

A conspectus of *Alangium* Lam. sect. *Alangium* (Alangiaceae)

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ABSTRACT

Alangium sect. *Alangium* comprises 11 species (and two varieties). The species are primarily defined by their growth habit, viz. erect shrubs or trees versus scandent plants, with additional characters derived from the inflorescences, the size of the flowers, and particulars of the stamens. A key to the species and species descriptions with brief associated information are presented. *Alangium amplum* W.J.de Wilde & Duyfjes, *A. indochinense* W.J.de Wilde & Duyfjes, *A. melliferum* W.J.de Wilde & Duyfjes, and *A. sempervirens* W.J.de Wilde & Duyfjes are new species; *A. frutescens* Zoll. & Mor. var. *palawanense* W.J.de Wilde & Duyfjes is a new variety, and *A. longiflorum* Merr. var. *brachyanthum* (Merr.) W.J.de Wilde & Duyfjes a new combination.

KEYWORDS: Alangiaceae, *Alangium* sect. *Alangium*, SE Asia, taxonomy.

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INTRODUCTION

Alangium Lam. with ca 50 species is distributed from Madagascar (*A. grisolleoides* Capuron), and Africa [*A. chinense* (Lour.) Harms, *A. salviifolium* (L.f.) Wangerin], east to China, Japan, SE Asia (incl. the whole of Malesia), the Pacific [incl. New Caledonia, *A. vitiense* (A.Gray) Baill.], and E Australia [*A. polyosmoides* (F.Muell.) Baill.]. It includes shrubs, trees and vines (scandent), but the latter facies lacks specialised devices for climbing although side twigs are often perpendicularly developed. In the literature up to date only one species, *A. salviifolium*, a member of sect. *Alangium*, is persistently known as comprising shrubs or trees as well as ‘leaning’ trees and vines. Such variation in growth habit within one species is peculiar, and in the case of *Alangium salviifolium* it appears to be untrue, that is, the climbing forms represent three distinct species (*A. amplum*, *A. frutescens* Zoll. & Mor., *A. glandulosum* Thwaites) as accepted in this article. A fourth climbing species is *Alangium scandens* Bloemb., a member of sect. *Marlea*.

Following Bloembergen (1935, 1939) there are four sections in *Alangium*. The section *Alangium* is characterised by flowers with stamens two or more times the number of petals, and all its species have

compound inflorescences (see below); the other sections, i.e. sect. *Marlea* (Roxb.) Baill., sect. *Rhytidandra* (A.Gray) Baill., and sect. *Conostigma* Bloemb. are characterised by flowers with stamens of the same number as the petals, but they are distinguished by differences in the stigma. The section *Alangium*, at present accepted with 11 largely geographically separated species (see figure 1), includes *A. salviifolium* (with *A. decapetalum* Lam., the conserved type of the genus, as a synonym). The latter species, now defined in a more restricted sense as compared with the opinions of previous authors, now comprises only shrubs and trees, not vines.

The distinction of species in *Alangium* appeared to be problematic in parts of all sections, but particularly so in sect. *Alangium*. By using the growth form, i.e. scandent versus non-scandent (arborescent) as a character, the definition of the species has become more plausible. Apart from the growth form, we also consider the position of the compound inflorescences on the twigs in relation to extant foliage leaves or scars of fallen leaves as a useful character, the latter most likely also determined by the prevailing climatic conditions under which the species occurs (for explanation see below and figure 2). Other important characters for species

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delimitation include the number of flowers per inflorescence, the size of the flower (length of petals), and shape and hairiness of the filaments. In figure 3 stamens of six species are depicted. It can be seen that the filaments are either uniformly straight or more or less two-parted, with the lower part (lower half) thicker and, at its apex, prolonged into a thickened hairy protrusion or knob. These latter filaments could be called geniculate although they do not conform with the general definition as being abruptly knee-like bent; they might also be called 'kinked'.

All cited herbarium collections were seen by the authors.

MORPHOLOGY AND POSITION OF THE INFLORESCENCE IN *ALANGIUM*

Two types of inflorescences can be distinguished in the genus, viz. simple inflorescences and compound inflorescences.

Simple inflorescences are few- or many-flowered dichasia with a single peduncle solitary in the axils of extant foliage leaves, as in sect. *Marlea* (eight species) and sect. *Rhytidandra* (13 species).

Compound inflorescences are (sub)sessile, and thought as essentially formed of a lateral shoot with simple inflorescences contracted into a short or very short short-shoot. Consequently, in a compound inflorescence, each partial inflorescence compares with a simple inflorescence. Compound inflorescences are placed either in the axils of extant foliage leaves or axillary to scars of fallen (deciduous) leaves, as in sect. *Alangium* (11 species) and sect. *Conostigma* (19 species). By further reduction these compound inflorescences may become only 1- or 2- or few-flowered and seemingly simple, but they are (sub) sessile, i.e. without or almost without a peduncle.

The compound inflorescences have an abortive (or a reduced or a dormant) terminal bud. A dormant terminal bud is found in e.g. *A. salviifolium* and

