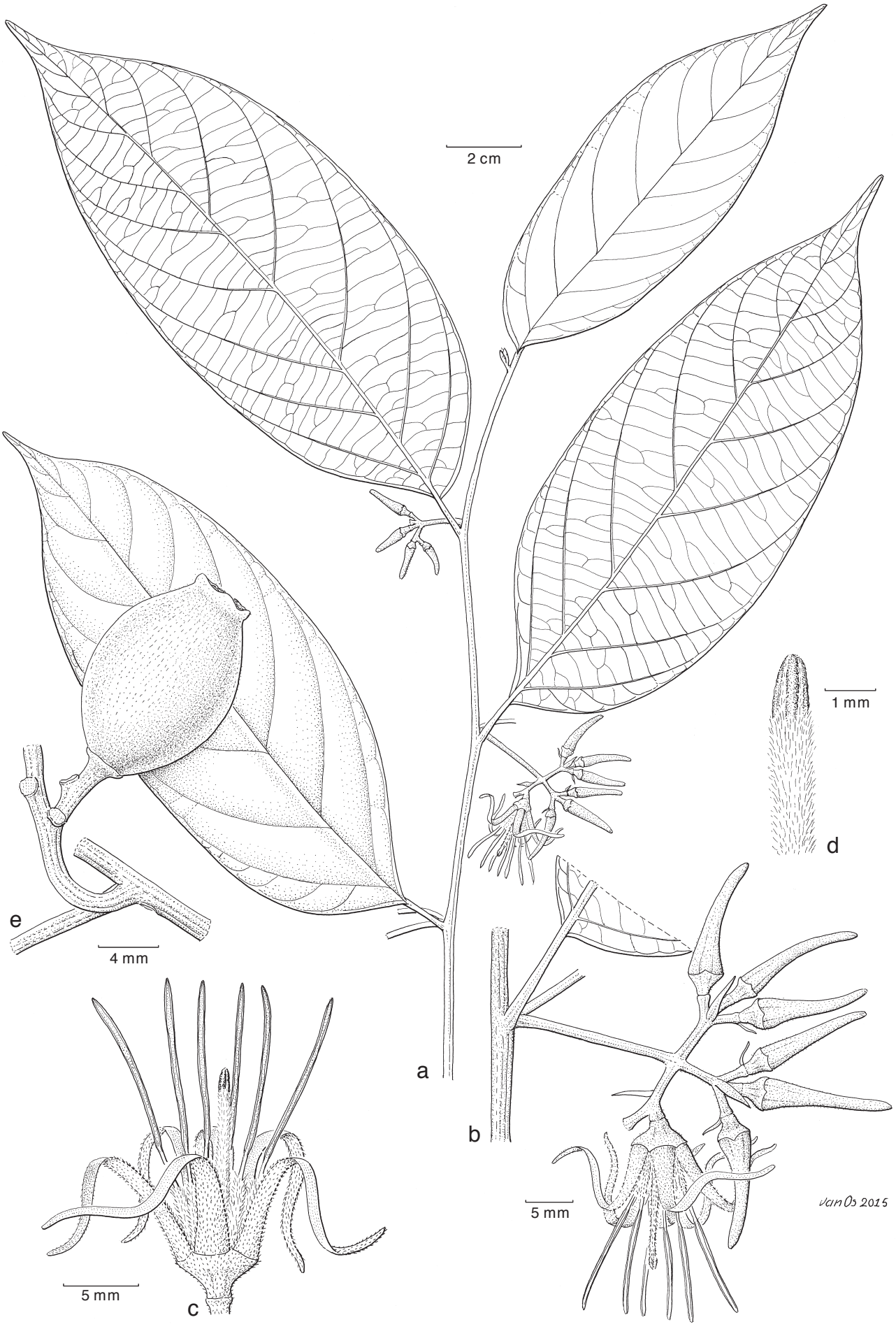

Fig. 2 *Alangium havilandii* Bloemb. a. Flowering twig; b. partial inflorescence; c. flower; d. apex of style with stigma; e. fruit (a–d: *Ariffin et al. BRUN 17820*; e: *Anderson 8531*, all L). — Drawn by Jan van Os.

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

Habitat & Ecology — Dry land lowland forest on low hills; sandy loam soil with lime; to 250 m altitude; flowering in July and August; fruiting from July to February.

Field-note — Ripe fruit red.

Notes — 1. *Alangium javanicum* is variable, possibly also in the hairiness of the leaf buds; see also the notes under *A. oblongum* and *A. meyeri*.

2. The distribution area of *A. javanicum* is determined as restricted to W Java and E Kalimantan (1 collection, *Kostermans 4365*, Sungei Riko, Balikpapan).

It should be noted that according to Bloembergen (1939: 222) the type of the synonym *Marlea costata* originates from Lampong, S Sumatra, cultivated in the Bogor Botanical Garden (from *Teijsmann 6717*); however, the annotation '*Teijsmann 6717*' on the holotype of *M. costata* (L L0009823) is lacking and its provenance cannot be proven.

In addition there are in L three collections from outside Java which cannot go with other species, but which also do not fully match our present conception of *A. javanica*. They are: *Neth. Ind. For. Service bb 22406*, N Sumatra, Aceh, G. Agusan, ± 1800 m alt., fr.; *Neth. Ind. For. Service bb 26597*, SE Kalimantan, upper Mahakam River, low alt., fr. (fruit different from *bb 22406*); *Leighton 106*, E Kalimantan, Kutei, low alt., fr.). More, similar material from these areas is needed in order to place these collections.

8. *Alangium kayuniga* K.M.Wong — Fig. 3

Alangium kayuniga K.M.Wong (in Wong & Low 2015) 69, f. 1. — Type: *Yusop BRUN 22161* (holo BRUN; iso SING), Brunei, Belait, Sungai Liang, Andulau Forest Reserve, 21 Mar. 2007, fr.

Tree 10–15(–25) m tall; *twigs* pale brown, c. 2 mm diam, glabrous (only when young very densely short-hairy); *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-acuminate; veins pinnate, 7–9 on each side; tertiary venation thin, reticulate. *Inflorescences* minutely hairy, of 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 and calyx* c. 4 mm long, slightly ribbed; *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, densely very fine 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. *Fruit* 1 (or 2?) per infructescence, ripening reddish purple, glabrous, broadly ellipsoid, 18–22 by 12–16 mm, shallowly ribbed or not ribbed; *calyx remnant* small.

Distribution — Borneo (Brunei, Sarawak, Sabah).

Habitat & Ecology — Hill ridge in forest intermediate between heath and dipterocarp type, mixed dipterocarp forest, forest on steep slopes; shallow shales, yellow clay with big sandstone rocks; 50–900 m altitude; flowering in June and October; fruiting in March to April and August to October.

Field-notes — Fruit reddish with yellow spots and fruits black with juicy skin.

Vernacular names — Mediong, Midong (Iban).

Additional specimens studied. Sarawak, *Luang S 23684*, 3rd Div., Bukit Iju, Ulu Arip, balingian, 60 m alt., 1 Aug. 1965, fr.; *Hou 403*, 4th Div., Nyabau, Bintulu, 200 m alt., 26 June 1966, fl.; *Julaihi*, *Rantia et al. S 76956*, 4th Div., Gunung Pelamau, Sungai Tutoh, Ulu Baram, Miri, 800 m alt., 15 Apr. 1997, fr.; *Yii* & *Asah S 64913*, 4th Div., Bukit Kana, Ulu Sungai Sangan, Tatau, Bintulu, 700 m alt., 6 Oct. 1994, fl.; *Yii S 53525*, 7th Div., Bukit Tasu, Ulu Sungai Penuan, Batang Balui, 850 m, 14 Mar. 1987, fr. – Sabah, *Wood* & *Wyatt-Smith A 4388*, Tenom, Bukit Tenom, 275 m alt., 3 Sept. 1954, fr.; *Meijer SAN 121372*, Tenom, 800–900 m alt., 17 Oct. 1987, fr.; *Wong* & *Donggop WKM 2286*, Tongod, Sungai Imbak, 335 m alt., 29 Aug. 1992, fr.

