

ANNONACEAE

**I.M. Turner^{1,2}, D.M. Johnson³, J. Chen¹, N.A. Murray³,
S.K. Ganesan¹, Y. Sirichamorn⁴, P. Sutthisaksopon⁵,
X.Y. Ng⁶ & D.C. Thomas¹**

Juss., Gen. Pl. (1789) 283, as ‘Anonae’, nom. cons.; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 45, as ‘Anonaceae’; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 1, as ‘Anonaceae’; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) [1], as ‘Anonaceae’; Ridley, Fl. Malay Penins. 1 (1922) 21, as ‘Anonaceae’; Sinclair, Gard. Bull. Singapore 14(2) (1955) 149; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 100; Kochummen, Tree Fl. Malaya 1 (1972) 61; Keng, Ord. Fam. Malayan Seed Pl., ed. 3 (1983) 30; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 9; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 93; Li & Gilbert, Fl. China 19 (2011) 672; Chatrou et al., Bot. J. Linn. Soc. 169 (2012) 5; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 1; Chatrou et al., Kew Bull. 73-39 (2018) 1; Turner, Gard. Bull. Singapore 70 (2018) 409; Turner, Annonac. Malesia (2019) 1; Johnson & Murray, Fl. Thailand 16(1) (2022) 3. **Type:** *Annona* L.

Hornschuchiaceae J.Agardh, Theoria Syst. Pl. (1858) 65. **Type:** *Hornschuchia* Nees

Monodoraceae J.Agardh, Theoria Syst. Pl. (1858) 126. **Type:** *Monodora* Dunal

Trees, treelets (often monopodial) and woody climbers, rarely shrubs and shrublets but never truly herbaceous, generally unarmed (*Artabotrys*, with its curved inflorescence hooks, might be considered an exception in Singapore), often aromatic. **Twigs** often black or grey, with fibrous bark, fibres often reticulate giving a longitudinally striate or latticed appearance externally with impressed lozenges between the fibre bundles, medullary rays widening outwards generally obvious to the naked eye as a pale star or spider’s web in cross-section, pith often septate. **Indumentum** hairs simple, sometimes stellate or more rarely lepidote. **Leaves** simple, entire, arrangement generally alternate and distichous, less commonly spiral, membranous to coriaceous, often glaucous, pinnately veined, with lateral veins looping within the lamina margin, though often obscurely, stipules absent. **Inflorescences** terminal, axillary, leaf-opposed or (apparently) internodal, cauliflory and ramiflory are common. **Flowers** bisexual, or more rarely unisexual, predominantly trimerous, solitary, paired or in few- to many-flowered fascicles, regular and actinomorphic, sessile or stalked, often nodding or pendulous, fleshy and often rather brittle, typically bracteate, often fragrant; development often open with closed flower buds small and inconspicuous; sepals (2–)3(–4), hypogynous, valvate or imbricate, free

Addresses: ¹Singapore Botanic Gardens, National Parks Board, Singapore; ²Royal Botanic Gardens Kew, England, U.K.; ³Ohio Wesleyan University, Delaware, Ohio, U.S.A.; ⁴Silpakorn University, Nakhon Pathom, Thailand; ⁵Srinakharinwirot University, Bangkok, Thailand; ⁶Native Plant Centre, National Parks Board, Singapore.

Author contributions: J. Chen: *Artabotrys*, *Dendrokingstonia*; D.M. Johnson: *Trivalvaria*; D.M. Johnson & J. Chen: *Friesodielsia*, *Pyramidanthe*; D.M. Johnson & S.K. Ganesan: *Popowia*; D.M. Johnson & N.A. Murray: *Xylopia*; D.M. Johnson, I.M. Turner & J. Chen: *Fissistigma*; D.C. Thomas: *Goniothalamus*; D.C. Thomas & X.Y. Ng: *Uvaria*; I.M. Turner: *Alphonsea*, *Anaxagorea*, *Cananga*, *Cyathocalyx*, *Dasymaschalon*, *Desmos*, *Drepananthus*, *Huberantha*, *Maasia*, *Meiogyne*, *Mezzettia*, *Miliusa*, *Monocarpia*, *Monoon*, *Orophea*, *Phaeanthus*, *Polyalthia*; I.M. Turner & J. Chen: *Mitrella*; I.M. Turner, Y. Sirichamorn & P. Sutthisaksopon: *Annona*.

Doi: 10.26492/fo4.2026-11; 4 September 2026 (online & print).

to entirely connate; petals mostly green, white or yellow, sometimes orange, red or purple, hypogynous, usually 2 whorls of (2–)3(–4), more rarely a single whorls of 3, 4 or 6, valvate or imbricate, free or connate at the base, often apically coherent, usually alternating with the sepals; stamens hypogynous, numerous, spirally arranged or more rarely, definite, 3–15 and whorled, closely packed on the torus, sometimes staminodes present, filaments absent or short, anthers linear, sometimes rounded, occasionally transversely septate, generally opening by longitudinal slits, connective mostly with a truncate dilated apex, but sometimes produced to a cone, point or tongue-like projection, filaments short and free, or rarely longer and united in a tube; carpels 1 to many, free, connate at the base, wholly fused or paracarpous; ovules 1 to many, basal or lateral; styles free or united, mostly short and terete, stigma capitate, oblong or variously folded. **Fruit** composed of 1 to many fleshy or somewhat woody indehiscent or rarely dehiscent, sessile or stipitate monocarps, or syncarpous, monocarps cylindrical (and sometimes moniliform), ellipsoidal, globose or irregular, with 1 to many seeds in 1 or more rows, with seeds transverse or longitudinal to long axis of monocarp. **Seeds** sometimes arillate, often with a circumferential groove, endosperm abundant, ruminate, hard, oily, often divided almost to the axis into a series of horizontal plates; embryo straight, minute.

Distribution. The Annonaceae are a family largely confined to the warm, wet, equatorial regions of the World with the notable exception of the genus *Asimina* Adans. which extends up through eastern North America to the Canadian border. The family consists of about 2400 species (Turner, Annonac. Malesia (2019) 2) in 106 genera (Chatrou et al., Kew Bull. 73-39 (2018) 1). In the Asia-Pacific region some 1100 species in 40 genera are native (Turner, Gard. Bull. Singapore 70 (2018) 409). In Singapore, there are 79 species in 29 genera, of which 76 species and 27 genera are considered native, 1 species and 1 genus are considered cryptogenic, and 2 species and 1 genus are considered casual.

Ecology. The Annonaceae are predominantly plants of the lowland tropical rain forest including swampy areas. There are Annonaceae species present in montane and seasonally dry forests, but the diversity is lower than in the lowland, wetter formations. Indeed, the family is certainly a characteristic lowland element in the floristics of tropical rain forest vegetation globally. In lowland tropical rain forest, the Annonaceae are typically both abundant and diverse. This is the case in Singapore where they are very well represented by species number among plants in general and particularly among trees and shrubs (Turner, Bot. J. Linn. Soc. 114 (1994) 218).

Bukit Timah Nature Reserve has records of 58 species of Annonaceae (Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 41–134). In 2 ha at Bukit Timah, for which all stems of 1 cm or more diameter at breast height were counted, measured and identified, the Annonaceae were the family with the second highest total number of species recorded (LaFrankie et al., Forest Trees Bukit Timah (2005) 38). They dropped to ninth place in terms of stem abundance and 15th by total stem basal area.

The Annonaceae are also well represented among the climbing plants in Singapore's native flora in terms of species richness, even more so if only woody species (lianas) are included (Turner, Bot. J. Linn. Soc. 114 (1994) 218).

Pollination in the Annonaceae is generally performed by small beetles within a pollination chamber (Momose in Roubik et al. (ed.), Pollination Ecology and the Rain Forest: Sarawak Studies 174 (2005) 104–108), but pollination by large beetles, thrips, flies, bees and

cockroaches has also been reported (Saunders, Bot. J. Linn. Soc. 169 (2012) 222–244). The flowers are usually bisexual and nearly always dichogamous, specifically protogynous, i.e. functionally female before being functionally male (Endress, Phil. Trans. Roy. Soc. Ser. B 365 (2010) 411–421). The petals press closely over the reproductive structures forming a small chamber with restricted access between the edges of the petals. In species with narrow apertures between the inner petals, the gaps open up and then close trapping the pollinating beetles in the chamber at the optimal times in the beetle daily activity cycle (Lau et al., Front. Pl. Sci. 8 (2017) 1119). This was demonstrated for *Friesodielsia borneensis* (Miq.) Steenis in Singapore (Lau et al., Front. Pl. Sci. 8 (2017) 1119). In species with relatively free petals, a complex process of petal movements may take place over time, forming and unforming the pollination chamber during the male and female phases of the flower, as demonstrated for *Monoon coffeoides* (Thwaites ex Hook.f. & Thomson) B.Xue & R.M.K.Saunders and *Huberantha korinti* (Dunal) Chaowasku in Sri Lanka by Ratnayake et al. (Int. J. Pl. Sci. 167 (2006) 483–493). The beetles are attracted by scent and rewarded by various foods including stigmatic secretions (Lau et al., J. Integr. Pl. Biol. 59 (2017) 881–894) and floral structures, but apparently rarely by nectar, and sometimes by warmth. Thermogenesis has been detected in Annonaceae flowers with pollination chamber temperatures elevated by up to 8°C above ambient in *Xylopia championii* Hook.f. & Thomson in Sri Lanka (Ratnayake et al., Intern. J. Pl. Sci. 168 (2007) 1255–1268). The stamens may detach from the torus before they dehisce, sometimes being held by the spring-like thickenings of vascular bundles. This may facilitate access of the pollen to pollinators, as earlier the densely packed stamens with their relatively thick connectives helped protect the pollen from the pollinators. At the Lambir Hills National Park in Sarawak, 20 of 22 species studied were beetle-pollinated – mostly Nitidulidae and Curculionidae (Momose et al., Amer. J. Bot. 85 (1998) 1477–1501). In *Popowia pisocarpa* (Blume) Endl. ex Walp., the small flowers have a very small pollination chamber, apparently restricting access to thrips, at least at Lambir (Momose et al., Biotropica 30 (1998) 444–448). While protogyny may act to reduce self-pollination, it seems that some species have a fallback mechanism where the stamens held on the extended vascular thickenings manage to contact the unfertilised stigmas that remain receptive leading to self-pollination. This has been demonstrated in *Marsypopetalum littorale* (Blume) B.Xue & R.M.K.Saunders (Okada, Pl. Syst. Evol. 170 1990) 237–245). A more subtle mechanism to promote xenogamy was uncovered by Rogstad (Amer. J. Bot. 81 1994) 145–154) working on the reproductive biology of what are now considered species of *Maasia* Mols et al. The temporal patterns of flower development were found to be highly synchronised on the same tree. In populations of *Maasia hypoleuca* (Hook.f. & Thomson) Mols et al. and *M. sumatrana* (Miq.) Mols et al. at Pasoh, in Peninsular Malaysia, trees produced mature flowers at strict intervals of two days, but without exact synchrony across the whole population so that some trees had all female flowers on the same day as other trees had all male flowers and vice versa. A similar phenomenon was reported for *Desmos chinensis* Lour. in Hong Kong (Pang & Saunders, Int. J. Pl. Sci. 176 (2015) 333–345).

In general, Annonaceae produce fruits with a pulpy flesh attractive to frugivorous animals. Annonaceae fruits have been recorded in the diets of a wide range of animals including orangutan, gibbon, sun-bear, tree-shrew species and many species of hornbill. In Singapore, Lucas & Corlett (Amer. J. Primatol. 45 (1998) 29–44) recorded fruits of three Annonaceae species in the diets of troops of long-tailed macaque (*Macaca fascicularis fascicularis*) in Bukit Timah Nature Reserve. Seeds of *Drepananthus ramuliflorus* Maingay ex Hook.f. &

Thomson and *Fissistigma ovoideum* (King) Merr. were spat out by the monkeys, promoting seed dispersal, but seeds of *Xylopia malayana* Hook.f. & Thomson were destroyed during ingestion.

Uses. Despite their diversity and ecological importance, the Annonaceae are of relatively minor economic and cultural significance in Singapore. The fruits of custard apple (*Annona squamosa* L.) and soursop (*Annona muricata* L.) are readily available in markets and on fruit and drink stalls in hawker centres. The former is one of the fruit trees commonly grown in small suburban gardens. Traditionally a number of Annonaceae species have been grown in gardens for their fragrant flowers including *Anaxagorea javanica* Blume, *Artabotrys hexapetalus* (L.f.) Bhandari, *Cananga odorata* (Lam.) Hook.f. & Thomson and *Desmos chinensis* Lour. *Cananga odorata* is the source of ylang-ylang oil, widely used in perfumes. The columnar form of *Monoon longifolium* (Sonn.) B.Xue & R.M.K.Saunders, *M. longifolium* var. *angustifolium* Kangana & Kasana, was formerly widely planted as a landscaping and street tree, but has rather fallen into disfavour as it tends to grow out of shape as it ages giving planted rows an uneven appearance. However, it can still be found quite easily in Singapore.

Vernacular names. Despite its diversity and extensive range, the family is not well known to non-botanists. In English, the fruit trees in the genus *Annona* provide the origin of the general vernacular term - custard apple family. In Malay, pisang-pisang or mempisang is widely used. Pisang means banana, and this refers to the clustered Annonaceae fruits which in a few species can look like miniature bananas.

Taxonomy. The Annonaceae represent a natural family, quite readily circumscribed, sister to the small family Eupomatiaceae, and clearly allied to Magnoliaceae and Myristicaceae and other families in the order Magnoliales (Doyle & Endress, Int. J. Pl. Sci. 161 (2000) S121–S153; Massoni et al., Mol. Phylogen. Evol. 70 (2014) 84–93). Recent molecular phylogenetic studies have led to a major overhaul of generic circumscriptions and suprageneric classification of the family (Chatrou et al., Bot. J. Linn. Soc. 169 (2012) 5; Chatrou et al., Kew Bull. 73–39 (2018) 1). The latest classifications recognise four subfamilies, viz. Anaxagoreoideae, Ambavioideae, Annonoideae and Malmeoideae, divided among 20 tribes (Nge et al., Taxon 73 (2024) 1341–1369). Analyses of chloroplast and nuclear DNA sequence data have largely resolved relationships at the subfamily and tribal level (Chatrou et al., Bot. J. Linn. Soc. 169 (2012) 5; Guo et al., Sci. Rep. 7 (2017) 7323; Couvreur et al., Front. Plant Sci. 9 (2019) 1941; Nge et al., Taxon 73 (2024) 1341–1369), but there are some exceptions including some tribal relationships in subfamily Malmeoideae which remain difficult to interpret.

All of the subfamilies and 11 of the tribes are represented in the native flora of Singapore.

Key to genera

1. Free-standing tree or treelet 2
Climber or scandent shrub 23
2. Leaves drying with the midrib raised above **6. Cyathocalyx**
Leaves drying with the midrib sunken or flush to the surface above 3
3. Fruit compound of many coalescent sessile monocarps **3. Annona**
Fruit of 1 to many, free, mostly stipitate, monocarps 4
4. Carpel 1 (monocarps 1 per fruit) 5
Carpels 2 or more (monocarps generally 2 or more per fruit) 6
5. Twigs hairy; monocarps tomentose; seeds 5–6, testa not thick and woody
..... **8. Dendrokingstonia**
Twigs glabrous; monocarps glabrous with a pale waxy bloom; seeds 2, testa thick and woody **17. Mezzettia**
6. Flowers with inner whorl of petals absent; outer petals cohering along most of their edges; fruit moniliform **7. Dasymaschalon**
Flowers with inner whorl of petals present; outer petals not cohering along most of their edges; fruit not moniliform 7
7. Inner petals verrucose on inner surface near base **16. Meiogyne**
Inner petals smooth or wrinkled but not verrucose on inner surface near base 8
8. Petals of the two whorls more or less similar in size and shape 9
Petals of the two whorls [strongly] dissimilar in size and/or shape 18
9. Inner petals with bases tightly pressed over the reproductive structures, distal part of petals often terete, triquetrous or filiform 10
Inner petals with bases not tightly pressed over the reproductive structures, distal part of petals more or less flat 11
10. Flowers leaf-opposed, on leafless branches, or plants cauliflorous; inner petals remaining joined at the junction between claw and blade and falling united; monocarps indehiscent
..... **10. Drepananthus**
Flowers axillary or from axils of fallen leaves; inner petals touching along the margins at the base but eventually separating; monocarps dehiscent **29. Xylopia**
11. Petals with expanded and pouch-like base (saccate) **1. Alphonsea**
Petals not saccate 12

12. Leaves with lateral veins looping to form a distinct intramarginal vein; carpels 1–3 **20. Monocarpia**
 Intramarginal vein indistinct or absent; carpels more than 3, usually many more 13
13. Petals yellow with long pointed and usually incurved apex; apex of stamen connective prolonged to a point; ovules several (at least 5 seeds per monocarp); stipe of monocarp articulated at the apex **5. Cananga**
 Petals, if yellow, not incurved at the apex; apex of stamen connective more or less flat; ovules generally 1–3 (rarely more than 2 seeds per monocarp); stipe of monocarp articulated at the base 14
14. Leaves with lower surfaces densely covered with minute papillae giving a white or glaucous appearance **15. Maasia**
 Leaves not white or glaucous beneath 15
15. Leaves with lateral veins not joining at the tips (venation eucamptodromous), tertiary venation scalariform to subscalariform; seeds with a marked circumferential groove 16
 Leaves with lateral veins forming closed loops at the tips (venation brochidodromous), tertiary venation reticulate; seeds with a flat or raised circumferential band 17
16. Flowers with pedicels generally 10 mm long or more, petals 2.5 cm or more long; monocarps with stipes 6 mm, or often considerably more, long **21. Monoon**
 Flower with pedicels to 8 mm long, petals less than 2 cm long; monocarps with stipes to 4 mm long **27. Trivalvaria**
17. Leaf base more or less symmetrical, acute to obtuse or rounded; corolla greenish yellow; ovules 1 per carpel; seeds 1 per monocarp, attached at the base **14. Huberantha**
 Leaf base more or less asymmetrical, subcordate; corolla orange or pink; ovules usually 2–6 per carpel; seeds usually 2 or more per monocarp, attached laterally ... **24. Polyalthia**
18. Outer petals scarcely larger than the sepals and smaller than the inner petals 19
 Outer petals larger than sepals, and similar in size to or larger than inner petals 21
19. Inflorescences axillary; inner petals saccate **18. Miliusa**
 Inflorescences supra-axillary or leaf-opposed; inner petals not saccate 20
20. Leaves often drying blackish; flowers and fruit pendulous on long slender pedicels **23. Phaeanthus**
 Leaves not drying blackish; flowers and fruit on short, erect pedicels **25. Popowia**
21. Inner petals not clawed, free; monocarps dehiscent follicles with 2 valves **2. Anaxagorea**
 Inner petals clawed, the blades joined marginally to form a cap or mitre over the reproductive structures (at least in the early stages); monocarps indehiscent 22

22. Outer petals a similar length or longer than inner petals; inner petals without conspicuous glands adaxially **13. Goniothalamus**
 Outer petals shorter than inner petals; inner petals with paired glands on blade adaxial surface **22. Orophea**
23. Stellate hairs present **28. Uvaria**
 Stellate hairs absent 24
24. Inflorescence axis hooked **4. Artabotrys**
 Inflorescence axis not forming a hook 24
25. Inflorescences/infructescences predominantly leaf-opposed or terminal 26
 Inflorescences/infructescences always or predominantly axillary 28
26. Leaves with base lacking marginal glands on each side of the petiole; monocarps 4–16-seeded but never moniliform **11. Fissistigma**
 Leaves with base bearing a linear marginal gland 1–2 mm long on each side of the petiole; monocarps moniliform, or 1(–2)-seeded 27
27. Outer and inner petals of similar size and shape, with petals at least 2 cm long; monocarps moniliform, usually with more than 2 seeds **9. Desmos**
 Outer petals much longer than inner petals; monocarps ovoid, ellipsoid, or oblong, not moniliform, 1(–2)-seeded **12. Friesodielsia**
28. Flowers with a single whorl of 3 petals; tertiary venation scalariform; monocarps moniliform **7. Dasymaschalon**
 Flowers with two whorls of 3 petals; tertiary venation reticulate; monocarps multi-seeded but not moniliform 29
29. Flower buds triangular in cross-section; monocarps red, apex rounded; seeds pitted **19. Mitrella**
 Flower buds circular in cross-section; monocarps green to yellow, apex with a broad beak; seeds smooth **26. Pyramidanthe**

1. ALPHONSEA Hook.f. & Thomson

(Alphonse Louis Pierre Pyramus de Candolle, 1806–1893, Swiss botanist)

Fl. Ind. 1 (1855) 152; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 124; Ridley, Fl. Malay Penins. 1 (1922) 97; Sinclair, Gard. Bull. Singapore 14(2) (1955) 381; Kochummen, Tree Fl. Malaya 1 (1972) 66; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 122; Kessler, Bot. Jahrb. Syst. 118 (1995) 81; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 11; Leeratiwong & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 10. **Type:** *Alphonsea ventricosa* (Roxb.) Hook.f. & Thomson, lectotype designated by Pfeiffer, Nomencl. Bot. 1(1) (1872 [‘1873’]) 118.

Evergreen or more rarely deciduous trees or treelets. **Leaves** with lateral veins looping clearly within margin. **Inflorescences** mostly leaf-opposed, less commonly supra-axillary or axillary, single to many-flowered, shortly pedunculate or sessile. **Flowers** bisexual, buds conical; sepals 3, valvate, connate at base or free, much shorter than petals; petals valvate, two whorls of 3, whorls of similar size or inner slightly smaller, saccate at base and tips reflexed at anthesis; stamens few to many, connectives with shortly prolonged apex; carpels 1 or more, ovules few, biseriate. **Fruit** with up to 8 monocarps, cylindrical, ellipsoidal or globose, thick-walled, sessile or short-stalked. **Seeds** up to 16 in 2 rows, compressed, sometimes reniform, embedded in endocarp, smooth or wrinkled, endosperm ruminations lamellate.

Distribution. A genus of approximately 34 species in India and Sri Lanka, China, continental Southeast Asia and through Malaysia to the Philippines, Moluccas and probably New Guinea. In Singapore, 2 native species.

Ecology. Trees of lowland and montane forest.

Key to *Alphonsea* species

1. Young twigs and midrib beneath glabrous or with short, more or less adpressed hairs c. 0.1 mm long; monocarps irregularly warty **1. *A. johorensis***
 Young twigs and midrib beneath with erect to decumbent hairs at least 0.5 mm long; monocarps more or less smooth **2. *A. maingayi***

1. *Alphonsea johorensis* J.Sinclair (of Johor)

Gard. Bull. Singapore 14(2) (1955) 386; Kochummen, Tree Fl. Malaya 1 (1972) 67; Kessler, Bot. Jahrb. Syst. 118 (1995) 88; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 108; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 15; Khoo et al., Gard. Bull. Singapore 70 (2018) 59; Turner, Gard. Bull. Singapore 70 (2018) 415; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 65, 118; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 135. **Type:** *Kiah SFN 32139*, [Malaysia], Johor, Sungei Kayu, 21 October 1936 (lectotype SING [SING0048650], first step designated by Kessler, Bot. Jahrb. Syst. 118 (1995) 93, second step designated here; isolectotypes BO, E [E00393090], K [K000574901], L [L0037869, L0037870], P [P00411000], SING [SING0048651, SING0048652]). **Fig. 1.**

Trees 15–27 m tall, bole to 30 cm diam. **Twigs** drying black or dark grey, longitudinally wrinkled; young twigs dark grey, wrinkled, covered with very short pale or brown hairs. **Leaves:** lamina chartaceous, glabrous except for a fringe of very short hairs along midrib above and sometimes on midrib beneath, drying reddish brown or grey-brown above, smooth and shiny, similar shade beneath, ovate or elliptic, 3–9 × 1.5–4 cm, base acute to obtuse, apex acute to short-acuminate, midrib slightly sunken above, prominent beneath, lateral veins slightly raised on both surfaces, 8–10 pairs, arching forward, looping well within the margin, intercostal venation distinct beneath, obscure above; petioles 4–7 mm long, c. 1 mm thick, sometimes hairy. **Inflorescences** leaf-opposed, 1–3-flowered; peduncle to 25 mm long.

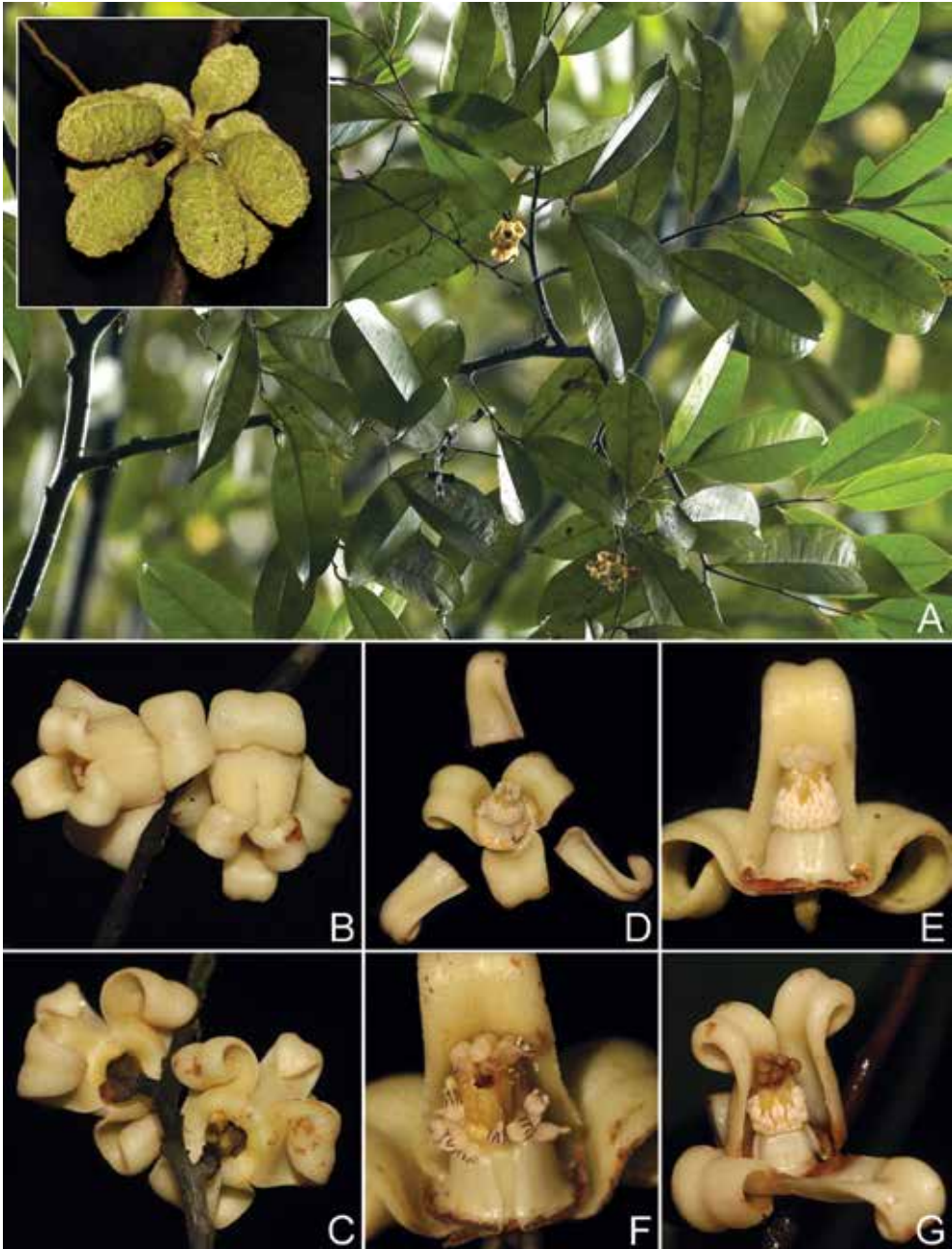


Figure 1. *Alphonsea johorensis* J.Sinclair. **A.** Leafy branches and clusters of flowers. Inset: Fruit. **B.** Side view of flowers. **C.** Flowers (back view). **D.** Flower with inner whorl of petals detached. **E.** Flower with three petals removed to show immature androecium and gynoecium. **F.** Flower with three petals removed to show anthers longitudinally dehiscing. **G.** Flower with three petals removed to show protogyny. (A–G including inset from Singapore, A–G, MacRitchie, *Ng et al. SING2026-203*; A inset, MacRitchie, *Ng et al. SING2026-468*. Photos: A–G & A inset, X.Y. Ng).

Flowers with pedicels 3–14 mm long, c. 1 mm thick; sepals very slightly connate at base, c. 1.5×2 mm, hairy outside; outer petals thin, ovate, c. 12×5 mm, drying brown, externally covered with short pale brown hairs, inside similar but sparser; inner petals same size as outer petals, saccate at base, drying dark brown, short adpressed pale brown hairy outside, inside glabrous; stamens c. 25, c. 1 mm long; carpels 7–8, c. 1.5 mm long, brown hairy, stigmas globose. **Fruit** with pedicels 10–13 mm long, 2–3 mm thick; calyx persistent; monocarps to 8, ellipsoidal, to 35 mm long, to 15 mm diam., muricate, covered with dense very short golden brown hairs, apex rounded; stipes to 8 mm long, 4 mm thick. **Seeds** several per monocarp.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, first collected from Mandai Road (*Sinclair SFN 40024*, 9 Sep 1953, K [K001292815], SING [SING0042168]). Subsequently, there have been collections of sterile material from Mandai (*Gwee SING2009-23*, 6 Jan 2009, SING [SING0144217]), Bukit Timah (*Gwee SING2009-485*, 24 Nov 2009, SING [SING0144217]) and MacRitchie (*Leong et al. MR 2014-053*, 20 Sep 2014, SING [SING0212451]).

Ecology. Lowland forest.

Conservation assessment. Globally, Near Threatened (NT B2ab(iii)) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

2. *Alphonsea maingayi* Hook.f. & Thomson

(Alexander Carroll Maingay, 1836–1869, English physician, colonial administrator and botanist)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 90; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 125; Ridley, Fl. Malay Penins. 1 (1922) 98; Sinclair, Gard. Bull. Singapore 14(2) (1955) 384; Kochummen, Tree Fl. Malaya 1 (1972) 67; Keng, Gard. Bull. Singapore 27 (1974) 69; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11; Turner, Gard. Bull. Singapore 45 (1993) 28; Wong et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 66; Kessler, Bot. Jahrb. Syst. 118 (1995) 96; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 108; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 12, 102, 200; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 18, 282; Turner, Gard. Bull. Singapore 70 (2018) 417; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 65, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 135. **Type:** *Maingay 3398* [Kew Distribution 98], [Malaysia], Malacca [Melaka], 9 March 1868 (lectotype K [K00574895], designated by Kessler, Bot. Jahrb. Syst. 118 (1995) 96; isolectotype BM [BM000946056]). **Fig. 2, 3.**

Trees to 20 m tall, bole to 25 cm diam. **Twigs** drying dark charcoal grey, latticed, youngest parts with dense brown tomentum of more or less erect hairs. **Leaves:** lamina chartaceous to subcoriaceous, hairy or not on midrib, otherwise glabrous above, hairy on veins beneath with scattered hairs on lamina and sometimes fine hairs on margin, drying grey, grey-brown to brown above, generally shiny, brown beneath with midrib and lateral veins darker, elliptic, elliptic-obovate, elliptic-ovate, ovate-lanceolate or lanceolate, $6\text{--}16 \times 2.5\text{--}6$ cm, base obtuse to

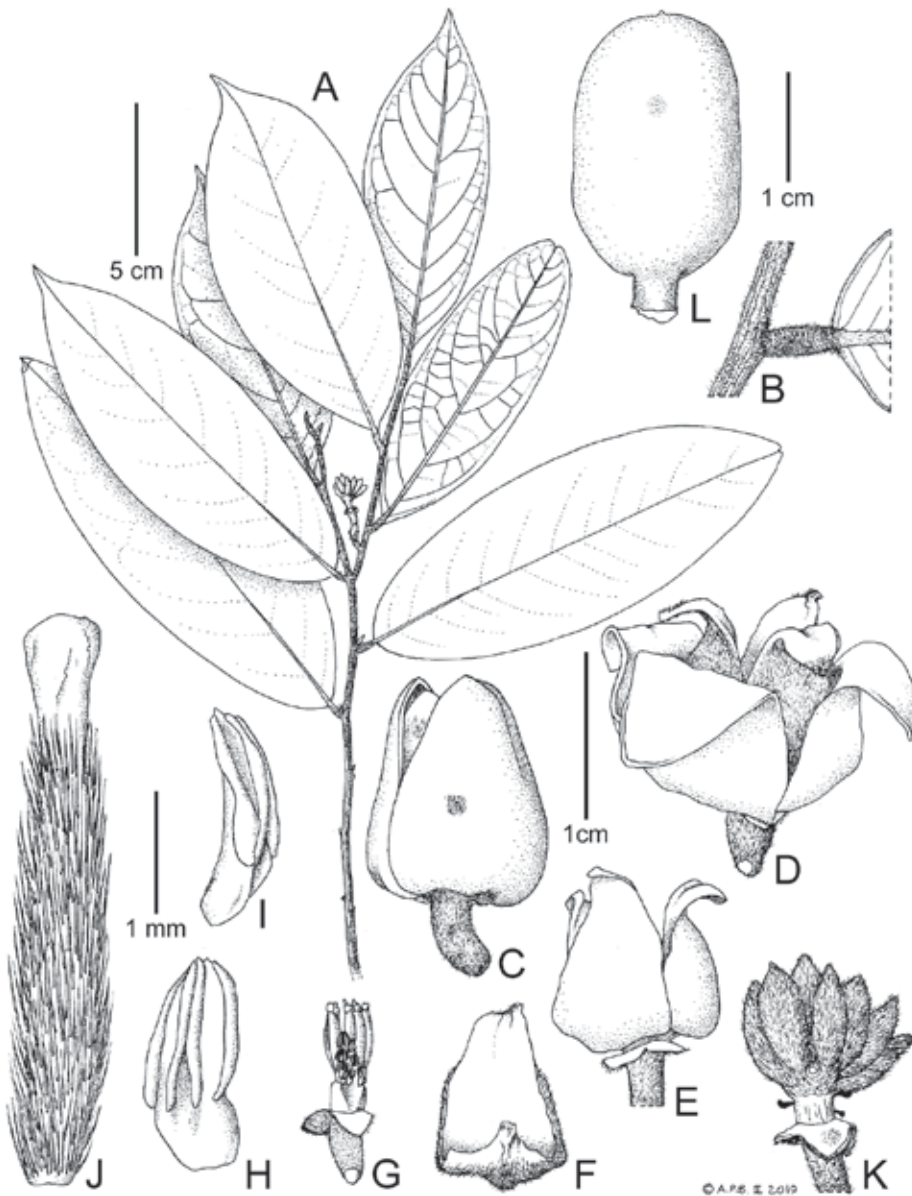


Figure 2. *Alphonsea maingayi* Hook.f. & Thomson. **A.** Habit of shoot with developing fruit. **B.** Section of twig with section of leaf (upper surface). **C.** Flower bud with indication of indumentum. **D.** Flower, with indumentum shown in full on pedicel and inner petals. **E.** Flower after removal of outer petals. **F.** Inner petal, adaxial surface with hairs confined to apex and margins. **G.** Flower after removal of outer and inner petals. **H.** Stamen (adaxial view). **I.** Stamen (side view). **J.** Carpel. **K.** Developing fruit. **L.** Monocarp (A–L from Peninsular Malaysia, A, B, K & L, *Whitmore FRI 3107*; C–J, *Maingay 3312*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 3. *Alphonsea maingayi* Hook.f. & Thomson. **A.** Habit. Inset: Trunk. **B.** Leaves (lower surface). Inset: Leaves (upper surface). **C.** Fruit. **D.** Fruit opened to reveal pulp-coated seeds. (A–D including inset from Peninsular Malaysia. Photos: Ahmad Fuad Morad).

rounded, apex acuminate, midrib generally slightly sunken above, prominent beneath, lateral veins more or less flush above, raised beneath, 7–13 pairs; petiole 4–6 mm long, 1–1.5 mm thick, hairy. **Inflorescences** subopposite leaves, axis to 7 mm long. **Flowers** with pedicels 3–4 mm long, 2 mm thick, densely brown hairy; sepals broadly ovate, c. 1.5×2 mm, hairy outside; outer petals ovate, c. 12×8 mm, densely pale brown silky hairy outside resulting in a predominantly pale look to dry flowers, sparser and very short woolly hairy near margins and apex within; inner petals c. 14×7 mm, apices reflexing, densely pale hairy outside, glabrous within; stamens many in three rows, c. 1 mm long; carpels pale hairy, c. 9, c. 4 mm long. **Fruit** with pedicels to 8 mm long, 3 mm thick; monocarps to 8 or more, roughly cylindrical, to 40×20 mm, with a dense short brown tomentum, surface minutely pimpled, apex rounded or with small apiculus, stipe distinct to 4×5 mm. **Seeds** many per monocarp.

Distribution. Peninsular Malaysia. In Singapore, known from Singapore Botanic Gardens' Rain Forest (*Ridley 12194*, Jan 1905, SING [SING0000055]) and Chan Chu Kang (*Ridley 6758*, 1894, SING [SING0000055]). Some recent sterile collections from Bukit Timah (e.g., *Gwee SING2010-057*, 5 Jan 2010, SING [SING0144284]) are likely to be this species.

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

2. ANAXAGOREA A.St.-Hil.

(Anaxagoras, Ancient Greek philosopher born c. 500 BCE)

Nouv. Bull. Sci. Soc. Philom. Paris 1825 (1825) 91; Ridley, Fl. Malay Penins. 1 (1922) 62; Sinclair, Gard. Bull. Singapore 14(2) (1955) 346; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 105; Maas & Westra, Bot. Jahrb. Syst. 105(1) (1984) 73; Maas & Westra, Bot. Jahrb. Syst. 105(2) (1985) 145; Kessler in Kubitzki et al (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 117; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 17; Leeratiwong & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 27. **Type:** *Anaxagorea prinoidea* (Dunal) A.St-Hail. ex A.DC.