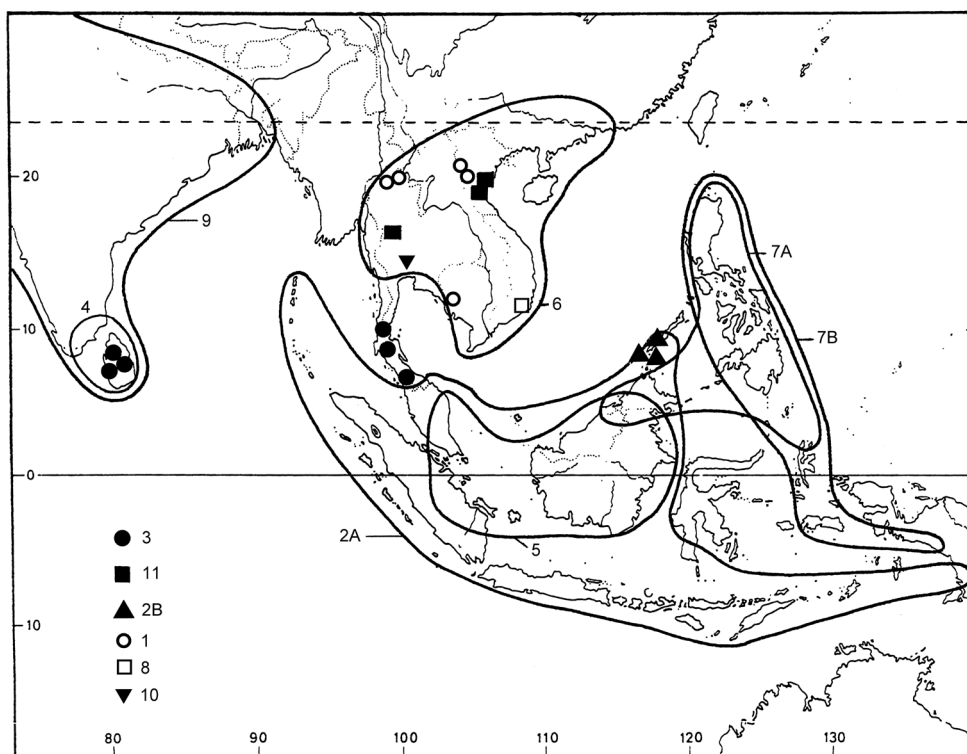


Figure 1. Approximate distribution areas of the 11 species accepted in *Alangium* Lam. sect. *Alangium*. 1. *A. amplum* (open dots). 2A. *A. frutescens* var. *frutescens*; 2B. *A. frutescens* var. *palawanense* (solid triangles); 3. *A. glandulosum* (solid dots); 4. *A. hexapetalum*; 5. *A. hirsutum*; 6. *A. indochinense*; 7A. *A. longiflorum* var. *longiflorum*; 7B. *A. longiflorum* var. *brachyanthum*; 8. *A. melliferum* (open square); 9. *A. salviifolium*; 10. *A. sempervirens* (inverted solid triangle); 11. *A. tonkinense* (solid squares).

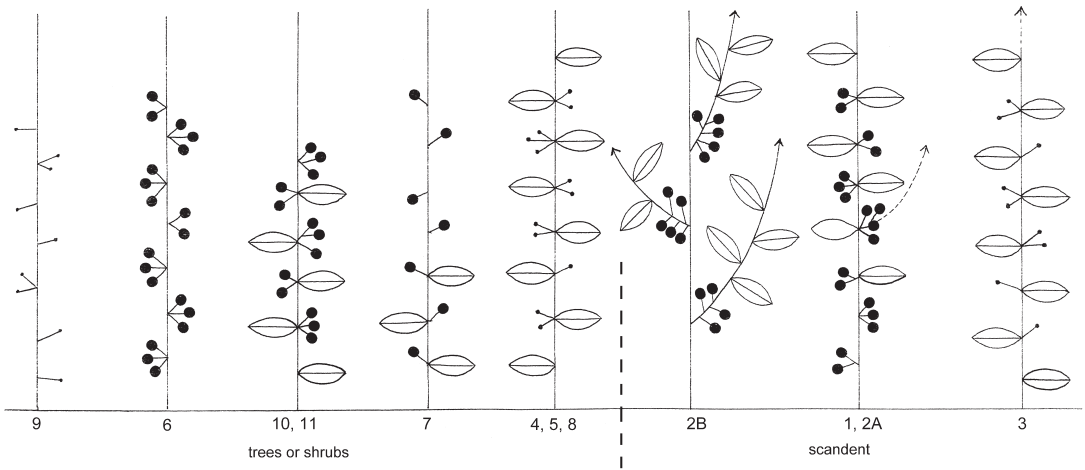


Figure 2.— Schematic representation of flowering twigs in species of *Alangium* sect. *Alangium*.

Indicated is the position of the inflorescences in relation to extant foliage leaves (as shown in the figure) or to leaf-scars when the plant is deciduous (and then leaves are not drawn in the figures). Inflorescences in sect. *Alangium* are all compound (for explanation see the text). One big dot represents a partial inflorescence, several together forming a compound inflorescence. A small dot represents the same, but the whole compound inflorescence reduced to merely 1 (or 2 or 3) flower(s). Left hand arborescent species (numbers 4–11), right hand scandent species (numbers 1–3). Numbers refer to the same species as numbered in figure 1.



Figure 3. Schematic representation of stamens in species of *Alangium* Lam. sect. *Alangium*. A. *A. indochinense*; B. *A. melliferum*; C. *A. sempervirens*; D. *A. tonkinense*; E. *A. frutescens* Zoll. & Mor. var. *frutescens*; F. *A. amplum*. Drawn by Jan van Os, all in the same scale.

A. longiflorum. A dormant bud may grow into the normal vegetative ramification of the plant, as found in *A. frutescens* var. *palawanense* (figure 2: 2B). A short-shoot may also grow into a spine.

In sect. *Alangium* the presumed mode of formation of the compound inflorescence is shown in the schematic representations in figure 2. In this figure each partial simple inflorescence of a compound several-flowered inflorescence is represented by a big black dot, and therefore a compound inflorescence is drawn as with (1 or) 2 or 3 big black dots. In some species this is specifically reduced to only a single (or rarely 2–4) individual flower(s) which is in the figure represented by inflorescences drawn as (a) small black dot(s).

A brief indication of the morphology and the position of the inflorescences on the flowering twig in sect. *Alangium* is given in the species enumeration below.

TAXONOMY

Alangium Lam. sect. *Alangium*

Alangium Lam., *Encycl.* 1: 174. 1783, **nom. cons.**—
Alangium Lam. sect. *Angolam* ('*Angolum*') (Adans.)

Baill., *Adansonia* 5: 270. 1876; *Bloemb.*, *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16: 148. 1939.—*Angolam* Adans., *Fam. Pl.* 2: 85. 1763, **nom. rej.**—*Alangium* Lam. sect. *Eualangium* Harms, *Nat. Pflanzenfam.* Abt. 8, 3: 261. 1898, **nom. inval.**—Type: *Alangium decapetalum* Lam., **typ. cons.** [= *Alangium salviifolium* (L.f.) Wangerin].

Scandent or erect shrubs or trees, spiny or not spiny. *Leaves* simple, base mostly symmetrical, subglabrous to densely hairy, usually palminerved at base, without or with domatia in the vein axils of the lower surface. *Inflorescences* (sub)sessile, compound (but sometimes few-flowered) with (abortive) terminal bud. *Flowers*: calyx adnate to the inferior ovary, towards the apex with a free limb; petals free; stamens two or more times as many as sepals or petals, spreading (not coherent) in anthesis, filaments about as long as or longer than anthers, stigma about as long as broad, ± 4-lobed; ovary 1-celled, style glabrous. *Fruits* few per infructescence, fruit and seed subglobose, not or hardly laterally compressed; endosperm superficially grooved, radicle at least half as long as cotyledons.

11 species, distributed from Africa to New Guinea; five species in Thailand.