Note — The flowers of *A. kayuniga* are herewith described for the first time (*Yii* & *Asah S 64913*; *Hou 403*). The species is close to *A. meyeri* var. *macilentum*, which differs mainly in the presence of a minute but distinct indument. In the cited collections the red-brown calyx limb contrasts with the yellowish ovary and corolla in bud.

9. *Alangium ledermannii* W.J.de Wilde & Duyfjes, *sp. nov.*

Differs from resembling *A. hollrungii* in twigs, inflorescences and flowers hairy (glabrous in *A. hollrungii*), thicker twigs, c. 0.5 mm (c. 0.3 mm in *A. hollrungii*). — Type: *Ledermann 9818* (holo L L.2497874; iso B†), Papua New Guinea, April River, 200–400 m alt., 22 Nov. 1912, fl.

Alangium meyeri auct. non Merr.: Melch. & Mansf., Bot. Jahrb. Syst. 60 (1925) 163.

Etymology. The specific epithet refers to the Swiss botanist Carl Ludwig Ledermann, who in 1912/13 joined an expedition along the Empress Augusta River (Sepik River).

Small or medium tree, 4–20 m tall; *twigs* dark grey-brown, c. 5 mm diam, glabrescent from scurfy hairs c. 0.3 mm long; *leaf bud* not seen. *Leaves*: *petiole* 1(–1.4) mm long; *lamina* drying greenish brown, glabrous, elliptic, 9–12 by 4.5–7 cm, base slightly asymmetric, (broadly) rounded, apex short acute-acuminate; veins pinnate, 8–12 on each side; tertiary venation finely scalariform-reticulate. *Inflorescences* densely finely hairy (hairs 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 and calyx* c. 4 mm long, *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. *Fruit* not known.

Distribution — Papua New Guinea (East Sepik).

Habitat & Ecology — Dense, moist primary rain forest with ferns and mosses; 200–400 m altitude; flowering in November.

Proposed IUCN (2012) conservation assessment — Data Deficient (DD), although there is concern as the species has been collected only twice.

Note — *Alangium ledermannii* is only known from two collections from Sepik area: *Ledermann 9818*, the type, and *Ledermann 9795*, collected between 1912 and 1913.

10. *Alangium maliliense* Bloemb.

Alangium maliliense Bloemb. (1935) 286; (1939) 214, f. 8, 10cc, dd. — Lectotype, here designated: *Cel/V 161* (= *Waturandang 43*) (BO; iso L L0009824), Central Sulawesi, Malili near Kawata, c. 300 m alt., 27 Sept. 1932, fl.

Tree 15–35 m tall; *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 (leaden) brown, hairy (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-acuminate; veins pinnate, 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 of 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* densely hairy;

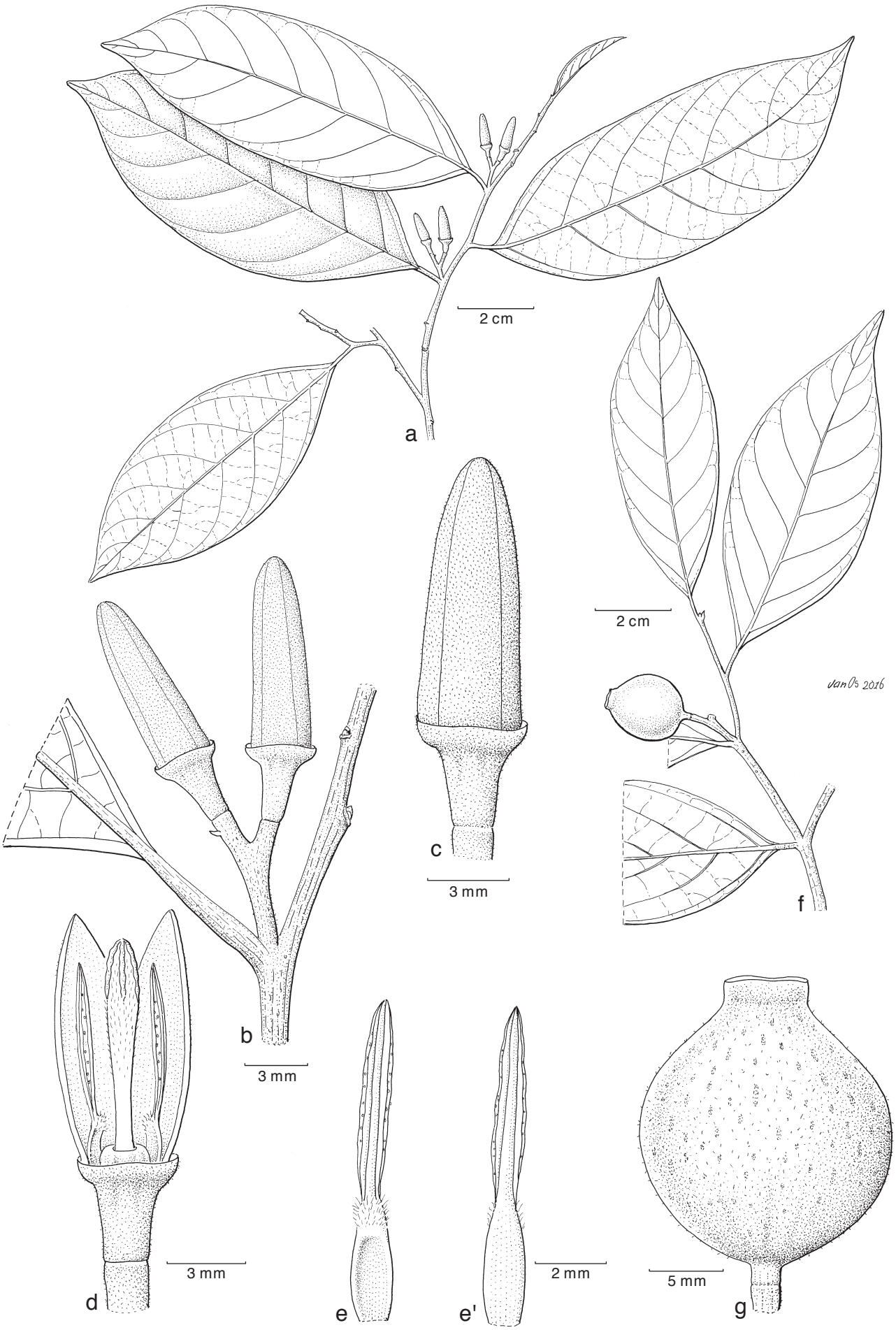

Fig. 3 *Alangium kayuniga* K.M.Wong. a. Flowering twig; b. inflorescence; c. mature flower bud; d. ditto, opened, some petals and stamens removed; e, e' stamen, inside and outside, respectively; f. fruiting twig; g. fruit (a–e': *Yii* & *Asah S 64913*; f–g: *Sibat ak Luang 23684*, all L). —Drawn by Jan van Os.

pedicel 1–5 mm long; *corolla in bud* (10–)12–14 mm long, base somewhat swollen, apex rounded; *ovary and calyx* 3–4 mm long, not ribbed; *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. *Fruit* solitary or 2 (or 3) per infructescence, stellate-dendroid yellow-brown hairy as the flower, ellipsoid, 10–27 mm long; *calyx remnant* minute.

Distribution — Sulawesi, (N) Moluccas, NW Papua. There are 2 varieties.

Key to the varieties

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

a. var. ***maliliense***

Indument composed of hairs c. 0.5 mm long. *Fruit* 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 — Central Sulawesi (Malili); known only from the type (3 collections from the same tree).