Rhopalocarpus Teijsm. & Binn. ex Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 22, nom. illeg. non Bojer (1846). **Type:** *Rhopalocarpus fruticosus* Teijsm. & Binn. ex Miq. (= *Anaxagorea luzonensis* A.Gray).

Eburopetalum Becc., Nuov. Giorn. Bot. 3 (1871) 181. **Type:** *Eburopetalum borneense* Becc. (= *Anaxagorea borneensis* (Becc.) J.Sinclair).

Shrubs to small trees. **Leaves** distichous, veins looping. **Inflorescences** axillary or leaf-opposed or terminal, ramiflorous or cauliflorous, rarely flagellate; 1- to several-flowered rhipidia or small panicles. **Flowers** bisexual, trimerous (rarely dimerous); sepals valvate to imbricate, connate or free; petals fleshy, valvate, inner whorl sometimes missing, little difference in length between whorls, torus convex; stamens free, 10–200, apex of connective

triangular or quadrangular, innermost stamens often staminodal; carpels 5–45, two basal ovules. **Fruit** free, clavate to dolabriform, stipe-like basal portion and more or less subglobose head, persistent apical beak usually less than 2 mm long, dehiscent along ventral suture. **Seeds** 2 per monocarp, inner face flattened, outer convex, often with one end pointed, shiny black, exarillate, endosperm ruminations ribbon-like.

Distribution. A genus of 25 species, 22 of which are neotropical. The remaining 3 species occur from Sri Lanka and continental Southeast Asia to western Malesia including Java, Philippines and Sulawesi. In Singapore, 1 native species.

Ecology. Lowland forest.

Notes. *Anaxagorea* is the only genus of the Annonaceae native to Asia with regularly, explosively dehiscent, dry (non-fleshy) monocarps.

Anaxagorea javanica Blume (of Java)

Fl. Javae, fasc. 28–29 (1830) 66, t. 32, t. 36: A; Sinclair, Gard. Bull. Singapore 14(2) (1955) 347; Kochummen, Tree Fl. Malaya 1 (1972) 68; Keng, Gard. Bull. Singapore 27 (1974) 70; Maas & Westra, Bot. Jahrb. Syst. 105(2) (1985) 181; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11, fig. 10.1; Turner, Gard. Bull. Singapore 45 (1993) 28; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 108; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 13, 103, 200; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 19, fig. 3, pl. 1: E, F; Turner, Gard. Bull. Singapore 70 (2018) 421; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 136; Leeratiwong & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 28, fig. 4: A–K, pl. 2: A, B. **Synonym:** *Xylopia javanica* (Blume) Steud., Nomencl. Bot., ed. 2, 1, fasc. 1–2 (1840) 84. **Type:** *Reinwardt s.n.*, [Indonesia], Java, coastal forest near Jakarta (lectotype L [L0037879], designated by Maas & Westra, Bot. Jahrb. Syst. 105(2) (1985) 181; isoelectotype L [L0037880]). **Fig. 4, 5.**

Anaxagorea scortechinii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 68, as ‘*scortechenii*’; Ridley, Fl. Malay Penins. 1 (1922) 62. **Type:** *Scortechini 1624*, [Malaysia], Perak, Batu Kuraw, December 1884 (lectotype K [K000691737], designated by Turner, Phytotaxa 36 (2011) 7).

Anaxagorea radiata C.B.Rob., Bull. Torrey Bot. Club 35 (1908) 66. **Type:** *Williams 3108*, Philippines, Jolo, Mount Dajo, 27 July 1905 (holotype NY [NY00025803]; isotypes NY [NY00025804], UC [UC534820]).

Polyalthia williamsii C.B.Rob., Philipp. J. Sci., C 3 (1908) 181. **Type:** *Williams 2306*, Philippines, Mindanao, Zamboanga, Sax River, 14 February 1905 (lectotype NY [NY00026226], designated by Turner, Phytotaxa 36 (2011) 7; isoelectotypes NY [NY00026224, NY00026225], US [US00098684]).

Mitrephora crassipetala Ridl., J. Straits Branch Roy. Asiat. Soc. 54 (1910) 13; Ridley, Fl. Malay Penins. 1 (1922) 74. **Type:** *Mat s.n.*, [Malaysia], Pahang, Tahan River, 23 September 1893 (holotype SING [SING0119273]).

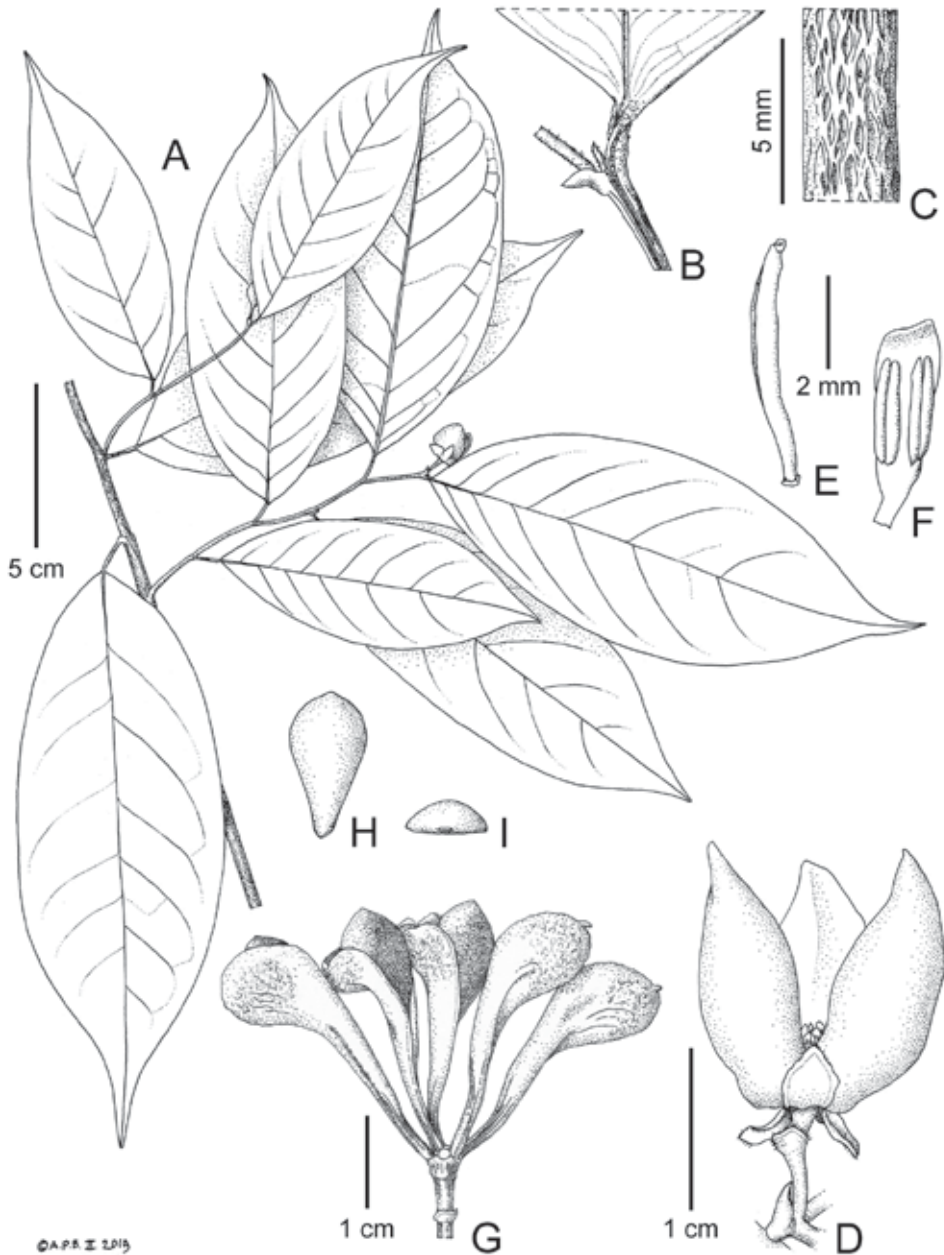


Figure 4. *Anaxagorea javanica* Blume. **A.** Habit of flowering shoot. **B.** Section of twig with section of leaf (upper surface). **C.** Latticed surface of twig. **D.** Flower. **E.** Carpel. **F.** Stamen. **G.** Infructescence with dehiscent monocarps. **H.** Seed from above. **I.** Seed from base. (A–C, G–I from Singapore, Singapore Botanic Gardens' Rain Forest, *Sinclair SFN 40651*; D from Peninsular Malaysia, *Scortechini 1624*; E & F from Peninsular Malaysia, *Suppiah FRI 11393*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 5. *Anaxagorea javanica* Blume. **A.** Habit. **B.** Leaves. **C.** Flower. **D.** Fruit. **E.** A split monocarp. **F.** Seeds. (From Singapore Botanic Gardens. Photos: A–F, W.F. Ang).

Melodorum fuscum Craib, J. Nat. Hist. Soc. Siam 6 (1923) 43. **Type:** *Smith 536*, [Thailand], Khao Rum (holotype K [K000691738]; isotype BM [BM000546766]).

Distribution. Thailand, Peninsular Malaysia, Singapore, Sumatra, Java, Borneo and the Philippines.

Taxonomy. The species is polymorphic in perianth structure. The various forms have been recognised at varietal rank (Corner, Gard. Bull. Straits Settlements 10 (1939) 12). These varieties seem not to differ consistently in other characters making it impossible to determine fruiting or sterile specimens to a variety. The type variety has two whorls of three petals. The other varieties lack the inner whorl of petals, with the trimerous forms called *Anaxagorea javanica* var. *tripetala* Corner and the dimerous forms called *A. javanica* var. *dipetala* Corner. Only the type variety has been found among Singapore collections.

var. *javanica*

Treelets or trees to 10 m tall. **Twigs** glabrous, drying pale green-brown, latticed when old, leaf-bearing portions can be very fine c. 1–2 mm diam. **Leaves:** lamina membranous to chartaceous, glabrous, drying pale grey-brown with midrib beneath pale brown, variable in shape, ovate-elliptic, oblong or lanceolate, 8.5–23 × 3–7.5 cm, base rounded to obtuse, apex obtuse to (shortly) acuminate, midrib slightly sunken above when dry, prominent beneath, lateral veins 8–9 pairs; petioles 8–12 mm long. **Inflorescences** generally leaf-opposed, sometimes appearing terminal, generally among leaves (when inflorescences often arise from alternate nodes) or just behind, more rarely truly cauliflorous, flowers often solitary, but up to 3 can be found; peduncle to 2 cm long. **Flowers** fragrant; pedicels 9–12 mm long, c. 1 mm thick; medial bract amplexicaul not directly beneath calyx, glabrous; perianth trimerous; sepals ovate, 3–6 mm long, 3–4 mm wide, margin scarious, ciliate; petals cream or yellow, outer whorl ovate, 10–12 × 5–7 mm, concave, thick, drying black, glabrous; inner petals similar to outer but generally narrower, 8–11 × 2–5 mm; stamens many; carpels many. **Fruit** with pedicels to 15 mm long, 2 mm thick; monocarps 6–9, drying pale brown to dark grey, to 30 mm long, 10 mm across in distal portion, minutely beaked. **Seeds** 1–2 per monocarp, shiny black, pear-shaped, c. 12 × 8 mm, flattened on one face if paired.

Distribution. Thailand, Peninsular Malaysia, Sumatra, Java, Borneo and the Philippines. In Singapore, it has been frequently collected over time from Singapore Botanic Gardens' Rain Forest (*Collector unknown s.n.*, 1909, SING [SING0217945]; *Sinclair SFN 40651*, 29 Jun 1955, SING [SING0003070]; *Samsuri Ahmad SA 1472*, 22 Mar 1977, SING [SING0001436]; *Kessler PK 3112*, Jun 2001, SING [SING0035936]; *Leong et al. SING2018-691*, 6 Jul 2018, SING [SING0276768]) but not from anywhere else.

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026, under *Anaxagorea javanica*). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Vernacular names. *Bunga pompun*, *kekapur*, *twin-seed* (NParks' Flora & Fauna Web, 2026).

3. ANNONA L.

(Latin, *annona* = the year's harvest of fruit, wine etc.; reflecting the various edible fruits in the genus)

Sp. Pl. 1 (1753) 536; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 126; Sirichamorn & Sutthisaksopon in Johnson & Murray, Fl. Thailand 16(1) (2022) 32. **Synonym:** *Guanabanus* Mill., Gard. Dict. Abr., ed. 4. (1754) [s.p.], nom. illeg. superfl. **Type:** *Annona muricata* L., lectotype designated by Safford, J. Washington Acad. Sci. 1 (1911) 119.

Rollinia A.St.-Hil., Fl. Bras. Merid. 1, fasc. 1 (1824) 28. **Type:** *Rollinia longifolia* A.St.-Hil. (= *Annona dolabripetala* Raddi), lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 260.

Raimondia Saff., Contr. U.S. Natl. Herb. 16 (1913) 217. **Type:** *Raimondia monoica* Saff. (= *Annona cherimolioides* Triana & Planch.).

Rolliniopsis Saff., J. Washington Acad. Sci. 6 (1916) 198. **Type:** *Rolliniopsis discreta* Saff. (= *Annona leptopetala* (R.E.Fr.) H.Rainer).

Trees or shrubs with indumentum of simple or stellate hairs. **Leaves** pinnately veined, tertiary venation reticulate. **Inflorescences** single-flowered or fasciculate, terminal, leaf-opposed, supra-axillary, cauliflorous or ramiflorous. **Flowers** bisexual; sepals (2–)3, valvate; petals 6 in 2 whorls, free or connate at base, valvate or imbricate, whorls subequal or inner whorl reduced or absent, sometimes outer whorl petals with spur or wing; stamens many, connective apex truncate or more rarely apiculate or hemispherical; carpels numerous, ovule 1, basal. **Fruit** pseudosyncarpous consisting of fleshy receptacle and originally free, coalescent sessile monocarps, often large, ovoid to globose, with surface variously ornamented. **Seeds** numerous per syncarp, 1 per monocarp, smooth, glabrous, arillate; endosperm ruminations lamellate to spiniform.

Distribution. A genus of 173 species found mostly in the Americas, but with a few native in Africa. The species in Asia are all thought to be introduced, but for some the original introduction was centuries ago. In Singapore, a few species have long been cultivated and one of these may be encountered as a relic of cultivation, hence treated as casual.

Ecology. Lowland to montane forest.

Uses. Several species are cultivated for their edible and highly esteemed fruit. These are the custard apples. *Annona squamosa* L. and *A. muricata* L. are commonly cultivated in Singapore; *A. reticulata* L. may also be encountered.

Notes. *Annona glabra* L. is an American swamp species naturalised in Peninsular Thailand (Sirichamorn & Sutthisaksopon in Johnson & Murray, Fl. Thailand 16(1) (2022) 33, pl. 2: E, F). It may yet appear in the mangroves of Singapore as there are reports of it invading southwards.

***Annona muricata* L.**

(Latin, *muricatus* = rough with short hard points or tubercles like the shell of the sea snail *Murex*; referring to the surface of the fruit)

Sp. Pl. 1 (1753) 536; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 13, 103, 233. **Synonym:** *Guanabanus muricatus* (L.) M.Gómez, Fl. Habanera (1897) 114. **Type:** [Published illustration] *Anona maxima, foliis latis splendentibus fructu maximo viridi conoide, tuberculis seu spinulis innocentibus aspero* in Sloane, Voy. Jamaica 2 (1725) t. 225, designated by Khatoon in Nasir & Ali, Fl. Pakistan 167 (1985) 11. **Fig. 6.**

Annona bonplandiana Kunth in Humboldt et al., Nov. Gen. Sp. 5, fasc. 20 (1821) 58, as '*Anona*'. **Type:** *Bonpland* 3832, [Ecuador], Guayaquil (lectotype P-Bonpl. [P00322476], designated here; isoelectotype P [P00734957]).

Annona muricata L. var. *borinquensis* Morales, Fl. Arbor. Cuba (1887) 60. **Type:** Not designated.

Annona muricata L. var. *angustifolia* Kuntze, Revis. Gen. Pl. 1 (1891) 7, as '*Anona*'. **Type:** *Kuntze s.n.*, 'Siam, cult.' [but actually Cambodia], Nkor [Angkor] (lectotype NY [NY00025835], designated here).

Annona cearaensis Barb.Rodr., Pl. Jard. Rio de Janeiro 6 (1898) 3, t. 2: fig. A, as '*Anona*'. **Type:** Not designated.

Annona macrocarpa Wercklé, TROPENPFLANZER 7 (1903) 428, as '*Anona*', nom. illeg. non Barb.Rodr. (1898). **Type:** Not designated.

Annona reticulata auct. non L.: Keng, Gard. Bull. Singapore 27 (1974) 70; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 13, 103, 262; Lok et al., Cosmos 6 (2010) 74; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 136.

Trees to 10 m tall. **Twigs** tomentose when young, becoming glabrous. **Leaves:** lamina chartaceous to subcoriaceous, hairy beneath, elliptic to obovate, 6–18 × 2.5–7 cm, base broadly cuneate to rounded, apex acute to shortly acuminate, midrib and lateral veins immersed above, raised beneath, lateral veins 6–13 pairs; petioles 5–15 mm long, glabrous. **Inflorescences** leaf-opposed or extra-axillary, 1–2(–3)-flowered, occasionally cauliflorous; peduncle 2–5 mm long, pubescent. **Flowers** with pedicels 10–20 mm long, pubescent, buds ovoid or subglobose; sepals hairy outside, ovate, 3–5 mm long, apex acute; petals free, yellow or yellow-green in vivo; outer whorl valvate, thick and fleshy, broadly ovate, 30–50 × 25–45 mm, base cuneate, apex acute to acuminate, adaxially rough and hairy, abaxially smooth and sparsely hairy; inner whorl valvate to marginally imbricate, thinner than the outer petals, ovate, 20–45 × 17–40 mm, base cuneate, apex acute, hairy inside and out; stamens many, 4–5 mm long, connective apex truncate; carpels many, c. 5 mm long, pubescent. **Fruit** with pedicels to 3 cm long,



Figure 6. *Annona muricata* L. **A.** Fruit. **B.** Leafy trunk. **C.** Flower. (A–C from Singapore, Cultivated. Photos: A, J. Chua; B & C, J. Teo).

ripening green with white fleshy and juicy pulp inside, irregularly ellipsoidal or ovoid, often asymmetrical, 7–35 × 6–20 cm (up to 4.5 kg in weight), surface with relatively uniformly spaced, curved protrusions, mostly ascending, but near the base some may curve downwards. **Seeds** ovoid or ellipsoid, 14–17 × 8–10 mm, brown to blackish, shiny.

Distribution. Native to the neotropics but it has been grown as a fruit tree throughout the wet tropics for many years. In Singapore, it is cultivated, though generally too large for small suburban gardens, and can be found as a remnant of past cultivation, hence treated as casual, on Pulau Seletar (*Loo PS 212*, 12 Sep 1998, SING [SING0354768]), Pulau Tekong (*Tan Tekong 202*, 26 Mar 1996, SING [SING0354770]) and Pulau Selegu (*Lua SING2021-151*, 26 Jan 2021, SING [SING0386958]).

Ecology. In Singapore, a remnant in young secondary forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). Not native in Singapore.

Uses. The large fruit contain edible tangy, though rather fibrous, pulp around the seeds and are used mostly for juices and other drinks.

Vernacular names. *Durian belanda*, *durian benggala*, *durian europa*, *durian makkah*, *graviola*, *guanabana*, *prickly custard apple*, *soursop*, 红毛榴莲 (NParks' Flora & Fauna Web, 2026).

Notes. Chong et al. (Checkl. Vasc. Pl. Fl. Singapore (2009) 13, 103, 262), Lok et al., *Cosmos* 6 (2010) 74 and Lindsay et al. (Gard. Bull. Singapore 74(Suppl. 1) (2022) 136) listed *Annona reticulata* L. as a casual species in Singapore. Herbarium records provide no support for this species being found as a relic of cultivation in Singapore, and it is concluded here that this was an error for *Annona muricata* which has a much longer history of cultivation in Singapore and the region than *A. reticulata* and for which specimen evidence exists. *Annona reticulata* is known only in cultivation in Singapore.

4. ARTABOTRYS R.Br.

(Greek, *artao* = hanging, *botrys* = bunch of grapes; referring to the infructescences)

Bot. Reg. 5 (1820 [‘1819’]) t. 423; Blume, Fl. Javae, fasc. 28–29 (1830) 57; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 30; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 38; Ridley, Fl. Malay Penins. 1 (1922) 38; Sinclair, Gard. Bull. Singapore 14(2) (1955) 246; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 113; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 117; Nurainas, Floribunda 2(5) (2004) 118; Li & Gilbert, Fl. China 19 (2011) 701; Turner, Gard. Bull. Singapore 64 (2012) 374; Eiadthong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 38. **Type:** *Artabotrys odoratissimus* R.Br., nom. illeg. superfl. (= *Artabotrys hexapetalus* (L.f.) Bhandari).

Ropalopetalum Griff., Not. Pl. Asiat. 4 (1854) 716. **Type:** *Ropalopetalum uniflorum* Griff. (= *Artabotrys uniflorus* (Griff.) Craib).

Woody climbers. **Stem** with spiral branching from the main axis. **Twigs** glabrous or with simple hairs. **Leaves:** lamina chartaceous to coriaceous, base cuneate, rounded or decurrent to petiole. **Inflorescences** leaf-opposed, often recurved into woody and laterally compressed hooks, thyrsoid with one to many flowers, bracteoles usually minute and caducous. **Flowers** bisexual; sepals 3, valvate, usually much smaller than petals; petals 6, valvate in two whorls, subequal, divided into a flat or terete blade and a concave claw, the latter connivent over the stamens and carpels, inner whorl coherent and abscising as a single unit; stamens many, anthers aseptate, anther connective apex truncate or apiculate; carpels few to many, ovules basal and 2 in each carpel. **Fruit** with few to many monocarps, base sessile or contracted into a stipe. **Seeds** 1 or 2 per monocarp, collateral, smooth or rugose, ellipsoid (if 1 per monocarp) or plano-convex (if 2 per monocarp), aril rudimentary; endosperm ruminations lamellate.

Distribution. A genus of about 105 species throughout the Old World tropics and Australia. In Singapore, 6 native species.

Taxonomy. A recent molecular phylogenetic study by Chen et al. (J. Biogeogr. 46 (2019) 2690–2705) revealed that the genus can be divided into an Early-divergent Grade (EDG) and a species-rich Main *Artabotrys* Clade (MAC). The former comprises only two African species whereas the latter comprises an African clade sister to an Asian clade. MAC species possess an elaborate rim between the inner petal blade and claw that enables the inner petals to cohere tightly to form a pollination chamber whereas the inner petals of EDG species lack a projecting rim.

Notes. The inflorescences are extra-axillary and appear leaf-opposed owing to displacement to one side by sympodial branch development. The genus often exhibits heteroblasty and hence the leaves of juvenile plants may differ considerably from those of adult plants. *Artabotrys* saplings typically produce leaves with greater length to width ratio and a caudate apex; this is especially pronounced in *Artabotrys suaveolens* saplings which bear linear leaves. Therefore, it should be noted that the descriptions and key below pertain to mature plants rather than saplings. *Artabotrys hexapetalus* is cultivated as an ornamental plant in Singapore and there is no evidence of escape into the wild. *Artabotrys* can be easily distinguished from other hook-bearing genera in the field. Although *Uncaria* Schreb. also bears hooked inflorescences, its hooks occur in pairs (versus singly) and are semi-circular in curvature (versus sharply angled). The hooks of *Luvunga* Wight & Arn. and *Indorouchera* Hallier f. are also semi-circular in curvature. The inflorescence hook of *Artabotrys* is sometimes inconspicuous, however.

Key to *Artabotrys* species

- 1. Leaf laminas erect-hairy beneath, midrib sunken above, except towards leaf apex; monocarps tawny-tomentose, c. 20 per fruit **6. A. wrayi**
Leaf laminas subglabrous to glabrous beneath, midrib raised to flush above; monocarps glabrous, up to 8 per fruit 2
- 2. Leaf base decurrent on petiole 3
Leaf base cuneate or rounded 4

3. Twigs remaining smooth with age; inflorescence with 1–4 flowers; petal blades flat, 13–23 mm long, 2.5–5 mm wide; fruit pedicels 3–4 mm thick; monocarps 30–35 × 26–30 mm, pericarp 3–6 mm thick **3. A. maingayi**
Twigs becoming rough with age; inflorescence with 6–23 flowers; petal blades terete, 7–13 mm long, c. 1 mm wide; fruit pedicels c. 1 mm thick; monocarps 12–15 × 7–8 mm, pericarp less than 1 mm thick **5. A. suaveolens**
4. Young twigs with dense covering of erect hairs; leaves often bullate, lateral veins prominent beneath; outer petal blades 4–6 mm long, apex rounded, inner petals terete; monocarps 25–30(–34) × 12–15 mm **1. A. costatus**
Young twigs often glabrous, sometimes with dense covering of adpressed or sub-erect hairs; leaves not bullate, lateral veins slightly raised beneath; outer petal blades 10–23 mm long, apex acute, inner petals planar; monocarps 30–44 × 17–31 mm 5
5. Leaves coriaceous, petioles 2–3 thick; flower pedicels 4–7 mm long; flower pedicels and outside of sepals densely villose; petal blades 15–23 mm long, outer ovate (8–12 mm wide), inner oblong-elliptic (7–10 mm wide); fruit pedicels 4.5–6 mm thick; monocarp apex rounded or mucronate (< 1 mm long) **2. A. crassifolius**
Leaves chartaceous to thinly coriaceous, petioles 1–2 mm thick; flower pedicels 10–17 mm long; flower pedicels and outside of sepals sparsely puberulent; petal blades 7–15 mm long, outer triangular (3.5–4.5 mm wide), inner linear (1–1.5 mm wide); fruit pedicels c. 2 mm thick; monocarp apex strongly beaked (5–6 mm long) **4. A. scortechinii**

1. *Artabotrys costatus* King

(Latin, *costatus* = ribbed; referring to the conspicuous secondary veins)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 37; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 47, pl. 63; Ridley, Fl. Malay Penins. 1 (1922) 43; Sinclair, Gard. Bull. Singapore 14(2) (1955) 255; Keng, Gard. Bull. Singapore 27 (1974) 70; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11; Turner, Gard. Bull. Singapore 45 (1993) 28; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 108; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 15, 103, 219; Turner, Folia Malaysiana 10(1) (2009) 85; Turner, Phytotaxa 36 (2011) 8; Turner, Gard. Bull. Singapore 64 (2012) 378; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 29, 282; Turner, Gard. Bull. Singapore 70 (2018) 427; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 136. **Type:** *King’s Collector 4291*, [Malaysia], Perak, Kinta, Gopeng, June 1883 (lectotype K [K000381022], designated by Turner, Folia Malaysiana 10(1) (2009) 85; isolectotypes BM [BM001014844], BO, CAL [CAL0000004275, CAL0000004307], L [L0185488], SING [SING0096249, SING0108007, SING0108008]). **Fig. 7.**

Climbers to 25 m tall. **Twigs** drying brownish black, with dense covering of erect hairs when young, smooth, becoming slightly rough. **Leaves:** lamina coriaceous to chartaceous, subglabrous above and beneath except for scattered (sub-)erect hairs on the midrib and lateral veins beneath, drying pale to dark brown, often bullate, oblong-elliptic to broadly elliptic, 8.4–17 × 3.2–7 cm, base rounded or cuneate, apex acuminate, midrib flush to slightly raised

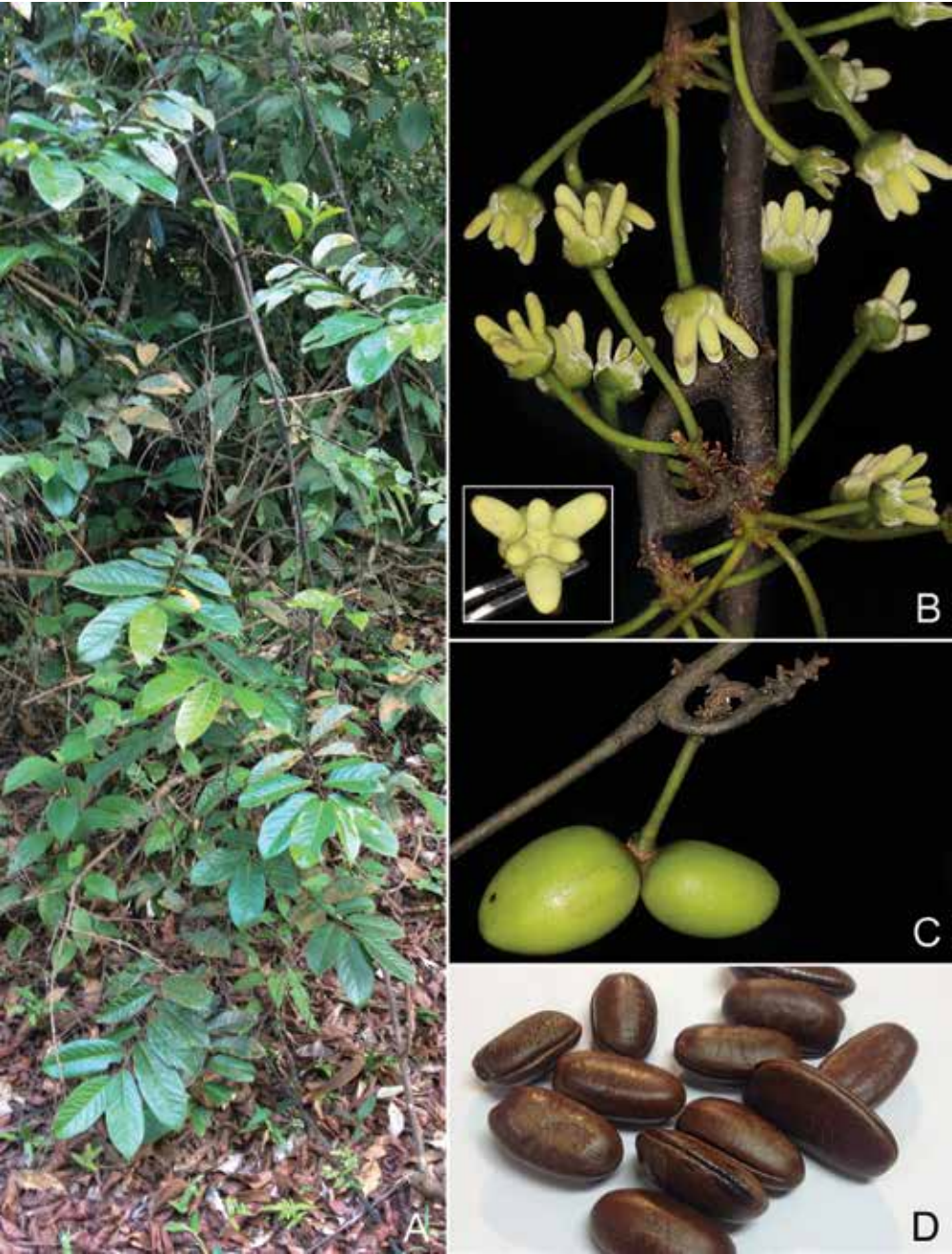


Figure 7. *Artabotrys costatus* King. **A.** Habit. **B.** Hooked inflorescence bearing many flowers. Inset: Flower (front view). **C.** Fruit with two monocarps. **D.** Seeds showing circumferential groove. (A–D including inset from Singapore, Nee Soon, Ng SING2017-459. Photos: X.Y. Ng).

above, prominent beneath, lateral veins 8–13 pairs, flush to slightly raised above, prominent beneath, tertiary veins reticulate, visible above and beneath; petiole 4–8 × 1–2 mm, (sub-)erect-hairy, becoming glabrous, grooved above. **Inflorescences** with 4–11 flowers, lateral branches condensed or short (to 5 mm long). **Flowers** with pedicels 14–21 mm long, less than 1 mm thick, sparsely puberulent; sepals ovate, c. 2 × 2 mm, sparsely puberulent outside, glabrous inside, apex acute to obtuse; petals cream, densely tomentose except the glabrous base inside; outer petal blade planar, oblong-ovate, 4–6 mm long, 2–2.5 mm wide, apex rounded, claw c. 2 mm long, 3.5–4 mm wide; inner petal blade terete, 3.5–5 mm long, 1–1.5 mm wide, apex rounded, claw c. 2 mm long, 1.5–2 mm wide; stamens less than 1 mm long, anther connective apex truncate; carpels 3–5 per flower, c. 1 mm long. **Fruit** with 2–5 monocarps borne on sparsely puberulent to glabrous pedicels 15–24 mm long, 1–2 mm thick; monocarps ripening yellow to red, ellipsoid, glabrous, 25–30(–34) × 12–15 mm, drying black to brownish black, strongly wrinkled, sessile, apex rounded or bluntly beaked, pericarp less than 1 mm thick. **Seeds** pale brown, 20–21 × 10–11 × 6–7 mm, smooth.

Distribution. Peninsular Malaysia and Borneo. In Singapore, it is known from Mandai (*Lua & Hassan Ibrahim SING2011-029*, 17 Feb 2011, SING [SING0153736]; *Boo et al. SING2015-166*, 11 Jun 2015, SING [SING0232192]) and Nee Soon (*Mhd Shah & Ali MS 4159*, 17 Dec 1981, SING [SING0003073]; *Lua et al. SING2011-383*, 9 Sep 2011, SING [SING0165932]; *Ng SING2017-459*, 10 Sep 2017, SING [SING0267831]).

Ecology. In Singapore, in secondary forest, forest edges and freshwater swamp forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Notes. The description above is based on material from Peninsular Malaysia and Singapore owing to the small number of fertile specimens from Singapore.

2. *Artabotrys crassifolius* Hook.f. & Thomson

(Latin, *crassus* = thick, *folium* = leaf; with thick leaves)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 54; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 33; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 42, pl. 51; Ridley, Fl. Malay Penins. 1 (1922) 40; Sinclair, Gard. Bull. Singapore 14(2) (1955) 249; Keng, Gard. Bull. Singapore 27 (1974) 70; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11; Turner, Gard. Bull. Singapore 45 (1993) 28; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 109; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 15, 103, 201; Turner, Nord. J. Bot. 33 (2015) 259; Turner, Gard. Bull. Singapore 68 (2016) 66; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 7; Turner, Gard. Bull. Singapore 70 (2018) 427; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 136; Eiadthong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 43. **Type:** *Griffith s.n.* [EIC 426], [Malaysia], Malacca [Melaka] (lectotype K [K000607645], designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 250). **Fig. 8.**

Climbers to 20 m tall. **Twigs** drying greyish brown, often glabrous but sometimes with dense covering of adpressed or sub-erect hairs when young, smooth, becoming rough and flaky. **Leaves:** lamina coriaceous, glabrous above and beneath except scattered adpressed hairs on the midrib beneath, drying greyish green to dark brown, not bullate, oblong-elliptic to broadly elliptic, 8.5–19(–27) × 3.6–10.8 cm, base cuneate or rounded, apex acute to acuminate, rarely caudate, midrib flush to slightly raised above, prominent beneath, lateral veins 8–12 pairs, flush to slightly raised above, slightly raised beneath, tertiary venation reticulate, visible or obscure above, obscure beneath; petiole 5–12 × 2–3 mm, glabrous, hardly grooved above. **Inflorescences** with 2–8 flowers, lateral branches condensed or short (to 15 mm long). **Flowers** with pedicels 4–7 mm long, c. 2 mm thick, densely villose; sepals lanceolate, 8–15 × 5–8 mm, densely villose on both surfaces except at the glabrous base inside, apex acute; petals cream-yellow, densely villose except the glabrous base inside; outer petal blade planar, ovate, 16–23 mm long, 8–12 mm wide, apex acute, claw 5–6 mm long, 6–6.5 mm wide; inner petal blade planar, oblong-elliptic, 15–21 mm long, 7–10 mm wide, apex acute, claw 4–5 mm long, 4–6 mm wide; stamens 2–3 mm long, anther connective apex truncate; carpels c. 10 per flower, 3–4 mm long. **Fruit** with 6–8 monocarps borne on subglabrous pedicels 10–18 mm long, 4.5–6 mm thick; monocarps ripening red, ellipsoid to obovoid, glabrous, 30–40 × 22–30 mm, drying brownish black or black, slightly rough, sessile or base contracted into a stipe 3–4 mm long, apex rounded or mucronate (beak < 1 mm long), pericarp c. 3 mm thick. **Seeds** dark brown, c. 23 × 13–14.5 × 7.5–8 mm, rough.

Distribution. Myanmar, Thailand and Peninsular Malaysia. In Singapore, known from Bukit Timah (*Sinclair SFN 38845*, 13 Oct 1949, SING [SING0003077]), MacRitchie (*Yeoh YYS 13*, 10 Aug 2015, SING [SING0222236]) and Nee Soon (*Lua et al. SING2014-304*, 12 Sep 2014, SING [SING0215123]).

Ecology. In Singapore, in primary forest, secondary forest, forest edges and freshwater swamp forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), *Singapore Red Data Book*, ed. 3 (2024) 466).

Notes. The description above is partly based on material from Peninsular Malaysia owing to the small number of fertile specimens from Singapore.