KEY TO THE SPECIES OF *ALANGIUM* SECT. *ALANGIUM*

1. Flowers shorter, corolla in bud 10–20 mm long. Fruit purple-black (all species?). Shrubs, trees, or lianas (scandent). Species from outside Malesia (except scandent *A. frutescens*)
 2. Shrub or tree. Domatia inconspicuous or absent
 3. Inflorescence with (3–)several or many flowers
 4. Inflorescences on bare twigs **6. A. indochinense**
 4. Inflorescences in the axils of extant foliage leaves
 5. Petals glabrous. Filaments straight, (almost) glabrous **11. A. tonkinense**
 5. Petals hairy. Filaments straight, in lower part hairy **10. A. sempervirens**
 3. Inflorescence composed of 1–2(–3) flowers
 6. Leaves (generally) narrow, narrowly elliptic, base narrow, apex obtuse or subacute. Flowering on bare twigs. Calyx lobes (6–)7–10 **9. A. salviifolium**
 6. Leaves broader, (broadly) elliptic, base broadly cuneate or rounded, apex acute-acuminate. Flowers usually axillary to extant foliage leaves. Calyx lobes 5 or 6
 7. Filaments somewhat geniculate, hairy towards base. Calyx lobes 6. India, Sri Lanka **4. A. hexapetalum**
 7. Filaments strongly geniculate, with knob-like, densely hairy knee about the middle. Calyx lobes 5. Vietnam (Annam) **8. A. melliferum**
2. Plant scandent. Domatia obvious
 8. Inflorescence with (4–)5 or more flowers; terminal bud of inflorescence present
 9. Inflorescence compact. Hairs of calyx ca 0.3 mm long. Filaments straight, (sub)glabrous. Indochina **1. A. amplum**
 9. Inflorescence lax. Hairs of calyx short, ca 0.1 mm long. Filaments geniculate, the lower part densely hairy. Malesia **2. A. frutescens** (2 varieties)
 8. Inflorescence with 1–3(–4) flower(s), terminal bud not obvious. S India (?), Sri Lanka, Peninsular Thailand, Peninsular Malaysia (Perak) **3. A. glandulosum**
1. Flowers generally longer, corolla in bud (15–)20–50 mm long. Fruits red. Low trees. Malesia
 10. Inflorescences 1–3-flowered. Pedicels 2–5 mm long. Trunk occasionally with spines. Sumatra, Peninsular Malaysia, Singapore, Borneo **5. A. hirsutum**
 10. Inflorescences several-flowered. Pedicels 1–2 mm long. Trunk presumably without spines. Borneo (Sabah), Philippines, Moluccas (Morotai), Papua **7. A. longiflorum** (2 varieties)

1. *Alangium amplum* W.J.de Wilde & Duyfjes, sp. nov.

Resembling *A. frutescens* Zoll. & Mor. but differing in its 6-lobed calyx limb (vs. 10-lobed calyx limb) and straight filaments (vs. geniculate filaments). Type: Thailand, Northern, Chiang Rai, Ban San Pa Sak, Tham Luang-Khun Nam Norn FP, 29 Mar. 2012, *Norsaengsri & Tathana 9301* (holotype **QBG!**; isotype **BKF!**). Fig. 3F.

Climber, bark of twigs pale brown, glabrous, 3–4 mm diam., vertically ridged, with scattered lenticels; spines not seen. *Leaves*: petiole 0.5–1.5 cm long; lamina glabrous but short-hairy in vein axils below (domatia), obovate-narrowly elliptic, broadest above the middle, (7–)10–19 × 4–7 cm, base rounded or short-cuneate, slightly asymmetric, apex acute-acuminate with rounded tip; veins prominent on lower surface, 3-plinerved at base, reaching to about halfway the blade, lateral veins 3–5 on each side, intercostal veins fine, scalariform. *Inflorescences* subsessile, axillary to extant foliage leaves, all densely pale brown hairy, compact, several- or many-flowered, terminal bud not obvious. *Flowers*: pedicel ca 2.5 mm long, with at apex 1 minute bracteole; corolla in bud (10–)15 mm long; ovary and calyx ca 2.5 mm long, densely hairy, hairs ca 0.3 mm long, limb ca 3 mm wide, 6-lobed, lobes ca 0.5 mm long, acute; petals 6, white, abaxially short-hairy, ca 16 mm long; stamens 14, as long as petals, filaments straight with some hairs in lower half; style glabrous, as long as petals, stigma irregularly flat-capitate, ca 3.5 mm wide. *Fruits* (immature) 1? per infructescence, minutely hairy, faintly ridged, ovoid, 12–18 mm long.

Thailand.— NORTHERN: Chiang Rai [Tham Luang-Khun Nam Nang Norn FP, 29 Mar. 2012, fl., *Norsaengsri & Tathana 9301* (**BKF**, **QBG**, types); same place, 566 m, 25 May 2011, fr., *Norsaengsri & Tathana 7883* (**QBG**)]; SOUTH-EASTERN: Chanthaburi [Khao Sabab, 300 m, 6 Jan. 1930, fl., *Kerr 17973* (**BKF**, **K**, **L**)].

Vietnam.— Ninh Binh [Cuc Phuong NP, 19 Apr. 2000, fl., *Mai Van Sinh MVX 100* (**L**)]; Bac Giang [Dong Loi, 12 Apr. 1941, fl., *Pételot 6798* (**K**, **P** 00542975, **P** 00542976)].

Habitat & Ecology.— Evergreen forest, along stream bank; on limestone; 300–600 m altitude; flowering January to April, fruiting in May.

Etymology.— *Amplus* (Latin) = large, great. The species epithet refers to the growth form, a large liana.

Proposed conservation assessment.— Near Threatened (NT) (IUCN, 2012). The species, only found on limestone, is rare, but known from localities wide apart.

Fieldnote.— Woody climber, or scandent shrub, fruits green, flowers aromatic. In Vietnam recorded as a very big liana.

Note.— *Alangium amplum* resembles *A. glandulosum* and *A. frutescens*, all three being scandent species. *Alangium glandulosum* differs in straight filaments, densely hairy towards the base (seen in *Thwaites CP 381*, Sri Lanka), *A. frutescens* differs in having geniculate densely hairy filaments.

2. *Alangium frutescens* Zoll. & Mor. in Zoll., Syst. Verz. 3: 63. 1855. Type: Indonesia, Java, Madjang tenga, without date, *Zollinger II 2289* (holotype **P!** (2 sheets); isotypes **BM!**, **BO!**, **K!**, **L!** (2 sheets), **P!**, **U!**).

— *Alangium salviifolium* (L.f.) Wangerin subsp. *hexapetalum* auct. non (Lam.) Wangerin: Wangerin, Pflanzenr. IV.220b (Heft 41): 9. 1910, p.p. (excl. type).

— *Alangium sundanum* Miq., Fl. Ned. Ind. 1: 774. 1856.— *Alangium salviifolium* (L.f.) Wangerin subsp. *sundanum* (Miq.) Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 156. 1939, p.p.— Type: Indonesia, Java, Surabaya (Soerabaja), without date, *Horsfield s.n.* (holotype U 0000160!; isotype L 2500181!).

Scandent plant, not spiny. *Leaves* partly deciduous in the dry season; lamina (sub) glabrous, elliptic or (ob)ovate, base (broadly) rounded, apex acuminate, 3-plinerved at base, domatia present. *Inflorescences* rather lax, (1–)several-flowered, axillary to extant foliage leaves or scars, the terminal bud remaining dormant or growing through into a lateral shoot. *Corolla* in bud ca 15 mm long; calyx short-hairy, hairs ca 0.1 mm long; calyx lobes and petals ca 6; filaments geniculate, hairy in lower part. *Fruits* ripening red.