Habitat & Ecology — Apparently collected in forest remnant near village; flowering in September; fruiting in November and December.

Field-note — Bloembergen 1939 notes: “Flowers white, with aromatic odour, fruit yellowish brown or yellow-orange, without odour, sweet and sour”.

Vernacular name — Moroipo (Malili).

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

Differs from the typical variety in indument composed of short hairs, 0.3 mm long, and small fruits, 10–13 mm long. — Type: *De Vogel 3867* (holo L L.2500128; iso BO n.v.), Moluccas, Bacan, near Amasing Kali, S0°35' E127°28', 100 m alt., 4 Nov. 1974, fl.

Etymology. The name *celatum* (Latin = hidden) refers to this long time unnoticed taxon.

Indument composed of hairs c. 0.3 mm long. *Fruit* 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 — N Moluccas (Morotai, Halmahera, Bacan), NW Papua (Vogelkop, Biak).

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

Field-notes — Many buttresses; bark smooth, not peeling.

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

Additional specimens studied. Moluccas, Morotai, *Main & Aden 828*, Tjaw, 30 m alt., 17 May 1949, st.; *Tangkilisan bb 33865*, Tobelo, 30 m alt., 18 May 1949, fr.; *Tangkilisan bb 33866*, Tobelo, 30 m alt., 18 May 1949, fr.; *Tangkilisan bb 33870*, Tobelo, 30 m alt., 18 May 1949, fr.; *Kostermans bb 33786*, Tobelo, 70 m alt., 7 May 1949, st.; *Kostermans bb 33919*, 40 m alt., 14 July 1949, fr. Halmahera, Weda, *Neth. Ind. For. Service bb 24861*, Tiloppe, 25 m alt., 18 Apr. 1938, st.; *Neth. Ind. For. Service bb 24883*, Tiloppe, 25 m alt., 1 May 1938, st.; *Neth. Ind. For. Service bb 24884*, Tiloppe, 1 May 1938, st.; *Neth. Ind. For. Service bb 24909*, Tiloppe, 4 May 1938, st. – Papua, Biak, *Jarissetouw BW 595*, 15 Mar. 1954, st.; *Moll BW 9573*, near Mansforbo, 35 m alt, 14 Nov. 1959, st.; *Moll BW 9628*, near Mansforbo, 35 m alt., 19 Nov. 1959, st. Sorong, *Moll BW 11702*, Warsamson Valley, 30 m alt., 2 Aug. 1961, st.; *Versteegh BW 4632*, Sausapor, 15 m alt., 20 Oct. 1956, st.

Note — The here recognised varieties are very similar indeed, but have quite different facies, especially by drying colour. Bloembergen (1939) placed a number of sterile collections of the present var. *celatum* in a new, but not formally described, subspecies of *A. villosum.*

11. *Alangium meyeri* Merr.

Alangium meyeri Merr. (1906) 54. — *Alangium javanicum* (Blume) Wangerin var. *meyeri* (Merr.) Berhaman (1994) 34; (1995) 10. — Type: *Meyer FB 2284* (holo PNH†; iso B†, BO, K K000704820, NY NY00218024, SING, US US00127563), Philippines, Luzon, Bataan, Lamao River, Mt Mariveles, Dec. 1904, fl.

Alangium tutela Ridl. (1912) 10; (1922) 894. — *Alangium ebenaceum* (C.B. Clarke) Harms var. *tutela* (Ridl.) Kochummen (1970) 133. — Type: *Ridley* (*Goodenough*) *5082* (holo SING SING0059171; iso BM BM000944960), Singapore, Ponggol, 4 May 1893, fl.

Tree to 25 m tall; *twigs* brown, 1.5–4 mm diam, at apex (including *leaf bud*) minutely hairy (hairs c. 0.1 mm long), glabrescent. *Leaves*: *petiole* 1–1.5 cm long; *lamina* drying brown, early glabrescent from minute hairs, (narrowly) elliptic or elliptic-oblong, (8–)10–18 by 4–7 cm, base almost symmetric, rounded or (short) attenuate, apex acute or acute-acuminate; veins pinnate, 6–10 on each side, loop-veined towards apex of lamina; tertiary venation reticulate-scalariform. *Inflorescences* minutely hairy (hairs c. 0.1 mm long), of 1 or 2 main branches (peduncles) from the leaf axil, each (1–)2–10-flowered, sessile or peduncle(s) to 20 mm long. *Flowers* minutely hairy, pedicel 2–4 mm long; *corolla in bud* 8–14 mm long, base not swollen, apex (sub)obtuse; *ovary and calyx* c. 2 mm long, ± ridged; *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. *Fruit* (1–)2–4 per infructescence, ripening red to purple, minutely hairy, ovoid-ellipsoid, (18–)20–25 by 12–15 mm, (6–)10–12-ribbed or not; *calyx remnant* 1–2 mm long, c. 4 mm wide, shallowly lobed.

Distribution — Sumatra, Peninsular Malaysia, Singapore, Borneo, Philippines. For convenience sake, 2 varieties are recognised.

Key to the varieties

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

a. var. ***meyeri***

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

Distribution — Sumatra, Peninsular Malaysia (Johor, Selangor, Pahang), Singapore, Borneo (Brunei, Sarawak, Sabah, E Kalimantan), Philippines.

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; from sea level to 1000(–1500) m altitude; flowering and fruiting all year round.

Field-notes — Bark smooth, greyish; thin buttresses recorded; old fruit red and also fruit blackish when ripe, edible, sour. *Argent et al. SAN 108281* observed: "flowers white, visited by butterflies which probed successfully while bees could not; strongly and sweetly scented".

Vernacular names — Bantoenan, Bidara oeding, Kaju manan, Taramajang oeding (all Sumatra); Kayu Tass (Malay), Ladjik, Ridan, Tengalim (all Kalimantan), Midung (Iban), Indakarapus (Dusun).

b. var. ***macilentum*** W.J.de Wilde & Duyfjes, *var. nov.*

Differs from the typical variety in slender twigs, and leaf blade, corolla in bud and fruit all smaller. — Type: *Wood A4101* (holo L L0521507; iso A n.v., BRI n.v., KEP n.v., SING), Borneo, Sabah, Kalabakan, 30 miles WNW of Tawau, 100 m alt., 24 Nov. 1954, fl.

Etymology. The name *macilentum* (Latin = meager) refers to the delicate stature of the twigs with smaller leaves, flowers, and fruit.

Tree 10–25 m tall. *Twigs* 1.5–2(–2.5) mm diam, minutely hairy (hairs 0.1 mm long or less). *Inflorescences* 1–2-flowered. *Corolla in bud* c. 8 mm long; *ovary and calyx* minutely hairy. *Fruit* 1 (or 2) per infructescence, minutely hairy, not or late glabrescent, 15–20 mm long.

Distribution — 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; sea level to 200 m altitude.

Field-notes — Small and low buttresses recorded.

Additional specimens studied. Sarawak, *Wright et al. S 32266*, 5th Div., Sungai Medamit, 200 m alt., 9 Oct. 1972, fr.; *Paie S 15123*, Bintulu, Segan Forest Reserve, 23 Nov. 1961, fr.; *Othman et al. S 43369*, 7th Div., Sungai Semawat, 22 Oct. 1981, f. – Sabah, *Patrick SAN 36750*, Sandakan, Sepilok Forest Reserve, 15 May 1963, fl.; *Enggo BNBFD 10450*, Sandakan, Sepilok Forest Reserve, 30 m alt., 22 July 1939, st.; *Elmer 21176*, Tawau; *Elmer 21447*, Tawau; *Sinanggul SAN* 54534, Lahad Datu, Kelumpang Forest Reserve, 100 m alt., fl. – Kalimantan, *Saridan 410*, E Kalimantan, Kotawaringin, 50 m alt., Nov. 1993, fr.