3. *Artabotrys maingayi* Hook.f. & Thomson

(Alexander Carroll Maingay, 1836–1869, English physician, colonial administrator and botanist)

in Hooker, *Fl. Brit. India* 1, fasc. 1 (1872) 55; King, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 61(1) (1892) 35; King, *Ann. Roy. Bot. Gard. Calcutta* 4 (1893) 45, pl. 58; Ridley, *J. Straits Branch Roy. Asiat. Soc.* 33 (1900) 39; Ridley, *Fl. Malay Penins.* 1 (1922) 42; Sinclair, *Gard. Bull. Singapore* 14(2) (1955) 259, p.p.; Keng, *Gard. Bull. Singapore* 27 (1974) 70, p.p.; Keng, *Concise Fl. Singapore*, vol. 1, *Gymn. Dicot.* (1990) 11, p.p.; Turner, *Gard. Bull. Singapore* 45 (1993) 28, p.p.; Turner, *Gard. Bull. Singapore* 47 (1997)

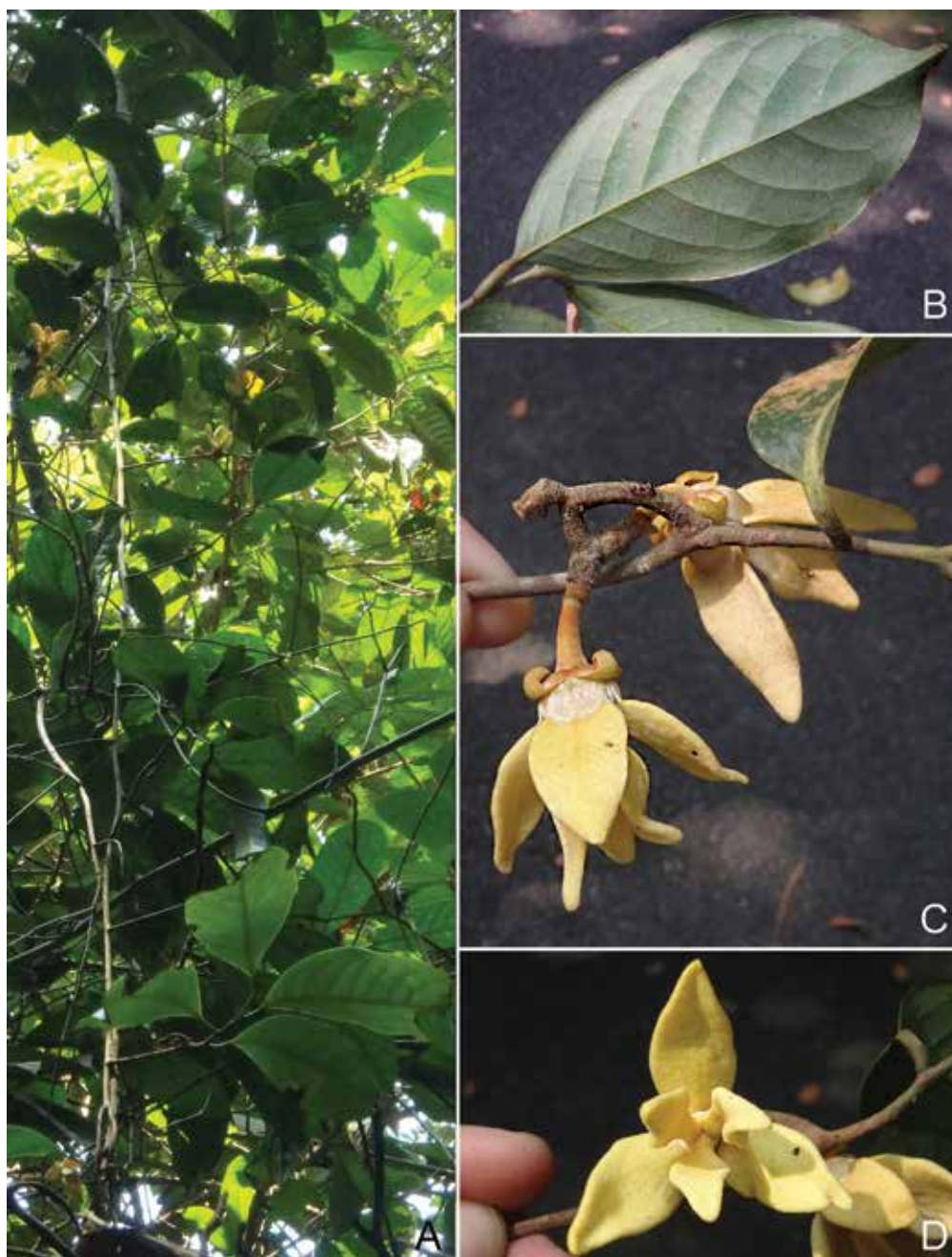


Figure 8. *Artabotrys crassifolius* Hook.f. & Thomson. **A.** Habit. **B.** Lower surface of leaf. **C.** Hooked inflorescence bearing two flowers. **D.** Flower (front view). (A–D from Singapore, Nee Soon, Lua *et al.* SING2014-304. Photos: H.K. Lua).

['1995']) 109, p.p.; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170, p.p.; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 16, 103, 201, p.p.; Turner, Folia Malaysiana 10(1) (2009) 62; Turner, Phytotaxa 36 (2011) 10; Turner, Gard. Bull. Singapore 64 (2012) 384; Neo et al., Nat. Singapore 6 (2013) 119, p.p.; Neo et al., Nat. Singapore 7 (2014) 61, p.p.; Turner, Gard. Bull. Singapore 70 (2018) 432; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 136. **Type:** *Maingay 2617* [Kew Distribution 34], [Malaysia], Malacca [Melaka], 1867 or 1868 (lectotype K [K000381024, K000381029 – a single specimen over 2 sheets], first step designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 260, second step designated by Turner, Gard. Bull. Singapore 70 (2018) 432; probable isoelectotype L [L0185527], explicitly including only the right twig and monocarp in packet). **Fig. 9.**

Artabotrys havilandii Ridl., Bull. Misc. Inform. Kew 1912 (1912) 382; Ridley, Sarawak Mus. J. 1(3) (1913) 77, p.p.; Sinclair, Sarawak Mus. J. 5(18) (1951) 598, p.p.; Bygrave in Coode et al., Checkl. Flow. Pl. Gymn. Brunei (1996) 12; Merrill, J. Straits Branch Roy. Asiat. Soc., Special No. [Bibliogr. Enum. Born. Pl.] (1921) 267, p.p.; Masamune, Enum. Phanerog. Bornearum (1942) 280; Turner, Folia Malaysiana 10(1) (2009) 63. **Type:** *Haviland 1629*, [Malaysia], Sarawak, near Kuching, 9 September 1892 (lectotype K [K000691275], designated by Turner, Folia Malaysiana 10(1) (2009) 63; isoelectotype SAR n.v.).

Climbers to 25 m tall. **Twigs** drying brownish black, glabrous, very smooth. **Leaves:** lamina chartaceous to thinly coriaceous, glabrous above and beneath except for scattered adpressed hairs on the midrib beneath, drying brownish green to greyish green, not bullate, oblong-elliptic to oblong-ovate, 6.8–13.2 × 3.2–5.6 cm, base decurrent on petiole, apex acute, acuminate or caudate, midrib raised above, prominent beneath, lateral veins 6–10 pairs, slightly raised above, slightly raised to flush beneath, tertiary veins reticulate, visible above, obscure beneath; petiole 3–10 × c. 1 mm, glabrous, grooved above. **Inflorescences** with 1–4 flowers, lateral branches condensed. **Flowers** with pedicels 4–6 mm long, 1–2 mm thick, sparsely puberulent to glabrous; sepals ovate, 3–4 × 3–4 mm, sparsely puberulent outside, glabrous inside, apex acute to obtuse; petals cream-yellow, densely adpressed-hairy except the glabrous base inside; outer petal blade planar, lanceolate, 14–23 mm long, 4–5 mm wide, apex acute or rounded, claw c. 2 mm long, 3.5–4 mm wide; inner petal blade planar, lanceolate, 13–22 mm long, 2.5–4 mm wide, apex acute or rounded, claw c. 2 mm long, 2–3 mm wide; stamens c. 1.5 mm long, anther connective apex truncate; carpels 3–5 per flower, c. 2 mm long. **Fruit** with 3–4 monocarps borne on glabrous pedicels 8–10 mm long, 3–4 mm thick; monocarps ripening yellow-orange, obovoid to ellipsoid, glabrous, 30–35 × 26–30 mm, drying black, smooth, subsessile, apex beaked 1–2 mm long, pericarp 3–6 mm thick. **Seeds** brownish black, c. 20 × 14–15 × 8–9 mm, rough.

Distribution. Peninsular Malaysia and Borneo. In Singapore, known from Bukit Kalang (*Mhd Shah & Samsuri MS 4132*, 9 Jul 1981, SING [SING0003098]; *Maxwell 82-251*, 16 Sep 1982, SING [SING0003095, SING0003097]), MacRitchie (*Lua SING2014-250*, 11 Jul 2014, SING [SING0205874]), Mandai (*Lua et al. SING2015-228*, 13 Aug 2015, SING [SING0222208]) and Nee Soon (*Turner et al. NRS 249*, 9 Apr 1992, SING [SING0205253]).

Ecology. In Singapore, in secondary forest, forest edges and freshwater swamp forest.



Figure 9. *Artabotrys maingayi* Hook.f. & Thomson. **A.** Habit. Inset: Young flowers. **B.** Leafy branch showing lower surfaces of leaves and slightly decurrent leaf base. **C.** Side view of flower. **D.** Flower (front view). **E.** Flower with three outer petals and one inner petal removed, showing stamens and stigmas. **F.** Flower (back view). (A–F including inset from Singapore, A, A inset, D & F, MacRitchie; B, C & E, Nee Soon, *Thomas DCT1005*. Photos: A, W.F. Ang; B, C & E, D.C. Thomas; D, J. Chen; F, X.Y. Ng).

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Notes. The petal description and line drawing in Sinclair (Gard. Bull. Singapore 14(2) (1955) 260, fig. 14) are inconsistent with the type material of *Artabotrys maingayi*, but instead matches that of *A. scortechinii*. The leaves of *Artabotrys maingayi* are often bullate in fresh material but do not appear bullate in dried material.

4. *Artabotrys scortechinii* King

(Benedetto Scortechini, 1845–1886, Italian priest and botanist)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 32; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 40, pl. 48; Ridley, Fl. Malay Penins. 1 (1922) 39; Sinclair, Gard. Bull. Singapore 14(2) (1955) 253; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 109; Turner, Gard. Bull. Singapore 68 (2016) 67; Chen et al., Gard. Bull. Singapore 70 (2018) 5, fig. 2; Turner, Gard. Bull. Singapore 70 (2018) 437; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 118; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 137. **Type:** *Scortechini s.n.*, [Malaysia], Perak (lectotype K [K000381008], designated by Turner, Gard. Bull. Singapore 68 (2016) 67). **Fig. 10.**

Artabotrys maingayi auct. non Hook.f. & Thomson: Sinclair, Gard. Bull. Singapore 14(2) (1955) 259, p.p.; Keng, Gard. Bull. Singapore 27 (1974) 70, p.p.; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11, p.p.; Turner, Gard. Bull. Singapore 45 (1993) 28, p.p.; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 109, p.p.; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170, p.p.; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 16, 103, 201, p.p.; Neo et al., Nat. Singapore 6 (2013) 119, p.p.; Neo et al., Nat. Singapore 7 (2014) 61, p.p.

Climbers to 10 m tall. **Twigs** drying dark grey or grey-brown, often glabrous but sometimes with dense covering of adpressed hairs when young, smooth, becoming rough. **Leaves:** lamina chartaceous to thinly coriaceous, glabrous above and beneath except for scattered adpressed hairs on the midrib beneath, drying greyish green (rarely brown), not bullate, elliptic or ovate-lanceolate, 6.5–13.9 × 2.5–6.5 cm, base cuneate or rounded, apex acuminate, midrib flush to slightly raised above, prominent beneath, lateral veins 7–11 pairs, flush to slightly raised above, slightly raised beneath, tertiary veins reticulate, visible above, visible or obscure beneath; petiole 3–9 × 1–2 mm, subglabrous, grooved above. **Inflorescences** with 1–4 flowers, lateral branches condensed. **Flowers** with pedicels 10–17 mm long, c. 1 mm thick, sparsely puberulent; sepals ovate, 2–4 × 2–4 mm, sparsely puberulent outside, glabrous inside, apex acute; petals cream-yellow, sparsely adpressed-hairy except the glabrous base inside; outer petal blade planar, triangular, 10–15 mm long, 3.5–4.5 mm wide, apex acute, claw c. 1.5 mm long, 3–3.5 mm wide; inner petal blade planar, linear, 7–12 mm long, 1–1.5 mm wide, apex acute, claw c. 1.5 mm long, c. 2 mm wide; stamens c. 1 mm long, anther connective apex truncate; carpels c. 5 per flower, c. 1.5 mm long. **Fruit** with 1–4 monocarps borne on sparsely puberulent to glabrous pedicels 14–17 mm long, c. 2 mm thick; monocarps ripening red, ellipsoid, glabrous, 31–44 × 17–31 mm, drying dull brown, slightly rough, base contracted

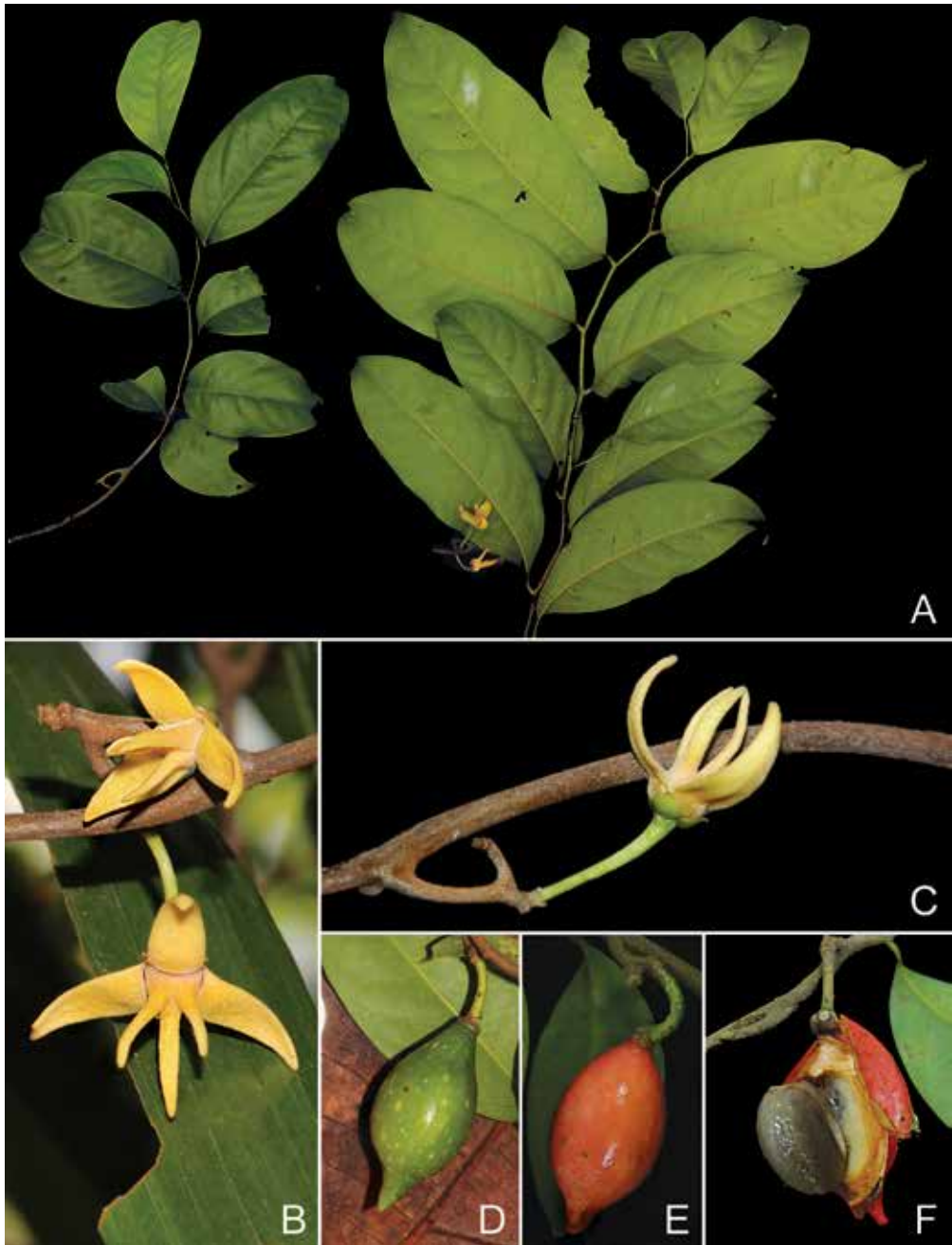


Figure 10. *Artabotrys scortechinii* King. **A.** Leafy branches and a detached inflorescence. **B.** Flowers (front view). **C.** Side view of flower on hooked inflorescence. **D.** Unripe fruit. **E.** Fruit turning red as it matures. **F.** Fruit showing pulp and seed. (A–F from Singapore, A–C, Upper Seletar, *Chen et al. JH38*; D, Upper Seletar, *Thomas & Chen DCT3402*; E & F, Bukit Timah, *Lua et al. SING2017-083*. Photos: A & F, P.K.F. Leong; B & D, J. Chen; C, D.C. Thomas; E, W.W. Seah).

into a stipe c. 2 mm long, apex beaked 5–6 mm long, pericarp c. 1 mm thick. **Seeds** brown, c. $20 \times 16 \times 7$ mm, rough.

Distribution. Peninsular Malaysia. In Singapore, known from Bukit Timah (*Lua et al. SING2017-083*, 21 Mar 2017, SING [SING0241817, SING0241818]; *Lua et al. SING2017-107*, 28 Mar 2017, SING [SING0253309]), MacRitchie (*Sinclair 4876*, 5 Jul 1948, SING [SING0200055]) and Upper Seletar (*Chen JH 38*, 16 Feb 2016, SING [SING0243742, SING0243743, SING0243744]).

Ecology. In primary and secondary forest in Singapore.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Notes. The barcode numbers for the Bukit Timah collections of this species in Chen et al. (Gard. Bull. Singapore 70 (2018) 6) are erroneous and corrected here. The description above is based on material from throughout the distribution of the species owing to the small number of fertile specimens from Singapore.

5. *Artabotrys suaveolens* (Blume) Blume

(Latin, *suavis* = sweet, pleasant, *olens* = smelling; referring to the fragrant flowers)

Fl. Javae, fasc. 28–29 (1830) 62, t. 30, t. 31: D; Hooker & Thomson, Fl. Ind. 1 (1855) 129; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 55; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 36; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 46, pl. 61; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 42; Sinclair, Gard. Bull. Singapore 14(2) (1955) 256, fig. 12, fig. 13; Keng, Gard. Bull. Singapore 27 (1974) 70; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 11, fig. 10.3; Kessler & van Heusden, Rheedeia 3(1) (1993) 55; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 109; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Lee et al., Gard. Bull. Singapore 55 (2003) 291; Nurainas, Floribunda 2(5) (2004) 123; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 16, 103, 214; Turner, Folia Malaysiana 10(1) (2009) 69; Turner, Phytotaxa 36 (2011) 11; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 7; Turner, Gard. Bull. Singapore 64 (2012) 389; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 29, 283; Neo et al., Nat. Singapore 6 (2013) 119; Neo et al., Nat. Singapore 7 (2014) 61; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 438; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 137; Eiadthong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 53, pl. 5: F. **Basionym:** *Unona suaveolens* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 17. **Type:** *Blume* 885, [Indonesia], Java, G. Seribu (lectotype L [L0180644], designated by Chen & Baldini, Blumea 65(3) (2020) 182). **Fig. 11.**

Climbers to 25 m tall. **Twigs** drying greyish to brownish black, glabrous but sometimes with sparse covering of adpressed hairs when young, smooth, becoming rough. **Leaves:** lamina chartaceous to thinly coriaceous, sparsely adpressed-hairy to subglabrous above and beneath,

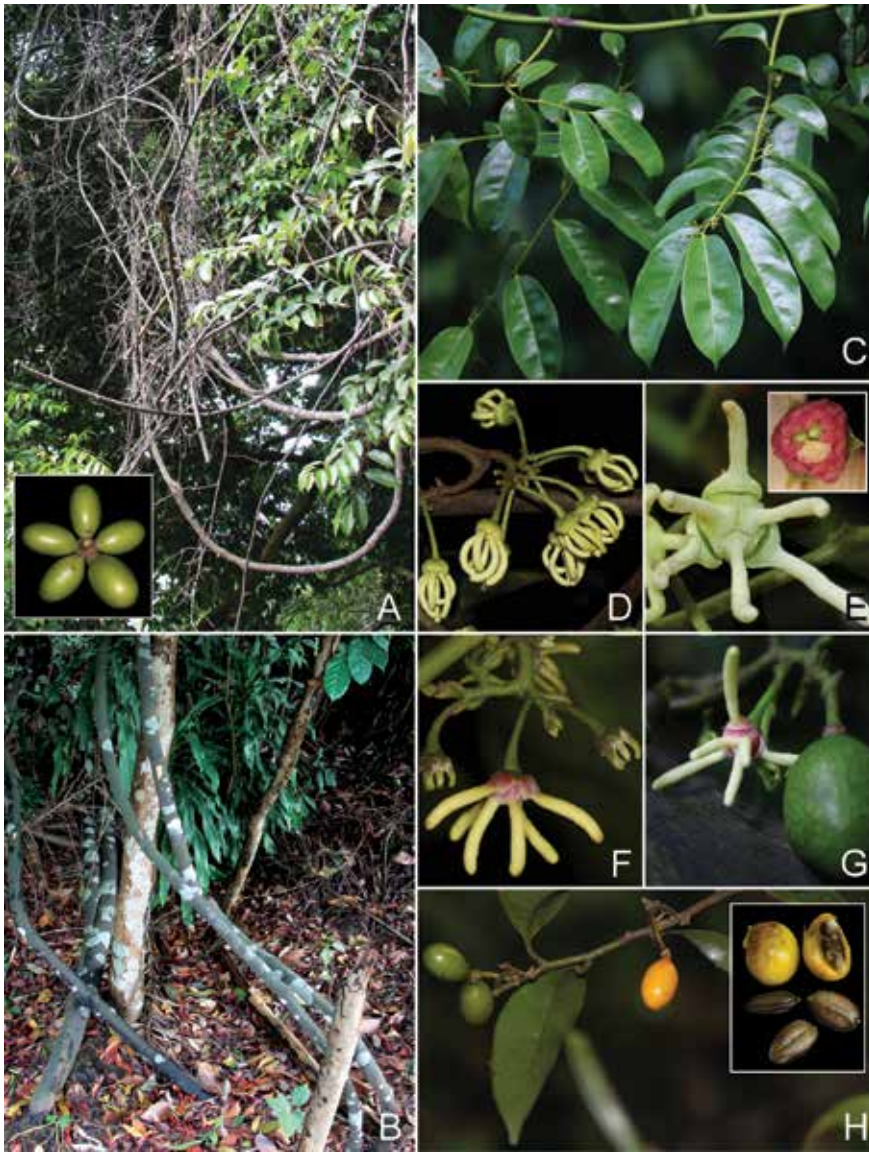


Figure 11. *Artabotrys suaveolens* (Blume) Blume. **A.** Climbing habit. Inset: Fruit with five monocarps; note that monocarp number rarely exceeds two per fruit. **B.** Main stems showing dark grey bark. **C.** Leaves. **D.** Immature flowers on hooked inflorescence. **E.** Front view of mature flower with three basal apertures. Inset: Flower with petals removed, showing pink stamen connectives and pale stigma. **F.** Side view of mature flower with petal bases that are sometimes tinged pink. **G.** Mature flower borne simultaneously with an unripe fruit. **H.** Fruiting branch; note that the ripe monocarps are bright orange whereas unripe ones are dark green. Inset: Cut monocarp showing pulp and seeds. (A–H including insets from Singapore, A & B, MacRitchie; A inset, Chestnut, *Ng et al. SING2018-942*; C, E inset & F, Nee Soon; D, Western Catchment, *Lua et al. SING2019-1413*; E, Mandai; G & H inset, Bukit Brown, *Hassan Ibrahim et al. SING2011-516*; H, Upper Peirce. Photos: A, B & E, J. Chen; A inset, C, D, E inset, F & H, X.Y. Ng; G & H inset, S. Lee).

drying brown or dull green, not bullate, oblong-elliptic to ovate, $6\text{--}14.5 \times 2.5\text{--}5.5$ cm, base decurrent on petiole, apex acute to acuminate, midrib raised to flush above, prominent beneath, lateral veins 6–10 pairs, raised to flush above, flush to slightly raised beneath, tertiary veins reticulate, visible (rarely obscure) above, often obscure beneath; petiole $2\text{--}8 \times \text{c. } 1$ mm, sparsely adpressed-hairy to glabrous, grooved above. **Inflorescences** with 6–23 flowers, lateral branches condensed to elongate (to 2.5 cm long). **Flowers** with pedicels 5–13 mm long, 0.5–1 mm thick, sparsely puberulent to glabrous; sepals ovate, $2\text{--}3 \times \text{c. } 2$ mm, sparsely puberulent outside, glabrous inside, apex acute; petals cream, sometimes with pink base, sparsely to densely adpressed-hairy except the glabrous base inside; outer petal blade terete, 8–13 mm long, c. 1 mm wide, apex rounded, claw 1.5–2 mm long, 2–3 mm wide; inner petal blade terete, 7–10 mm long, c. 1 mm wide, apex rounded, claw 1.5–2 mm long, c. 2 mm wide; stamens 0.5–1 mm long, anther connective apex truncate; carpels 3–5 per flower, c. 2 mm long. **Fruit** with 1–2(–5) monocarps borne on glabrous pedicels 8–15 mm long, c. 1 mm thick; monocarps ripening yellow-orange, ellipsoid, glabrous, $12\text{--}15 \times 7\text{--}8$ mm, drying dull black to brownish black, smooth, sessile, apex rounded, pericarp less than 1 mm thick. **Seeds** dark brown, $8\text{--}12.5 \times 5\text{--}6.5 \times 3\text{--}5$ mm, smooth.

Distribution. Widespread in the Andaman and Nicobar Islands, Myanmar, Southern Thailand, Peninsular Malaysia, Sumatra, Java, Borneo and the Philippines. In Singapore, known from Lower Peirce (*Saifuddin SING2007-605*, 13 Dec 2007, SING [SING0043159]), Upper Peirce (*Lua SING2017-149*, 5 Apr 2017, SING [SING0258554]), MacRitchie (*Mhd Shah & Ali MS 3951*, 2 Aug 1976, SING [SING0003096]), Mandai (*Gwee SING2010-259*, 2 Feb 2010, SING [SING0144600]), Bukit Kalang (*Sidek & Ali SK 610*, 18 Nov 1982, SING [SING0003101]), Nee Soon, Seletar, Bukit Timah, Springleaf, Jalan Ulu Sembawang, the Western Catchment, Pulau Ubin and Pulau Tekong.

Ecology. In primary and secondary forest, forest edges and freshwater swamp forest in Singapore.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Least Concern (LC) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Taxonomy. For a full list of synonyms applicable outside of Peninsular Malaysia and Singapore, see Turner (Gard. Bull. Singapore 70 (2018) 438).

Notes. The description is based only on material from Singapore owing to the abundance of material available.

6. *Artabotrys wrayi* King

(Leonard Wray, 1853–1942, Curator of the Perak Museum)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 37; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 48, pl. 64; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 40; Sinclair, Gard. Bull. Singapore 14(2) (1955) 248; Keng, Gard. Bull. Singapore 27 (1974) 70; Keng,

Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 109; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 16, 103, 214; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 7; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 29, 283; Turner, Gard. Bull. Singapore 68 (2016) 67; Turner, Gard. Bull. Singapore 70 (2018) 441; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 137. **Type:** *King's Collector 3615*, [Malaysia], Perak, Larut, November 1882 (lectotype K [K000381023], designated by Turner, Gard. Bull. Singapore 68 (2016) 67; isolectotypes BM n.v., CAL [CAL0000004276]). **Fig. 12.**

Climbers to 10 m tall. **Twigs** drying greyish brown, with dense covering of erect hairs when young (visible with the naked eye), becoming glabrous, rough, flaky. **Leaves** chartaceous to thinly coriaceous, glabrous above, sparsely to densely erect-hairy beneath, drying black above and dull brown beneath, bullate, oblong-elliptic to broadly elliptic, (12–)16–27 × 5.5–10 cm, base rounded or cuneate, apex acute, acuminate or caudate, midrib sunken above except towards leaf apex, prominent beneath, lateral veins 10–13 pairs, flush to slightly raised above, prominent beneath, tertiary veins subscalariform, visible above and beneath; petiole 8–10 × 2.5–4 mm, erect-hairy beneath and along margins, glabrous above, grooved above. **Inflorescences** with up to c. 16 flowers, lateral branches elongate (to 3.2 cm long). **Flowers** with pedicels 7–12 mm long, c. 3 mm thick, densely villose; sepals ovate, 12–15 × 8–9 mm, densely villose except the glabrous base inside, apex acute; petals pale yellow, densely villose except the glabrous base inside; outer petal blade planar, oblong-ovate to oblong-elliptic, 15–20 mm long, 8–10 mm wide, apex acute to obtuse, claw c. 4 mm long, c. 6 mm wide; inner petal blade planar, oblong-elliptic to lanceolate, 13–17 mm long, 7–8 mm wide, apex acute to obtuse, claw c. 5 mm long, 4–5 mm wide; stamens 2–3 mm long, anther connective apex truncate; carpels c. 25 per flower, 3–4 mm long. **Fruit** with c. 20 monocarps borne on sparsely to densely villose pedicels 10–23 mm long, 4–6 mm thick; monocarps ripening red, obovoid, sparsely to densely tawny-tomentose, 27–30 × 17–21 mm, drying dull black with brown patches of indumentum, slightly rough, sessile, apex rounded or mucronately beaked, 1–2 mm long, pericarp c. 2 mm thick. **Seeds** greyish brown, c. 20 × 13 × 8 mm, smooth.

Distribution. Peninsular Malaysia. In Singapore, known from Bukit Mandai (*Ridley 3630a*, 1892, SING [SING0003107]), Bukit Timah (*Ngadiman s.n.*, 3 Mar 1938, SING [SING0003104]; *Sinclair SFN 39664*, 11 Jun 1953, SING [SING0003106]; *Morawetz et al. 15-28285*, 28 Feb 1985, SING [SING0205262]) and Cluny Road (*Ridley 6051*, 1894, SING [SING0003105]).

Ecology. In primary forest in Singapore.

Conservation assessment. Globally, not assessed. Listed as Endangered (EN/D) in Singapore by Tan et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 2 (2008) 214) but as Data Deficient (DD) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466) because the identity of sterile specimens on which the earlier assessment was based cannot be verified.

Notes. The description above is based on material from throughout the distribution of the species owing to the small number of flowering specimens from Singapore. Although each

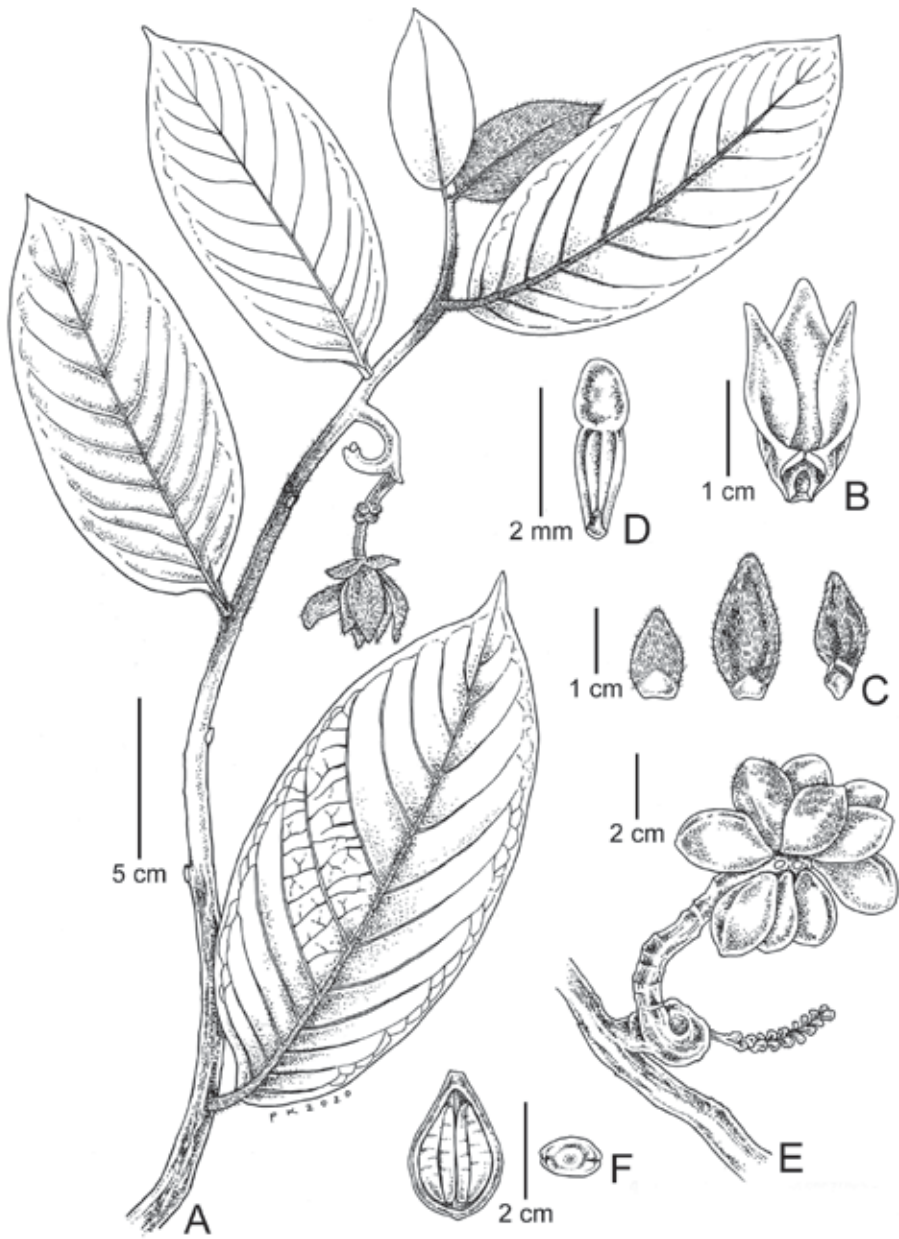


Figure 12. *Artabotrys wrayi* King. **A.** Habit. **B.** Dissected flower, showing an outer petal and two basally connivent inner petals. **C.** Adaxial view of sepal (left), outer petal (middle) and inner petal (right). **D.** Stamen. **E.** Fruit with many densely clustered monocarps. **F.** Hilar view of seed (right) and sectioned monocarp, showing pericarp and lateral view of seeds (left). (A from Singapore, Bukit Timah, *Ridley 6051* (habit) and Peninsular Malaysia, *Corner SFN 32301* (flower); B–D from Singapore, Bukit Mandai, *Ridley 3630a*; E from Singapore, Bukit Timah, *Ngadiman s.n.*; F from Peninsular Malaysia, *Corner SFN 32301*. Drawn by P.K. Cheng).

inflorescence bears numerous flowers (inferred from the pedicel scars on the long and woody branches of the inflorescence), it appears that only a few flowers undergo anthesis and develop into fruit at any one time.

5. CANANGA (Dunal) Hook.f. & Thomson

(from a vernacular name)

Fl. Ind. 1 (1855) 129, nom. cons.; Sinclair, Gard. Bull. Singapore 14(2) (1955) 323; Kochummen, Tree Fl. Malaya 1 (1972) 68; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 121; Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 189; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 21; Srisanga in Johnson & Murray, Fl. Thailand 16(1) (2022) 56. **Basionym:** *Unona* L.f. [unranked] *Cananga* Dunal, Monogr. Anonac. (1817) 96. **Synonyms:** *Uvaria* L. sect. *Cananga* (Dunal) Blume, Fl. Javae, fasc. 21–22 (1830) 13 as ‘*Canangae*’. – *Unona* L.f. subsect. *Cananga* (Dunal) G.Don, Gen. Hist. 1 (1831) 94. – *Unona* L.f. sect. *Canangium* Baill., Hist. Pl. 1(4) (1868) 213, nom. illeg. superfl. – *Canangium* Baill. ex King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 41, nom. rej. **Type:** *Canangium odoratum* (Lam.) Baill. ex King (= *Cananga odorata* (Lam.) Hook.f. & Thomson), lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 260.

Fitzgeraldia F.Muell., Fragm. 6(41) (1867) 1. **Type:** *Fitzgeraldia mitrastigma* F.Muell. (= *Cananga odorata* (Lam.) Hook.f. & Thomson).

Evergreen or deciduous trees to 30 m tall, branches spirally arranged on trunk, held more or less horizontally. **Twigs** generally pubescent with pale lenticels. **Leaves** petiolate. **Inflorescences** axillary, fascicled or shortly pedunculate, 1–6-flowered. **Flowers** very fragrant, bisexual; sepals 3, valvate, ovate or triangular, connate at base, much shorter than petals; petals valvate, two whorls of 3, whorls more or less equal, oblong; stamens many, connectives apiculate; carpels many, ovules up to 4 per ovary, biseriate, stigmas agglutinated to form a disc. **Fruit** oblong, glabrous, stipitate, stipe articulate at apex, pericarp thin. **Seeds** several in two rows, flattened ovoid, drying brown, pitted, arillate, endosperm ruminations lamellate.

Distribution. A genus of 2 species. Continental Southeast Asia to Australia, naturalised or casual elsewhere. In Singapore, 1 cryptogenic species.

Ecology. Lowland forest.

Uses. *Cananga odorata* is cultivated as an ornamental tree and garden shrub (*Cananga odorata* var. *fruticosa* (Craib) J.Sinclair) and also in plantations for essential oil production from the flowers.

Cananga odorata (Lam.) Hook.f. & Thomson

(Latin, *odoratus* = having a smell; referring to the fragrant scent)

Fl. Ind. 1 (1855) 130; Sinclair, Gard. Bull. Singapore 14(2) (1955) 324; Kochummen, Tree Fl. Malaya 1 (1972) 70; Keng, Gard. Bull. Singapore 27 (1974) 70; Corner, Wayside Trees Malaya, ed. 3, 1 (1988) 141; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 23, 103, 237; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 22, fig. 4; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 109; Turner, Gard. Bull. Singapore 70 (2018) 443; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 137; Srisanga in Johnson & Murray, Fl. Thailand 16(1) (2022) 59, pl. 6: F. **Basionym:** *Uvaria odorata* Lam., Encycl. 1, fasc. 2 (1785) 595. **Synonyms:** *Unona odorata* (Lam.) Dunal, Monogr. Anonac. (1817) 108. – *Canangium odoratum* (Lam.) Baill. ex King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 41. **Type:** *Sonnerat s.n.* (lectotype P-LA [P00286083], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 196). **Fig. 13, 14.**

Uvaria cananga Banks in Hawkesworth, Voy. South. Hemisph. 2 (1773) 742. **Type:** [Unpublished illustration] Parkinson, Cook First Voyage Artwork Collection, item J3 (lectotype BM, designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197). **Epitype:** *Collector unknown s.n.*, Indonesia, Java, cult. in Hort. Bot. Bogor. sub XI.B(iii).20 (epitype L [L0181287], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197; isoeptype BO).