KEY TO THE VARIETIES OF *A. FRUTESCENS*

1. Terminal bud of inflorescences usually dormant. Ovaries and fruits greyish hairy. Fruits faintly ribbed **a. var. frutescens**
 1. Terminal bud of inflorescences growing through into lateral shoots. Ovaries and fruits bright brown-hairy. Fruits smooth **b. var. palawanense**

a. var. frutescens Figs. 3E, 4C–E.

Distribution.— Andaman Is. (no specimens seen), Sumatra (incl. Simaloer), Peninsular Malaysia, Singapore, Java, Borneo (2 collections), Sulawesi, Lesser Sunda Is., Moluccas, Papua.

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

This variety differs from *Alangium frutescens* var. *frutescens* in the terminal bud of the inflorescences apparently consistently early growing through into a leafy lateral shoot, and the fruits (ovaries) being bright brown pubescent, smooth, not ribbed. Flowers not seen. Type: Philippines, Palawan, Pagdanan Range, Ibangley Brookside Hill, 22 Apr. 1984, *Ridsdale SMHI 1506* (holotype **L!**; isotype **L!**).

Distribution.— Philippines: Palawan, and Balabac Is.

Specimens examined.— Palawan [Puerto Princesa, May 1911, fr., *Elmer 13152* (**L**); Roxas, 200 m, 22 June 1992, fr., *Fernando & Reynoso 7710* (**L**); Ibangley Brookside Hill, 22 Apr. 1984, fr., *Ridsdale SMHI 1506* (**L**); 40 m, 24 Apr. 1984, fr., *Podzorski SMHI 968* (**L**); Cleopatra Ranges, 500 m, 27 June 1996, fr., *PPI (Majaducon) 24318* (**L**); Iraan Mountains, 100 m, 31 May 1950, fr., *PNH (Sulit) 12505* (**L**); Victoria Mountains, 200 m, 22 May 1950, fr., *PNH (Sulit) 12439* (**L**)]; Balabac, further details unknown, *BS (Mangubat) 400* (PNH? n.v., see Bloembergen, 1939: 158).

3. Alangium glandulosum Thwaites, Enum. Pl. Zeyl. 133. 1859; Trimen, Handb. Fl. Ceylon 2: 286. 1894.— *Alangium lamarckii* Thwaites var. *glandulosum* (Thwaites) C.B. Clarke, Fl. Brit. India 2: 742. 1879.— *Alangium salviifolium* (L.f.) Wangerin subsp. *hexapetalum* auct. non (Lam.) Wangerin: Weeras., Revis. Handb. Fl. Ceylon 13: 3. 1999. Lectotype here designated: Sri Lanka, without date, *Thwaites CP 381* (**K** 000704805!; isolectotypes **BM!**, **BO!**, **BR!**, **P!**, **PDA**, **US!**). Fig. 5D.

Scandent plant, occasionally spiny on the main stem or the twigs. *Leaves* not deciduous in the dry season; lamina subglabrous, ovate, base attenuate or rounded, apex acuminate, 3-plinerved at base, domatia present. *Inflorescences* 1–4-flowered, axillary to extant foliage leaves (fruit axillary to leaves or to leaf scars); terminal bud not obvious. *Corolla* in bud (Sri Lanka) ca 12 mm long; calyx lobes and petals 6; filaments straight, hairy towards the base. *Fruits* ripening purple red.

Distribution.— S India (?), Sri Lanka (wet area), Peninsular Thailand (Phatthalung), and N Peninsular Malaysia (Perak).

Notes.— 1. To this species, described from Sri Lanka, we reckon also two fruiting collections from geographically outlying Peninsular Thailand. These collections are indicated in figure 1 as dots. The single only known Malesian collection from N Peninsular Malaysia (*Corner SF 31626* (**SING**) from Grik) links up with those from Thailand [*Maxwell 86-345* (**L**) and *Middleton et al. 455* (**L**) both from Khao Pu-Khao Ya National Park].

2. Specimens of possibly partly scandent plants from S India [e.g. *Wight 1064* (**L**) and *1255* (**L**), and *Sutramanian 1161* (**L**)] are deviating in a more greyish indumentum, a stouter habit and larger flowers. At present these collections are referred to *A. hexapetalum* Lam.

3. *Scortechini s.n.* (**L** 2497495) from Perak (Peninsular Malaysia), in fruit, may belong here.

4. Alangium hexapetalum Lam., Encycl. 1: 174. 1783; Vahl, Symb. Bot. 2: 62. 1791; Willd., Sp. Pl. ed. 4, 2(2): 1175. 1799; Wight & Arn., Prodr. Fl. Ind. Orient. 1: 326. 1834; Wight, Ill. Ind. Bot. 2: 2, pl. 96. 1850. Lectotype here designated: Rheede, Hort. Malab. 4: 39, tab. 26. 1683; epitype, here designated: Provenance, collector and date unknown, *Herbier Lamarck s.n.* (**P-LA** 00308281!).

Tree (always?), possibly rarely spiny. *Leaves* not deciduous, associated with inflorescences; lamina subglabrous, ovate-elliptic, base (broadly)

rounded, apex acute-acuminate, 3-plinerved at base, domatia inconspicuous or absent. *Inflorescences* 1- or 2- (or 3)-flowered, mostly axillary to extant foliage leaves; terminal bud not obvious. *Corolla* in bud 15–20 mm long; calyx lobes and petals 6; filaments densely hairy in basal part, somewhat geniculate.

Distribution.—S India, possibly Sri Lanka but no specimens seen.

Notes.—1. Contrary to the more recent interpretations with which *Alangium hexapetalum* is regarded as a widespread subspecies or variety of *A. salviifolium*, we accept *A. hexapetalum* in its original sense and as restricted to S India. Lamarck (1783) described three species for S India, viz. *Alangium decapetalum*, *A. hexapetalum*, and *A. tomentosum*, of which the last name was later found to be a synonym of *A. decapetalum* by Bloembergen (1939). The remaining two species were upheld up by later authors, e.g., Vahl (1791), Willdenow (1799), up to Wight (1850). The latter author, who apparently knew both species himself from the area, recognized for S India two distinct species, viz. *Alangium decapetalum* (now *A. salviifolium*) besides *A. hexapetalum*. The present authors, although having seen a limited amount of specimens only, are of the opinion that Wight's plants represent two separate species indeed. The recent collection *Sutramanian 1161* (L) is annotated as being scandent, possibly in error, but more material needs to be seen.

2. It seems clear that with the description of *Alangium hexapetalum* by Lamarck (1783) the references to Rheede tot Drakestein (1683: tab. 26) and Plukenet (1705: 24, tab. 370, f. 1) served as the basis for the name, and that no herbarium specimen was at hand. However, in the Lamarck Herbarium (P-LA) there are two collections (photographs seen) without any indication on provenance, collector or date, which represent *A. decapetalum* (P-LA 00308282) and *A. hexapetalum* (P-LA 00308281) respectively; the broad-leaved collection (P-LA 00308281) clearly represents *A. hexapetalum*, at least the leafy twig on the left side of the sheet. Both specimens are here designated as epitypes of the two names concerned.