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

12. *Alangium mezianum* Wangerin

Alangium mezianum Wangerin (1907) 338; (1910) 15, f. 3f, j. — Type: *Hose* (*Haviland*) *2885* (holo L L0009821; iso BO, K 2 sheets K000704824, K000704825, SING), Sarawak, Kapit, Rejang, July 1885, fl.

(Shrub) tree to 30 m tall; *twigs* brown, 3–5 mm diam, at apex short hairy; *leaf bud* straight, densely short hairy, hairs 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; veins pinnate, 10–15 on each side, loop-veined especially towards apex of lamina; tertiary venation thin, ± scalariform. *Inflorescences* minutely hairy, hairs c. 0.2 mm long, of 1 (or 2) branches (peduncles) from the leaf axil, 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 and calyx* 3–6 mm long, narrow, 6(–10)-ribbed; *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. *Fruit* 1 or 2 per infructescence, ripening reddish (purplish?), 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 — 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; from sea level to 300–1000(–1660 (*Mikil SAN 41761*, Trusmadi FR)) m altitude; flowering and fruiting all year round, but most in October.

Field-notes — Mature fruits dull reddish or dull purple; buttresses and small or large stilt roots recorded.

Vernacular names — Midong (Iban), Ridan (E Kalimantan).

Notes — 1. *Alangium mezianum* is close to *A. borneense*, the latter generally with smaller dimensions in most parts, and differing especially in a more conspicuous indument of the curved leaf bud.

2. *Alangium mezianum* appears to be even in its here conceived restricted sense a variable entity, especially in its general appearance. Beside about 30 collections studied there can be some 10 collections separated as somewhat doubtful as they show traits intermediate with *A. borneense*, viz. Brunei: *Suzuki* & *Miyamoto K 13266*. – Sarawak: *Abang S 48002*, *Chai S 34677*, *Hansen 918* & *943*, *Jacobs 5359*, *Luang S 21882* & *S 22478*, *Paie S 28242*. – Sabah: *Mikil SAN 41761* (in Berhaman (1994) as *A. javanicum* var. *meyeri*). – E Kalimantan: *Church et al. 955* & *2018*.

13. *Alangium minahassicum* (Bloemb.) W.J.de Wilde & Duyfjes, *stat. nov.*

Alangium javanicum (Blume) Wangerin var. *minahassicum* Bloemb. (1935) 284, f. 5w, x; (1939) 220. — Lectotype, here designated: *Beguin 2262* (L L.2497856; iso BO), Moluccas, Halmahera, W Pitoe, 80 m alt., 23 Nov. 1922., fr.

Tree 10–30(–40) m tall; *twigs* grey or (dark) brown, 2–4 mm diam, early glabrescent from minute hairs less than 0.1 mm long; *leaf bud* minutely hairy. *Leaves*: *petiole* 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-acuminate; veins all pinnate, 5–8 on each side; tertiary venation thinly (inconspicuously) scalariform. *Inflorescences* subglabrous (hairs less than 0.1 mm long), of 1 or 2 main branches (peduncles) in the leaf axil, each shortly branched, 2–6-flowered; *peduncle*(*s*) 3–12 mm long. *Flowers* minutely hairy; pedicel 2–3 mm long; *corolla in bud* 12–20 mm long, apex (sub)acute; *ovary and calyx* 4–5 mm long, (faintly) ridged, *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. *Fruit* 1 (or 2) per infructescence, drying black, minutely hairy, glabrescent, ovoid-ellipsoid, 25–35 by 15–18 mm, smooth; *calyx remnant* small.

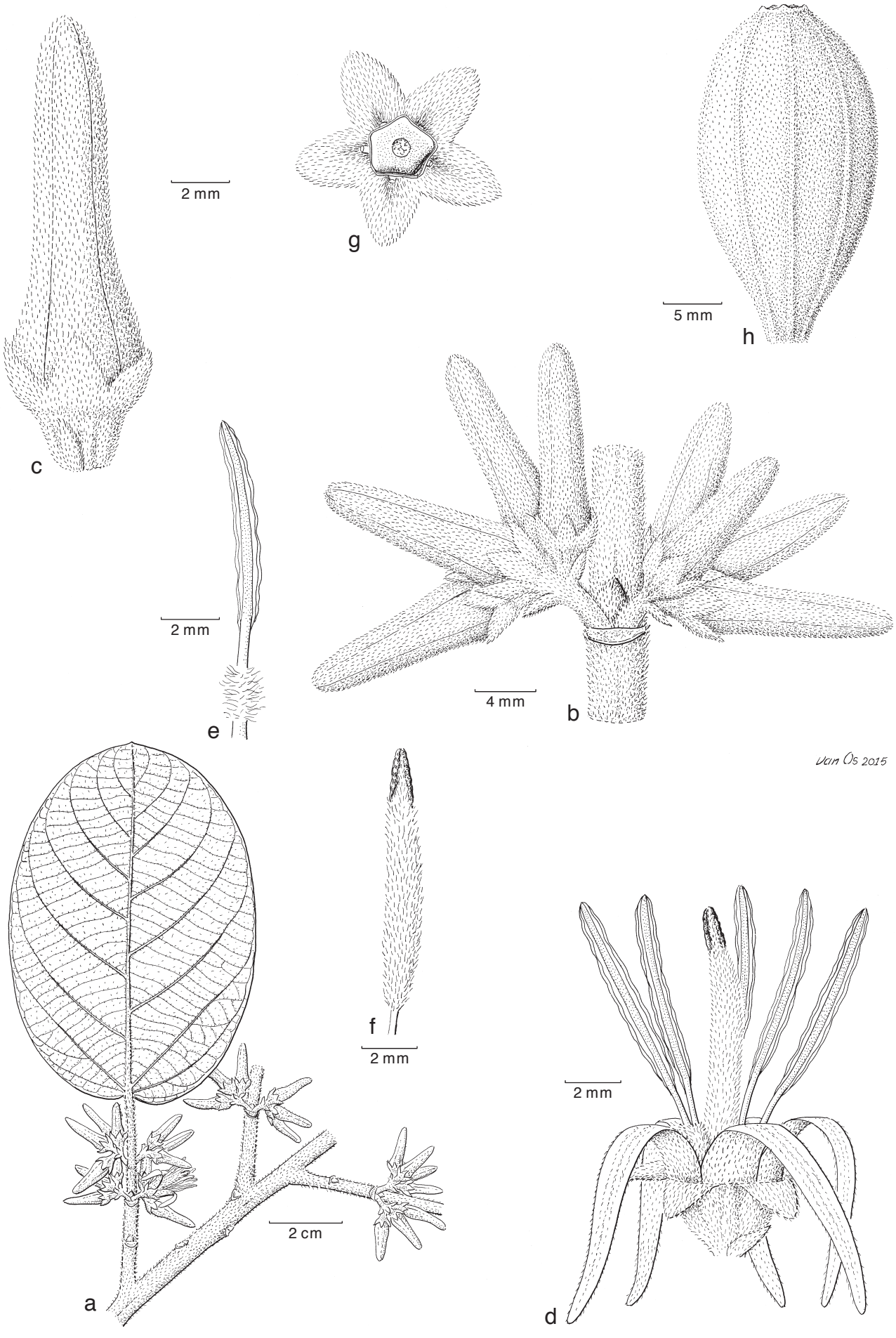

Fig. 4 *Alangium nobile* (C.B.Clarke) Harms. a. Portion of flowering branch; b. node with (compound) inflorescence; c. flower bud; d. open flower; e. stamen; f. style and stigma; g. view of calyx limb and disc on top of ovary, after removal of style; h. fruit (a–g: *Teo & Pachiappan KL 3131*; h: *Kostermans 9971*, all L). — Drawn by Jan van Os.