Uvaria trifoliata Gaertn., Fruct. Sem. Pl. 2, fasc. 1 (1790) 156, t. 114: fig. [2]. **Synonym:** *Uvaria gaertneri* Dunal, Monogr. Anonac. (1817) 89, nom. illeg. superfl. **Type:** [Published illustration] *Uvaria trifoliata* in Gaertner, Fruct. Sem. Pl. 2, fasc. 1 (1790) t. 114: fig. [2], lectotype designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 198. **Epitype:** *Nenga Wirawan 8*, Indonesia, Java, Udjong Kulon Nature Reserve, 15 April 1963 (epitype L [L0185668], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 198; isoeptypes A [A02612488], BO, K [K004052686], LAE, P [P01952475], SING [SING0390821]).

Unona leptopetala DC. in Dunal, Monogr. Anonac. (1817) 98, 114, 143. **Type:** *Leschenault*, Timor (not traced).

Uvaria javanica Thunb., Fl. Jav. 2 (1825) 19. **Type:** *Herb. Thunberg 12901*, [Indonesia, Java] (lectotype UPS-Thunb, designated by Turner, Gard. Bull. Singapore 70 (2018) 443).

Unona cananga Spreng., Syst. Veg. (ed. 16) 4(2) (1827) 215. **Type:** *Kuhl & van Hasselt s.n.*, [Indonesia], Java (lectotype L [L0185671], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197).

Uvaria axillaris Roxb., Fl. Ind. 2 (1832) 667. **Type:** *Hardwicke 6*, Mauritius, Grand Rivere, M. Rosselle's Garden (lectotype BM [BM000895029], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197).

Unona odoratissima Blanco, Fl. Filip. (1837) 467. **Type:** *Merrill: Species Blancoanae 466*, Philippines, Luzon, Province of Rizal, Antipolo, 6 January 1914 (neotype US [US688555], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197; isoneotypes A [A02612621], B, BM [BM001124523], BO, CAL, F, GH [GH02612633], K [K000691376], L [L0181064], MO [MO4296126], NSW [NSW460005], NY [NY04725921], P [P01952554], UC, W).

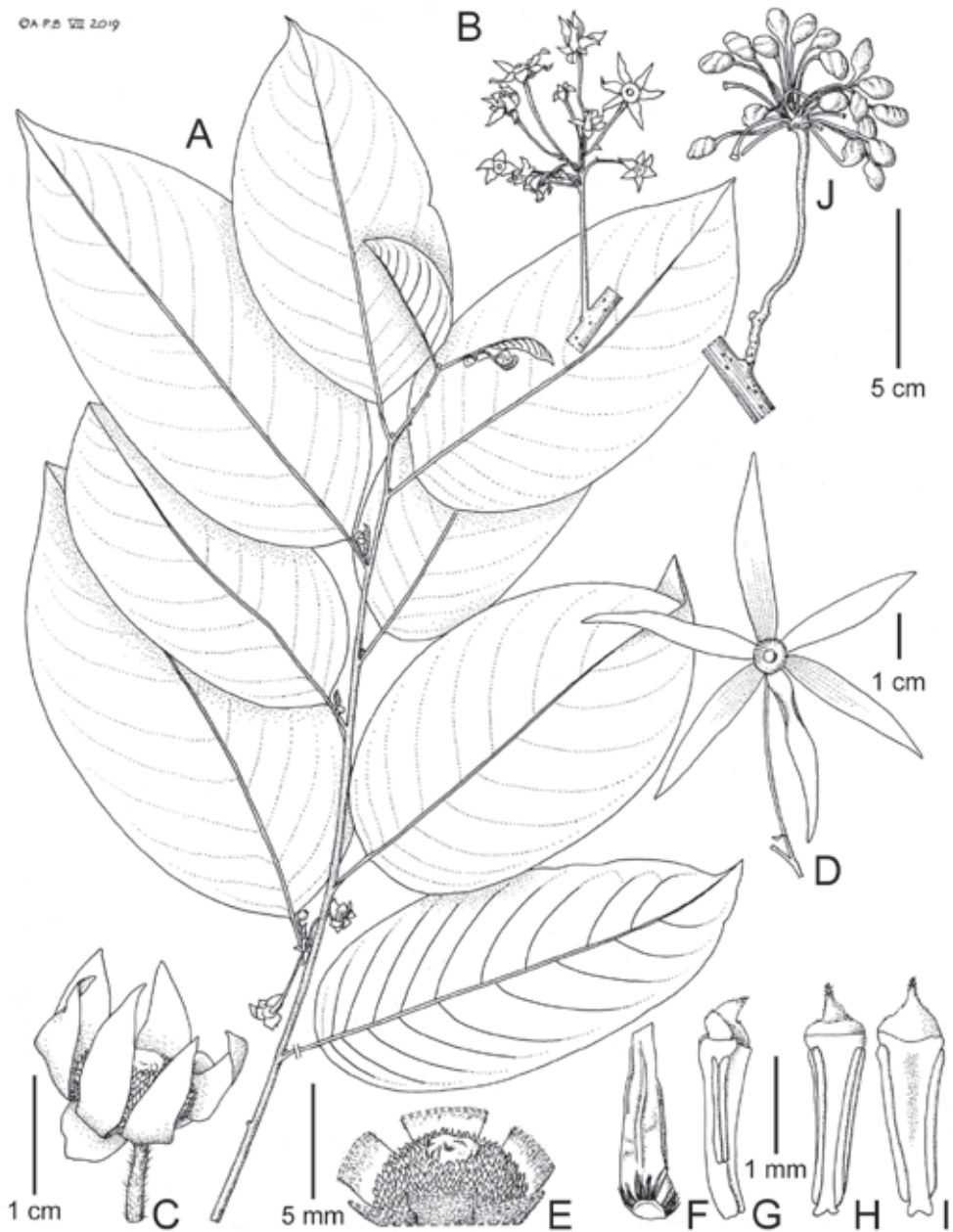


Figure 13. *Cananga odorata* (Lam.) Hook.f. & Thomson. **A.** Habit of flowering shoot. **B.** Young inflorescence. **C.** Young flower. **D.** Flower at anthesis. **E.** Flower interior view, petals excised just above base. **F.** Carpel. **G.** Stamen (lateral view). **H.** Stamen (abaxial view). **I.** Stamen (adaxial view). **J.** Inflorescence. (A–J from Peninsular Malaysia, A, *Kadim et al.* 36; B, *Chan FRI* 25098; C & E–I, *Field* 841; D, *King's Collector* 5696; J, *Chelliah KEP* 98610. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

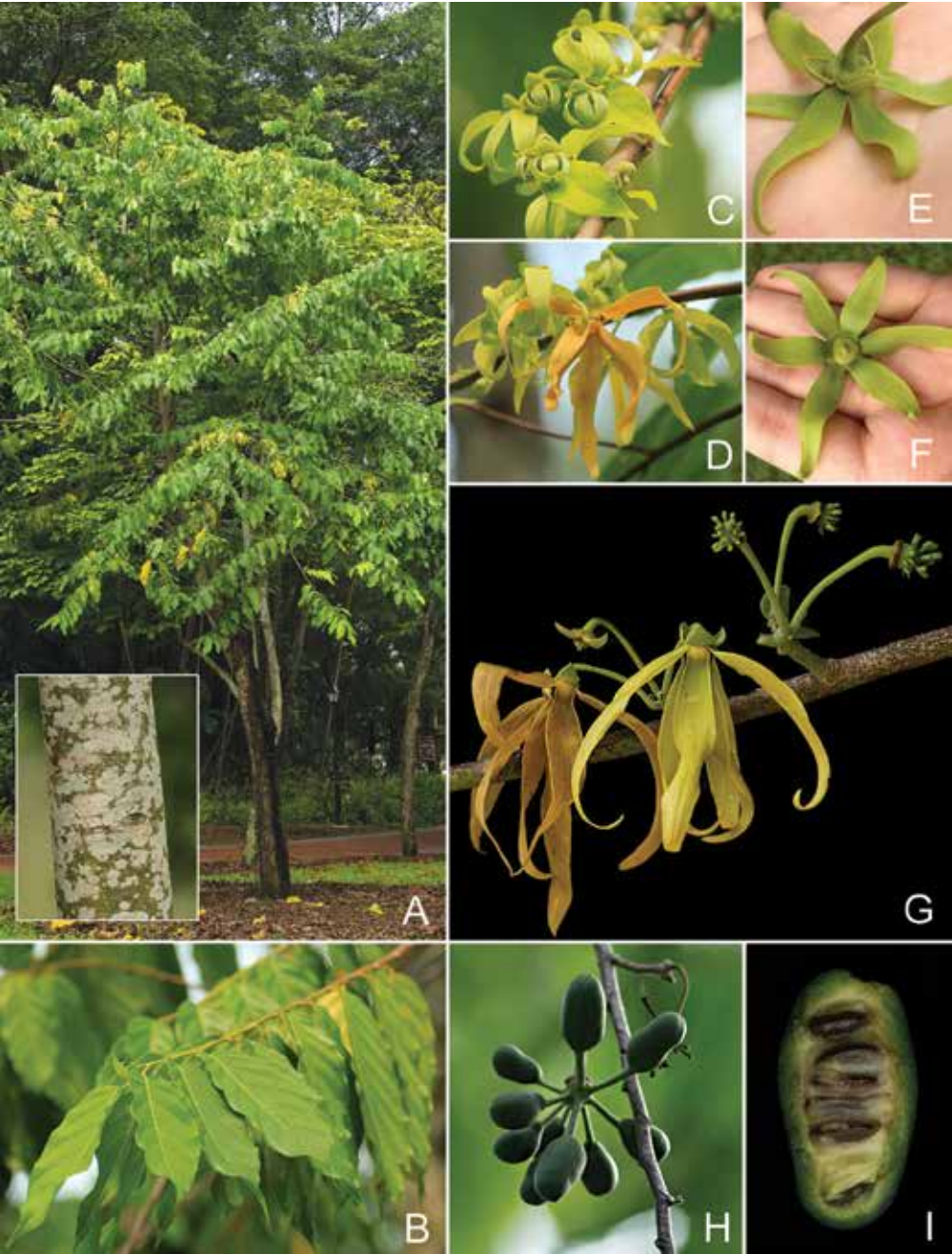


Figure 14. *Cananga odorata* (Lam.) Hook.f. & Thomson. **A.** Habit. Inset: Trunk. **B.** Leaves. **C.** Young flowers. **D.** Older flowers. **E.** Flower (back view). **F.** Flower (front view). **G.** Flowers and young fruit. **H.** Fruit. **I.** Longitudinal section of monocarp showing seeds. (A–H including inset from Singapore, A & G–I, Fort Canning Park; A inset & B–F, cultivated in the Chinese Garden, Jurong Lake Gardens. Photos: A & G–I, Zaki Jamil; A inset & B–F, X.Y. Ng).

Unona ossea Blanco, Fl. Filip. (1837) 467. **Synonym:** *Uvaria ossea* (Blanco) Blanco, Fl. Filip., ed. 2 (1845) 322. **Type:** *Barbon et al. PPI 8370*, Philippines, Luzon, Camarines Sur, Mt Isaraog, Naga City, 9 June 1992 (neotype K [K000271624], designated by Turner, Nordic J. Bot. 33 (2015) 262; isoneotypes BP, PNH).

Uvaria subcordata Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 9. **Synonym:** *Canangium odoratum* (Lam.) Baill. ex King var. *velutinum* Koord. & Valeton, Meded. Lands Plantentuin 61 [Bijdr. Boomsoort. Java 9] (1903) 282, as ‘*velutina*’. **Type:** *Reinwardt s.n.*, [Indonesia], Java (neotype L [L0195691], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197). **Epitype:** *Koorders 22570*, [Indonesia], Java, Pekalongan, Soebah, 11 May 1896 (epitype L [L0181304], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 197; isoepitype BO).

Fitzgeraldia mitrastigma F.Muell., Fragm. 6(41) (1867) 1. **Synonym:** *Canangium mitrastigma* (F.Muell.) Domin, Biblioth. Bot. 89 (1925) 670. **Type:** *Dallachy s.n.*, Australia, Queensland, Rockingham Bay (lectotype YU [YU.025971], designated by Turner, Gard. Bull. Singapore 70 (2018) 444; possible isolectotypes YU [YU.025972, YU.025973]).

Canangium scortechinii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 42; Ridley, Fl. Malay Penins. 1 (1922) 43. **Type:** *Scortechini 1925*, [Malaysia], Perak, Kwala Dipong, April 1885 (lectotype K [K000691379], designated by Turner & Veldkamp, Gard. Bull. Singapore 61(1) (2009) 196; isolectotypes BM [BM001124522], SING [SING0048661]).

Distribution. Mainland Southeast Asia to Australia. Naturalised or casual elsewhere. In Singapore, it is unclear if it is native or not and is, therefore, treated as cryptogenic.

Notes. Two varieties are recognised, *Cananga odorata* var. *odorata* and *C. odorata* var. *fruticosa* (Craib) J.Sinclair, of which the latter may only be of horticultural origin (Turner, Gard. Bull. Singapore 70 (2018) 444–445). Only *Cananga odorata* var. *odorata* is present in the wild in Singapore.

var. *odorata*

Trees to 30 m tall. **Twigs** drying dark brown or black, shallowly striate or latticed, sometimes with small pale raised lenticels, long pale hairs, sometimes erect, most noticeable on youngest parts. **Leaves** distichous; lamina chartaceous, drying dark brown or silvery grey-brown above, similar but generally paler beneath, expanding leaves densely pale hairy on both surfaces, soon lost above except for scattering of hairs along midrib, more persistent beneath, mature leaves sometimes densely hairy beneath, ovate to ovate-oblong or ovate-lanceolate, 8.5–20 × 3–9 cm, base cuneate, rounded or cordate, sometimes asymmetric, apex acuminate, midrib above in dry leaves often with a slightly raised central ridge, otherwise flush, lateral veins very slightly raised above, midrib and lateral veins prominent beneath, lateral veins 7–13 pairs, arching forward, looping obscurely, reticulations distinct on both surfaces; petioles 6–15 mm long, 1–2 mm thick. **Inflorescences** terminal, axillary or ramiflorous. **Flowers** with pedicels 1–5 cm long, c. 1 mm wide, thickening distally, drying black with short pale tomentum, medial bract, if present, ovate, 2–4 × 1–2 mm, densely pale hairy on both surfaces; sepals spreading, reflexing and folding back at anthesis, broadly ovate, 5–7 × 5–7 mm, drying dark brown, some

pale hairs particularly near apex; petals to 60×10 mm, ovate-lanceolate to linear, drying pale to dark with very fine short pale tomentum, straight longitudinal veins more or less visible, inner whorl similar size to outer whorl, or slightly narrower; stamens many, to 3 mm long, markedly apiculate; carpels many, ovaries glabrous, stigmas united. **Fruit** with pedicels similar to flowering pedicels; monocarps to 20 or more, irregularly globose or ellipsoidal, often drying rather angular, to c. 10 mm diam., drying black, more or less glabrous, stipe to 15 mm long, 1 mm thick. **Seeds** c. 4 per monocarp, ellipsoidal, c. $8 \times 5 \times 2$ mm, drying brown, smooth, irregularly pitted.

Distribution. It is likely native in continental Southeast Asia to Australia. Naturalised or casual elsewhere. Doubtless the range has expanded through its long history of cultivation. The native status of the species in Singapore is questionable. Singapore probably lies within the native range of the species and there are collections from forested areas such as MacRitchie (*Corner SFN 34827*, 20 Feb 1938, SING [SING0042173]) and Singapore Botanic Gardens' Rain Forest (*Furtado SFN 31188*, 18 Nov 1936, SING [SING0000058]). However, these could also be escapes from cultivation and it is, therefore, treated here as cryptogenic.

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026, under *Cananga odorata*). In Singapore, assessed as cryptogenic by Lindsay et al. (Gard. Bull. Singapore 74(Suppl. 1) (2022) 137).

Vernacular names. *Cananga*, *chenanga*, *ilang ilang*, *kenanga*, *kenanga hutan*, *kenanga utan*, *nerian*, *nyai*, *perfume tree*, *ylang ylang*, 香水树, 依兰, 依兰依兰 (NParks' Flora & Fauna Web, 2026).

6. CYATHOCALYX Champ. ex Hook.f. & Thomson

(Greek, *kyathos* = cup, ladle, *kalyx*, *kalykos* = calyx; referring to the shape of the sepals)

Fl. Ind. 1 (1855) 126; Sinclair, Gard. Bull. Singapore 14(2) (1955) 233; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 113; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 118; Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 513; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 24; Wang & Saunders in Johnson & Murray, Fl. Thailand 16(1) (2022) 61. **Type:** *Cyathocalyx zeylanicus* Champ. ex Hook.f. & Thomson

Monopodial evergreen trees. **Leaves** distichous; lamina often coriaceous, midrib raised above in dry leaves. **Inflorescences** extra-axillary, fascicled or cymose, 1–4-flowered. **Flowers** often fragrant, bisexual, buds conical or ovoid; sepals 3, valvate, connate or free, much shorter than petals; petals valvate, two whorls of 3, spoon-shaped with orbicular claw connivent and closely pressed over reproductive structures, blades linear, filiform, oblong, flat or terete, outer whorl free, inner whorl united; stamens many, connectives flat-topped; carpels 1, glabrous, stigma peltate, ovules many per carpel, generally multiseriate (2–4 rows). **Fruit** with 1 indehiscent monocarp, globose or ovoid, sessile or short-stalked, glabrous, smooth or verrucose, pericarp

thick. **Seeds** several to many per monocarp, flattened ovoid, glabrous, smooth or wrinkled, drying brown, exarillate; endosperm ruminations spiniform.

Distribution. A genus of approximately 8 species in India and Sri Lanka to the Philippines. In Singapore, 1 native species.

Ecology. Lowland forest.

Taxonomy. There has been considerable contention over many years as to whether *Drepananthus* Maingay ex Hook.f. & Thomson should be included within *Cyathocalyx*. Recent molecular analyses (Surveswaran et al., Taxon 59 (2010) 1721–1734) provide clear support for recognising *Drepananthus* as a separate genus, with *Cyathocalyx* sensu stricto being closer to *Cananga* than to *Drepananthus*. Morphologically, *Cyathocalyx* sensu stricto can be distinguished by the leaves with the midrib raised above and a single carpel per flower and hence solitary monocarps. Species of *Drepananthus* have the midrib flush to sunken above and two or more carpels per flower.

***Cyathocalyx sumatranus* Scheff.**

(of Sumatra)

Natuurk. Tijdschr. Ned.-Indië 32 (1873) 388; Sinclair, Gard. Bull. Singapore 14(2) (1955) 236; Kochummen, Tree Fl. Malaya 1 (1972) 71; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 110; Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 528; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 30, 103, 203; Turner, Gard. Bull. Singapore 70 (2018) 446; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 137; Wang & Saunders in Johnson & Murray, Fl. Thailand 16(1) (2022) 62, fig. 10, pl. 7: B, C. **Type:** *Djoemadi* 57, [Indonesia], Java, cult. Kebun Raya Bogor sub XX.D.73, 24 May 1960 (neotype SING [SING0026232], designated by Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 513). **Fig. 15, 16.**

Xylopia curtisii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 116. **Type:** *Curtis* 1569, [Malaysia], Penang, Waterfall, June 1888 (lectotype CAL [CAL0000004607], designated by Kessler et al., Prov. Checkl. Asiat.-Austral. Annonac. (1995) 88; isolectotypes K [K000691225], SING [SING0026134]).

Xylopia tembelingensis M.R.Hend., Gard. Bull. Straits Settle. 7(2) (1933) 89, pl. 16. **Type:** *Henderson* SFN 24533, [Malaysia], Pahang, Tembeling, 27 May 1931 (holotype SING [SING0049734]; isotypes A [A00135503], BO, CAL, DD, K [K000691226], MICH [MICH1115463], MO [MO-216854], NY, OXF).

Trees to 30 m tall, bole to 65 cm diam. **Twigs** with youngest parts drying smooth, brown, covered with tomentum of short brown hairs, soon becoming more or less glabrous, grey or grey-brown with longitudinal striations. **Leaves:** lamina chartaceous to subcoriaceous, apparently glabrous though very tiny pale hairs may be seen along the midrib beneath under magnification, drying grey or grey-brown above, rather shiny, with brown midrib and lateral veins, brown beneath, ovate-lanceolate to elliptic-lanceolate, sometimes almost rhomboidal, 21–28 × 5–10 cm, midrib flush to slightly raised above, lateral veins more or less impressed, midrib and lateral

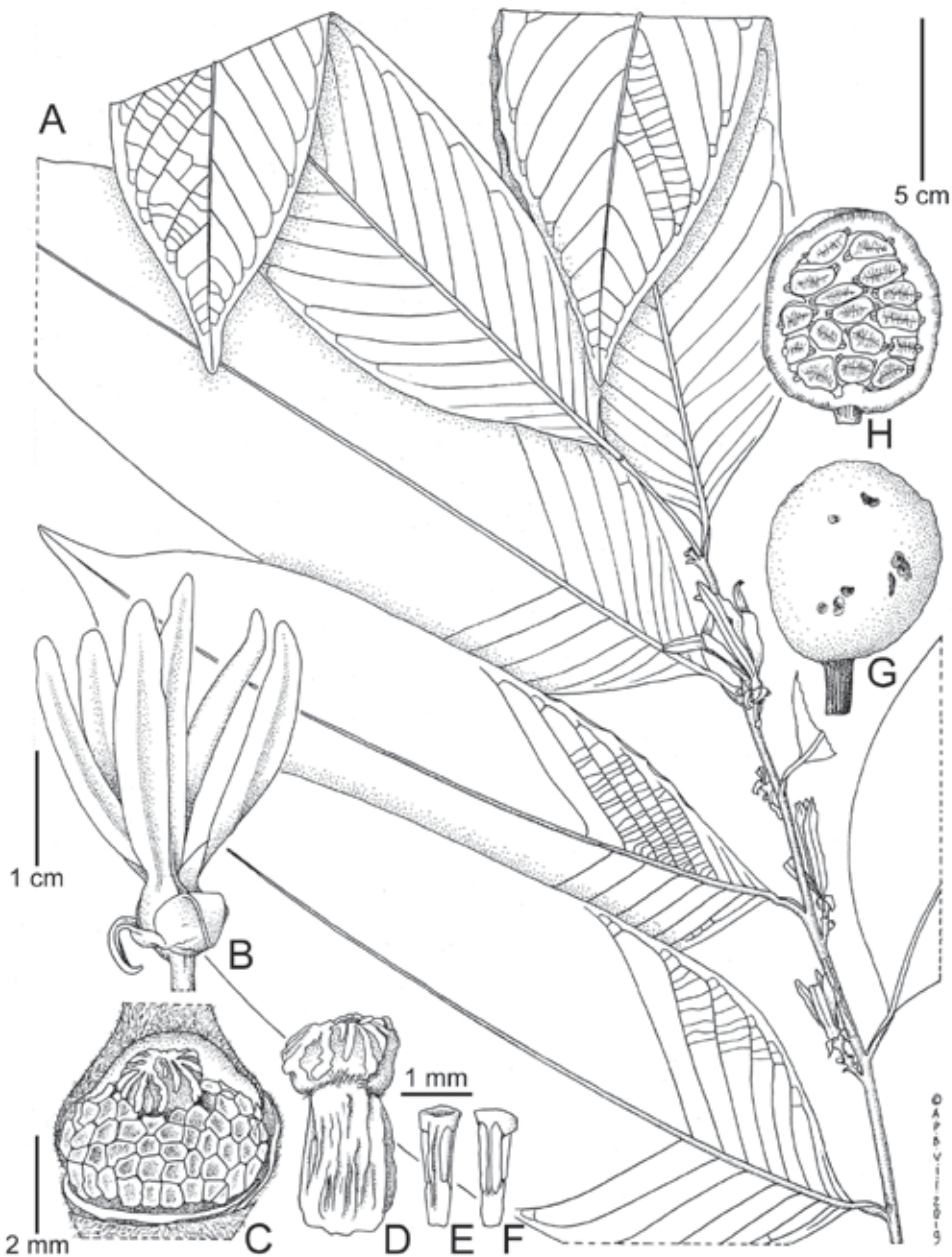


Figure 15. *Cyathocalyx sumatranus* Scheff. **A.** Habit of flowering shoot. **B.** Flower. **C.** Flower interior view with corolla removed except for one interior petal. **D.** Carpel. **E.** Stamen (adaxial view). **F.** Stamen (abaxial view). **G.** Monocarp. **H.** Monocarp in longitudinal section. (A from Singapore, Singapore Botanic Gardens' Rain Forest, *Corner s.n.*; B–F from Singapore, Singapore Botanic Gardens' Rain Forest, Liane Road, *Lee et al. SING2005-168*; G & H from Peninsular Malaysia, *Henderson 24533*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

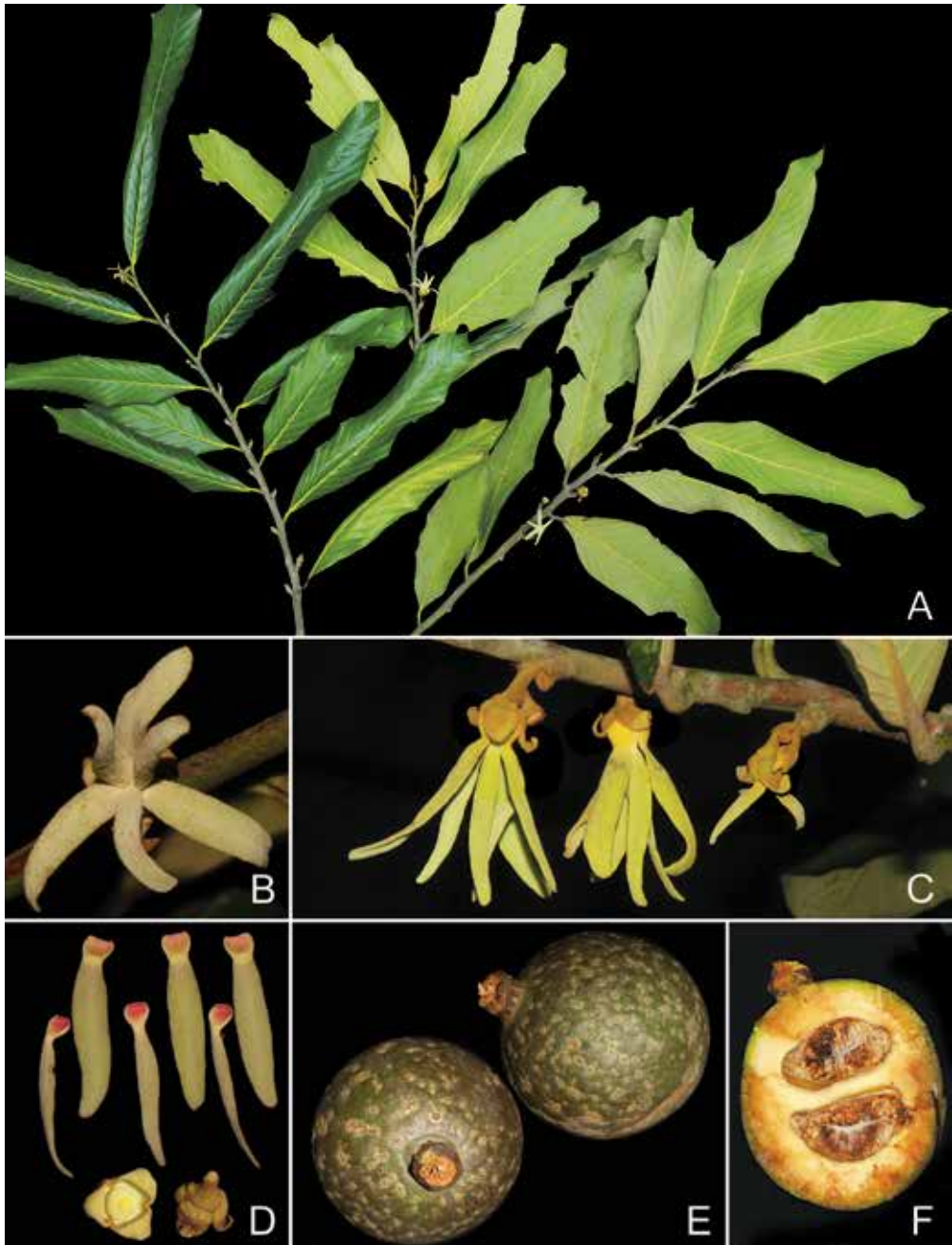


Figure 16. *Cyathocalyx sumatranus* Scheff. **A.** Branch with leaves and flowers. **B.** Immature flower (front view) on underside of twig. **C.** Flowering branch. **D.** First row, outer petals, second row inner petals, third row showing immature flower with corolla removed from above and below. **E.** Whole fruit. **F.** Sectioned fruit. (A–F from Singapore, Singapore Botanic Gardens' Rain Forest, Ooi & Lim SING2018-425. Photos: A, P.K.F. Leong; B & D–F, X.Y. Ng; C, R.C.J. Lim).

veins prominent beneath, lateral veins 18–20 pairs, arching forward and running more or less straight, looping within margin, slightly decurrent to midrib, tertiary venation more or less scalariform, distinct from beneath, obscure from above; petiole 10–18 mm long, 2–3 mm wide, drying dark brown, sometimes short pale or brown hairy. **Inflorescences** subopposite leaves or on twigs behind leaves, with short woody axes to 10 mm long, 2 mm wide. **Flowers** with pedicels c. 4 mm long, 1 mm wide, widening distally, covered in short golden-brown tomentum; sepals broadly ovate, c. 5×5 mm, fleshy at base, densely hairy on both surfaces; petals with a basal convex part (claw) and a distal blade, densely covered in short, pale brown hairs except for inside basal concavity, outer petals with basal portion ovate c. 3×3 mm, blade oblong to c. 40×4 –6 mm, externally with central longitudinal ridge sometimes visible; inner petals similar though blade typically narrower, c. 2–2.5 mm wide, external ridge more prominent; stamens many 1.5–2 mm long; carpel 1. **Fruit** with pedicels 15 mm long, 4–6 mm thick; monocarp 1, globose to 6 mm diam., surface more or less smooth, drying grey-brown, fruit wall to 5 mm thick. **Seeds** many per monocarp, c. $3 \times 1 \times 1$ cm.

Distribution. Thailand, Peninsular Malaysia and Sumatra. In Singapore, known only from Singapore Botanic Gardens' Rain Forest (*Corner s.n.*, 5 Sep 1943, SING [SING0000059]; *Lahiru SING2009-407*, 6 Jul 2009, SING [SING0138153]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

7. DASYMASCHALON (Hook.f. & Thomson) Dalla Torre & Harms

(Greek, *dasy* = hairy, *maschale* = axil, armpit; the type species has tufts of hairs in the leaf axils)

Gen. Siphon., fasc. 3 (1901) 174, nom. cons.; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 114; Nurmawati, Floribunda 2(3) (2003) 67; Wang et al., Syst. Bot. 34 (2009) 252; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 26; Wang et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 64. **Basionym:** *Unona* L.f. sect. *Dasymaschalon* Hook.f. & Thomson, Fl. Ind. 1 (1855) 134. **Synonym:** *Desmos* Lour. sect. *Dasymaschalon* (Hook.f. & Thomson) Safford, Bull. Torrey Bot. Club 39 (1912) 507. **Type:** *Unona dasymaschala* Blume (= *Dasymaschalon dasymaschalum* (Blume) I.M.Turner), lectotype designated by Finet & Gagnepain, Bull. Soc. Bot. France 53(Mém. 4(2)) (1906) 142.

Evergreen shrubs or small trees, sometimes scandent, rarely true climbers. **Leaves:** lamina chartaceous to subcoriaceous, glabrous to sparsely pubescent, often pale or glaucous beneath. **Inflorescences** single-flowered or occasionally few-flowered racemes, axillary or terminal, bracts 1–3. **Flowers:** sepals 3, connate at base, much shorter than petals; petals 3, apex acute, adhering at the margins; stamens many, connective truncate, or more rarely rounded or apiculate; carpels numerous, densely hairy, stigmas discoid or bilobed, ovules 1 to many per ovary. **Fruit** of many, stipitate monocarps, ellipsoidal or moniliform, glabrous or hairy. **Seeds** 1–2 per monocarp (or up to 8 in species with moniliform monocarps), globose to ellipsoidal, endosperm ruminations lamellate.

Distribution. A genus of 27 species occurring in China, continental Southeast Asia, Malay Peninsula, Sumatra, Java, Borneo, the Philippines and Sulawesi. In Singapore, 2 native species.

Notes. The recognition of *Dasymaschalon* at generic level has been contentious. The affinities with *Desmos* Lour. are clear, notably the moniliform monocarps in species such as *Dasymaschalon dasymaschalum*. It is the flower structure that offers the clearest distinction between the two with *Dasymaschalon* having lost the inner petal whorl, with the outer petals not constricted at the base and cohering along the edges, whereas *Desmos* has two whorls of petals, all of which have a basal constriction and are free.

Key to *Dasymaschalon* species

1. Twigs glabrous to glabrescent **1. *D. dasymaschalum***
 Twigs tomentose **2. *D. wallichii***

1. *Dasymaschalon dasymaschalum* (Blume) I.M. Turner

(Greek, *dasys* = hairy, *maschale* = axil, armpit; referring to the tufts of hairs in the leaf axils)

Gard. Bull. Singapore 58(2) (2007) 267; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 7; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 27; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 448; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 138; Wang et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 67, pl. 7: *D.* **Basionym:** *Unona dasymaschala* Blume, Fl. Javae, fasc. 23–24 (1830) 55, t. 27; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 61; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 47; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39. **Synonyms:** *Uvaria dasymaschala* (Blume) Walp., Repert. Bot. Syst. 1, fasc. 1 (1842) 77. – *Dasymaschalon blumei* Finet & Gagnep., Bull. Soc. Bot. France 53(Mém. 4(2)) (1906) 143, nom. illeg. superfl.; Nurmawati, Floribunda 2(3) (2003) 72; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 76, 283. – *Desmos dasymaschalus* (Blume) Saff., Bull. Torrey Bot. Club 39 (1912) 507; Ridley, Fl. Malay Penins. 1 (1922) 46, as ‘*dasymaschala*’; Sinclair, Gard. Bull. Singapore 14(2) (1955) 269; Keng, Gard. Bull. Singapore 27 (1974) 71, as ‘*dasymaschala*’; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12, fig. 10.6, as ‘*dasymaschala*’; Turner, Gard. Bull. Singapore 45 (1993) 29, as ‘*dasymaschala*’; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10, as ‘*dasymaschala*’; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 111, as ‘*dasymaschala*’; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 140, as ‘*dasymaschala*’; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170, as ‘*dasymaschalus*’; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 33, 103, 204, as ‘*dasymaschala*’. **Type:** *Blume s.n.*, [Indonesia], Java (lectotype L [L0186230], designated by Nurmawati, Floribunda 2(3) (2003) 73). **Fig. 17.**

Unona dasymaschala Blume var. *blumei* Hook.f. & Thomson, Fl. Ind. 1 (1855) 135; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 47. **Type:** *Gomez s.n.* [EIC 6426B], Burma [Myanmar], Tavoy, 13 October 1827 (lectotype K-W [K001123873], designated by Wang et al., Syst. Bot. 34 (2009) 255).

Unona coelophloea Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1869 [‘1870’]) 6, as ‘*coelophlaea*’. **Synonym:** *Dasymaschalon coelophloeum* (Scheff.) Merr., Philipp. J. Sci., C 10(4) (1915) 237. **Type:** *Collector unknown s.n.*, [Indonesia], Java, cult. in Hort. Bot. Bogor. (lectotype or possibly neotype,

U [U0014710], designated by Turner, Gard. Bull. Singapore 70 (2018) 448; possible isoelectotype or isoneotype U [U0014708]).

Unona cleistogama Burck ex Boerl., Cat. Pl. Phan. 1 (1899) 127, t. 72. **Synonym:** *Dasymaschalon cleistogamum* (Burck ex Boerl.) Merr., Philipp. J. Sci., C 10(4) (1915) 237. **Type:** *Collector unknown s.n.*, [Indonesia], Java, cult. in Hort. Bot. Bogor. sub IV.G.45 (not traced).

Dasymaschalon blumei Finet & Gagnep. var. *suratense* Bân, Bot. Zhurn. (Moscow & Leningrad) 60 (1975) 229. **Type:** *Snan 468*, Thailand, Surat Thani Province, Surat, Bannasarn, 20 February 1955 (holotype A [A00039284]; isotype BKF).

Shrubs or small trees, sometimes scandent. **Twigs** drying dark brown, glabrescent, sometimes youngest parts with recurved, decumbent hairs. **Leaves:** lamina chartaceous to subcoriaceous, midrib above from glabrous to having a dense covering of down-curved brown hairs, midrib and lateral veins beneath glabrous to sparsely hairy with generally slightly curled hairs, pale or glaucous beneath, drying brown or grey-brown above, typically brown with a silvery wash beneath with main veins brown, oblong or oblanceolate, $6\text{--}23 \times 2\text{--}8$ cm, base typically rounded and ultimately slightly cordate, apex obtuse to shortly acuminate, midrib and lateral veins flush to slightly sunken above, prominent beneath, lateral veins 10–12 pairs, tertiary venation scalariform but typically obscure; petioles 3–10 mm long, 2–3 mm thick, variably tomentose. **Inflorescences** axillary or terminal, mostly single-flowered, occasionally up to 3. **Flowers** with pedicels 1–6.5 cm long, c. 0.7 mm wide at narrowest, widening distally, pubescent; sepals thick and fleshy, broadly triangular, 3–5 mm long, 3–4 mm wide, apex acuminate to apiculate, tending to reflex, tomentose outside, glabrous within except near margin; petals subcoriaceous to coriaceous, lanceolate, $3.5\text{--}7 \times 1.5\text{--}3.5$ cm, apex acuminate, sparsely covered with short adpressed hairs; stamens many, c. 4 mm long; carpels many, densely hairy. **Fruit** with pedicels 1.5–3(–12) cm long; monocarps many, moniliform, to 35 mm long, c. 5 mm diam., apex apiculate, drying brown, adpressed hairs densest between seeds, stipes 4–6 mm long. **Seeds** 2–5 per monocarp.