3. The ripening colour of the fruit is unknown.

5. *Alangium hirsutum* Bloemb., *Blumea* 1: 254. 1935; *Bull. Jard. Bot. Buitenzorg*, sér. 3, 16: 161. 1939. Type: Indonesia, West Borneo, without date, 1893–1894, *Hallier 3238* (holotype **BO!**; isotype **L!**). Fig. 5E–F.

Low or medium tree, often spiny on the trunk. *Leaves* not deciduous in the dry season; lamina sparsely or densely hairy, (ob)ovate-narrowly elliptic, base narrowly or broadly rounded, apex acute-acuminate, 3-plinerved at base, domatia present. *Inflorescences* 1–2(–3)-flowered, axillary to extant foliage leaves; terminal bud not obvious. *Corolla* in bud ca 22 mm long; pedicel 2–5 mm long; calyx lobes and petals 5–7; filaments straight, filiform, hairy at the middle. *Fruits* ripening red.

Distribution.—Sumatra, Peninsular Malaysia, Singapore, Borneo.

Notes.—1. Similar material from the Moluccas and Papua, all in fruit except for one, is provisionally relegated to and discussed under *Alangium longiflorum* var. *brachyanthum* (see there).

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

6. *Alangium indochinense* W.J.de Wilde & Duyfjes, **sp. nov.**

Resembling *A. salviifolium* L.f. but differing in its multi-flowered inflorescences (vs. 1–3-flowered inflorescences) and leaves widest above the middle (vs. leaves narrower and widest usually about the middle). Type: Thailand, Chiang Mai, 12 May 1936, *Garrett 1075* (holotype **L!**; isotypes **BKF!**, **K!**). Figs. 3A, 5A–C.

Shrub or tree 3–10 m tall, suckers usually long-spiny; crown widely and densely branched; twigs often spiny, flowering when leafless, 1.5–3(–5) mm diam., glabrous or glabrescent from ca 0.3 mm long hairs; bark of older twigs somewhat pale, with scattered lenticels. *Leaves*: petiole 0.5–1.2 cm long; lamina elliptic-obovate, rarely nearly circular, broadest (slightly) above the middle, 5–15 × 3–6.5 cm, base cuneate (rarely rounded), slightly asymmetric, apex acute-acuminate; veins prominent on lower surface, 3-plinerved at base, lateral veins 3–5 on each side; intercostal venation scalariform-reticulate, domatia inconspicuous or absent. *Inflorescences* on bare

twigs, sessile, few or several branched clusters of 5–20 flowers, all densely pubescent, hairs ca 0.2 mm long, terminal bud present but not obvious. *Flowers*: pedicel 1–5 mm long, with halfway or at apex 1 or 2 minute bracteoles; corolla in bud variable in size, 10–20 mm long; ovary and calyx 2–4 mm long, hairy, hairs ca 0.1 mm long, limb 2–4 mm wide, 6–9(–10)-lobed, lobes 0.5(–1) mm long, blunt; petals 6 or 7(–10), whitish, 10–18 mm long; stamens 12–20, filaments geniculate with a hairy knob, hairy in the basal part; style glabrous, 8–12 mm long, stigma irregularly subglobose or short club-shaped, 1–2 mm wide. *Fruits* 1–3 per infructescence, often on leafy twigs because of new shoots developed after flowering, ripening purple-black, juicy, subglabrous or sparsely hairy, smooth, not ribbed, subglobose, 10–15 mm diam.

Thailand.—NORTHERN: Chiang Mai [Chiang Mai University, 350 m, 5 Mar. 1988, *Maxwell 88-288* (CMUB, L); 19 Apr. 1988, *Maxwell 88-476* (BKF, CMUB, L); 1 May 1991, *Maxwell 91-391* (CMUB, L); 27 May 1992, *Maxwell 92-241* (CMUB, L); 3 Mar. 1993 (*Maxwell 93-214* (CMUB, L); 19 May, 1993, *Kopachon 22* (BKF, CMUB, L); Mae Ping Rapids, 17 Mar. 1911, *Kerr 1699* (K); 18 Mar. 1913, *Kerr 2952* (K); 18 Mar. 1913, *Kerr 2952A* (K); Doi Sutep-Pui, 2 Feb. 1910, *Kerr 979* (K); Doi Sutep-Pui National Park, 400 m, 19 Mar. 1990, *Maxwell 90-332* (CMUB, L); Chiang Mai, 300 m, 12 Mar. 1936, *Garrett 1075* (BKF, K, L); Chiang Mai-Ebene, 300 m, 15 Mar. 1905, *Hosseus 440* (L); Chiang Mai, Gaw Glang, 350 m, 25 Feb. 1991, *Lertkusol 25* (L); Lampang [Me Kung, Mar. 1913, Winit 11 (K); Ngao, without date, *Anan BKF 37069* (BKF, L)]; Tak [Ban Dong Lan, 29 Feb. 2012, *Norsaengsri et al. 9096* (BKF, QBG), *Norsaengsri et al. 9098* (BKF, QBG)]; Phrae [without further locality, 20 Nov. 1931, *Vibul 88* (BKF)]; Nakhon Sawan [Tham Phet Tham Thong Forest Park, foot of Doi Khun Ming, 140 m, 21 Feb. 2004, *van de Bult 750* (BKF, L)]; EASTERN: Surin [without further locality, 25 Feb. 1927, *Put 634* (K)]; NORTH-EASTERN: Loei [Wang Saphung, 4 Feb. 1953, *Dee 639* (BKF)]; Khon Kaen [Phonphisai, 20 Feb. 1967, *Smitinand et al. 10199* (BKF)]; SOUTH-WESTERN: Kanchanaburi [vicinity of Kanchanaburi, 6 Mar. 1926, *Kerr 10569* (K)]; Mahidol University, Kanchanaburi Campus, western part, near Trairat Village, Lum Sum Subdistrict, 200 m, 11 Jan. 1975, *Maxwell 75-11* (CMUB, L); Nong