Distribution — Sulawesi (Manado), N Moluccas (Halmahera, Ternate, Bacan, Obi Isl., Buru, Seram).

Habitat & Ecology — Primary forest, on hillside, steep terrain, near river bank; loamy soil with little humus, sandy soil, clayey soil with stones, black volcanic soil, on shale quartzite bedrock, also on limestone; from sea level to 700 m altitude; flowering and fruiting predominantly from October to December and March.

Field-notes — Often recorded as a solitary tall tree with a straight bole; bark smooth; prop roots, buttresses, and small stilt roots exist; flowers very fragrant. The ripening colour of the fruit is not recorded.

Vernacular names — Lansabonti poete, Wai Wai Bebudo (Ternate).

Note — In the Leiden Herbarium there is a number of mainly sterile specimens from New Guinea, most of these collected by Boswezen (BW), which obviously belong, or are closely related to *A. minahassicum.* These collections can be somewhat arbitrarily divided into the following 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 (fruit c. 25 mm long) and they could be linked up with *A. hollrungii*. The collections are: *BW 2922* (fruit), *Vink 17571* (fruit), *BW 2958*, *BW 8496* (200 km W of Hollandia), *BW 11175* (Japen Isl.), *BW 12398*, *BW 12455*, *BW 12768*, *BW 13291*. More fertile material is needed for a decision on their status.
2. A group of 4 collections, all sterile, from Adi Isl. (limestone), which may belong to *A. minahassicum*, but fertile material is needed to be certain. The collections are: *BW 9959*, *BW 10152*, *BW 10154*, *BW 10155*.

14. *Alangium nobile* (C.B.Clarke) Harms — Fig. 4

Alangium nobile (C.B.Clarke) Harms (1898) 262; King (1902) 79; Wangerin (1910) 11; Ridl. (1922) 892; Bloemb. (1935) 276, f. 4a–f; (1939) 211, f. 9a–e; Berhaman (1994) 32; (1995) 13; Argent (in Argent et al. 1997) 7, f. 3. — *Marlea nobilis* C.B.Clarke (1879) 743. — Lectotype (designated by Berhaman 1994): *Griffith 3385* (K K000077038; iso BM BM000944964, C, P 2 sheets P P00542816, P00542817, U 2 sheets U.1230478, U.1230480), Malay Peninsula, Malacca.

Tree 20–45 m tall; *twigs* brown, irregularly angular, 3–8 mm diam, brown-hairy (hairs 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 ± rounded), apex broadly rounded, sometimes with short acumen c. 0.5 cm long; venation 3–5-plinerved at base, lateral pinnate veins 6–10 at each side, (not) neatly loop-veined; tertiary venation thin or stout, mostly distinctly scalariform. *Inflorescences* densely hairy, of (1 or) 2 or 3 subsessile or stalked (peduncle) 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 and calyx* c. 4 mm long, coarsely 5-ribbed; *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), inside largely short grey-hairy, 10–15 mm long; *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. *Fruit* 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.

Distribution — Sumatra (Palembang), Peninsular Malaysia, Singapore, Borneo (Sarawak, Sabah, Kalimantan).

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

Field-notes — A very handsome large tree; plank buttresses 2 m high extending to 2 m over the ground, narrow; bole fluted to 5 m; bark smooth, thin; fruit reddish.

Vernacular names — Mata oedang (Medang), Midong (Iban), Malapang gunung.

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

15. *Alangium oblongum* Craib — Fig. 5

Alangium oblongum Craib (1930) 426; (1931) 807. — Type: *Kerr 17028* (holo K K000704837; iso BK, BM BM000944972), Thailand, Ranong, Kampuan, 50 m alt., 6 Feb. 1928, fl.
Alangium costatum auct. non (Boerl.) Boerl. ex King: King (1902) 78.
Alangium ridleyi auct. non King: Evrard (1923) 1186; Tardieu (1968) 48.
Alangium javanicum var. *meyeri* auct. non (Merr.) Berhaman: Berhaman (1994) 35, p.p.

Tree 10–30 m tall; *twigs* brown, 2–4(–5) mm diam, at apex with (dense) minute hairs c. 0.1 mm long, glabrous or early glabrescent; *leaf bud* straight, with short 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(–30) by 4–10 cm, base symmetric, (rounded or) short or long-attenuate, apex acute-acuminate; veins pinnate, 8–15 per side, loop-veined towards apex of lamina; tertiary venation reticulate or thin-scalariform. *Inflorescences* glabrous (or minutely hairy), of 1–3 main branches (peduncles) from the 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 subobtuse; *ovary and calyx* 2–4 mm long, usually 10–12-ribbed; *limb* ± spreading, 1(–2) mm long, at margin 3.5–4 mm wide, subtruncate with straight or (faintly) lobed margin; *petals* 6, minutely hairy (appearing as glabrous) inside, 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. *Fruit* 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.

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

Habitat & Ecology — Primary forest, mixed dipterocarp forest, dipterocarp forest, flatland, hillside, sandy ridges, and along rivers; yellow clayey soil; 30–700 m altitude; flowering and fruiting all year round.

Uses — Wood for constructions and canoes.

Field-notes — *Van Balgooy et al. 5357*: “fruit purple, 1 seed covered by a white sweet sour juicy carcotesta, edible, favourite food of pigs and primates, very common” and *Argent 9615 et al.* “tree with bright red edible fruit, brought into camp to be eaten”. Bark whitish or whitish brown; stilt roots and buttresses recorded.

Vernacular names — Taramajang boeloeh (Aceh), Jadam (Malay), Midong or Midung (Iban), Senumpul, Pangoron (Batak).