Distribution. Andaman Islands and Myanmar to Java and Borneo. In Singapore, collected from various locations including Chua Chu Kang (*Ridley 2121*, 1891, SING [SING002435]), MacRitchie (*Boo SING2011-355*, 15 Sep 2011, SING [SING0166305]), Bukit Timah (*Samsuri Ahmad SA 1314*, 25 Nov 1976, SING [SING0003143]), Chestnut (*Gwee SING2010-514*, 9 Mar 2010, SING [SING0144628]) and Pulau Ubin (*Gwee GAT 63*, 5 Nov 2002, SING [SING0003143]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Vernacular name. *Akar mempisang* (NParks' Flora & Fauna Web, 2026).

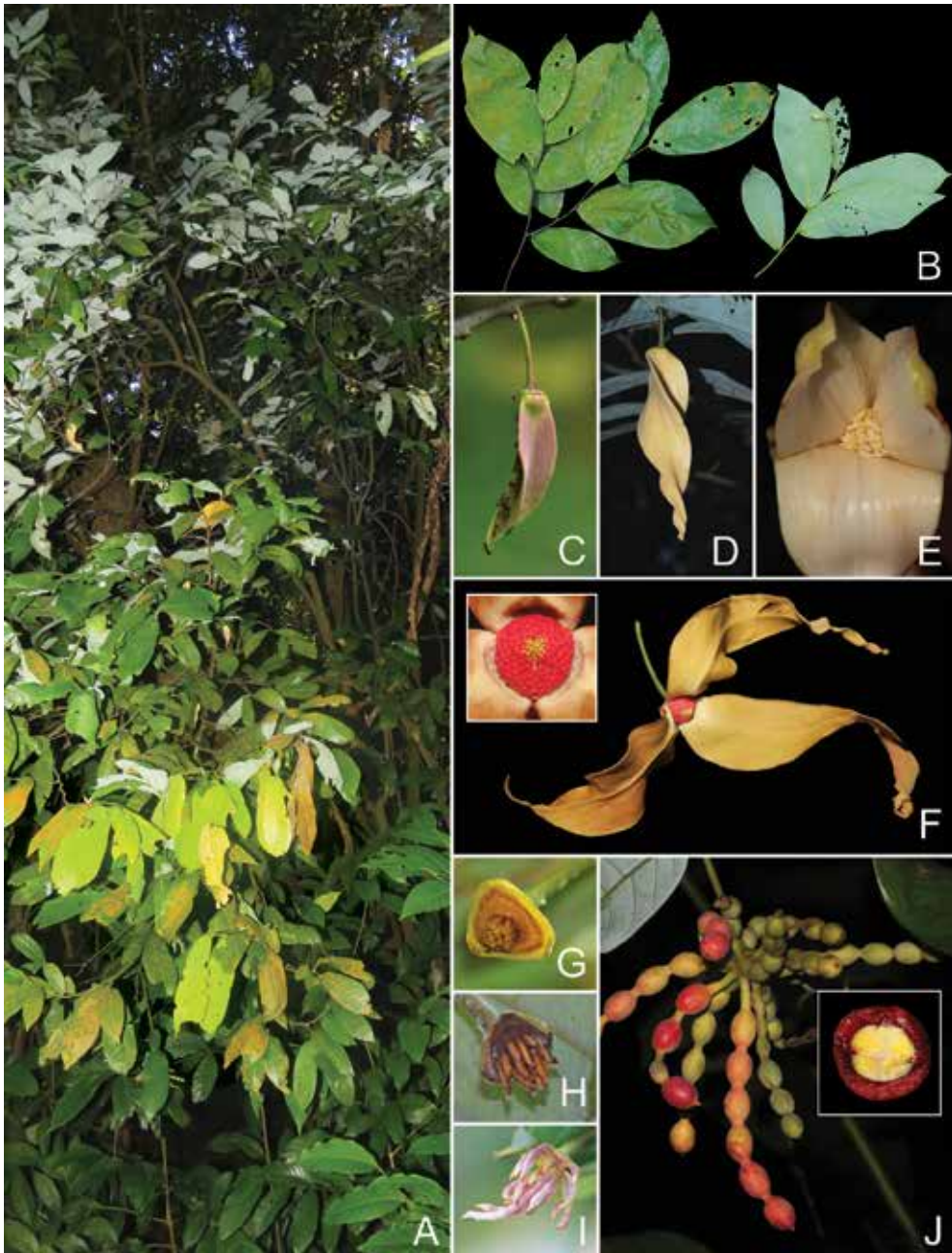


Figure 17. *Dasydaschalum dasymaschalum* (Blume) I.M.Turner. **A.** Habit. **B.** Leafy branch. **C & D.** Flowering stages. **E.** Flower at anthesis. **F.** Flower fully opened. Inset: Close-up of red anthers and yellow stigma. **G–I.** Fruit developmental stages. **J.** Fruit turning red. Inset: Cross-section of seed-bearing portion of monocarp. (A–J including insets from Singapore, A, C–J including insets, MacRitchie, Ng *et al.* SING2017-627; B, Bukit Timah. Photos: A & F, R.C.J. Lim; B, P.K.F. Leong; C, E, F inset, G–J & J inset, X.Y. Ng; D, J. Chen).

2. *Dasymaschalon wallichii* (Hook.f. & Thomson) Jing Wang & R.M.K.Saunders

(Nathaniel Wallich, 1786–1854, Superintendent of the Calcutta Botanic Garden)

Syst. Bot. 34 (2009) 263; Turner, Gard. Bull. Singapore 70 (2018) 453; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 138; Wang et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 75, pl. 8; E, F. **Basionym:** *Unona dasymaschala* Blume var. *wallichii* Hook.f. & Thomson, Fl. Ind. 1 (1855) 135; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 62; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 47. **Synonyms:** *Desmos dasymaschalus* (Blume) Saff. var. *wallichii* (Hook.f. & Thomson) Ridl., Fl. Malay Penins. 1 (1922) 46; Sinclair, Gard. Bull. Singapore 14(2) (1955) 270; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 111. – *Dasymaschalon blumei* Finet & Gagnep. var. *wallichii* (Hook.f. & Thomson) Bân, Bot. Zhurn. (Moscow & Leningrad) 60 (1975) 228; Nurmawati, Floribunda 2(3) (2003) 75. – *Dasymaschalon dasymaschalum* (Blume) I.M.Turner var. *wallichii* (Hook.f. & Thomson) I.M.Turner, Gard. Bull. Singapore 58(2) (2007) 277. **Type:** *Wallich s.n.* [EIC 6421A], Singapore, October 1822 (lectotype K-W [K001123862], designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 271). **Fig. 18.**

Unona longiflora auct. non Roxb.: Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39.

Small trees or treelets. **Twigs** drying dark grey or dark red-brown with a scattering of pale lenticels, generally with a tomentum of dense, more or less erect, brown or golden-brown hairs though some specimens are only sparsely hairy. **Leaves:** lamina chartaceous to pergamentaceous, glabrous or with line of erect hairs on midrib above, generally with hairs along midrib beneath, sometimes scattered on lower lamina surface also, drying brown or grey-brown above, brown to pale silvery grey (glaucous) beneath with contrasting brown main veins, narrowly oblong-elliptic to oblong-obovate, 7–26 × 2–9 cm, base obtuse to rounded, ultimately slightly auriculate, apex obtuse to sharply acuminate, midrib slightly sunken above in dry leaves, prominent beneath, lateral veins more or less flush above, slightly raised beneath, lateral veins 10–12 pairs, arching forward and looping obscurely within the margin; petiole 4–6 mm long, c. 2 mm wide, densely to sparsely hairy. **Inflorescences** axillary, single-flowered. **Flowers** with pedicels 2–8 cm long, 1 mm wide, widening distally, drying red-brown with scattered pale or brown hairs; sepals broadly ovate, c. 3 × 4 mm, hairy outside, more or less glabrous within, basally thick and fleshy, apex acute; petals ovate-lanceolate to 10 cm long, 4 cm wide, apex acute, externally with dense covering of short, more or less adpressed hairs; stamens many; carpels many, brown hairy. **Fruit** with pedicels 1.5–8 cm long, c. 1 mm wide, widening distally, drying red-brown with scattered tiny pale hairs; monocarps many, moniliform, 8–30 mm long with 1–4 seeds, drying red-brown with small pale hairs, apex apiculate, stipe to 5 mm long, 1.5 mm wide, sometimes with long, straight adpressed hairs. **Seeds** ellipsoidal, c. 7 mm long, 4 mm diam.

Distribution. Thailand and Peninsular Malaysia. In Singapore, known from various locations including Bukit Timah (*Lai LJ378*, 1998, SING [SING0019875]), Nee Soon (*Samsuri et al. NES 95*, 8 Jan 2003, SING [SING0045803]), MacRitchie (*Yeo et al. SING2012236*, 22 May 2012, SING [SING0182104]) and Pulau Ubin (*Lai SING2014-293*, 1 Sep 2014, SING [SING0241758]).

Ecology. Lowland forest.

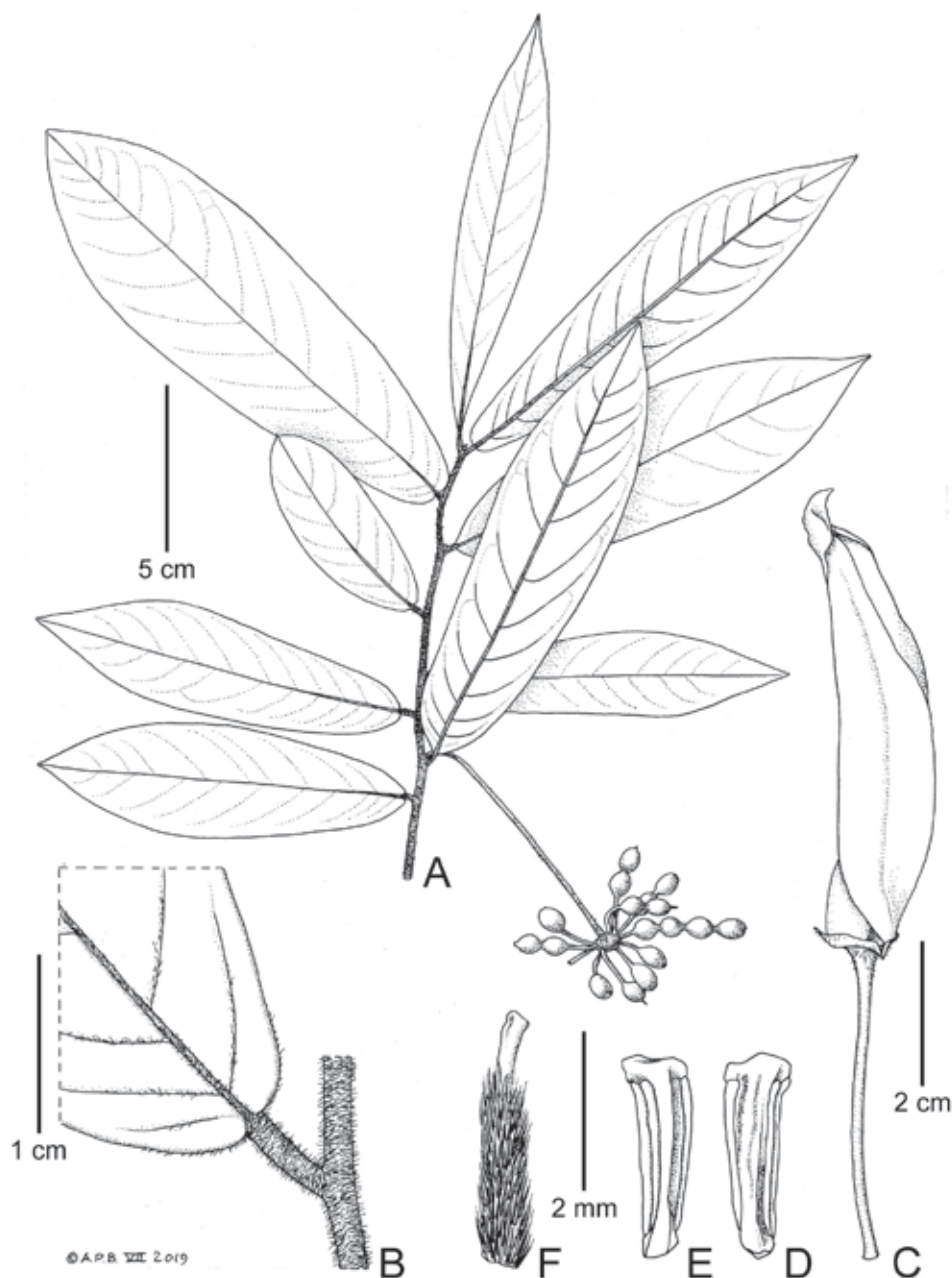


Figure 18. *Dasymaschalon wallichii* (Hook.f. & Thomson) Jing Wang & R.M.K.Saunders. **A.** Habit of a fruiting shoot showing moniliform monocarps. **B.** Section of twig with section of leaf (upper surface). **C.** Flower. **D.** Stamen (adaxial view). **E.** Stamen (abaxial view). **F.** Carpel. (A–F from Peninsular Malaysia, A & B, *Ridley 6347*; C–F, *Suppiah FRI 14878*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

8. DENDROKINGSTONIA Rauschert

(Greek, *dendron* = tree, Robert Creaser Kingston, c. 1846–1872, English plant collector)

Taxon 31 (1982) 555; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 113; Chaowasku et al., Bot. J. Linn. Soc. 168 (2012) 78; Chaowasku in Johnson & Murray, Fl. Thailand 16(1) (2022) 77.

Synonym: *Kingstonia* Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 93, nom. illeg. non Gray (1821); King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 128; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 167; Ridley, Fl. Malay Penins. 1 (1922) 100; Sinclair, Gard. Bull. Singapore 14(2) (1955) 184. **Type:** *Dendrokingstonia nervosa* (Hook.f. & Thomson) Rauschert

Trees. **Twigs** glabrous or with simple hairs. **Leaves:** lamina elliptic to oblong, base cuneate, rounded, obtuse or subcordate; midrib sunken above; tertiary veins somewhat percurrent. **Inflorescences** axillary, with a solitary flower or fasciculate with several to many flowers, epedunculate. **Flowers** bisexual; sepals 3, connate or free, slightly imbricate at base when free, persistent in fruit; petals 6 in two whorls, outer petals heart-shaped, (oblong-)ovate or lanceolate, inner petals (oblong-)ovate, lanceolate or narrowly oblong; stamens many, anther connective apex flat; carpels 1 or 2, stigmas (irregularly) peltate, ovules 3–10 per carpel, lateral, uni- or biseriate; torus flat or elevated, enlarged as carpophore in fruit when elevated. **Fruit** of 1 or 2 monocarps, sessile on carpophore or an unenlarged torus, subglobose to (irregularly) cylindrical, often wrinkled when dry, densely tomentose, pericarp wall thick and hard when dry. **Seeds** 2–9 per monocarp (5–6 in Singapore), in 1 or 2 column(s), exarillate; endosperm ruminations lamellate.

Distribution. A genus of 3 species occurring from Peninsular Thailand extending southwards to Sumatra. In Singapore, 1 native species.

Taxonomy. Formerly monotypic, the genus was recently expanded by Chaowasku et al. (Bot. J. Linn. Soc. 168 (2012) 76–90) to include two additional species. This revised generic circumscription was based on a combination of morphological characters that are considered rare in the Annonaceae, viz. leaves with percurrent tertiary venation, enlarged stigmas, presence of few carpels per flower, and huge monocarps with a hard, thick pericarp. Chatrou et al. (Bot. J. Linn. Soc. 169 (2012) 5–40) assigned the genus to the monogeneric tribe Dendrokingstonieae. Phylogenetic studies based on plastid DNA data consistently suggest that the tribes Dendrokingstonieae, Miliuseae, Monocarpieae and Phoenicantheae form a strongly supported clade. Guo et al. (Sci. Rep. 7 (2017) art. 7323) retrieved Dendrokingstonieae as sister to a clade comprising the tribes Miliuseae and Monocarpieae whereas Chaowasku et al. (Candollea 73 (2018) 261–275) recovered Dendrokingstonieae and Miliuseae as sister clades. A recent genus-level phylogenomic study of the Annonaceae revealed that Dendrokingstonieae is sister to Miliuseae with strong support (Nge et al., Taxon 73 (2024) 1341–1369).

Dendrokingstonia nervosa (Hook.f. & Thomson) Rauschert(Latin, *nervosus* = with conspicuous nerves, veins or ribs; referring to the secondary veins)

Taxon 31 (1982) 555; Chaowasku et al., Bot. J. Linn. Soc. 168 (2012) 82; Lim et al., Gard. Bull. Singapore 70 (2018) 70; Turner, Gard. Bull. Singapore 70 (2018) 454; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 118; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 138. **Basionym:** *Kingstonia nervosa* Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 93; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 128; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 167, pl. 216: A; Ridley, Fl. Malay Penins. 1 (1922) 100; Sinclair, Gard. Bull. Singapore 14(2) (1955) 184. **Synonym:** *Bocagea nervosa* (Hook.f. & Thomson) Pierre, Fl. Forest. Cochinch., fasc. 1 (1880) sub pl. 16. **Type:** *Maingay 1054* [Kew Distribution 22], [Malaysia], Malacca [Melaka], 26 September 1865 or 1866 (lectotype K [K000574907], first step designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 185, second step designated by Chaowasku et al., Bot. J. Linn. Soc. 168 (2012) 82). **Fig. 19, 20.**

Trees to 24 m tall, bole to 90 cm diam. **Twigs** drying greyish brown to greyish black, sparsely covered with short, sub-erect hairs or rarely a mixture of long, adpressed hairs and short, sub-erect hairs when young, becoming glabrous, longitudinally ridged. **Leaves:** lamina chartaceous, glabrous on both surfaces except the occasionally sparsely tomentose midrib and lateral veins beneath and the occasionally sparsely tomentose midrib near the petiole above, drying greyish brown to chestnut brown, oblong-elliptic to elliptic, $9.2\text{--}21 \times 3\text{--}6.8$ cm, base rounded to obtuse, apex acuminate, acumen 2–9 mm long, midrib sunken above, prominent beneath, lateral veins 11–15 pairs, flush to sunken above, prominent beneath, tertiary veins subscalariform, visible to obscure on both surfaces; petiole $4\text{--}10 \times 1.5\text{--}2.5$ mm, sparsely covered by short, sub-erect hairs when young. **Inflorescences** fasciculate, with 5–10 flowers per fascicle, axillary (in the axils of fallen leaves); bracts and bracteoles ovate to hemispherical, sparsely tomentose outside, glabrous inside, bracteole placed immediately below the sepal. **Flowers** with pedicels 5–9 mm long, less than 1 mm thick, densely tomentose, sepals free, slightly imbricate at base, ovate, c. 3 mm long, c. 2 mm wide, sparsely adpressed-pubescent outside, glabrous inside, apex obtuse to acute; petals pale yellow, lanceolate, densely adpressed-pubescent inside and outside, apex rounded; outer petals 8–10 mm long, 2–3 mm wide; inner petals c. 7 mm long, c. 2 mm wide; stamens c. 1 mm long, c. 1 mm wide; carpels solitary per flower, c. 2 mm long; ovary cylindrical, adpressed-pubescent; stigma irregularly peltate, c. 1 mm diam.; ovules 6 or 7 per carpel, lateral, biseriate; torus flat, not enlarged in fruit. **Fruit** with 1 monocarp borne on subglabrous pedicels 6.5–14 mm long, 3–4 mm thick; monocarp ripening brown, subglobose to cylindrical, densely tomentose, $40\text{--}57 \times 34\text{--}38$ mm, drying brown, wrinkled, sessile, apex rounded, pericarp 4–5 mm thick. **Seeds** 5–6 per monocarp, in 2 columns, brown, $24\text{--}31 \times$ c. 12 mm, rough.

Distribution. Peninsular Malaysia. In Singapore, known only from Bukit Timah (*Woon SING2010-865*, 8 Oct 2010, SING [SING0153601]).

Ecology. In Singapore, in primary forest.

Conservation assessment. Globally, Near Threatened (NT B2ab(iii)) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

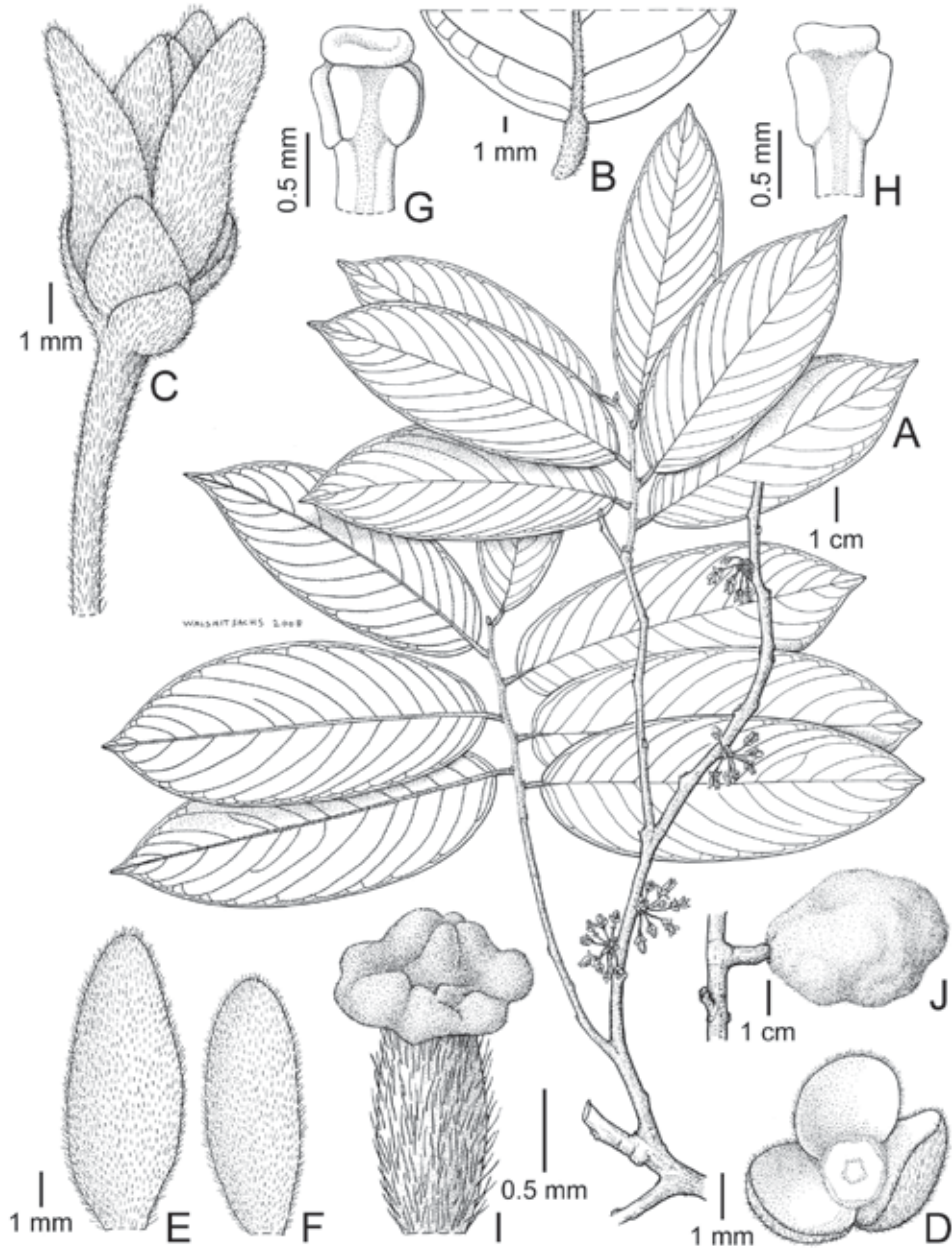


Figure 19. *Dendrokingstonia nervosa* (Hook.f. & Thomson) Rauschert. **A.** Habit. **B.** Section of leaf (upper surface). **C.** Nearly mature flower. **D.** Front view of flower with petals, stamens and carpel detached, showing flat torus and slightly overlapping sepals at the base. **E.** Outer petal (adaxial view). **F.** Inner petal (adaxial view). **G.** Stamen (abaxial view). **H.** Stamen (adaxial view). **I.** Carpel. **J.** Monocarp. (A–J from Peninsular Malaysia, A–I, *Rogstad 961*; J, *Whitmore FRI 0608*. Drawn by A. Walsmit Sachs, reproduced with the consent of Naturalis Biodiversity Center and Blumea).

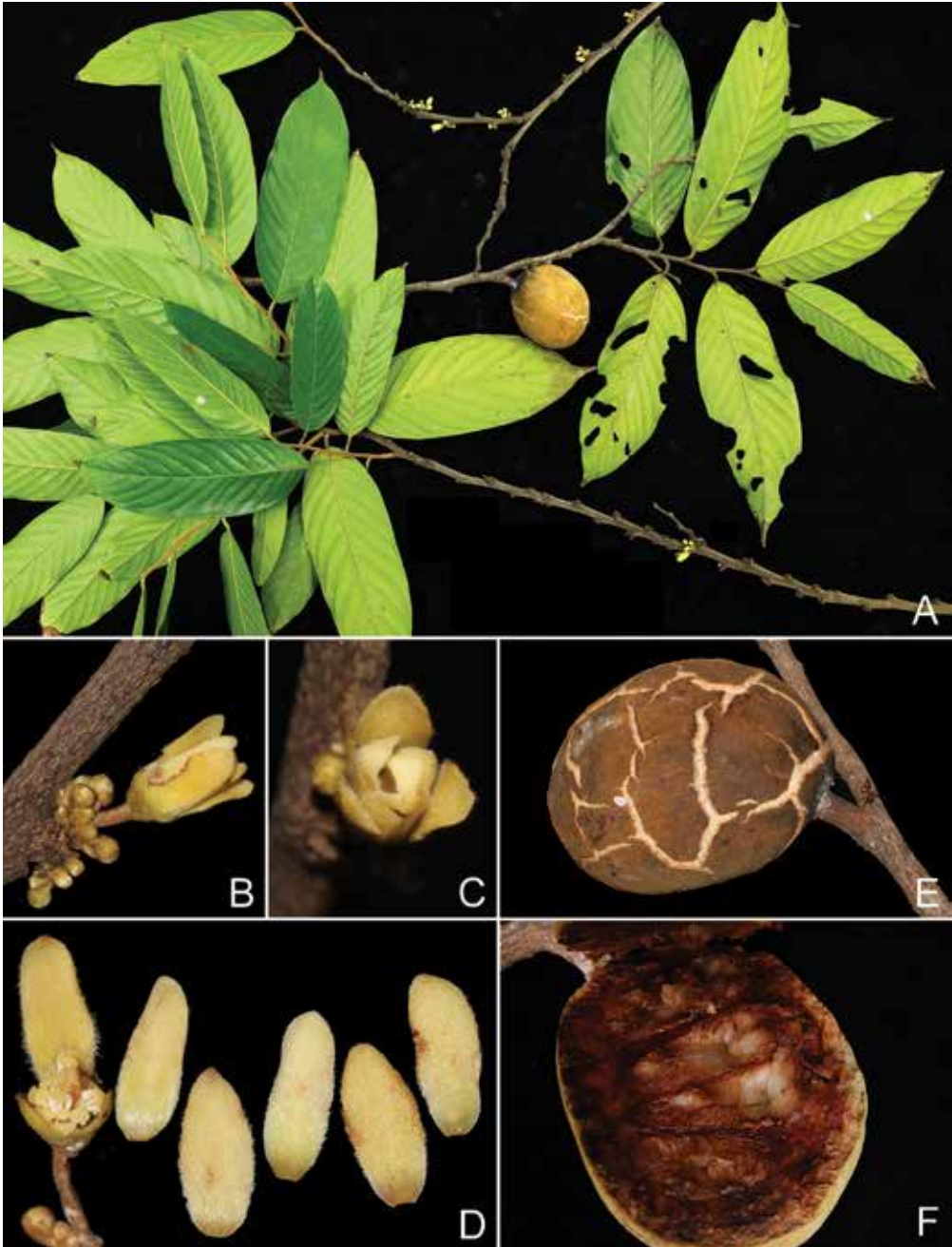


Figure 20. *Dendrokingstonia nervosa* (Hook.f. & Thomson) Rauschert. **A.** Leafy branches bearing flowers and fruit. **B.** Flower (side view). **C.** Flower (front view). **D.** Dissected flower. **E.** Fruit. **F.** Ruminant endosperm of the unripe seeds. (A–F from Singapore, A–D, Singapore Botanic Gardens, Chen & Koh JH 73; E & F, Chen JH 74. Photos: A & F, P.K.F. Leong; B–E, J. Chen).

Notes. The description above is based on material from throughout the distribution of the species as there is only a single flowering specimen from Singapore. The description of carpel characters is taken from Chaowasku et al. (Bot. J. Linn. Soc. 168 (2012) 76–90).

9. DESMOS Lour.

(Greek, *desmos* = a band, halter or fetter; referring to the moniliform monocarps being reminiscent of a chain)

Fl. Cochinch. 1 & 2 (1790) 329 as '*Desmis*', 352, [745]; Ridley, Fl. Malay Penins. 1 (1922) 44; Sinclair, Gard. Bull. Singapore 14(2) (1955) 261; Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1766; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 114; Li & Gilbert, Fl. China 19 (2011) 681; Turner, Gard. Bull. Singapore 64 (2012) 394; Murray et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 78. **Synonyms:** *Unona* L.f. [unranked] *Desmos* (Lour.) Dunal, Monogr. Anonac. (1817) 97, 100. – *Unona* L.f. sect. *Desmos* (Lour.) DC., Syst. Nat. 1 (1817 ['1818']) 485, 493. **Type:** *Desmos cochinchinensis* Lour., lectotype designated by Safford, Bull. Torrey Bot. Club 39 (1912) 505.

Evergreen woody climbers or scandent shrubs. **Twigs** glabrous or hairy. **Leaves:** lamina chartaceous to coriaceous, often with paired glands in lamina margin, one each side of the petiole. **Inflorescences** 1- or 2-flowered, leaf-opposed or supra-axillary. **Flowers** bisexual; sepals 3, valvate, more-or-less connate at the base, much shorter than petals; petals valvate in two whorls of 3, subequal, inner petals with bases compressed over reproductive structures; stamens numerous, connective truncate or rounded; carpels numerous, stigmas globose or clavate, ovules up to 8 per ovary, lateral, uniseriate. **Fruit** with many monocarps, indehiscent, glabrous or hairy, moniliform or ellipsoidal, stipitate. **Seeds** 1–8 per monocarp, glabrous, smooth, drying brown, exarillate; endosperm ruminations lamellate.

Distribution. A genus of 17 species from India and Sri Lanka to south China and the Philippines. In Singapore, 3 species of which 2 are native and 1 is casual.

Ecology. Generally lianas of lowland forest.

Notes. Wallich collected a specimen (EIC 6420E, K-W [K001123859] of *Desmos cochinchinensis* Lour. (synonym *Unona desmos* Dunal, nom. illeg. superfl.: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 44) said to be from Singapore. However, as the species has never been found again in Singapore and is also not known in southern Peninsular Malaysia, it is concluded that there was an error in Wallich's locality (probably a mistake for Penang) and the record of this species for Singapore is not accepted here.

Key to *Desmos* species

1. Leaves with venation obscure; flowers axillary **3. *D. dunalii***
 Leaves with venation distinct; flowers opposite leaves 2
2. Leaves glabrous **1. *D. chinensis***
 Leaves tomentose **2. *D. dumosus***

1. *Desmos chinensis* Lour. (of China)

Fl. Cochinch. 1 (1790) 352; Ridley, Fl. Malay Penins. 1 (1922) 46; Sinclair, Gard. Bull. Singapore 14(2) (1955) 266; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 111; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Lee et al., Gard. Bull. Singapore 55 (2003) 291; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 81, 284; Turner, Gard. Bull. Singapore 70 (2018) 455; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 138; Murray et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 79, pl. 9: A, B. **Synonym:** *Unona chinensis* (Lour.) DC., Syst. Nat. 1 (1817 [‘1818’]) 495. **Type:** *Staunton s.n.*, China (neotype BM [BM000546922], designated by Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1771).

Uvaria monilifera Gaertn., Fruct. Sem. Pl. 2, fasc. 1 (1790) 156, t. 114: fig. [2]. **Type:** [Published illustration] *Uvaria manilifera* in Gaertner, Fruct. Sem. Pl. 2, fasc. 1 (1790) t. 114: fig. [2], lectotype designated by Turner, Phytotaxa 36 (2011) 19. **Epitype:** *Jacobs 4729*, Indonesia, Java, East Java, Besuki, Nusa Barung Island, between Teluk Tjambak and Teluk Kandangan, 11 May 1957 (epitype K [K000779809], designated by Turner, Phytotaxa 36 (2011) 19; isoepitypes A, BO, L [L0181912], LAE, NY, PNH, SING [SING0390819]).

Unona discolor Vahl, Symb. Bot. 2 (1791) 63, t. 36; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39. **Synonym:** *Uvaria discolor* (Vahl) Walp., Repert. Bot. Syst. 1, fasc. 1 (1842) 77. **Type:** *König s.n.*, ‘India Orientali’ (holotype C [C10005693]).

Unona lessertiana Dunal, Monogr. Anonac. (1817) 107, t. 26. **Type:** *Collector unknown s.n.*, locality unknown (holotype G [G00386658]; possible isotype G-DC [G00201428]).

Unona biglandulosa Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 16. **Type:** *van Hasselt s.n.* [Herb. Blume no. 1206], [Indonesia], Java, Tjikao (lectotype L [L0186343], designated by Turner, Phytotaxa 36 (2011) 19).

Unona discolor Vahl var. *bracteata* Blume, Fl. Javae, fasc. 23–24 (1830) 55, t. 26. **Type:** [Published illustration] *Unona discolor* var. *β* in Blume, Fl. Javae, fasc. 23–24 (1830) t. 26, lectotype designated by Turner, Nordic J. Bot. 33 (2015) 263.

Unona amherstiana A.DC., Mem. Soc. Phys. Genève. 5 (1832) 204. **Synonym:** *Uvaria amherstiana* (A.DC.) Walp., Repert. Bot. Syst. 1, fasc. 1 (1842) 77. **Type:** *Wallich s.n.* [EIC 6424], Burma [Myanmar], Amherst, 14 July 1827 (lectotype K-W [K001123870], designated by Turner, Phytotaxa 32 (2011) 47; isolectotypes BM, CAL [CAL0000064620]).

Unona undulata Wall., Pl. Asiat. Rar. 3, fasc. 11 & 12 (1832) 42, t. 265, nom. illeg. non (P.Beauv.) Dunal (1817). **Synonym:** *Uvaria undulata* Walp., Repert. Bot. Syst. 1, fasc. 1 (1842) 77, nom. illeg. non Lam. (1785). **Type:** *Collector unknown s.n.* [EIC 6423B], India, cultivated in Hort. Bot. Calc. (lectotype K-W [K001123868], designated by Turner, Phytotaxa 36 (2011) 19; isolectotypes BM [BM001118255], CAL [CAL0000064621], CGE [$\times 2$], K [K000797996]).

Uvaria cordifolia Roxb., Fl. Ind. 2 (1832) 662. **Type:** *Roxburgh 3663*, India orientalis (lectotype BM [BM001050359], designated by Turner, Phytotaxa 36 (2011) 19).

Unona discolor Vahl var. *pubiflora* Hook.f. & Thomson, Fl. Ind. 1 (1855) 133. **Type:** Not designated.

Unona discolor Vahl var. *laevigata* Hook.f. & Thomson, Fl. Ind. 1 (1855) 133. **Synonym:** *Desmos chinensis* Lour. var. *laevigatus* (Hook.f. & Thomson) Debika Mitra, Bull. Bot. Survey India 35 (1997) 117, as '*laevigata*'. **Type:** *Collector unknown s.n.* [EIC 6423B], India, cultivated in Hort. Bot. Calc. (lectotype CAL [CAL0000064621], designated by Mitra, Bull. Bot. Surv. India 35 (1997) 117; isolectotypes BM [BM001118255], K [K000797996], K-W [K001123868]).

Unona discolor Vahl var. *pubescens* Hook.f. & Thomson, Fl. Ind. 1 (1855) 133. **Type:** *Collector unknown* [Hooker] 143, India, Sikkim (lectotype K [K000739190], designated by Turner, Phytotaxa 36 (2011) 20).

Unona discolor Vahl var. *latifolia* Hook.f. & Thomson, Fl. Ind. 1 (1855) 133. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka] (lectotype K [K000779807], designated by Turner, Phytotaxa 36 (2011) 19).

Unona discolor Vahl var. *parviflora* Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 376. **Type:** *Teijsmann s.n.*, [Indonesia], Sumatra, Poeloe [Pulau] Pisang prope Padang (lectotype K [K003527572], designated here).

Magnolia echinina P.Parm., Bull. Sci. France Belgique 27(2) (1896) 204, 265, 325, 333, pl. 9: fig. 25. **Type:** *Ralph s.n.*, India [possibly an error] (holotype P [P01753395]).

Unona discolor Vahl var. *macropetala* Teijsm. & Binn. ex Boerl., Cat. Pl. Phan. 1 (1899) 16. **Synonym:** *Desmos chinensis* Lour. var. *macropetalus* (Teijsm. & Binn. ex Boerl.) Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1774. **Type:** *Collector unknown s.n.* [Bogor. distrib. no. 174a], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub XI.A.32a, 1899 (lectotype US [US03900370], designated by Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1174).

Unona discolor Vahl var. *brevifolia* Teijsm. & Binn. ex Boerl., Cat. Pl. Phan. 1 (1899) 17. **Synonym:** *Desmos chinensis* Lour. var. *brevifolius* (Teijsm. & Binn. ex Boerl.) Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1773. **Type:** *Collector unknown s.n.* [Bogor. distrib. no. 170b], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub XI.A.35, 1899 (lectotype US [US03900364], designated by Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1773).