Hoi, 26 Feb. 1992, *Niyomdham 2920* (BKF); Mahidol University, Sai Yok Campus, 250 m, 19 Feb. 2000, *Maxwell 00-70* (BKF, CMUB, L); without further locality, 29 Jan. 2000, *Phengklai et al. 12563* (BKF); Mahidol University, Kanchanaburi Campus, northeastern part, Doi Hin area, Lum Sum Subdistrict, 175 m, 26 Mar. 2006, *Chongko 488* (L); Tahan Village, 15 m., 3 Mar. 2009, *Maxwell 09-58* (CMUB, L)]; Ratchaburi [Suan Phueng, 27 Jan. 2001, *Niyomdham 6402* (BKF)]; Phetchaburi [Khao Luk Chang, 50 m, 7 Feb. 2008, *Maxwell 08-21* (CMUB, L)]; Prachuap Khiri Khan [Huai Yang Waterfall, low elevation, 8 Feb. 1970, *van Beusekom & Santisuk 2725* (BKF, L)]; Uthai Thani [Huai Ka Kaeng Game Reserve, 350 m, 16 Feb. 1970, *van Beusekom & Santisuk 2952* (BKF, L)]; CENTRAL: Saraburi [without further locality, 1 Mar. 1947, *Dee 18* (BKF)]; Bangkok [Jan. 1920, *Kerr 18096* (L)]; SOUTH-EASTERN: Chon Buri [Sriracha, Mar. 1918, *Collins 610* (K); 23 Mar. 1921, *Collins 663* (K); 20 Mar. 1921, *Collins 667* (K); 27 Mar. 1921, *Collins 703* (K), *Collins 708* (K); 12 m, Mar. 1922, *Collins 762* (K, L); 4 Apr. 1923, *Collins 852* (K); 22 Feb. 1925, *Collins 1074* (K); 2 Feb. 1925, *Collins 1074A* (K); 21 March 1927, *Collins 1521* (K); 18 Jan. 1964, *Din 160* (BKF)]; Khao Khiao, 125 m, 11 Jan. 1975, *Maxwell 75-11* (CMUB, L)]; Chanthaburi [Khao Soi Dao, 250 m, 4 May 1975, *Maxwell 75-459* (CMUB, L)].

Cambodia.—Kratie [Mekong river, 30 m, 20 Mar. 2007, *Maxwell 07-135* (CMUB, L)].

Laos.—Champasak [Khong, Thola-ti Is., southern part, Mekong River, 75 m, 3 Feb. 1998, *Maxwell 98-132* (CMUB, L); Don Long, W side, Mekong River, 75 m, 24 Apr. 1998, *Maxwell 98-443* (CMUB, L)].

Vietnam.—Dong Nai [Bien Hoa, Apr. 1865, *Pierre 5175* (L, P); June 1909, *Anonymous in herb. d'Alleizette s.n.* (L, P)]; Ho Chi Minh City [Plantes du Jardin Botanique de Saigon, 3 Feb. 1919, *Hiép 504* (L, P)].

China.—Hainan [Lam Ko, Lin Fa Shan, 2 May 1928, *Tsang 16954* (L)].

Ecology.—Seasonal forest with bamboo; known from limestone, granite, and shale-granite; flowering in the dry season, February to March; from sea level to 350 m altitude.

Etymology.— The species epithet ‘*indochinense*’ alludes to its distribution.

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

Notes.— 1. The flower size (length), and hence the length of petals, stamens and style is strongly variable, most likely also depending of fertility of soil and degree of dryness of the dry season. The flowers of the small-flowered specimen *Hosseus 440* seem to have only sterile stamens.

2. This species largely comprises the Indochinese portion of *A. salviifolium* as conceived by Bloembergen (1939).

7. *Alangium longiflorum* Merr., Philipp. J. Sci. C7: 319. 1912; Bloemb., Blumea 1: 253. 1935; Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 159. 1939; Berhaman in Soepadmo & K.M.Wong, Tree Fl.

Sabah & Sarawak 1: 12. 1995, excluding syn. *A. hirsutum*. Type: Philippines, Luzon, Cagayan Province, Malueg, 16 Apr. 1909, *FB (Darling) 14773* (holotype **PNH** †; lectotype here designated: **L.2497730!**; isolectotypes **BO!**, **K!**).

Shrub or tree, possibly not spiny. *Leaves* not deciduous when flowering or deciduous and flowering in the dry season (var. *brachyanthum*); lamina subglabrous, (ob)ovate-narrowly elliptic, base attenuate, apex acute-acuminate, 3-plinerved at base, domatia present. *Inflorescences* with several (2–5) flowers, axillary to leaf scars or to extant foliage leaves; terminal bud not obvious. *Corolla* in bud 15–50 mm long; calyx lobes and petals 5; pedicel 1–2 mm long; filaments filiform, straight, hairy at the middle. *Fruits* ripening red.

Note.— Much resembling *Alangium hirsutum* (see key to the species).

KEY TO THE VARIETIES OF *A. LONGIFLORUM*

1. Not deciduous when flowering. Corolla in bud (20–)30–50 mm long; filaments much longer than anthers **a. var. longiflorum**
 1. Deciduous when flowering. Corolla in bud shorter, ca 15 mm long; filaments about as long as anthers **b. var. brachyanthum**

a. var. longiflorum Fig. 4A–B.

Distribution.— Borneo (Sabah), Philippines, Moluccas (Morotai).

b. var. brachyanthum (Merr.) W.J.de Wilde & Duyfjes, **comb. et stat. nov.**— *Alangium brachyanthum* Merr., Philipp. J. Sci. C7: 319. 1912; Bloemb., Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 162. 1939.— Type: Philippines, Luzon, Tabayas, 09 Apr. 1908, *FB (Curran) 10341* (holotype **PNH** †; isotype **NY 02684195!**).

Differs from the type variety in being deciduous when flowering in the dry season, shorter flowers, the buds 15–16 mm long, and filaments about as long as anthers.

Distribution.— Philippines (Luzon), possibly Moluccas, Papua.

Notes.— 1. The circumscription of var. *brachyanthum* appears problematic. Whereas resembling *Alangium hirsutum* and *A. longiflorum* var. *longiflorum* seem clearly distinct, there remains a pile of specimens from Moluccas and Papua, mainly in fruit [but *Cuming 1716* (**K**) from Luzon, and *De*

Vogel 4508 (**L**) from Halmahera in flower], more or less intermediate of habit, and difficult to assign to either of these two taxa. They possibly belong to var. *brachyanthum*, originally described by Merrill (1912) from Luzon as *A. brachyanthum* on a single collection consisting of two duplicates with several leafless flowering twigs per sheet, one in **PNH** (lost), and one in **NY**. The flowers are smaller (shorter) than those of *A. longiflorum* var. *longiflorum*. The decision whether var. *A. brachyanthum* should be held up in the future as a distinct species needs further study preferably on more flowering material. It should be mentioned here that Berhaman (1994, 1995) sunk *Alangium hirsutum* into *A. longiflorum*, but we cannot agree with this.

2. Bloembergen (1939: 160) comments on specimens with short flowers of *A. longiflorum* as being possibly transitional to *A. salviifolium* subsp. *sundanum* (now *A. frutescens*). We have not seen the specimens concerned, but remark here that the filaments in *A. frutescens* are geniculate, those in the two varieties of *A. longiflorum* and *A. hirsutum* are straight, not geniculate.