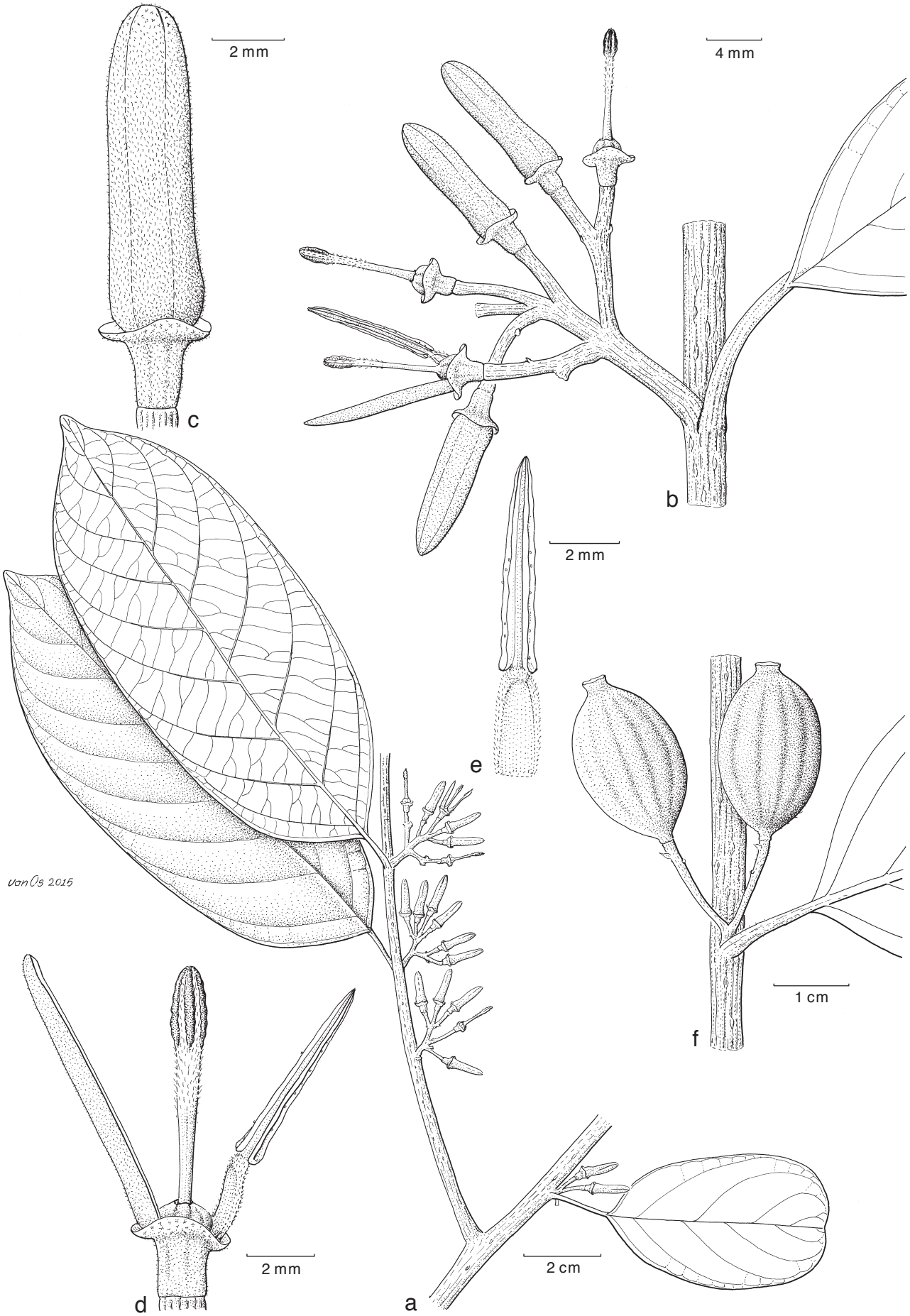

Fig. 5 *Alangium oblongum* Craib. a. Portion of flowering branch; b. inflorescence; c. flower bud; d. flower at anthesis showing ovary, calyx limb, disc, style, and conical stigma (petals and stamens removed, except one of each); e. stamen; f. fruit (a–d: *Wongprasert s.n.* (SN130168); e: *Suddee et al. 3509*, BKF; f: *Poilane 10950* (Annam), L). — Drawn by Jan van Os.

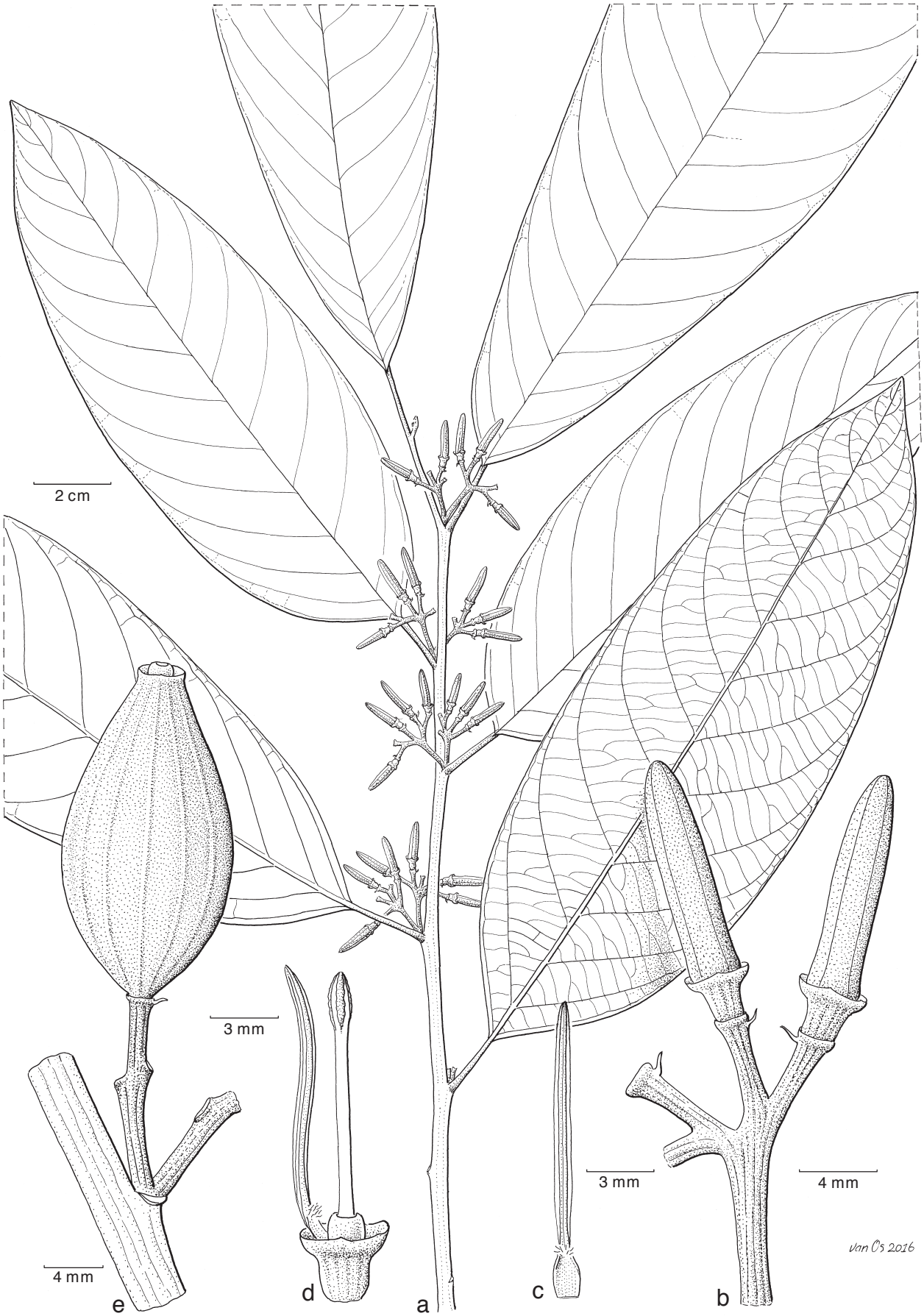

Fig. 6 *Alangium pallens* W.J.de Wilde & Duyfjes. a. Flowering twig; b. portion of inflorescence with mature buds; c. stamen seen from the inside; d. flower, corolla and stamens, except one, removed; e. infructescence with one fruit (a–d: *Mariyoh et al. SAN 128850*; e: *Minjulu SAN 77013*, all L). — Drawn by Jan van Os.

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 relegated to *A. javanicum*.

2. It could be imagined that three here accepted species, viz. *A. oblongum*, *A. meyeri*, and *A. ridleyi* are exponents of one single species, only differing in sizes and in facies, as there seem to be sufficient intermediates to connect them. However, we do not believe this, as it readily appears incredible to unite e.g. 'typical' *A. ridleyi* from Singapore, a plant with robust twigs, with *A. meyeri*, a plant of much more delicate stature, from Luzon. On the other hand, also *A. javanicum* (a species with obvious hairy leaf bud, and small fruits, 15–20 mm long), seems to intergrade with *A. meyeri*, typically with an indument of minute scale-like hairs. In this way, the '*javanicum* complex' problem, as alluded to in the introduction, is replaced by a smaller '*oblongum* complex' problem which again needs further study; probably some more not yet defined taxa are involved.

3. Some specimens here included in *A. oblongum* are cited under *A. javanicum* var. *meyeri* by Berhaman (1994).

16. *Alangium pallens* W.J.de Wilde & Duyfjes, *sp. nov.* — Fig. 6

Differs from resembling *A. ebenaceum* in leaves drying greenish brown below and corolla sparsely minutely hairy (leaves drying purplish below and corolla densely hairy in *A. ebenaceum*) and from resembling *A. meyerii* in pale twigs contrasting with blackish brown peduncles (twigs and petioles brown in *A. meyeri*). — Type: *Kostermans 21328* (holo L L0521448; iso A n.v., BO, CANB n.v., G n.v., K K000271862, NY n.v., P P00542866, SAR n.v., SING, US n.v.), E Kalimantan, Berau, Mt Njapa on Kelai River, 100 m alt., 17 Oct. 1963, fr.