Unona discolor Vahl var. *angustipetala* Boerl., Cat. Pl. Phan. 1 (1899) 17. **Type:** *Collector unknown s.n.* [Bogor. distrib. no. 168], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub XI.A.33a (lectotype L [L0186415], designated by Turner, Phytotaxa 36 (2011) 20; isolectotype K [K003527603]).

Unona discolor Vahl var. *siamensis* Scheff. ex Boerl., Cat. Pl. Phan. 1 (1899) 17. **Type:** *Collector unknown s.n.* [Bogor. distrib. no. 182], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub XI.A.40a (lectotype L [L0181979], designated by Turner, Phytotaxa 36 (2011) 20),

Unona discolor Vahl var. *neglecta* Boerl., Cat. Pl. Phan. 1 (1899) 17. **Type:** *Collector unknown s.n.* [Bogor. distrib. no. 168], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub XI.A.17 (lectotype L [L0181967], designated by Turner, Phytotaxa 36 (2011) 20).

Artabotrys esquirolii H.Lév., Fl. Kouy-Tcheou (1914–1915) 29. **Type:** *Esquirol 2039*, China, Kouy-Tcheou [Gui Zhou], 17 April 1910 (lectotype E [E00181425], designated by Turner, Phytotaxa 36 (2011) 20).

Desmos chinensis Lour. var. *jarawae* Chakrab. & P.G.Diwakar, J. Econ. Taxon. Bot. 34 (2010) 812, fig. 1 (2010). **Type:** *Chakrabarty 4202*, India, Andaman Islands, Middle Andaman, Jarawa Reserve, Jhulan Pathar, 27 August 2002 (holotype CAL [CAL0000033183]; isotype CAL [CAL0000033184]).

Scandent shrubs or large climbers to 40 m long. **Twigs** slender, striate, dark, slightly pubescent at the tips. **Leaves:** lamina thinly chartaceous, glabrous, glaucous beneath, oblong, 6–13 × 3–6 cm, base rounded, sometimes emarginate, apex acute to acuminate, midrib immersed above, prominent beneath, sparsely hairy beneath, lateral veins 8–10 pairs, faint above, prominent beneath; petioles 5 mm long, slender. **Inflorescences** opposite the leaves, single-flowered. **Flowers** pendulous; pedicels 3–6 cm long, less than 0.5 mm thick, slender, glabrous or puberulous; sepals ovate-lanceolate, 5–10 mm long, apex acute, puberulous to glabrous; petals greenish yellow, clawed, narrowly lanceolate, 4–8 cm long, glabrous or sparsely pubescent; stamens numerous, c. 1 mm long; carpels many. **Fruit** with pedicels to 6 cm long; c. 20 moniliform monocarps, 30–40 mm long, glabrous or minutely pubescent, terminal section apiculate, stipes 10–14 mm long. **Seeds** 2–6 per monocarp.

Distribution. Widespread from India to the Philippines. In Singapore, it seems probable that it is not native but is found as a relic of cultivation, therefore casual, notably on Pulau Ubin (*Choong 38*, 18 Jun 1990, SING [SING0354699, SING0354700, SING0354701]; *Ali et al. SING2020-173*, 8 Jan 2020, SING [SING0310298]).

Ecology. Lowland forest, but also widely cultivated for its fragrant blooms.

Conservation assessment. Globally, not assessed. Presumed not native in Singapore.

Vernacular names. *Akar darah*, *akar pisang-pisang*, *chinese desmos*, *kenanga hutan*, 假鹰爪 (NParks' Flora & Fauna Web, 2026).

Notes. Bân (Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1771) designated a specimen in BM as lectotype of *Desmos chinensis* Lour. in the mistaken belief that it was a collection made by Loureiro. The specimen was actually collected by George Staunton and does not represent original material for *Desmos chinensis*. There is a Loureiro specimen of *Desmos chinensis* in the Paris Herbarium but it is not labelled with the name by Loureiro. As the P specimen was not associated with the name by the author, it also fails to qualify as original material (ICN Art. 9.4). Bân's typification can therefore be corrected to one of neotype.

As a widespread species with a long history of cultivation, it is not surprising that *Desmos chinensis* has a long list of synonyms including many infraspecific taxa.

2. *Desmos dumosus* (Roxb.) Saff.

(Latin, *dumosus* = bushy; referring to the general form of the plant, a very bushy climber)

Bull. Torrey Bot. Club 39 (1912) 506; Ridley, Fl. Malay Penins. 1 (1922) 46; Burkill, Dict. Econ. Prod. Malay Penins. 1 (1935) 797, as '*dumosa*'; Sinclair, Gard. Bull. Singapore 14(2) (1955) 268; Keng, Gard. Bull. Singapore 27 (1974) 71; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72, as '*demosa*'; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 111; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 33, 103, 204; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 81, 284; Turner, Gard. Bull. Singapore 70 (2018) 458; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 138; Murray et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 82, fig. 16, pl. 9: F. **Basionym:** *Unona dumosa* Roxb., Fl. Ind. 2 (1832) 670; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 45; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39. **Type:** [Unpublished illustration] Icones Roxburghianae no. 2294 (lectotype K, designated by Turner, Phytotaxa 36 (2011) 21). **Epitype:** *Collector unknown s.n.* [EIC 6429B], India, cult. in Hort. Bot. Calcutta (epitype K-W [K000852825, K000852826], designated by Turner, Phytotaxa 36 (2011) 21; isoepitypes BM, K [K003819963]). **Fig. 21, 22.**

Unona subbiglandulosa Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 11. **Synonym:** *Desmos subbiglandulosus* (Miq.) Merr., Philipp. J. Sci., C 10(4) (1915) 235; Nikmah et al., Floribunda 6(3) (2019) 102. **Type:** *Korthals s.n.*, [Indonesia], Borneo, Martapoera (lectotype L [L0182002], designated by Turner, Phytotaxa 36 (2011) 21).

Desmos dumosus (Roxb.) Saff. var. *glabrior* Craib, Fl. Siam. 1(1) (1925) 39. **Type:** *Kerr 2591*, Siam [Thailand], [Chiang Mai], Doi Sutep, Payap, 13 May 1912 (lectotype K [K000595478], designated by Turner, Gard. Bull. Singapore 70 (2018) 459; isolectotype BM [BM000546926]).

Oxymitra monilifera Merr., Univ. Calif. Publ. Bot. 15 (1929) 73. **Synonym:** *Dasymaschalon moniliferum* (Merr.) P.T.Li, Acta Phytotax. Sin. 14(1) (1976) 104. **Type:** *Elmer 20525*, [Malaysia], Borneo, Sabah, near Tawao, October 1922–March 1923 (lectotype MO [MO-176168], designated by Turner, Phytotaxa 36 (2011) 21; isolectotypes A [A00039336], B [B 10 1093185], BISH [BISH1000684], BM [BM000815201], BO, BRI [BRI-AQ0210961], C [C10005659], CAL [CAL0000004477], CAS [CAS0007030], CM [CM0608], DS, HBG [HBG0514541], IBSC, K [K000691350], L [L018991], M [M0240057], MICH [MICH1115438], MIN [MIN1002813], MO [MO176168], NY [NY00026184], P [P00602186], PH [PH00017794], S [S07-13623], SING [SING0108011], U [U0014691], UC [UC289923]).

Scandent shrubs. **Twigs** relatively stout, tomentose when young, striate with numerous lenticels. **Leaves:** lamina membranous, variably pubescent, drying pale brown or grey with midrib and veins dark brown, ovate to oblong-ovate, 6–17 × 4–7 cm, base subcuneate to rounded and emarginate, apex obtuse to acute, midrib sunken above, prominent beneath, sparsely pubescent, lateral veins 10–12 pairs, prominent beneath, tertiary venation scalariform; petioles 7–20 mm long, rusty tomentose. **Inflorescences** subopposite leaves, single-flowered. **Flowers** with pedicels c. 2 cm long, tomentose; sepals ovate-lanceolate, 5–10 mm long, apex acute, almost glabrous; petals greenish yellow, clawed, narrowly lanceolate, 4–8 cm long, densely pubescent; stamens numerous, c. 1 mm long; carpels many. **Fruit** with pedicels 2–4 cm long; monocarps 30 or more, moniliform, 20–40 mm long, stipes 10–15 mm long, minutely pubescent, terminal segment usually beaked. **Seeds** 2–5 per monocarp.

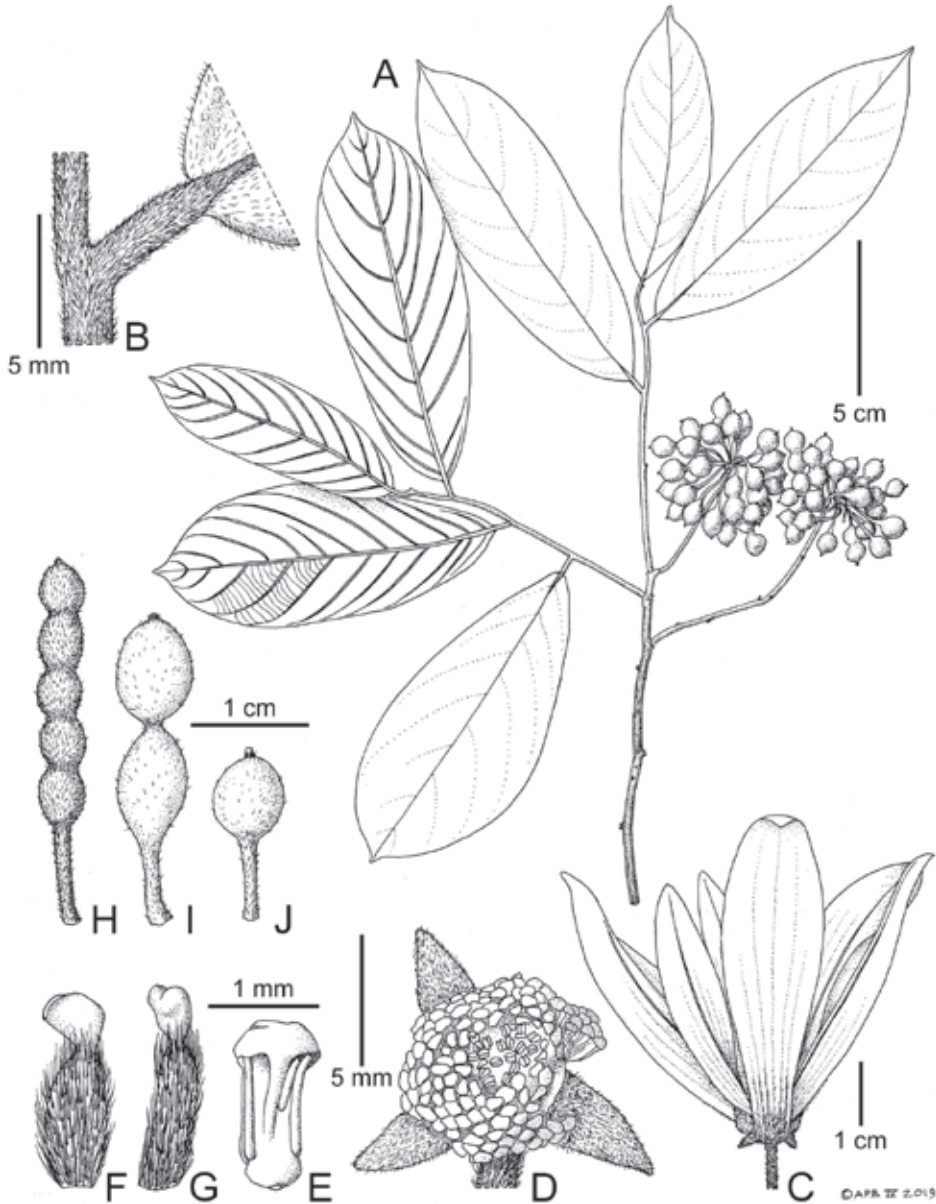


Figure 21. *Desmos dumosus* (Roxb.) Saff. **A.** Habit of fruiting shoot. **B.** Section of twig with section of leaf (upper surface). **C.** Flower (only upper part of pedicel shown). **D.** Interior view of flower with corolla removed and some stamens lost. **E.** Stamen (adaxial view). **F & G.** Carpel. **H.** Monocarp, immature, 5-seeded. **I.** Monocarp, mature, 2-seeded. **J.** Monocarp, mature, 1-seeded. (A & B from Peninsular Malaysia, *King's Collector s.n.*; C–G from Singapore, MacRitchie, *Burkill 1812*; H from Peninsular Malaysia, *King's Collector 4592*; I from Peninsular Malaysia, *Ridley et al. s.n.*; J from Peninsular Malaysia, *Ridley s.n.* Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

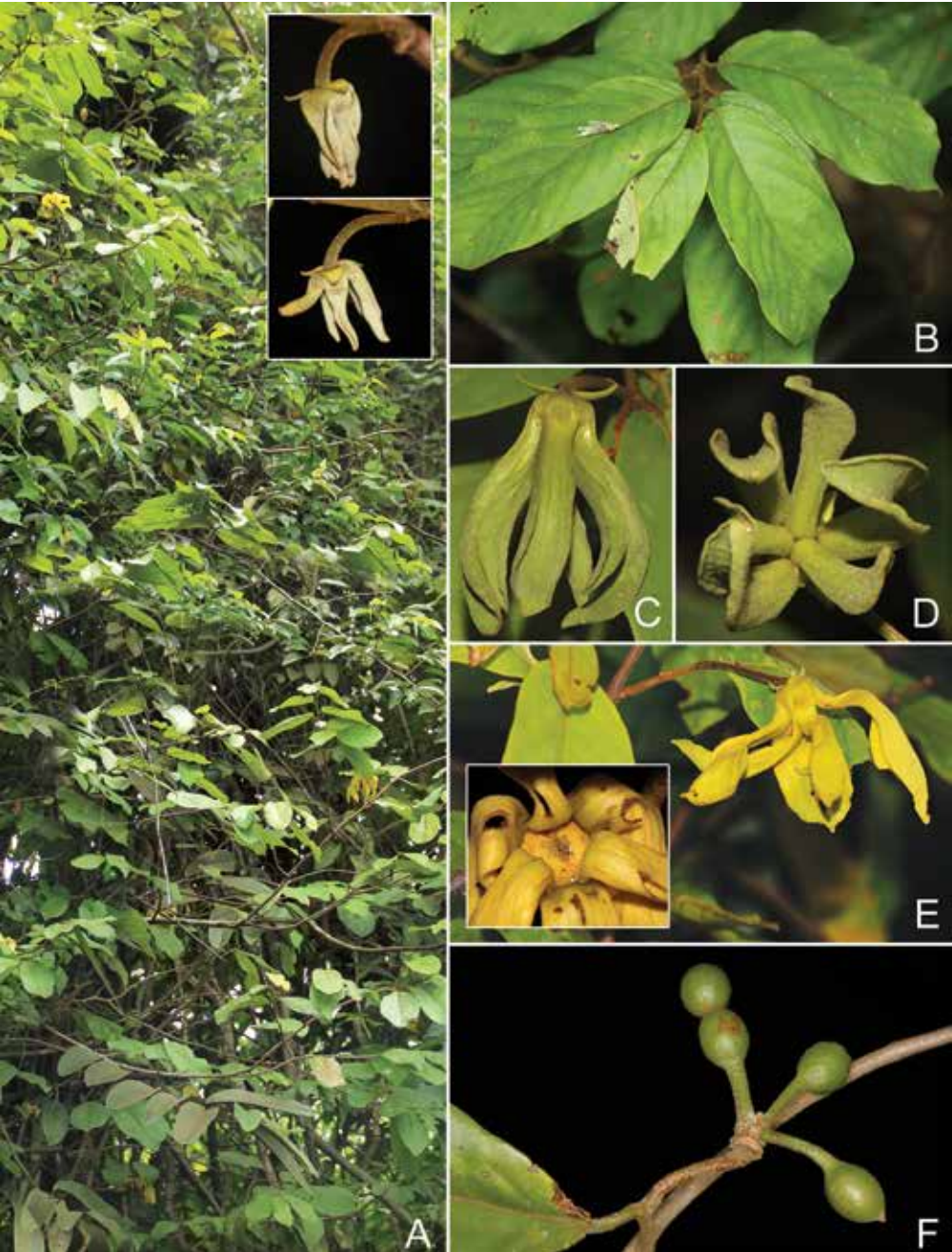


Figure 22. *Desmos dumosus* (Roxb.) Saff. **A.** Habit. Insets: Flower buds. **B.** Leaves. **C.** Young flower. **D.** Pendulous young flower viewed from below. **E.** Fully opened flower. Inset: Flower centre showing anthers and brownish stigma. **F.** Young infructescence with 1- and 2-seeded monocarps. (A–F including insets from Singapore, Nee Soon, Ng & Teo SING2018-373. Photos: A & B, W.F. Ang; A insets, C–F, X.Y. Ng).

Distribution. From India and China through continental Southeast Asia to Peninsular Malaysia and Borneo. In Singapore, known from Bukit Timah (*Wee W75*, 13 May 1961, SING [SING0354717]), Nee Soon (*Samsuri Ahmad 1525*, 17 Sep 1981, SING [SING0003124]) and MacRitchie (*Abu Kassim 1387*, 16 Aug 1956, SING [SING0354716]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Vernacular name. 毛叶假鹰爪 (NParks' Flora & Fauna Web, 2026).

3. *Desmos dunalii* (Wall. ex Hook.f. & Thomson) Saff.

(Michel Félix Dunal, 1789–1856, French botanist and author of a monograph on the Annonaceae)

Bull. Torrey Bot. Club 39 (1912) 506; Ridley, Fl. Malay Penins. 1 (1922) 45; Sinclair, Gard. Bull. Singapore 14(2) (1955) 263; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 111; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 459; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 139; Murray et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 84, pl. 9: G. **Basionym:** *Unona dunalii* Wall. [Numer. List no. 6425 (1832), nom. nud.] ex Hook.f. & Thomson, Fl. Ind. 1 (1855) 131. **Type:** *Porter s.n.* [EIC 6425], [Malaysia], Penang (lectotype K [K000691358], designated by Turner, Phytotaxa 36 (2011) 21; isolectotypes CAL [CAL0000064622], CGE, GZU, K [K000691356, K000691357], K-W [K001123871], P [P00751163]).

Liana to 30 m long. **Twigs** slender, glabrous with pale lenticels. **Leaves:** lamina subcoriaceous, glabrous except for some hairs on midrib beneath, sometimes glaucous beneath, drying pale brown above, oblong-elliptic to oblong-oblong-oblanceolate, 6–13 × 3–6 cm, base rounded to acute, apex acute, midrib flush to slightly sunken above, prominent beneath, lateral veins 11–13 pairs, fine and faint on both surfaces, tertiary venation reticulate; petioles 5–7 mm long. **Inflorescences** axillary or terminal, flowers single or occasionally in pairs. **Flowers** fragrant; pedicels 8–10 mm long with tiny adpressed hairs; sepals reflexed, broadly ovate, 5–7 mm long, puberulous; petals greenish yellow, drying brown, narrowly oblong-lanceolate, 25–32 mm long, sometimes covered with short adpressed hairs; stamens numerous; carpels many. **Fruit** with pedicels to 15 mm long; monocarps moniliform, numerous, glabrous, 13–35 mm long. **Seeds** 1–5 per monocarp, globose or ellipsoidal, c. 8 × 5 mm, drying brown, smooth.

Distribution. Peninsular Malaysia and Borneo. In Singapore, the species escaped detection until relatively recently, but as it has now been found in various localities it is accepted as native. Localities include Pulau Tekong (*Gwee SING2007-252*, 5 Mar 2007, SING [SING0096355]), Bukit Timah (*Niissalo SING2019-1290*, 19 Nov 2019, SING [SING0295466]) and Upper Peirce (*Gwee SING2009-463*, 17 Nov 2009, SING [SING0138019]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

10. DREPANANTHUS Maingay ex Hook.f. & Thomson

(Greek, *drepanos* = falcate, sickle-shaped, *anthos* = flower; referring to the shape of the petals)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 56; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 38; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 48; Ridley, Fl. Malay Penins. 1 (1922) 37; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 118; Surveswaran et al., Taxon 59 (2010) 1721; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 34; Wang & Saunders in Johnson & Murray, Fl. Thailand 16(1) (2022) 89. **Synonym:** *Cyathocalyx* Champ. ex Hook.f. & Thomson sect. *Drepananthus* (Maingay ex Hook.f. & Thomson) Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 [‘1885’]) 6. **Type:** *Drepananthus pruniferus* Maingay ex Hook.f. & Thomson, lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 258.

Evergreen, monopodial trees or treelets, often with horizontally spreading branches at the top of a tall straight trunk. **Indumentum** comprising stellate or more rarely simple hairs. **Leaves** distichous; midrib drying furrowed or flush above. **Inflorescences** extra-axillary, fascicled or cymose, 1–8-flowered. **Flowers** bisexual, often fragrant, ovoid or conical in bud; sepals 3, valvate, connate or free; petals 6 in two whorls of 3, valvate, not persistent in fruit, all more or less similar in size and shape being spoon-shaped with orbicular claw, connivent and closely pressed over reproductive structures, blades (distal parts) linear, filiform, oblong, flat or terete; inner petals united in falling, smooth or wrinkled; stamens many, anthers not septate, connectives flat-topped; carpels 2–30 or more, stigma ellipsoid, ovules 1–10(–20) per carpel, in 1–2 rows. **Fruit** with monocarps globose or ovoid, sessile or shortly stipitate. **Seeds** 1 or more per monocarp, flattened, exarillate; smooth or pitted, endosperm rumination peg-like rarely spiniform.

Distribution. A genus of approximately 27 species from India and Sri Lanka to the South Pacific. In Singapore, 3 native species.

Taxonomy. See under *Cyathocalyx* for notes on the recognition of *Drepananthus* as a genus distinct from *Cyathocalyx*.

Key to *Drepananthus* species

1. Inflorescences in few-flowered aggregations subopposite leaves; blades of outer petals to 70 mm long; monocarps cylindrical, markedly constricted between seeds ... **3. D. ridleyi**
Inflorescences in clusters on branches behind leaves; blades of outer petals to 10 mm long; monocarps ellipsoid, not constricted between seeds 2
2. Blades of outer petals not terete; monocarps not red-brown hairy **1. D. pruniferus**
Blades of outer petals terete; monocarps red-brown hairy **2. D. ramuliflorus**

1. *Drepananthus pruniferus* Maingay ex Hook.f. & Thomson

(Latin, *prunum* = plum, *-fer* = to carry or bear; bearing fruit like plums)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 56; Turner, Gard. Bull. Singapore 70 (2018) 471; Ng et al., Nat. Singapore 13 (2020) 47; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 139; Wang & Saunders in Johnson & Murray, Fl. Thailand 16(1) (2022) 91, fig. 18, pl. 10: B, C. **Synonym:** *Cyathocalyx pruniferus* (Maingay ex Hook.f. & Thomson) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 239; Kochummen, Tree Fl. Malaya 1 (1972) 71; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 110; Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 525. **Type:** *Maingay* 2385 [Kew Distribution 90], [Malaysia], Malacca [Melaka], 2 May 1866 (lectotype K [K000691222], designated by Turner, Gard. Bull. Singapore 70 (2018) 471).

Monopodial trees to 23 m tall. **Twigs** terete, drying brown with sparse to dense tomentum of short brown more or less erect hairs, finely longitudinally striate with a round-topped ridge running down from the base of the petiole on each side. **Leaves:** lamina coriaceous, stiff when dry, generally with hairs on the veins above, sparsely to densely brown hairy on lower lamina and veins, drying grey-brown to dark brown above, generally more uniformly light brown beneath, sometimes with a silvery wash, with main veins slightly darker, oblong-ovate to oblong-obovate, 17–32 × 8.5–17 cm, base truncate to subcordate, apex rounded to obtuse, midrib and lateral veins more or less flush above in dry leaves, midrib prominent and lateral veins raised beneath, lateral veins 13–19 pairs, tertiary venation scalariform, though sometimes obscure; petiole 13–20 × 3–5 mm, generally brown hairy. **Inflorescences** in small aggregations on twigs behind leaves, axes to 15 mm long, c. 4 mm wide. **Flowers** with pedicels 15 mm long, c. 2 mm wide, densely brown hairy; medial bract broadly ovate, 7 mm long, c. 6 mm wide, base clasping pedicel, densely short brown hairy outside; sepals oblong-ovate, 12–13 × 6–8 mm, slightly connate at base, densely dark brown hairy outside, inside hairs paler, becoming glabrous at base; petals thick and fleshy, distinctly clawed, outer petals c. 15 × 7 mm, claw concave, c. 5 mm long, 7 mm wide, brown hairy outside, glabrous within, blade boat-shaped, c. 10 mm long, 7 mm wide, densely short brown hairy; inner petals with claw concave, c. 5 × 5 mm, outside with hairs confined to a central longitudinal, slightly raised band, inside glabrous except in upper regions; stamens many, flat-topped, 1–2 mm long; carpels c. 10 or more, c. 2 mm long, densely pale hairy. **Fruit** with 10 or more, subsessile, ovoid or pyriform monocarps to 35 × 25 mm, apex rounded, drying brown, glabrescent though pale hairs persisting near base and sometimes at apex. **Seeds** c. 10 in two rows, flattened oblong-ovate, to 15 × 8 mm, drying light brown.

Distribution. Thailand, Peninsular Malaysia and Sumatra. A recent collection from Nee Soon (*Lim & Ng SING2018-332*, 4 Apr 2018, SING [SING0243368, SING0294911]) is the first confirmed record for the species from Singapore.

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

Notes. Earlier reports of *Drepananthus pruniferus* in Singapore (Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 37) were based on misidentification of specimens of *D. ramuliflorus* Maingay ex Hook.f. & Thomson.

2. *Drepananthus ramuliflorus* Maingay ex Hook.f. & Thomson

(Latin, *ramulus* = branchlet, twig, *flos* = flower; flowers on the twigs)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 56; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 39; Ridley, Fl. Malay Penins. 1 (1922) 38; Surveswaran et al., Taxon 59 (2010) 1371; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 39; Turner, Gard. Bull. Singapore 70 (2018) 472; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 139. **Synonym:** *Cyathocalyx ramuliflorus* (Maingay ex Hook.f. & Thomson) Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 [‘1885’]) 7; Sinclair, Gard. Bull. Singapore 14(2) (1955) 243; Kochummen, Tree Fl. Malaya 1 (1972) 71; Keng, Gard. Bull. Singapore 27 (1974) 70; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13, fig. 10.5; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 69; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 110; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; LaFrankie et al., Forest Trees Bukit Timah (2005) 58, 161; Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 527; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 30, 103, 226; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 7; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 70, 283; Neo et al., Nat. Singapore 7 (2014) 100. **Type:** *Maingay 1586* [Kew Distribution 91], [Malaysia], Malacca [Melaka], 9 March 1867 (lectotype K [K000691215], designated by Turner, Phytotaxa 36 (2011) 25). **Fig. 23.**

Cyathocalyx bancanus Boerl., Icon. Bogor. 1, fasc. 2 & 3 (1899) 116, [163], t. 54. **Type:** *Teijsmann s.n.*, [Indonesia], Sumatra, Bangka, Toelin (holotype BO [sheet no. BO-1372510]; isotype BO [sheet no. BO-1346797]).

Drepananthus pruniferus auct. non Maingay ex Hook.f. & Thomson: Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 37.

Trees to 15 m tall. **Twigs** terete, smooth, brown with short erect persistent brown or red-brown hairs. **Leaves:** lamina membranous to stiffly coriaceous, hairy beneath on lamina and veins, above with fringe of stiff short hairs on midrib and veins, drying brown, generally paler beneath, sometimes partly or wholly grey beneath contrasting with brown veins and midrib, elliptic-oblong, 19–34 × 11–18 cm, base shallowly cordate to obtuse, apex rounded to shortly acuminate, midrib immersed above, prominent beneath, lateral veins looping, 16–19 pairs, some spaced more than 2 cm apart; petioles terete, 10–15 mm long, mostly densely covered with short brown hairs. **Inflorescences** on branches behind leaves, dense clusters of flowers tightly pressed to the branch. **Flowers** with pedicels 3–5 mm long; basal bract c. 2 mm long, densely brown tomentose; sepals triangular, c. 4 × 4 mm, densely brown tomentose outside, glabrous within; petal blades terete, incurved, c. 6 mm long by 1 mm diam., drying dark with pale hairs, not dense enough to completely cover the blade, claw of outer petals broadly ovate, c. 2–2.5 × 3 mm, densely covered in pale hairs externally, glabrous within, claw of inner petals narrower, c. 2.5 mm wide with external tomentum confined to a longitudinal central

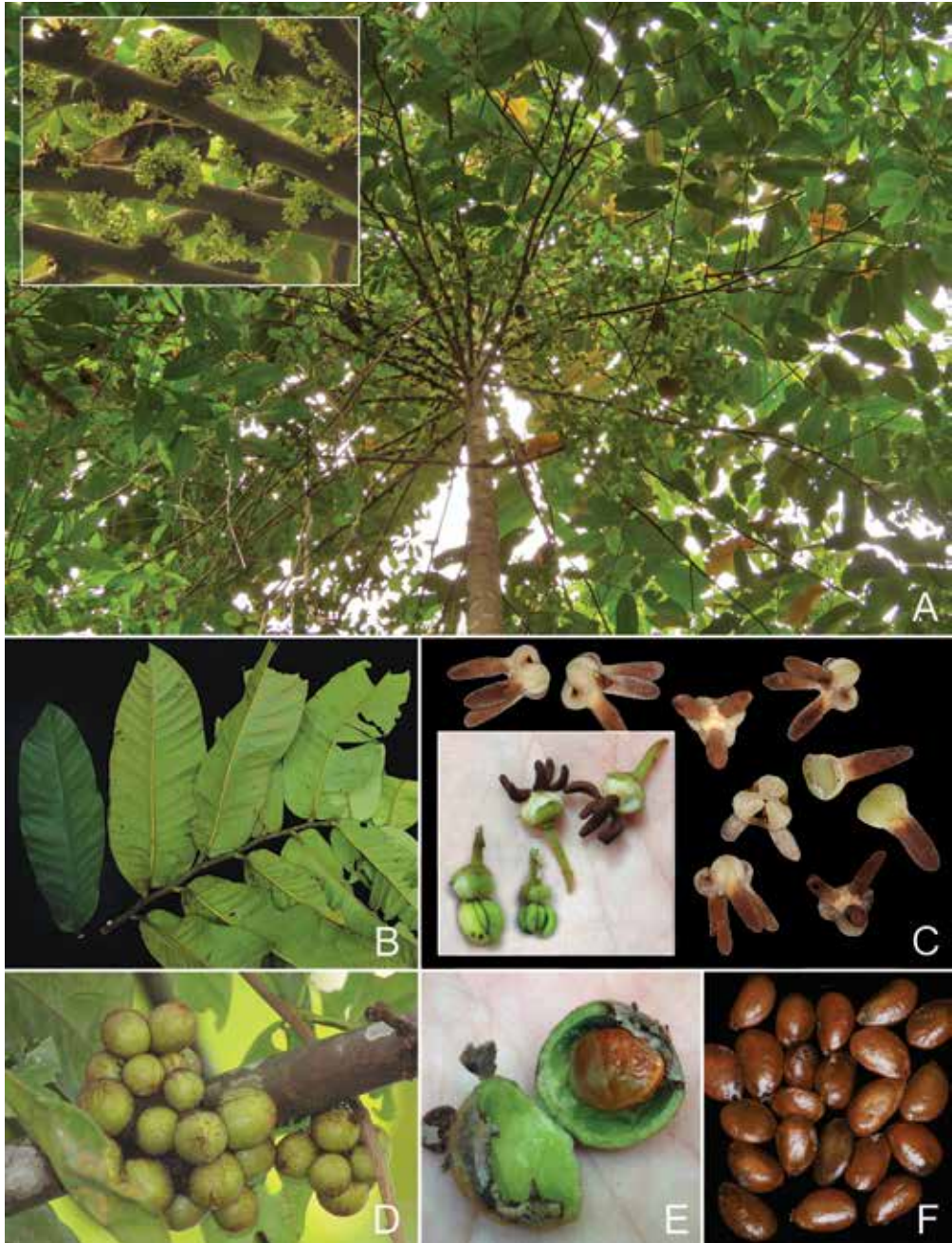


Figure 23. *Drepananthus ramuliflorus* Maingay ex Hook.f. & Thomson. **A.** Habit. Inset: Close-up of flower fascicles. **B.** Leafy branch. **C.** Dropped inner petal whorls. Inset: Aborted flowers. **D.** Fruiting branch. **E.** Opened monocarp. **F.** Seeds. (A–F including insets from Singapore, A & A inset, Bukit Timah, Teo SING2018-703; B, Tagore forest; C, Nee Soon; C inset & D, MacRitchie; E & F, Bukit Timah. Photos: A & A inset, R.C.J. Lim; B, P.K.F. Leong; C, C inset & D–F, X.Y. Ng).

linear band; stamens many, c. 1 mm long, connective apex flat or oblique; carpels many. **Fruit** with pedicels to 15 mm long, 4 mm thick; monocarps 6–8, globose, c. $25 \times 15\text{--}20$ mm, not constricting between seeds, covered in dense red-brown tomentum wearing off in patches, sessile. **Seeds** several per monocarp, flattened, ovate in outline, c. 10×7 mm, smooth.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, there are historical collections from Kranji (*Ridley 6176*, 1894, SING [SING0003111]) and Jurong (*Corner SFN 26162*, Jan 1933, SING [SING0003110]). More recent collections are from MacRitchie (*Ganesan SKG 173*, 21 May 2009, SING [SING0123460]), Nee Soon (*Chong et al. NSSF 2-Q308aU90*, 9 May 2014, SINU [SING0354941]) and Bukit Timah (*Ho et al. SING2016-095*, 26 Apr 2016, SING [SING0243757]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

3. *Drepananthus ridleyi* (King) Survesw. & R.M.K.Saunders

(Henry Nicholas Ridley, 1855–1956, English botanist and first Director of Singapore Botanic Gardens)

Taxon 59 (2010) 1731; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 40, fig. 9, pl. 2: E; Turner, Gard. Bull. Singapore 70 (2018) 472; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 139. **Basionym:** *Xylopiopsis ridleyi* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 121; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 95. **Synonym:** *Cyathocalyx ridleyi* (King) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 237; Kochummen, Tree Fl. Malaya 1 (1972) 71; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 29; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 69; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 110; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 527; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 30, 103, 220; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 7; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 70, 283; Neo et al., Nat. Singapore 7 (2014) 100. **Type:** *Ridley 4711*, Singapore, Changi, 1892 (lectotype K [K000691224], designated by Wang & Saunders, Bot. J. Linn. Soc. 152 (2006) 527; isolectotypes CAL, SING [SING0049720]). **Fig. 24, 25.**

Trees to 25 m tall. **Twigs** terete, smooth with dense dark brown hairs, glabrous with age. **Leaves:** lamina chartaceous to coriaceous, hairy beneath or more or less glabrous, short hairs on midrib and veins above, drying dark brown to blackish above, paler brown beneath, sometimes with a paler mottling or silvery wash, ovate to ovate-lanceolate, $7.5\text{--}21.5 \times 4\text{--}11.5$ cm, base cuneate to rounded, apex obtuse to emarginate, sometimes shortly acuminate, midrib flush above, prominent beneath, lateral veins 10–13 pairs, some more than 2 cm apart; petioles terete with an adaxial groove, 15–25 mm long, densely brown hairy. **Inflorescences** subopposite leaves, peduncle to c. 6 mm long, bearing c. 3–6 flowers. **Flowers** with pedicels 6–9 mm long; basal bract 4–5 mm long, red-brown hairy; sepals triangular, 6–7 mm long, c.