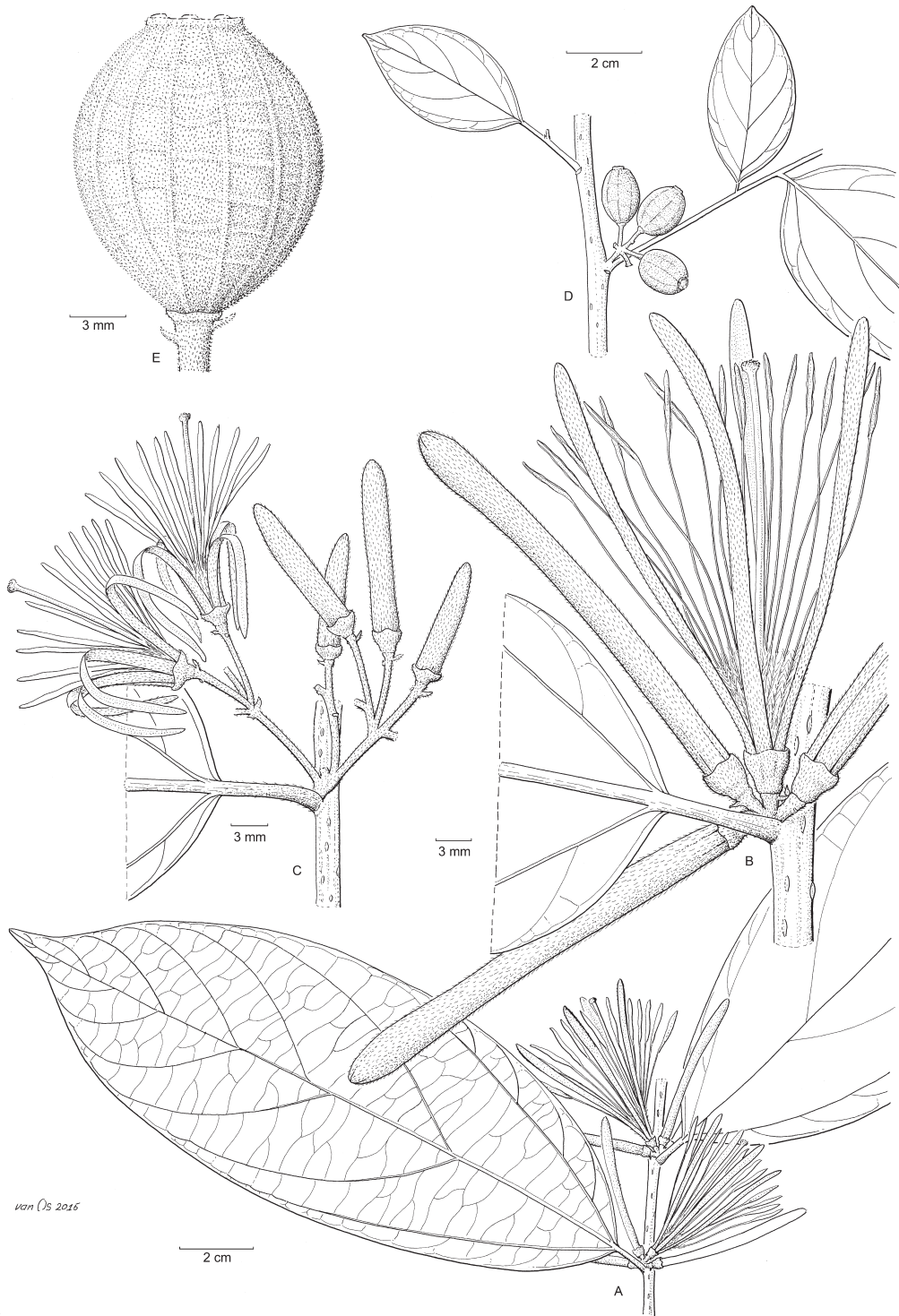


Figure 4. *Alangium longiflorum* var. *longiflorum*: A. Portion of flowering branch; B. idem, detail.— *Alangium frutescens* var. *frutescens*: C. Portion of flowering branch; D. portion of fruiting branch; E. fruit (A, B: *Hernaez* 635; C: *Zollinger II* 2289; D, E: *Wirawan* 368). Drawn by Jan van Os.



Figure 5. A–C. *Alangium indochinense*. A: tree in village along road, flowering when leafless, B: subsessile inflorescences with pollinator, C: ripe fruit purple black; D. *A. glandulosum* flowering twig, note flowers with 6 petals; E–F. *A. hirsutum*. E: portion of flowering twig showing hairy leaves, F: ripe fruit red. Photos: A–B. by S. Rueangruca; C. by S. Gardner; D. by J. de Vlas (photo taken in Sri Lanka); E–F. by J. Lai (Singapore).

8. *Alangium melliferum* W.J.de Wilde & Duyfjes, sp. nov.

Resembling *A. tonkinense* Gagnep. but differing in its geniculate filaments with a densely hairy knob in its middle (vs. filaments straight and glabrous). Type: Vietnam, Annam, Nhatrang, 1 Mar. 1922, *Poilane 2676* (holotype **P** 00542904!; isotype **K!**). Fig. 3B.

Tree 8 m tall, twigs short hairy, glabrescent, 3–4 mm diam., bark grey, cracked, with scattered lenticels; spines not seen. *Leaves*: petiole ca 1.5 cm long; lamina glabrous on upper surface, some very short hairs on veins excepted, lower surface glabrous but short-hairy in vein axils, elliptic-obovate, broadest above the middle, (4.5–)6–7.5 × (2–)3.5–4.5 cm, base rounded or short-cuneate, asymmetric, apex acuminate with rounded tip; veins prominent on lower surface, 3-plinerved at base, reaching to about halfway the blade, lateral veins 3–5 on each side, intercostal venation reticulate or faintly scalariform, domatia inconspicuous or absent. *Inflorescences* almost sessile, axillary to extant foliage leaves, densely short rust-hairy, unbranched, 1–3-flowered, terminal bud not obvious. *Flowers*: pedicel 1–3 mm long with at apex 2 minute fused bracteoles; corolla in bud ca 14 mm long; ovary and calyx 3–4 mm long, densely short hairy, hairs ca 0.2 mm long, limb ca 5 mm wide, 5-lobed, lobes ca 1 mm long, obtuse; petals 5, white, short hairy on both surfaces, ca 14 mm long; stamens 13, ca 12 mm long, filaments conspicuously geniculate at the middle by a densely hairy knob, hairy in lower half; style glabrous, as long as petals, stigma irregularly capitate, ca 1.5 mm wide. *Fruits* not seen.

Distribution.— South Vietnam, Nha Trang, only known from the type.

Habitat.— Not indicated; flowering in March.

Proposed conservation assessment.— Vulnerable (VU) (IUCN, 2012). The species is known only from the type and was collected in 1922.

Etymology.— Mellis (Latin) = honey. The label reads, translated: “... when the tree is flowering the honey producing insects are so numerous that one could imagine to be situated amid a swarm of bees”.