Etymology. The specific epithet *pallens* (Latin = pale) refers to the pale brown or whitish twigs.

Tree 10–35 m tall; *twigs* pale brown or whitish, contrasting with blackish drying colour of petioles and peduncles, 2–5 mm diam, glabrous, sometimes ± angular; *leaf bud* pale brownish hairy, hairs short or long, 0.1–0.3(–0.5) 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 subsymmetric, rounded or cuneate, apex acute-acuminate; veins pinnate, 8–18 on each side, occasionally loop-veined; tertiary venation faintly scalariform. *Inflorescences* (sub)glabrous, drying blackish, of 1 or 2 main branches (peduncles) from the 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 bluntish or (sub)acute; *ovary and calyx* 3–4 mm long, ± not ribbed; *limb* broadly saucer-shaped, c. 1.5 mm long, 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. *Fruit* 1–3 per infructescence, ripening (pink or) red, drying blackish, glabrous, ± flattish, ovoid-ellipsoid, 20–32 by 13–20 mm, smooth or thinly multi-lined; *calyx remnant* small, narrow.

Distribution — (West) Sumatra, Peninsular Malaysia (Pahang, Terengganu), Borneo (Sarawak, Sabah, E Kalimantan).

Habitat & Ecology — Primary and secondary forest, on river banks, sand stone rocks; brownish sandy soil, sandstone, and limestone; from sea level to 700 m altitude; flowering in March, May, June, October; fruiting in March, May, July, August, December.

Field-notes — Strongly fluted trunk and buttresses recorded; fruit ripening pink-red or wine-red.

Vernacular names — Kondolon (Dusun), Ladjik (E Kalimantan (Sangkulirang)).

Proposed IUCN (2012) conservation assessment — Least Concern (LC).

Additional specimens studied. Sumatra, *LaumonierTFB 4530*, Sebelah Nature Reserve, 600 m alt., 23 May 1983, fr.; *Laumonier TFB 4564*, ditto, fr. – Peninsular Malaysia, *Whitmore FRI 8573*, Pahang, Sungai Tembeling, 5 m alt., 6 Mar. 1968, fl.; *Whitmore FRI 4391*, Kelantan, Sungai Lebir Kechil, 160 m alt., 17 Sept. 1967, fl. – Sarawak, *Lee S 44284*, 2nd Div., Gunong Lesong, 450 m alt., 3 Dec. 1981, fr. – Sabah, *Lantoh SAN 83186*, Kinabatangan, Sungai Inarat, 700 m alt., 12 May 1976, fl.; *Minjulu SAN 77013*, Kunak, Madai, 13 Aug. 1973, fr.; *Mariyoh et al. SAN 128850*, Lahad Datu, Danum Valley, 11 June 1990, fr.; *Ampuria SAN 36521*, Kinabatangan, Bolungun Hill, 40 m alt., 3 June 1963; *Gibot SAN 37144*, Tawau, Meretai Besar, 230 m alt., 29 July 1963, fr.; *Madani SAN 90138*, Kunak, Tingkayu Forest Reserve, 100 m alt., 14 Mar. 1979, fl.; *Amin et al. SAN 107114*, Tongod, Sungai Pinangah, 13 Oct. 1984, fl.; *Kumin SAN 107985*, Kinabatangan, Meliau, 20 Oct. 1986, fl.; *Meijer SAN 141552*, Sandakan, Sepilok Forest Reserve, 18 Aug. 1994, st.; *Campbell 204*, Lahad Datu, Palum Tambun Nature Trail, 1 July 1991, fr. – Kalimantan, *Kostermans 13256*, East Kalimantan, Sangkulirang, Mt Medadem, 199 m alt., 30 July 1957, fr.

Notes — 1. Stout specimens may be confounded with *Alangium ebenaceum*, the latter differing in leaves purplish below on drying.

2. Some specimens here included in *A. pallens* are cited under *A. javanicum* var. *meyeri* by Berhaman (1994).

17. *Alangium plumbeum* W.J.de Wilde & Duyfjes, *sp. nov.*

Most similar to *A. hollrungii* but differing in hairy filaments and hairy petals within (filaments glabrous and petals glabrous within in *A. hollrungii*). — Type: *Gafui et al. BSIP 8666* (holo L L.2497913; iso BSIP), Solomon Isl., N Kolombangara, 18 Jan. 1968.

Etymology. The specific epithet *plumbeum* (Latin = leaden grey) refers to the drying colour of the leaves.

Tree 6–20 m tall; *twigs* pale brown or grey, 1–3 mm diam, glabrous (early glabrescent from hairs 0.1 mm long or less); *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-acuminate; veins pinnate, 5 or 6 on each side; tertiary venation thin, reticulate-scalariform. *Inflorescences* minutely hairy (hairs less than 1 mm long), of 1 (or 2) branches (peduncle(s)) from the leaf axil, each few-branched, with 1–4(–5) flowers; *peduncle*(*s*) 2–7 mm long. *Flowers* 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 and calyx* 3–4 mm long, finely ribbed; *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. *Fruit* 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 Isl., widespread; in *Malesia*: Papua New Guinea (Bougainville Isl., only known from *Gideon LAE 78669*, a sterile specimen).

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

Field-notes — Thin plank-like buttresses; flowers purple-white or cream.

Proposed IUCN (2012) conservation assessment — Least Concern (LC), as the species is widespread in the Solomon Isl.