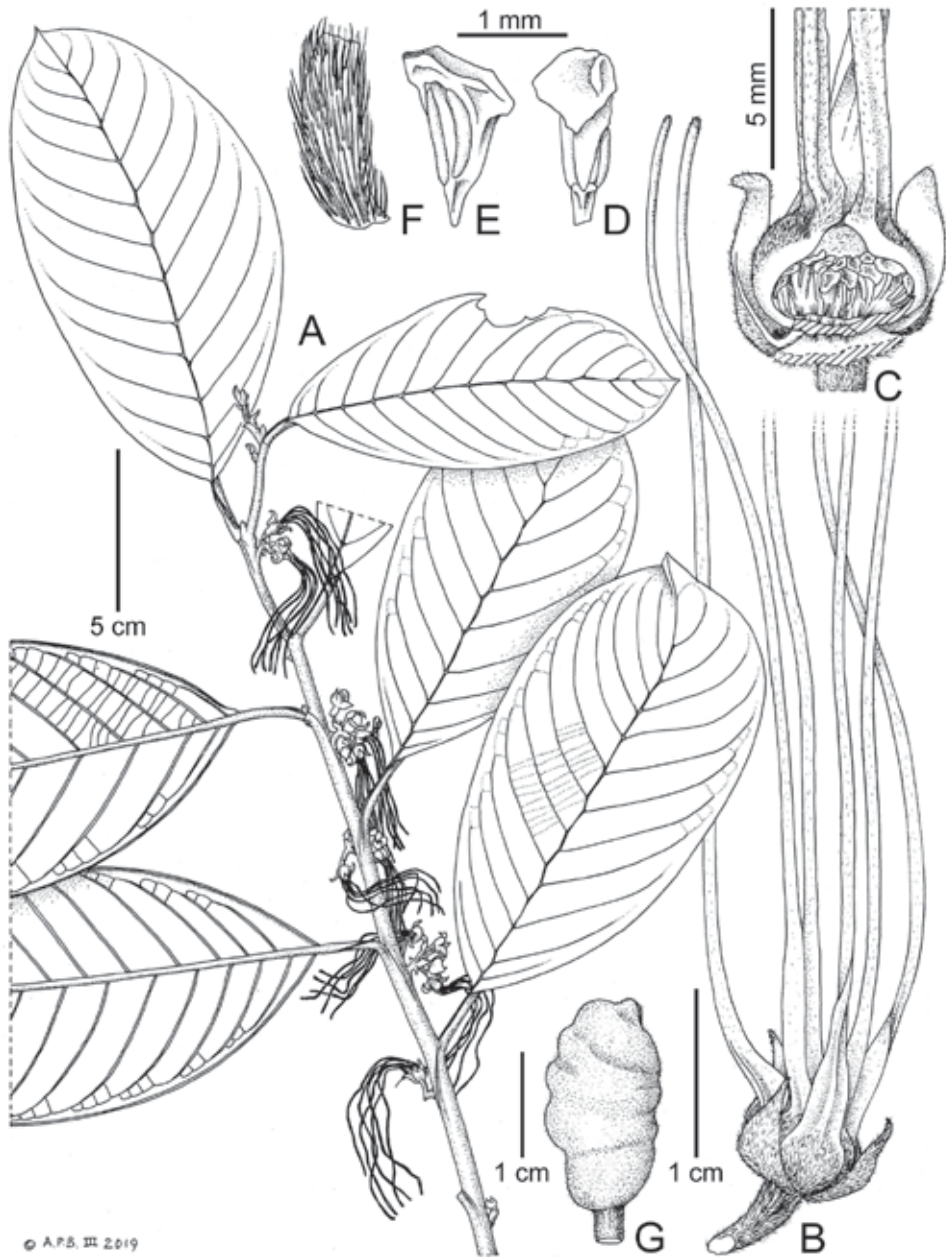


Figure 24. *Drepananthus ridleyi* (King) Survesw. & R.M.K.Saunders. **A.** Habit of flowering shoot. **B.** Flower. **C.** Interior view of flower after removal of 1 sepal, 2 outer petals and 1 inner petal. **D.** Stamen (adaxial view). **E.** Stamen (side view). **F.** Carpel. **G.** Monocarp. (A from Singapore, MacRitchie, *Leong et al. SING2009-317*; B–F from Peninsular Malaysia, *Cockburn FRI 8000*; G from Peninsular Malaysia, *Chan FRI 16931*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

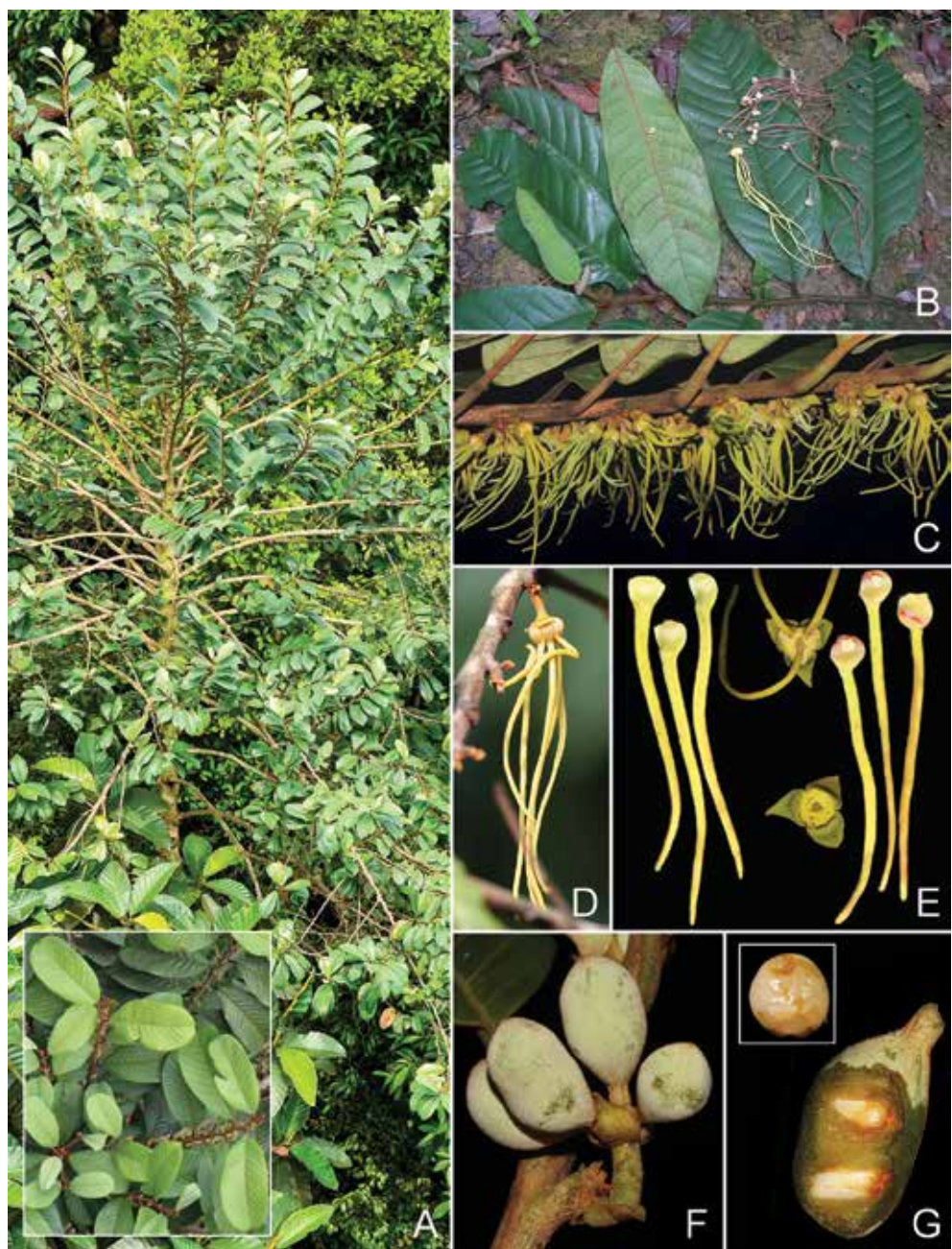


Figure 25. *Drepananthus ridleyi* (King) Survesw. & R.M.K.Saunders. **A.** Habit. Inset: Close-up of leaves. **B.** Leafy branch from another tree. **C.** Flowering branch. **D.** Flower. **E.** Left: Outer petals. Right: Inner petals. Middle-top: Flower with outer petals removed. Middle-bottom: Flower with all corolla removed. **F.** Fruit. **G.** Monocarp with a thin longitudinal slice removed. Inset: seed. (A–G including insets from Singapore, A, A inset, C–G & G inset, MacRitchie, Ng *SING2018-273*; B, Nee Soon, *Saat Senian et al. SING2005-45*. Photos: A, Zaki Jamil; A inset, C–G & G inset, X.Y. Ng; B, S. Lee).

5 mm wide, apex acute, often recurving, red-brown tomentose; petal blades very narrowly linear, to 70 mm long, 1–2 mm wide, covered with very dense short pale tomentum, claw of outer petals broadly ovate, c. 3×3.5 –4 mm, densely pale to rusty tomentose externally, glabrous within; claw of outer petals narrower, c. 3 mm wide, with pale pubescence confined to a central longitudinal band; stamens many, c. 2 mm long, connectives flat-topped; carpels many. **Fruit** with c. 10 monocarps, cylindrical, to 25×10 mm, drying irregularly sunken between seeds, very short brown hairs densest near the apex and on stipe, sometimes with a pale or glaucous waxy bloom, stipe 2 – 4×3 mm. **Seeds** 2–5 per monocarp, lenticular, c. $10 \times 8 \times 4$ mm, drying red-brown, smooth.

Distribution. Peninsular Malaysia and Borneo. In Singapore, there are historical collections from the Botanic Gardens' Rain Forest (*Furtado* 2000, 23 Sep 1927, SING [SING0001445] and Bukit Timah (*Ngadiman SFN 37013*, 8 Sep 1939, SING [SING0003113]) and more recent specimens from Nee Soon (*Saat et al. SING2005-45*, 14 Mar 2005, SING [SING0058101]) and MacRitchie (*Leong et al. SING2009-317*, 16 Mar 2009, K [K001292572], SING [SING0123461]).

Ecology. Lowland forest.

Conservation assessment. Globally, Near Threatened (NT B2ab(iii)) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

11. FISSISTIGMA Griff.

(Latin, *fissus* = cleft, divided, *stigma* = stigma; referring to the cleft stigma of the type species)

Not. Pl. Asiat. 4 (1854) 706; Merrill, Philipp. J. Sci. 15(2) (1919) 125; Sinclair, Gard. Bull. Singapore 14(2) (1955) 349; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 121; Li & Gilbert, Fl. China 19 (2011) 672; Turner, Gard. Bull. Singapore 64 (2012) 400; Turner, Gard. Bull. Singapore 70 (2018) 473; Johnson & Leeratiwong in Johnson & Murray, Fl. Thailand 16(1) (2022) 91. **Type:** *Fissistigma scandens* Griff.

Woody climbers, main stem with distichous branches, branches often flexuous and wrapping around adjacent supports. **Indument** of simple hairs. **Leaves** chartaceous to coriaceous, with conspicuous venation and usually somewhat pubescent, base symmetrical, cuneate to subcordate, lateral veins parallel and barely joining near leaf margin, tertiary venation often scalariform; petiole exceeding 1 cm in length in many species. **Inflorescences** leaf-opposed, occasionally terminal or rarely axillary, either condensed cymes on a short peduncle or racemose with an extended axis, 1–20-flowered; pedicels arising from a short common peduncle (fasciculate) or a more extended rachis (paniculate), peduncle and rachis sometimes absent. **Flowers** bisexual; pedicels bearing 1–3 bracts up to 9 mm long; buds usually ovoid or conical; sepals much smaller than petals, often slightly connate at base; petals often separating before anthesis, valvate, chartaceous to fleshy, lanceolate to ovate, the inner whorl slightly shorter, narrower, and more acute than the outer whorl and occasionally a different colour at

anthesis; outer petals spreading or reflexed; inner petals remaining erect, with the tips spreading to form a small aperture; stamens numerous, oblong, anthers not septate, anther connective apex usually tongue-shaped or irregularly capitate and red at anthesis; carpels 10–20, ovaries pubescent, stigmas narrowly oblong to clavate, truncate, bilobed or bifurcate, glabrous or with a few hairs or setae at the apex; torus elevated, truncate. **Fruit** consisting of stalked indehiscent monocarps, often with persistent pubescence and marked by bumps and ridges. **Seeds** attached laterally in two rows, semicircular in side view, wedge-shaped in cross-section, shiny, smooth, brown, exarillate, endosperm ruminations lamellate in quadrants.

Distribution. A genus of 62 species, confined to Southeast Asia and West Malesia. In Singapore, 4 native species.

Ecology. Scandent shrubs or lianas in forest and at forest margins.

Notes. Records from Singapore of *Fissistigma latifolium* (Dunal) Merr. (Burkill, Dict. Econ. Prod. Malay Penins. 1 (1935) 1021; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; *Fissistigma latifolium* (Dunal) Merr. var. *latifolium*: Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 121, 285) have not been substantiated and the taxon is not included in this account.

Key to *Fissistigma* species

1. Leaves glabrous beneath to the naked eye and touch; lateral veins to 10 pairs; mature flowers with outer petals to 1 cm long; mature monocarps distinctly stipitate (stipe more than 10 mm long), but stipe shorter than seed-bearing portion of monocarp and apex rounded **1. *F. fulgens***
Leaves tomentose beneath to the naked eye and touch; lateral veins 13 or more pairs; mature flowers with outer petals 1.5 cm long or more; mature monocarps subsessile (stipe 5 mm long or less) or if stipitate then stipe longer than seed-bearing portion and/or apex of monocarps obtuse or broadly beaked 2
2. Outer petals 30–40 mm long; monocarp stipes to 8 mm long **2. *F. lanuginosum***
Outer petals 16–22 mm long; monocarp stipes 20–72 mm long 3
3. Leaves adpressed-pubescent beneath; outer petals broadly lanceolate, 8–10 mm wide; monocarps smooth, apex obtuse **3. *F. manubriatum***
Leaves erect-pubescent beneath; outer petals linear-lanceolate, 5–7 mm wide; monocarps strongly ribbed and rugose longitudinally, apex formed into a broad beak
..... **4. *F. ovoideum***

1. *Fissistigma fulgens* (Hook.f. & Thomson) Merr.

(Latin, *fulgens* = shiny, bright-coloured; presumably referring to the sericeous undersides of the leaves)

Philipp. J. Sci. 15(2) (1919) 130; Sinclair, Gard. Bull. Singapore 14(2) (1955) 353; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12, fig. 10.7; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 112; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 221; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 121, 284; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 477; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 139; Johnson & Leeratiwong in Johnson & Murray, Fl. Thailand 16(1) (2022) 94, pl. 10: E. **Basionym:** *Melodorum fulgens* Hook.f. & Thomson, Fl. Ind. 1 (1855) 120; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 35; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 104; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 83. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka] (lectotype K [K000574633], designated by Turner, Phytotaxa 36 (2011) 28). **Fig. 26, 27.**

Magnolia ferruginea P.Parm., Bull. Sci. France Belgique 27(2) (1896) 203, 263, 325, 333, pl. 9: fig. 24, nom. illeg. non W. Watson (1889). **Type:** *Ralph s.n.*, India [possibly an error] (holotype P [P01964102]).

Melodorum parviflorum Scheff. var. *angustifolium* Boerl., Icon. Bogor. 1, fasc. 2 (1899) 134, as '*angustifolia*'. **Type:** *Haviland & Hose 416L*, Borneo, Sarawak, near Kuching, 17 October 1894 (holotype BO [sheet no. BO-1349056]).

Melodorum cylindricum auct. non Maingay ex Hook.f. & Thomson: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 106, p.p.; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 84, p.p.

Woody liana climbing to 10 m, climbing by the wrapping around of the bases of the lateral branches, stem to 3 cm diam.; bark brown, densely lenticellate. **Twigs** grey, powdery puberulent. **Leaves:** lamina chartaceous, finely and densely golden-sericeous beneath, lanceolate to narrowly elliptic, 9.6–10.6 × 3.4–3.8 cm, base broadly cuneate, apex acuminate, acumen 9–14 mm long, midrib slightly impressed above, raised beneath, lateral veins 9–10 per side, weakly brochidodromous, flush and indistinct above, slightly raised beneath, higher-order veins reticulate and only weakly scalariform, indistinct on both surfaces; petioles 8.5–12 mm long, pinched in at base of leaf blade, semiterete, sericeous. **Inflorescences** terminal and occasionally axillary, 1–5-flowered, axes pubescent. **Flowers** with pedicels c. 8 mm long, bearing two bracts; buds ovoid; sepals semicircular, 2–2.5 mm long, acute sparsely golden-sericeous; petals orange-yellow, outer petals narrowly ovate, 8.5–11 × 5.5–7.3 mm, puberulent adaxially, golden-sericeous abaxially, obtuse, thickened along the margins, inner petals distinctly shorter than outer petals, ovate, 6.7–7.5 × c. 4.5 mm, acute, glabrous; stamens c. 1.5 mm long, apex of connective prolonged to a point; carpels many, oblong, c. 2 mm long, ovary and stigma subequal, ovaries yellowish pubescent, stigmas black, glabrous. **Fruit** with up to 10 monocarps, oblong, 36–52 × 22–28 mm, golden brown sericeous, sunken in places, pericarp 5–6 mm thick, apex rounded, stipe 15–22 × 2.8–3.2 mm, sulcate and somewhat angular in cross-section. **Seeds** c. 16 per monocarp, oblong-lenticular, c. 15 mm long, shiny brown.

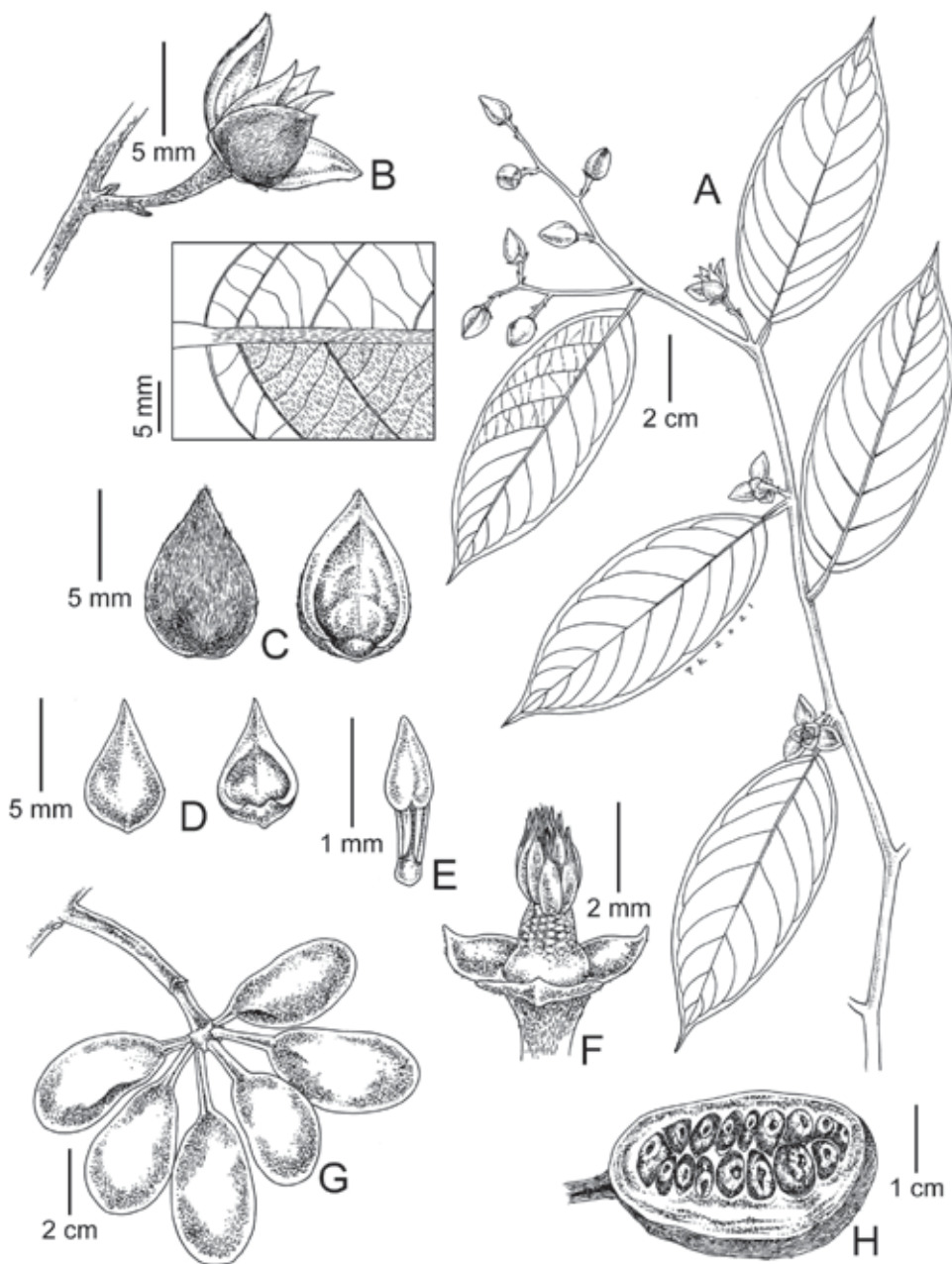


Figure 26. *Fissistigma fulgens* (Hook.f. & Thomson) Merr. **A.** Habit. Inset: Lower leaf surface. **B.** Mature flower. **C.** Outer petals. **D.** Inner petals. **E.** Stamen. **F.** Flower with petals and stamens detached, showing sepals and carpels. **G.** Fruit. **H.** Monocarp section, showing the micropylar end of seeds. (A, B & E–H from Singapore, A, Singapore Botanic Gardens, *Ahmad s.n.*; B & F, MacRitchie, *Lua SING2014-172*; C & D from Peninsular Malaysia, *Mahamat 2116*; E, Toa Payoh, *Ridley 182*; G, Singapore Botanic Gardens Rain Forest, *Ridley s.n.*; H, Bukit Mandai, *Ridley s.n.* Drawn by P.K. Cheng).



Figure 27. *Fissistigma fulgens* (Hook.f. & Thomson) Merr. **A.** Habit. Inset: Close-up of leaf lower surface. **B.** Flower (front view). **C.** Abscised flowers. **D.** Flower (back view). **E.** Side view of flower from which the petals and stamens have fallen, showing the carpels. (A–E including inset from Singapore, Nee Soon. Photos: X.Y. Ng).

Distribution. Peninsular Malaysia, Borneo and the Philippines. In Singapore, there are historical collections from Bukit Timah (*Ridley 2115*, 26 Oct 1890, SING [SING0042249]), Toa Payoh (*Ridley 182*, 1890, SING [SING0042220]), Choa Chu Kang (*Goodenough 5079*, Mar 1893, SING [SING0042229]) and several other places. More recent collections are from Bukit Timah, MacRitchie (*Lua SING2014-172*, 6 May 2014 (SING [SING0205583]), Nee Soon (*Ng et al. SING2023-463*, 14 Nov 2023, SING [SING0395938]) and other parts of the Central Catchment.

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 466).

2. *Fissistigma lanuginosum* (Hook.f. & Thomson) Merr.

(Latin, *lanugos* = wool-like surface, *-osus* = abundant; referring to the indumentum on the twigs and leaves)

Philipp. J. Sci. 15(2) (1919) 132; Burkill, Dict. Econ. Prod. Malay Penins. 1 (1935) 1021; Sinclair, Gard. Bull. Singapore 14(2) (1955) 357; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 112; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 215; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 121, 284; Turner, Gard. Bull. Singapore 70 (2018) 479; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 140; Johnson & Leeratiwong in Johnson & Murray, Fl. Thailand 16(1) (2022) 96, pl. 10: F. **Basionym:** *Melodorum lanuginosum* Hook.f. & Thomson, Fl. Ind. 1 (1855) 117; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 35; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 79; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 108; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 86. **Type:** *Porter s.n.* [EIC 6454A], [Malaysia], Penang, December 1823 (lectotype K-W [K001123943], first step designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 357, second step designated by Turner, Gard. Bull. Singapore 70 (2018) 479, excluding the leafy twig bearing immature fruit mounted on the lower left of the sheet; possible isoelectotype K [K000574624]).

Large woody climbers. **Twigs** very densely brown hairy, becoming glabrous and blackish with age, when drying irregularly longitudinally wrinkled with many, longitudinally elongate, pale lenticels. **Leaves:** lamina chartaceous to subcoriaceous, densely to very densely covered with fine long brown hairs beneath, above glabrous except for dense pale more or less erect hairs on the midrib and brown hairs around margin, drying grey and slightly shiny above with brown midrib and brown beneath with darker main veins; oblong-elliptic, obovate or oblanceolate 7–18.5 × 4–6 cm, base broadly cuneate to rounded, apex acute to shortly acuminate, more rarely emarginate, lateral veins 15–18 pairs, running almost straight and parallel from the midrib at c. 45° before looping obscurely within margin, tertiary venation subscalariform, generally obscure from above and sometimes from beneath due to dense tomentum; petioles

10–28 mm long, 2–2.5 mm wide, more or less terete, densely brown hairy. **Inflorescences** 1–4-flowered cymes, terminal or leaf-opposed. **Flowers** with pedicels 8–10 mm long, 2.5–3 mm wide, densely golden-brown hairy; sepals triangular to ovate, 8–10 mm long, 6–10 mm wide, densely golden brown hairy outside, glabrous within except near apex; outer petals coriaceous, drying c. 1 mm thick at margins, ovate-lanceolate, 3–4 cm long, 1–1.5 cm wide at base, apices recurving slightly at anthesis, outside densely golden brown hairy, inside glabrous except for very short woolly tomentum near apex and margins, inner petals slightly shorter and narrower but thicker than outer petals, almost triquetrous at apex, with very short woolly tomentum in central longitudinal band outside, inside tomentum more patchy; stamens many, 2–3 mm long, apex oblique and slightly produced; carpels many, c. 3 mm long, densely golden hairy, stigmas glabrous. **Fruit** with monocarps 5 or more, globose, to 22 mm diam., apex round, densely golden-brown hairy, pericarp c. 3 mm thick, stipe to 5 mm long, 5 mm wide. **Seeds** 4–6 per monocarp, shiny brown, c. 1.5 cm long.

Distribution. Peninsular Malaysia. In Singapore, there are historical collections from various places including Tuas (*Ridley s.n.*, 1891, SING [SING0003149]), Bukit Timah (*Ridley 5099*, 1893, SING [SING0003146]), Sungei Jurong (*Ridley 6052*, 1894, SING [SING0003158]) and Toa Payoh. More recent collections are from the Central Catchment (*Chong s.n.*, 17 Nov 2010, SING [SING0155572], SINU [SING0354832]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

3. *Fissistigma manubriatum* (Hook.f. & Thomson) Merr.

(Latin, *manubriatum* = handle, haft; perhaps in reference to the monocarp stipes which are very long in comparison to those of other *Uvaria* species known to Wallich)

Philipp. J. Sci. 15(2) (1919) 134; Sinclair, Gard. Bull. Singapore 14(2) (1955) 355; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 112; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 221; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 121, 285; Neo et al., Nat. Singapore 7 (2014) 61; Turner, Gard. Bull. Singapore 70 (2018) 481; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 140. **Basionym:** *Melodorum manubriatum* Hook.f. & Thomson, Fl. Ind. 1 (1855) 118; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 104; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 84. **Synonym:** *Uvaria manubriata* Wall., Numer. List no. 6456 (1832), nom. nud. **Type:** *Porter s.n.* [EIC 6456A], [Malaysia], Penang (lectotype K [K000574630], designated by Turner, Phytotaxa 36 (2011) 30; isoelectotypes BM, K-W [K001123945]). **Fig. 28.**

Melodorum korthalsii Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 37. **Synonym:** *Fissistigma korthalsii* (Miq.) Merr., Philipp. J. Sci. 15(2) (1919) 132. **Type:** *Korthals s.n.*, [Indonesia], Borneo, Martapoera (lectotype L [L0182131], designated by Turner, Phytotaxa 36 (2011) 30).

Melodorum bancanum Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1870) 343. **Type:** *Teijsmann s.n.*, [Indonesia], Bangka, prope Blienjoe (lectotype U [U0014998], designated by Turner, Gard. Bull. Singapore 70 (2018) 481; possible isoelectotype U [U0014997]).

Climbers. **Twigs** brown, lenticellate, rusty-pubescent. **Leaves:** lamina chartaceous, densely pubescent along midrib above, densely adpressed-pubescent beneath, narrowly elliptic to elliptic, $4.5\text{--}16 \times 1.5\text{--}5$ cm, base broadly cuneate, apex acute to acuminate, acumen 9–14 mm long, midrib flush above, raised beneath, lateral veins 13–16 per side, camptodromous and nearly reaching margin, slightly raised above, raised beneath, higher-order veins distinctly scalariform, slightly raised on both surfaces; petioles 5–11 mm long, 1–2 mm wide, somewhat pinched in at base of leaf blade, shallowly canaliculate, pubescent. **Inflorescences** leaf-opposed, 1–5-flowered, axes rusty-pubescent; peduncle 4.1×2.4 mm. **Flowers** with pedicels 9×2 mm, bearing two small bracts; buds broadly ovoid; sepals ovate to triangular, 4–6 mm long, 5–6 mm wide, apex a short round-ended acumen, verrucose and glabrous adaxially, pale pubescent abaxially; petals reddish brown, outer petals broadly lanceolate, $16\text{--}22 \times 8\text{--}10$ mm, apex acute, verrucose and glabrous except for the margins pubescent toward the apex adaxially, pubescent abaxially; inner petals distinctly shorter than outer petals, ovate-lanceolate, $13.2\text{--}14.5$ mm long, 6–9 mm wide, apex acute, glabrous on basal half abaxially; stamens many, clavate, 1.6–1.8 mm long, apex of connective dome-shaped and somewhat truncate; carpels many, narrowly oblong and slightly curved, ovaries 1.4–1.8 mm long, long-pubescent, stigmas indistinctly articulated with ovary, c. 0.8 mm long, slightly notched at apex. **Fruit** with up to 10 monocarps, globose, $24\text{--}29 \times 21\text{--}24$ mm, cinnamon-pubescent, sunken in places, pericarp c. 3.6 mm thick, apex obtuse, stipe $40\text{--}52 \times 1.5\text{--}3$ mm, cinnamon-pubescent, terete in cross-section. **Seeds** 8–9 per monocarp, flattened ellipsoid, $10\text{--}12 \times 7\text{--}9 \times 2.5\text{--}4$ mm, shiny orange brown.

Distribution. Peninsular Malaysia and Borneo. In Singapore, there are historical collections from Changi (*Ridley* 4712, 1892, SING [SING0003163]), Chua Chu Kang (*Ridley s.n.*, 1894, SING [SING0003165]), Bedok (*Ridley* 8783, 1897, SING [SING0271100]) and Kranji. More recent collections are from Mandai (*Lai LJ520*, 1999, SING [SING0019943]) and Nee Soon (*Samsuri et al. NES 271*, 2 Sep 2003, SING [SING0047235]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

4. *Fissistigma ovoideum* (King) Merr.

(Latin, *ovoides* = egg-shaped; referring to the ovoid monocarps)

Philipp. J. Sci. 15(2) (1919) 134; Turner, Gard. Bull. Singapore 70 (2018) 482; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 140; Johnson & Leeratiwong in Johnson & Murray, Fl. Thailand 16(1) (2022) 99, pl. 11: A. **Basionym:** *Melodorum*

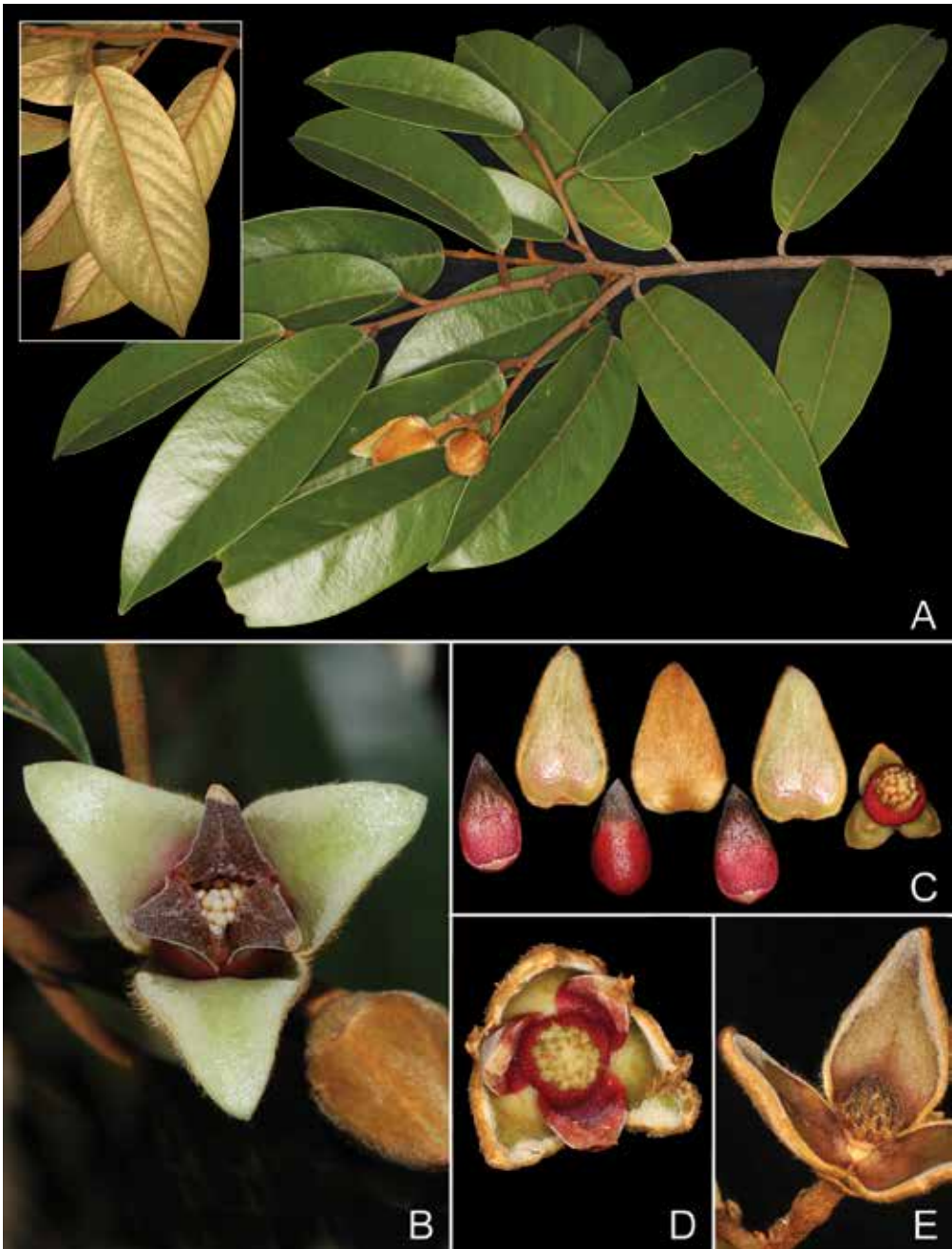


Figure 28. *Fissistigma manubriatum* (Hook.f. & Thomson) Merr. **A.** Habit. Inset: Close-up of leaf lower surface. **B.** Flower (front view). **C.** Dissected flower. **D.** Front view of flower from which the stamens and stigmas have fallen. **E.** Side view of flower from which the inner petals and stamens have fallen. (A–E including inset from Singapore; A, A inset & C–E, MacRitchie; B, Bukit Kalang. Photos: A, A inset & C–E, R.C.J. Lim; B, J. Chen).

latifolium (Dunal) Hook.f. & Thomson var. *ovoideum* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 106, as '*ovoidea*'; Ridley, Fl. Malay Penins. 1 (1922) 85. **Synonym:** *Fissistigma latifolium* (Dunal) Merr. var. *ovoideum* (King) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 359; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 112; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 221; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 121, 285; Neo et al., Nat. Singapore 7 (2014) 100. **Type:** King's Collector 8119, [Malaysia], Perak, Batang Padang District, August 1886 (lectotype K [K000574628], designated by Turner, Gard. Bull. Singapore 70 (2018) 482). **Fig. 29.**

Melodorum latifolium auct. non (Dunal) Hook.f. & Thomson: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 105; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41.

Woody climbers. **Twigs** golden brown- to greyish brown-pubescent. **Leaves:** lamina chartaceous, glabrous except for rusty pubescence on midrib above, uniformly erect-pubescent beneath, lanceolate to oblong, larger blades 11.5–17 × 3.7–6.5 cm, base rounded, apex obtuse, acute or acuminate, the acumen 3–8 mm long, lateral veins 16–23 per side, tertiary venation prominent beneath; petioles 8–16 mm long. **Inflorescences** terminal, racemose, up to 7-flowered, rachis c. 6 cm long. **Flowers** with pedicels 13–22 mm long, bearing 1 bract 3–6 mm long attached near the pedicel base; buds ovoid, obtuse; sepals triangular, coriaceous, 2–4.5 mm long, obtuse, coarsely and densely golden brown-pubescent; petals fleshy, outer petals linear-lanceolate, 18–22 × 5–7 mm, obtuse, inner petals ovate-lanceolate, 8–12 × 3–5 mm, acute; stamens c. 1.2 mm long, anther connective apex triangular, acute; carpels 3–6, ovaries ovoid-elliptic, 2.5–3 mm long, styles oblong, curved, stigmas U-shaped. **Fruit** with up to 15 monocarps, globose- to oblong-stipitate, fine golden brown-pubescent, seed-containing portion 32–41 × 22–32 mm, strongly ribbed and rugose longitudinally, apex a broad beak c. 2 mm long, stipe 23–31 × 4.5–5.5 mm, pericarp 2–3 mm thick. **Seeds** in one or two rows, up to 9 per monocarp, flattened ellipsoid or semi-circular and flattened, 12–16 × 7.5–10 mm, smooth, shiny, dark brown.

Distribution. Peninsular Malaysia. In Singapore, most fertile specimens have been collected in the early 1980s from Nee Soon (*Maxwell 81-58*, 1981, SING [SING0003152]), Peirce (*Mohd. Shah & Ali MS 4121*, 1981, SING [SING0003153], SING0240145) and Bukit Kalang (*Maxwell 82-252*, 1982, SING [SING0003154]), except a recent fertile specimen from MacRitchie (*Ng et al. SING2024-465*, 2024, SING [SING0397436]). However, sterile plants identified as *Fissistigma ovoideum* can still be found in protected areas.

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Notes. Treated as a variety of *Fissistigma latifolium* by Sinclair (Gard. Bull. Singapore 14(2) (1955) 359), but differences in leaves, flowers, and fruit support recognition of *F. ovoideum* at species level.