Note.— The label mentions that the fruits are sweet, but these were not collected. The specimen was not seen by Tardieu-Blot (1968).

9. *Alangium salviifolium* (L.f.) Wangerin, Pflanzenr. IV.220b (Heft 41): 9. 1910, p.p.; Evrard, *Fl. Indo-Chine* 2: 1185. 1923, p.p.; Bloemb., *Blumea* 1: 250. 1935, p.p.; Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 149. 1939, p.p.— *Grewia salviifolia* (*'salvifolia'*) L.f., *Suppl. Pl.*: 409. 1782. Type: “habitat in Zeylona” (see note 1), without date, *Koenig s.n.* (holotype **LINN-HS** 1423.22!; isotypes **BM** 000944979!, **BM** 000944978!).

— *Alangium decapetalum* Lam., *Encycl.* 1: 174. 1783; Wight, *Ic. Pl. Ind. Orient.* 1: pl. 194. 1839.— *A. salviifolium* (L.f.) Wangerin subsp. *decapetalum* (Lam.) Wangerin, *Pflanzenr.* IV.220b (Heft 41): 11. 1910. Type: Rheede, *Hort. Malab.* 4: 39, tab. 17. 1683 (see note 2); epitype here designated: provenance, date and collector unknown, *Herbier Lamarck s.n.* (**P-LA** 00308282!).

— *Alangium tomentosum* Lam., *Encycl.* 1: 175 (*'174'*). 1783.— Type: India, *Sonnerat s.n.* (**P-LA**, not seen).

— *Alangium lamarckii* Thwaites, *Enum. Pl. Zeyl.* 133. 1859, **nom. illeg. superfl.** (see note 3).

Shrub or tree, often spiny on the twigs. *Leaves* deciduous when flowering in the dry season; lamina (sub)glabrous or hairy, (narrowly) elliptic or (ob)ovate, base narrow, apex with blunt tip, 3-plinerved at base, or lamina completely pinnately veined, domatia inconspicuous or absent. *Inflorescences* 1–3-flowered, axillary to leaf scars; terminal bud not obvious. *Corolla* in bud (10–)15–25 mm long; calyx lobes petals 7–10; filaments geniculate and towards the base hairy.

Distribution.— India, Sri Lanka, and Bangladesh; also E Africa (Kenya, Tanzania, Comoro Is.).

Notes.— 1. Linnaeus filius (1782) gives as place of occurrence and collector of the type: “Habitat in Zeylona. König”. The holotype (**LINN-HS** 1423.22 bears the annotation: “*Grewia salviifolia* L. fil. König” without locality, while duplicates in **BM** bear the annotation “Coromandel [= S India] Joh. Gerh. Koenig”.

2. Bloembergen (1939: 151) presented descriptions of presumed type specimens in **P-LA** of Lamarck’s species *Alangium decapetalum* and *A. hexapetalum* and concluded that both belong to one single species. However, these specimens are considered here as not conspecific and not original material (proposed as epitypes here); Lamarck’s

species appear to be based on illustrations and Rheedes's descriptions only (see also note 2 under *Alangium hexapetalum*).

3. *Alangium lamarckii* Thwaites is a superfluous name for both *A. decapetalum* and *A. hexapetalum* (united by Thwaites), and does not have a type of its own.

10. *Alangium sempervirens* W.J.de Wilde & Duyfjes, sp. nov.

Resembling *A. tonkinense* Gagnep., but differing in its hairy petals (vs. glabrous petals), 12 stamens (vs. 18 stamens) with hairy filaments in the basal part (vs. almost glabrous filaments). Type: Thailand, Bangkok, Faculty of Pharmacy, Chulalongkorn University, 21 Mar. 2012, *Tansakul 1* (holotype **BKF!**). Fig. 3C.

Tree 5–10 m tall, twigs short hairy, glabrescent, ca 4 mm diam., bark whitish grey, vertically cracked, with scattered lenticels; 1–5 cm long spines on suckers. *Leaves*: petiole 1–1.5 cm long; lamina glabrous, elliptic-obovate, (3.5–)7–13(–13.5) × (2–)3.5–6 cm, base rounded, slightly asymmetric, apex acuminate with rounded tip; veins prominent on lower surface, 3-plinerved at base, reaching to about halfway the blade, lateral veins 4–6 on each side, intercostal venation (scalariform to) reticulate, domatia inconspicuous or absent. *Inflorescences* axillary to extant foliage leaves, unbranched, sessile 6–8-flowered, terminal bud not obvious. *Flowers*: pedicel 2–3 mm long with at apex 2 bracteoles; corolla in bud ca 10 mm long; ovary and calyx ca 2.5 mm long, densely short whitish hairy, hairs ca 0.1 mm long, limb ca 3 mm wide, (5- or) 6-lobed, lobes ca 0.6 mm long, acute; petals 6, white, hairy on both surfaces, 10–11 mm long; stamens 12, ca 10 mm long, filament straight, short stiff hairy in lower half; style glabrous, ca 8 mm long, stigma irregularly capitate, ca 1 mm wide. *Fruits* (not fully mature) 1 per infructescence, on leafy twigs, ripening purple-blue, short-hairy, smooth or faintly ridged, ovoid, ca 9 mm long; persistent calyx ca 1 mm high, ca 3 mm wide.

Distribution.— Only known from few trees in the garden of Faculty of Pharmacy, Chulalongkorn University, Bangkok.

Proposed conservation assessment.— Data Deficient (DD) (IUCN, 2012). The new species is only known from a few trees in the garden of faculty

of Pharmacy (Chulalongkorn University) which are probably remnants of original vegetation.

11. *Alangium tonkinense* Gagnep., Not. Syst. (Paris) 14: 22. 1950; Tardieu in Aubrév. & Tardieu, Fl. Cambodge, Laos & Vietnam 8: 37. 1968. Type: Vietnam, Tonkin, between Hoa-binh and Vu-banh, 07 Apr. 1938, *Pételot 6348* (holotype **P00542978!**). Fig. 3D.

Shrub or tree, not spiny. *Leaves* associated with inflorescences not deciduous when flowering; lamina subglabrous, elliptic or obovate, base attenuate, apex long acuminate, 3-plinerved at base, domatia inconspicuous or absent. *Inflorescences* several(-many)-flowered, axillary to extant foliage leaves; terminal bud not obvious. *Corolla* in bud ca 10 mm long; calyx lobes and petals 6, petals glabrous; stamens 18, filaments straight, almost glabrous. *Fruits* unknown.

Distribution.— Thailand (Tak, Huai Krasa, only known from *Hansen & Smitinand 13000* (**BKF, K, L**)), Vietnam (Tonkin).

Note.— Tardieu (1968) lists three *Pételot* collections for Vietnam, viz. *Pételot 6348* (**P00542978**), *Pételot 6386* (**BO, P00542977**), and *Pételot 6798* (**K, P00542976**), the latter is a large liana, now accommodated under *Alangium amplum*.

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