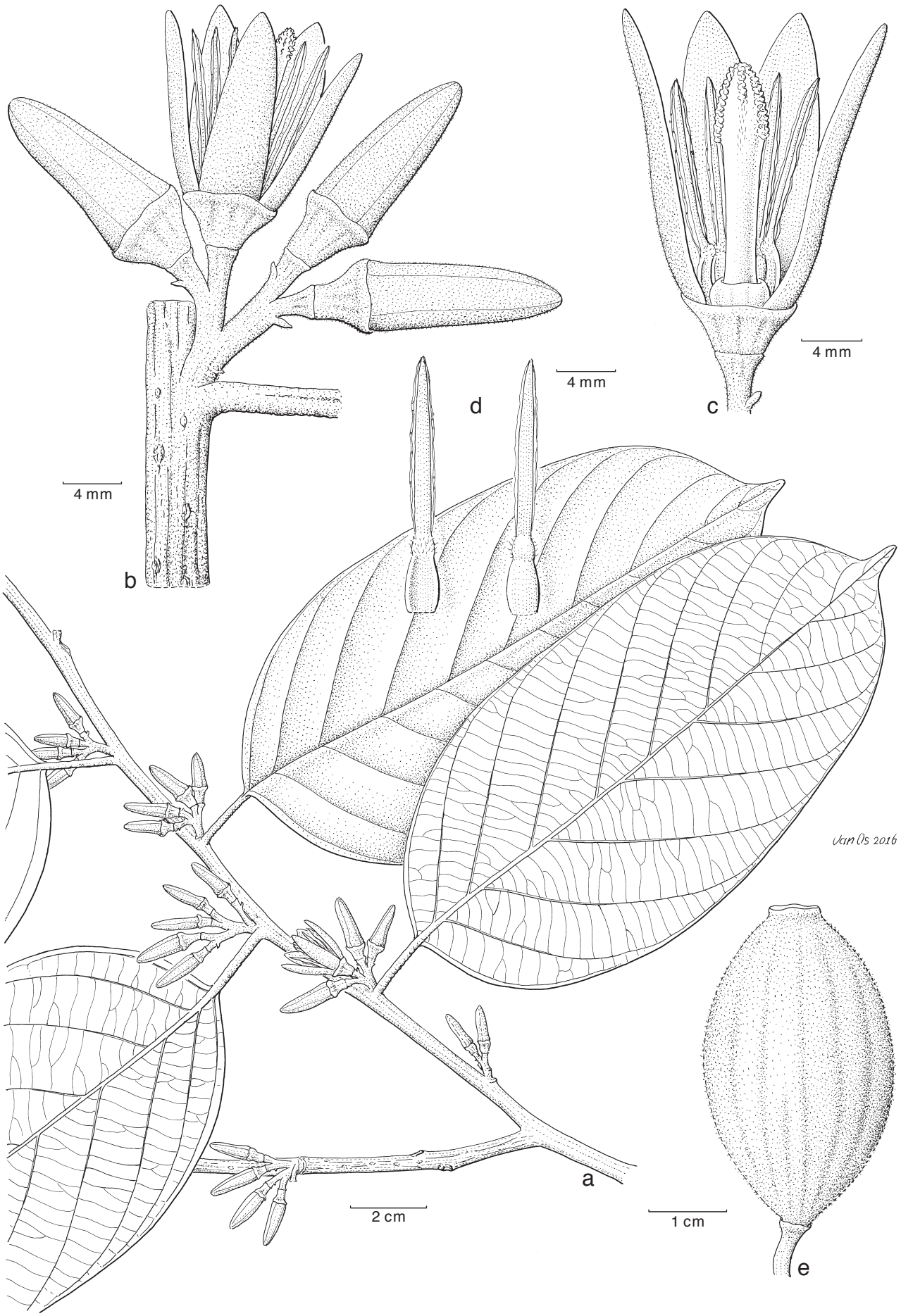

Fig. 7 *Alangium ridleyi* King. a. Habit of flowering twig; b. inflorescence; c. flower, some petals and stamens removed, note style glabrous; d. stamens; e. fruit (a–d: *Ambriansyah* & *Arifin 395*; e: *Afriastini 2607*, all L). — Drawn by Jan van Os.

18. *Alangium ridleyi* King — Fig. 7

Alangium ridleyi King (1902) 78; Wangerin (1910) 12; Ridl. (1922) 893; Bloemb. (1935) 278, f. 5a–i; (1939) 215, f. 10a–i; Wijedasa et al. (2014) 233, f. 1–3. — Lectotype (designated by Wijedasa et al. 2014): *Ridley 4941* (SING SING0059170; iso BM BM000944962, CAL n.v., K K000077044, US US00127566), Singapore, Botanic Garden Jungle, 1893, fl.

Marlea costata auct. non Boerl.: Valeton (1906) 267, t. 179. — *Alangium costatum* (Valeton) Wangerin (1910) 12, f. 3a–e, nom. illeg. — Voucher specimen: *Unknown collector*, *Hort. Bog. VIII H 17* (BO, K K000704829, L L.2497595), Sumatra, Bangka.

Tree to 40 m tall; *twigs* brown, (4–)5–10 mm diam, at apex and *leaf bud* with dense minute scale-like hairs c. 0.1 mm long, glabrescent. *Leaves*: *petiole* 1.5–2(–3) 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; veins pinnate, 8–14(–18) per side, loop-veined especially towards apex of lamina; tertiary venation reticulate or faintly fine-scalariform. *Inflorescences* glabrous or with scale-like hairs 0.1 mm long or less, with 3–10 flowers, simple or 2–3-branched, sessile or to 5(–10) mm peduncled. *Flowers* minutely hairy; pedicel 1–4 mm long; *corolla in bud* (12–)15–18 mm long, not thickened at base, apex blunt (or acute), *ovary and calyx* c. 5 mm long, faintly 10–12-ribbed, *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. *Fruit* 1 or 2 per infructescence, ripening purple or black, minutely hairy, glabrescent, ellipsoid, (25–)30–40 mm long, coarsely 10–12(–14)-ribbed, *calyx remnant* broad, subtruncate, 5–7 mm wide.

Distribution — S Peninsular Thailand; in *Malesia*: Sumatra (Simeuleu Isl., Bangka, S Sumatra, Riau), Peninsular Malaysia (Kedah, Perak, Trengganu, Pahang, Selangor, Negeri Sembilan, Johor), Singapore, Borneo (E Kalimantan; doubtful in C Kalimantan & Sabah).

Habitat & Ecology — Primary forest, mixed dipterocarp forest, hillside, undulating country, flatland, rocky valley, rocky ridge crest, rocky riverbank; granite; from sea-level to 550 m altitude; flowering February to October; fruiting January, May, July, October to November.

Field-notes — *Whitmore 8929*: “fruit green, slightly ribbed, turning pinkish magenta, with a sour translucent juicy aril”. Stilt-roots and buttresses sometimes present; bark smooth; flowers fragrant.

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

Note — Material from Borneo, at present treated under *Alangium 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 comparatively narrower, and hairy almost all over.

19. *Alangium subcordatum* W.J.de Wilde & Duyfjes, *sp. nov*.

Distinct from all other *Alangium* species by the combination of the following characters: stout habit; densely hairy twigs leaf bud and inflorescences; petiole slender, 2–4.5 cm long; lamina broad, 14–27 by 7–12 cm, with broadly rounded or shallowly cordate base; filaments glabrous. — Type: *K.J. White NGF 10471* (holo SING SING0208284; iso L L.2497994, LAE), Papua New Guinea, Morobe Prov., Oomsis near Lae, 300 ft., 3 Mar. 1959, fl. & fr.

Etymology. The specific epithet refers to the leaf base.

Tree 10–40 m tall; *twigs* brown, 4–6 mm diam, in apical portion densely hairy, the hairs 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-acuminate; veins pinnate, 8–15 on each side, (faintly) loop-veined; tertiary venation (reticulate-)scalariform. *Inflorescences* hairy as the twig and leaf bud, single, 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 subobtuse; *ovary and calyx* 4–7 mm long, faintly c. 10-ribbed; *limb* not spreading, 1–2 mm long, at margin 3.5–5 mm wide, margin 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. *Fruit* 1 (or 2?) per infructescence, ripening colour not recorded, (yellow-)brown hairy, ovoid(-ellipsoid), c. 30 by 20–22 mm, not ribbed; *calyx remnant* short, 2–2.5 by 5–6 mm.

Distribution — Papua New Guinea (Morobe Prov.), known from 3 collections.

Habitat & Ecology — Primary rain forest, on slope and flat ground; 100–150 m altitude; flowering in January and March; fruiting in March and September.

Field-notes — Strongly buttressed; bark grey brown or light grey, smooth, exfoliating in rounded flakes leaving a sculptured surface; fruit laterally compressed.

Proposed IUCN (2012) conservation assessment — Data Deficient (DD), although there is concern as the species has been collected only thrice in a restricted area in lowland rain forest.

Additional specimens studied. Papua New Guinea, Morobe Prov., *Kairo* & *Streimann NGF* 25578, Oomsis, 300 ft., 24 Sept. 1964, fr.; *Hartley TGH* 11351, N of Lae, between Rivers Busu and Butibum, 4 Mar. 1963, 500 ft., fr.

DUBIOUS TAXON

Alangium javanicum (Bloemb.) Wangerin var. ***jaheri*** Bloemb. (1935) 284, f. 5bb; (1939) 221, f. 10bb. — Type: *Jaheri s.n.* (holo BO n.v.), Kai Isl.

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”.

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 fruit, but we assume that the described fruit belongs to the section *Conostigma*. The variety may belong to *A. minahassicum* (fruit smooth) or to *A. hollrungii* (fruit presumably smooth). When the described ribs are not an artefact, it may represent a distinct taxon.

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In the Leiden herbarium helpful analytical drawings of flowers and (parts) of inflorescences were found with the sheets, representing most taxa. Although almost anonymous, it appeared that they were made in 1972 by Mrs E.L. Fluyt, a student of the late Marius Jacobs, studying *Alangium* intended for Flora Malesiana.

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