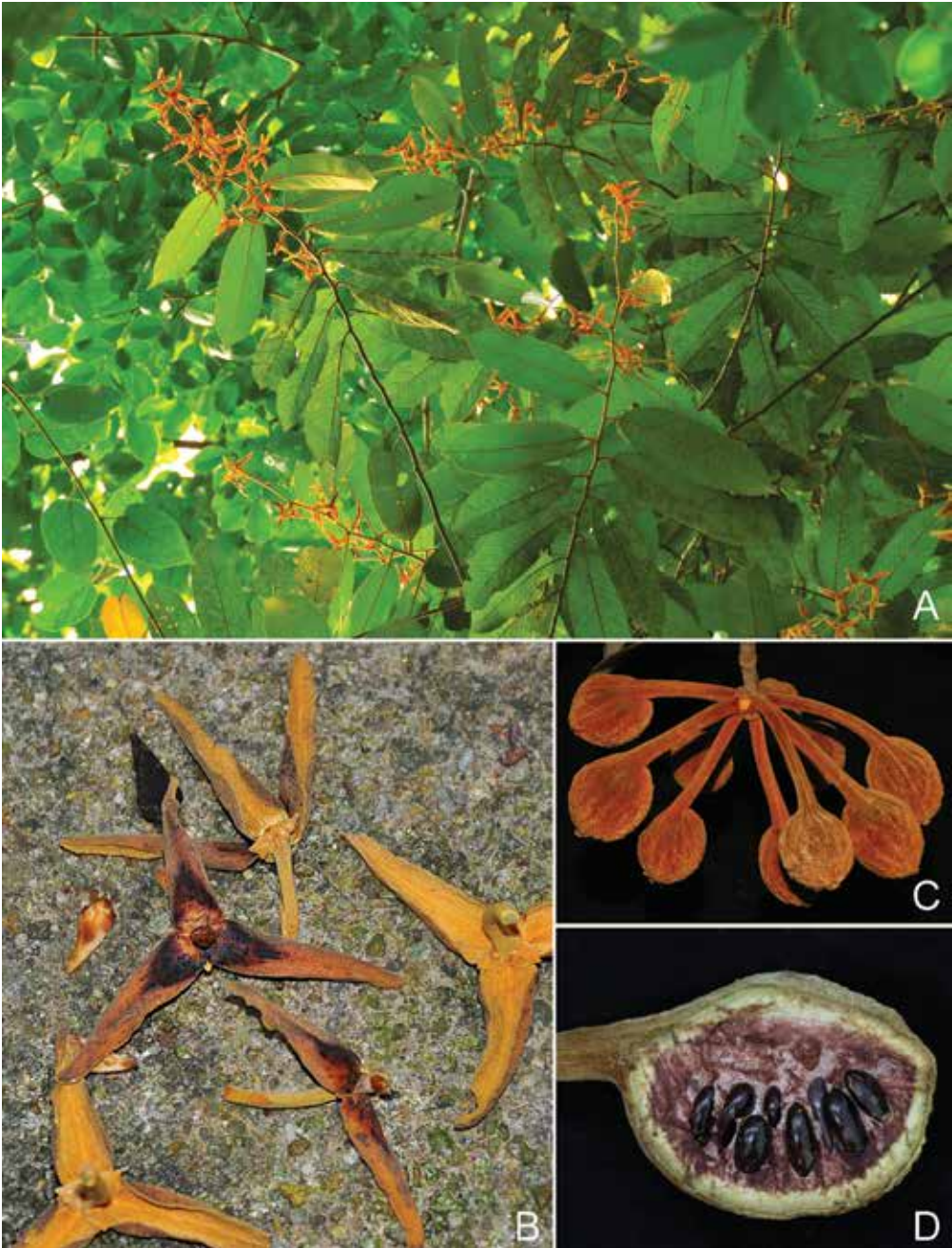


Figure 29. *Fissistigma ovoideum* (King) Merr. **A.** Habit showing leaves and flowers. **B.** Abscised flowers. **C.** Fruit. **D.** Longitudinal section of monocarp showing seeds in two rows. (A & B from Thailand; C & D from Singapore, MacRitchie, Ng *et al.* SING2024-465. Photos: A & B, C. Leeratiwong, reproduced with kind permission; C & D, X.Y. Ng).

12. FRIESODIELSIA Steenis

(Robert Elias Fries, 1876–1966, Swedish botanist, and Friedrich Ludwig Emil Diels, 1874–1945, German botanist; researchers on Annonaceae and many other families)

Bull. Jard. Bot. Buitenzorg, sér. 3, 17 (1948) 458, nom. cons.; van Steenis, Blumea 12(2) (1964) 353; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 93, p.p.; Turner, Gard. Bull. Singapore 64 (2012) 418; Guo et al., Taxon 66 (2017) 3; Leeratiwong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 103. **Synonyms:** *Polyalthia* Blume sect. *Oxymitra* Blume, Fl. Javae, fasc. 28–29 (1830) 71, t. 35, t. 36: D. – *Polyalthia* Blume subgen. *Oxymitra* (Blume) Rchb., Deut. Bot. Herb.-Buch. (1841) 192. – *Oxymitra* (Blume) Hook.f. & Thomson, Fl. Ind. 1 (1855) 145, nom. illeg. non Bischoff ex Lindeb. (1829); Sinclair, Gard. Bull. Singapore 14(2) (1955) 447. **Type:** *Polyalthia cuneiformis* (Blume) Blume (= *Friesodielsia cuneiformis* (Blume) Steenis).

Schefferomitra Diels, Bot. Jahrb. Syst. 49(1) (1912) 152, nom. rej. **Type:** *Schefferomitra subaequalis* (Scheff.) Diels (= *Friesodielsia subaequalis* (Scheff.) R.M.K.Saunders et al.).

Woody climbers with distichous branches, often with twigs forming loops around supports. **Leaves:** lamina frequently glaucous abaxially, with narrow 1–2 mm long glands along the margin of the leaf base near the petiole, lateral veins flush and indistinct above, raised beneath, tertiary veins regular and scalariform. **Inflorescences** 1(–2)-flowered, supra-axillary, internodal or leaf-opposed. **Flowers:** buds conical, pedicels 1-bracteate, sepals 3, free or more or less connate at base, valvate, much shorter than outer petals, usually persistent in fruit; petals in two whorls of 3, valvate in each whorl; outer petals long and narrow, spreading or connivent at anthesis; inner petals much shorter than outer petals, connivent, forming a cone over the stamens and carpels, each petal with a short broad claw; stamens many, anthers not septate, anther connective apex truncate but oblique; carpels 9–20, ovules 1(–2), attached basally. **Fruit** with up to 35 monocarps per fruit, orange, red or rarely black, 1(–2)-seeded, ellipsoid, oblong or ovoid, apiculate, stipitate, pericarp membranous. **Seeds** generally 1(–2) per monocarp, smooth, light brown, exarillate; endosperm ruminations lamellate in quadrants.

Distribution. A genus of 49 species as now delimited, distributed from India to Hainan, southwards to Java, and from the Philippines to New Guinea. In Singapore, 5 native species.

Taxonomy. Guo et al. (Taxon 66 (2017) 3–19) excluded the African species from *Friesodielsia* and re-circumscribed the genus as exclusively comprising the Asian species.

Key to *Friesodielsia* species

1. Leaf blade rounded, truncate or broadly emarginate at apex, rarely acute or acuminate, larger leaves 5.7 cm wide or wider 2
 Leaf blade acute to acuminate at apex, rarely obtuse, larger leaves 6.7 cm wide or less, usually much less 3
2. Leaf blades with 7–13 lateral veins per side; flower pedicels 9–18 mm long, bracts ovate; sepals large, 13–17 × 6–12 mm; monocarp stalks short and thick (3–7 × 1.6–2.5 mm) ...
 3. *F. calycina*

- Leaves blades with 11–17 lateral veins per side; flower pedicels 5–10 mm long, bracts lanceolate; sepals small, 2–4 × 4–6 mm; monocarp stalks long and slender (9–15(–19) × 1–1.2 mm) **5. *F. latifolia***
3. Leaves with (sub-)erect hairs beneath (visible with a hand lens) **2. *F. borneensis***
 Leaves with small adpressed hairs beneath (only visible under 15× magnification) 4
4. Leaves with a golden sheen beneath; sepals 7–9 mm long; monocarps 11–16 mm long with stipe 10–20 mm long **1. *F. biglandulosa***
 Leaves glaucous to light brown beneath; sepals 2–4 mm long; monocarps 7–10 mm long with stipe 6–10 mm long **4. *F. glauca***

1. *Friesodielsia biglandulosa* (Blume) Steenis

(Latin, *bi-* = two, *glandulosus* = bearing small glands; referring to the pair of glands at each leaf base)

Blumea 12(2) (1964) 358; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 113; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 221; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 122, 285; Turner, Gard. Bull. Singapore 70 (2018) 491; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 141. **Basionym:** *Guatteria biglandulosa* Blume, Fl. Javae, fasc. 32–33 (1830) 102, t. 51. **Synonyms:** *Monoon biglandulosum* (Blume) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19. – *Oxymitra biglandulosa* (Blume) Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1870) 341; Ridley, Fl. Malay Penins. 1 (1922) 81; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 1616; Sinclair, Gard. Bull. Singapore 14(2) (1955) 459; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72. – *Polyalthia biglandulosa* (Blume) Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 65. – *Richella biglandulosa* (Blume) R.E.Fr. in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 17a(2) (1959) 171. **Type:** [Published illustration] *Guatteria biglandulosa* in Blume, Fl. Javae, fasc. 32–33 (1830) t. 51, lectotype designated by Turner, Gard. Bull. Singapore 70 (2018) 491. **Epitype:** *de Vogel 1354*, Indonesia, Java, West Java, Dungus Iwul Nature Reserve, 21 April 1972 (epitype L [L0182233], designated by Turner, Gard. Bull. Singapore 70 (2018) 491). **Fig. 30.**

Monoon biglandulosum (Blume) Miq. f. *latifolium* Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19, as ‘*latifolia*’. **Type:** *Korthals s.n.*, Borneo [Indonesia], Balaran (lectotype L [L0187138], designated by Turner, Gard. Bull. Singapore 70 (2018) 491).

Monoon biglandulosum (Blume) Miq. f. *angustifolium* Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19, as ‘*angustifolia*’. **Type:** *Korthals 643*, [Indonesia], Sumatra (lectotype L [L0182228], designated by Turner, Gard. Bull. Singapore 70 (2018) 491).

Liana climbing to 7 m. **Twigs** brown, becoming greyish black, adpressed-puberulent in the youngest parts, soon becoming glabrous. **Leaves:** lamina often coriaceous, rarely chartaceous, glabrous above, completely adpressed-puberulent beneath (visible only under 15× magnification), drying brown above, paler with a golden sheen beneath, generally elliptic, sometimes lanceolate, obovate or ovate, 8.5–21.1 × 5–9.4 cm, base glandulose on lamina edge

near petiole attachment, broadly cuneate to nearly rounded and short-decurrent on petiole, apex acuminate, acumen 5–28 mm long, midrib impressed above, raised beneath, lateral veins 7–13 per side, weakly brochidodromous, flush above, slightly raised beneath, higher-order veins scalariform, visible on both surfaces; petioles 6–15 mm long, 1.5–2.5 mm wide, grooved above, finely adpressed-puberulent. **Inflorescences** supra-axillary, single-flowered, rarely few-flowered, peduncle 3–5 mm long, c. 1 mm thick, finely adpressed-puberulent. **Flowers** with pedicels 4–15 mm long, c. 1 mm thick, finely adpressed-puberulent, with a linear medial bract 1.5–4 mm long, c. 1 mm wide, finely adpressed-puberulent; buds triquetrous; sepals lanceolate, $7-9 \times 3.5-4.5$ mm, chartaceous, sparsely adpressed-puberulent inside and outside, glabrous at the very base inside, apex acute; petals yellow, outer petals linear-lanceolate with a distinct midvein, 30–37 mm long, 3.5–6 mm wide at midpoint, 5–9 mm wide at base, chartaceous, sparsely adpressed-puberulent to glabrate outside, glabrous inside, apex obtuse; inner petals ovate with a distinct midvein, 9–11 mm long, 3.5–4.5 mm wide, chartaceous, coherent at margins for about half of its length towards apex, sparsely adpressed-puberulent outside, glabrous inside, apex acute; stamens c. 1 mm long, c. 0.5 mm wide, connective apex orbicular, slightly convex; carpels densely villose, ovaries c. 1.5 mm long, stigmas funnel-shaped (U-shaped when viewed from above), glabrous. **Fruit** of 7–17 monocarps, ripening orange, oblong-ellipsoid, $10.5-16 \times 7-9$ mm (up to 24 mm long in 2-seeded monocarps), smooth, subglabrous, pericarp c. 0.5 mm thick, apex rounded, mucronate or apiculate, sometimes oblique, apiculum up to 2 mm long, stipe $10-20 \times 0.8-1.5$ mm, sparsely adpressed-puberulent. **Seeds** 1 per monocarp, rarely 2, ellipsoid, $11-14 \times$ c. 7 mm.

Distribution. West Malesia. In Singapore, known from Nee Soon (*Maxwell* 78-350, 30 Jul 1978, SING [SING0003170]; *Samsuri et al. NES* 160, 29 Jul 2003, SING [SING0045864]; *Leong et al. SING2016-016*, 27 Jan 2016, SING [SING0236432]), Seletar (*Sinclair SFN* 38870, 2 Feb 1950, SING [SING0003172]) and Jurong (*Ridley s.n.*, 1896, SING [SING0003174]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), *Singapore Red Data Book*, ed. 3 (2024) 467).

2. *Friesodielsia borneensis* (Miq.) Steenis (of Borneo)

Blumea 12(2) (1964) 358; Turner, *Gard. Bull. Singapore* 45 (1993) 30; Turner, *Gard. Bull. Singapore* 47 (1997 [‘1995’]) 113; Turner et al., *Gard. Bull. Singapore* 48 (1998 [‘1996’]) 140; Chew et al., *Gard. Bull. Singapore* 49(2) (1999 [‘1997’]) 170; Turner & Chua, *Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res.* (2011) 8; Chong et al., *Checkl. Vasc. Pl. Fl. Singapore* (2009) 43, 103, 221; Turner & Chua, *Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res.* (2011) 8; Wong et al., *Checkl. Pl. Sp. Nee Soon Swamp Forest* (2013) 122, 285; Turner, *Gard. Bull. Singapore* 70 (2018) 491; Lindsay et al., *Gard. Bull. Singapore* 74(Suppl. 1) (2022) 141. **Basionym:** *Oxymitra borneensis* Miq., *Ann. Mus. Bot. Lugduno-Batavi* 2, fasc. 2 (1865) 30. **Type:** *Korthals s.n.*, [Indonesia], Borneo, Martapoera (lectotype L [L0037935], designated by Turner, *Phytotaxa* 36 (2011) 33).

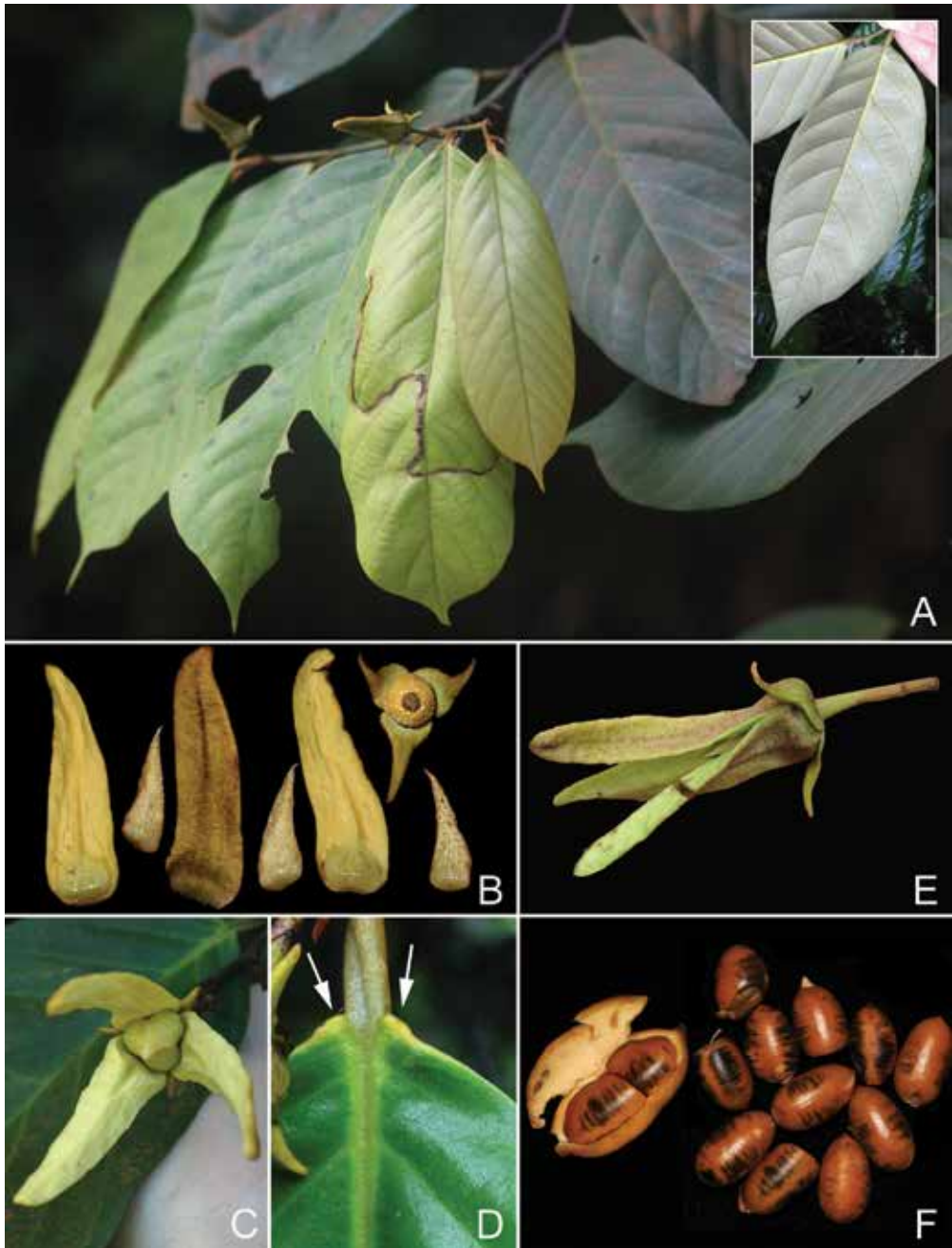


Figure 30. *Friesodielsia biglandulosa* (Blume) Steenis. **A.** Habit. Inset: Close-up of leaf lower surface. **B.** Dissected flower. **C.** Anthetic flower with basal apertures partially exposed (front view). **D.** Leaf glands indicated by arrows. **E.** Flower (side view). **F.** Left: A monocarp showing two seeds within, Right: seeds. (A–F including inset from Singapore, Nee Soon. Photos: X.Y. Ng).

Distribution. Peninsular Malaysia, Singapore, Sumatra and Borneo.

Ecology. Lowland forest.

Taxonomy. Two varieties are recognised, *Friesodielsia borneensis* var. *borneensis*, found only in Borneo, and *F. borneensis* var. *sumatrana* (Miq.) I.M.Turner, found in Sumatra, Peninsular Malaysia and Singapore (Turner, Gard. Bull. Singapore 70 (2018) 491–492). Only *Friesodielsia borneensis* var. *sumatrana* occurs in Singapore.

var. *sumatrana* (Miq.) I.M.Turner
(of Sumatra)

Gard. Bull. Singapore 70 (2018) 492; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 141. **Basionym:** *Oxymitra borneensis* Miq. var. *sumatrana* Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 31; Sinclair, Gard. Bull. Singapore 14(2) (1955) 458; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72. **Type:** *Korthals s.n.*, [Indonesia], Sumatra (lectotype K [K000691769], designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 459). **Fig. 31, 32.**

Oxymitra affinis auct. non Hook.f. & Thomson: Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 79, p.p.

Liana to 8 m tall, stem c. 2 cm thick. **Twigs** dark brown to blackish, densely (sub)erect-pubescent when young. **Leaves:** lamina chartaceous, generally glabrous above except the sparsely (sub)erect-pubescent midrib, sparsely to densely (sub)erect-pubescent beneath, especially along midrib and lateral veins, drying greyish brown, paler or glaucous beneath, oblong-elliptic to oblong-oblongate, 10–19.5 × 3–6.7 cm, base glandulose on lamina edge near petiole attachment, rounded to subcordate, apex obtuse, acute or acuminate, acumen 3–11 mm long, midrib flush to slightly sunken above, raised beneath, lateral veins 9–15 per side, arcuate, flush to slightly raised above, strongly raised beneath, higher-order veins scalariform between lateral veins, indistinct above, raised beneath; petioles 4.5–8 mm long, 1–2 mm wide, hardly grooved above, (sub)erect-pubescent. **Inflorescences** supra-axillary, single-flowered. **Flowers** with pedicels 5.5–13 mm long, 1–1.5 mm thick, densely (sub)erect-pubescent, bearing a linear, attenuate, pubescent bract 2.2–4.5 mm long, about a third of the way from pedicel base, rarely two-thirds of the way from pedicel base or directly beneath sepals; buds falciform, triquetrous; sepals lanceolate-attenuate to narrowly triangular, 5–9 × 3–4 mm, chartaceous, densely tomentose inside and outside, apex acute to caudate; petals yellow; outer petals strap-shaped with a distinct midvein, 33–59 mm long, 4–7 mm wide at midpoint, 5–6.5 mm wide at base, chartaceous, glabrous inside, adpressed-pubescent outside, apex acute; inner petals ovate, often with a distinct midvein, 8.4–10 mm long, 3–4 mm wide, chartaceous, coherent at margins for a third to half of its length towards apex, glabrous inside and outside, apex acuminate, acumen 1.1–3.7 mm long; stamens c. 2 mm long, c. 0.5 mm wide, connective apex truncate, slightly concave when dry; carpels densely villose, ovaries c. 2 mm long, stigmas funnel-shaped (U-shaped when viewed from above), glabrous. **Fruit** with 11–32 monocarps, pedicels 8–15 × 1.5–2 mm, sparsely suberect-pubescent, torus 2–3 mm high, 3–4 mm diam., tomentose; monocarps ripening pink to orange, ellipsoid, 9–10 × 5–5.5 mm, smooth, sparsely tomentose, glabrate, pericarp less than 0.5 mm thick, apex apiculate, apiculum 0.5–2 mm long,

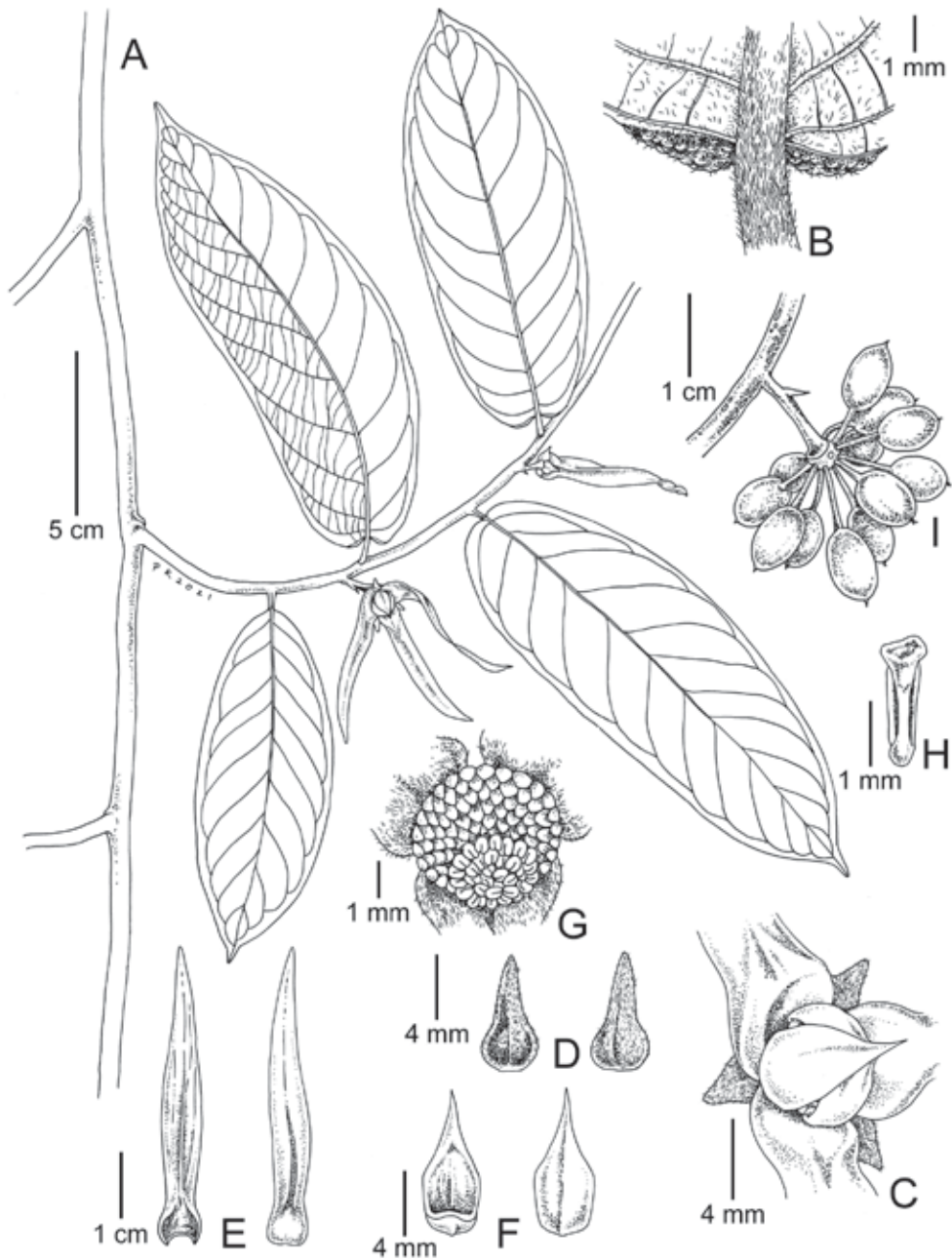


Figure 31. *Friesodielsia borneensis* (Miq.) Steenis var. *sumatrana* (Miq.) I.M.Turner. **A.** Habit. **B.** Section of leaf (lower surface). **C.** Close-up of the floral chamber of a mature flower. **D.** Sepals. **E.** Outer petals. **F.** Inner petals. **G.** Close-up of stamens and carpels. **H.** Stamen. **I.** Fruit. (A–I from Singapore, A, B & D–F, Nee Soon, *Lai LJ 243*; C, G & H, Central Catchment, *Guo & Chen GX71*; I, Nee Soon, *Yeoh SING2013-086*. Drawn by P.K. Cheng).



Figure 32. *Friesodielsia borneensis* (Miq.) Steenis var. *sumatrana* (Miq.) I.M.Turner. **A.** Twining habit. **B.** Flower (side view). Inset: Close-up of flower with petals removed, showing the stamens and stigmas. **C.** Fruit. **D.** Seeds. (A–D including inset from Singapore, Nee Soon. Photos: X.Y. Ng).

stipe 6–9 × 0.7–1 mm, sparsely sub-erect-pubescent. **Seeds** 1 per monocarp, ellipsoid, 8–8.5 × 4.5–5 mm, smooth, brown.

Distribution. Peninsular Malaysia (Johor) and Sumatra. In Singapore, known from Bukit Timah (*Ridley 6343*, 1894, SING [SING0003185]; *Niissalo et al. SING2019-393*, 2 May 2019, SING [SING0295647]), Chan Chu Kang (*Ridley s.n.*, 1894, SING [SING0003183]), Nee Soon (*Lai LJ 243*, 1997, SING [SING0008010]; *Yeoh SING2013-086*, 18 May 2013, SING [SING0203118]) and Mandai.

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

3. *Friesodielsia calycina* (King) Steenis

(Greek, *kalyx*, *kalykos* = calyx, *-inus* = resembling, owning; with a notable calyx)

Blumea 12(2) (1964) 358; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 113; Turner, Gard. Bull. Singapore 70 (2018) 492; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 141; Leeratiwong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 108, pl. 12: B. **Basionym:** *Oxymitra calycina* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 99; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 81; Sinclair, Gard. Bull. Singapore 14(2) (1955) 451. **Type:** *King’s Collector 10604*, [Malaysia], Perak, Ulu Bubong, July 1886 (lectotype P [P000602196], designated by Turner, Gard. Bull. Singapore 70 (2018) 492; isolectotypes BM, CAL [CAL0000004486, CAL0000004487], DD, K [K003818410], SING [SING0252035], WU [WU0026081]).

Oxymitra excisa auct. non Miq.: Sinclair, Gard. Bull. Singapore 14(2) (1955) 452.

Friesodielsia excisa auct. non (Miq.) Steenis: van Steenis, Blumea 12(2) (1964) 359; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 113; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 221; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 122, 285; Turner, Gard. Bull. Singapore 70 (2018) 493, p.p.

Liana, climbing to 15 m. **Twigs** dark brown to black, thick, rusty- to brown-tomentose. **Leaves:** lamina subcoriaceous to coriaceous, generally glabrate above except the sparsely tomentose midrib and lateral veins, densely tomentose beneath, especially along veins, including higher-order venation, drying blackish brown or chestnut brown above, glaucous or light brown beneath, obovate to oblong-obovate, 12.9–32 × 5.7–17.2 cm, base rounded, subcordate or truncate, apex rounded to truncate, sometimes slightly emarginate with a short mucronate tip, midrib impressed above, raised beneath, lateral veins 7–13 per side, weakly brochidodromous, flush or impressed above, raised beneath, higher-order veins forming scalariform reticulations between the lateral veins, indistinct or slightly impressed above, raised beneath; petioles 3.5–

14 mm long, 2–5 mm wide, grooved above, densely tomentose. **Inflorescences** internodal/leaf-opposed, single-flowered. **Flowers** with pedicels stout, 9–18 mm long, 1.5–2 mm thick, tomentose, with a clasping ovate bract 4–8 mm long, 3–5 mm wide, attached a quarter to a fifth of distance from base, tomentose; buds lanceolate, acute; sepals light velvety green, triangular, 13–17 × 6–12 mm, subcoriaceous, tomentose on both surfaces, apex acute to acuminate; petals velvety deep yellow; outer petals narrowly triangular, with raised thickened midvein, 13–24 mm long, c. 4 mm wide at midpoint, 6–7 mm wide at base, glabrous adaxially, sericeous abaxially, apex obtuse; inner petals ovate, with raised thickened midvein, 13–17 mm long, c. 5 mm wide, glabrous on both surfaces, apex acute; stamens 1.5–2 mm long, with flat-topped oblique connectives; carpels villose, ovaries c. 2 mm long. **Fruit** of 11–15 monocarps, pedicels 10–30 × 2–3 mm, tomentose, torus 4–5 mm high, 4.5–5 mm diam., tomentose; monocarps ripening bright red, seed-containing portion ellipsoid, 10–12.5 × 7–9 mm, smooth, sparsely tomentose to glabrate, apex rounded to an apiculum c. 1 mm long, stipe 3–7 × 1.6–2.5 mm, tomentose, pericarp c. 1 mm thick. **Seeds** 1 per monocarp, ellipsoidal, c. 9 × 6 mm.

Distribution. Peninsular Thailand and Peninsular Malaysia. In Singapore, known from Singapore Botanic Gardens' Rain Forest (*Ridley 9115*, Dec 1897, SING [SING0000080]), Sembawang (*Ridley 6428*, 1894, SING [SING0003177]) and Mandai (*Sinclair 10907*, 28 Aug 1966, SING [SING0003175]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Nationally Extinct (NEx) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Taxonomy. In our opinion, the specimens identified by Sinclair as *Oxymitra excisa* do not match the type of that name at L, lacking the broadly emarginate leaf blade apices. We have called all of the Singapore material with large shiny leaves *Friesodielsia calycina* and *F. excisa* is not found in Singapore.

4. *Friesodielsia glauca* (Hook.f. & Thomson) Steenis

(Greek, *glaukos* = bluish grey or bluish green; referring to the undersides of the leaves)

Blumea 12(2) (1964) 359; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 113; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 140; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43, 103, 192; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 122, 285; Turner, Gard. Bull. Singapore 70 (2018) 494; Chong et al., Gard. Bull. Singapore 70(Suppl. 1) (2018) 54; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 142; Leeratiwong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 112, pl. 12: E. **Basionym:** *Oxymitra glauca* Hook.f. & Thomson, Fl. Ind. 1 (1855) 146; Ridley, Fl. Malay Penins. 1 (1922) 82; Sinclair, Gard. Bull. Singapore 14(2) (1955) 460; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72. **Type:** *Collector unknown s.n.*, [Malaysia], Prince of Wales Island [Penang] (holotype K [K000691773]). **Fig. 33.**

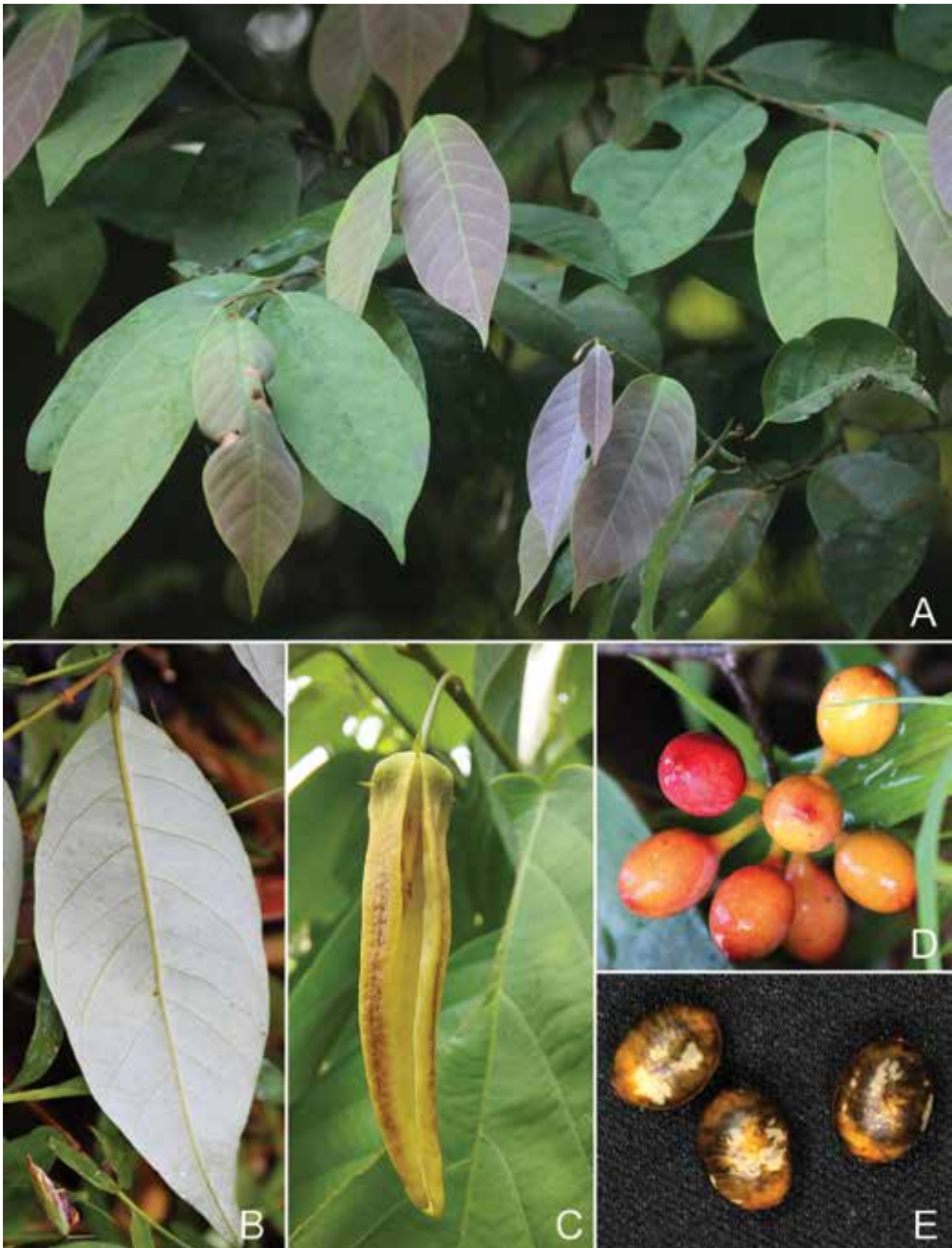


Figure 33. *Friesodielsia glauca* (Hook.f. & Thomson) Steenis **A.** Habit. **B.** Glaucous lower leaf surface. **C.** Flower. **D.** Fruit. **E.** Seeds. (A, B, D & E from Singapore, Nee Soon, *Neo et al. SING2013-343*; C from Thailand. Photos: A, B, D & E, X.Y. Ng; C, C. Leeratiwong, reproduced with kind permission).

Oxymitra diadema Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 31. **Synonym:** *Friesodielsia diadema* (Miq.) Steenis, Blumea 12(2) (1964) 358. **Type:** *Korthals s.n.*, [Indonesia], Borneo, Mt Sakoembang (lectotype L [L0182284], designated by Turner, Phytotaxa 36 (2011) 34).

Oxymitra linderifolia Ridl., Bull. Misc. Inform. Kew 1912 (1912) 385. **Synonym:** *Friesodielsia linderifolia* (Ridl.) Steenis, Blumea 12(2) (1964) 360. **Type:** *Haviland 2333*, [Malaysia], Sarawak, Kuching, 19 April 1893 (lectotype K [K000691760], designated by Turner, Gard. Bull. Singapore 64 (2012) 239; isoelectotypes BM [BM000946078], K [K000691760], SAR, SING [SING0059751]).

Liana climbing to 7 m. **Twigs** twining, brown to grey, adpressed-puberulent in the youngest parts, soon becoming glabrous. **Leaves:** lamina chartaceous, glabrous above, adpressed-puberulent beneath (visible only under 15× magnification), drying dark brown above, often glaucous or light brown beneath, elliptic to obovate, 7.5–12.6(–17) × 3–6.8 cm, base broadly cuneate or rounded, apex acuminate, acumen (4–)9–14 mm long, midrib impressed above, raised beneath, lateral veins 8–11(–16) per side, weakly brochidodromous, flush above, raised beneath, higher-order veins scalariform, indistinct above, slightly raised beneath; petioles 4–9 mm long, 1–2 mm wide, grooved above, finely adpressed-puberulent, becoming glabrous. **Inflorescences** from leafless portion of stem, single-flowered, rarely few-flowered, peduncle 3–6 mm long, less than 1 mm thick, adpressed-pubescent. **Flowers** with pedicels 11–35 mm long, less than 1 mm thick, adpressed-pubescent, with a linear medial bract 1.5–2 mm long, less than 1 mm wide, attached for a quarter to half of distance from base, glabrous or adpressed-pubescent; buds falciform, triquetrous; sepals triangular, 2–4 × 1.5–2 mm, chartaceous, adpressed-pubescent outside and inside except the very base inside, apex acute; petals yellow; outer petals linear, with raised thickened midvein, 17–26 mm long, 1.5–2 mm wide at midpoint, 3.5–4 mm wide at base, chartaceous, adpressed-pubescent outside, glabrous inside except along the veins, apex obtuse; inner petals narrowly triangular, with a distinct midvein, 6–8 mm long, 2–3 mm wide, chartaceous, coherent at margins for about half of length towards apex, glabrous outside and inside, apex acute; stamens 1–1.5 mm long, c. 0.5 mm wide, connective apex truncate, slightly concave when dry; carpels villous, ovaries c. 1 mm long, stigmas c. 1 mm long, funnel-shaped (U-shaped when viewed from above), glabrous. **Fruit** of 8–16 monocarps, pedicels 16–30 × 0.8–1 mm, sparsely adpressed-pubescent to glabrous, torus 2–2.5 mm high, 2–3 mm diam., sparsely tomentose to glabrous; monocarps ripening orange to red, seed-containing portion subglobose to ellipsoid, 7–10 × 6–7 mm, smooth, sparsely adpressed-puberulent to glabrate, apex mucronate, apiculum less than 1 mm long, stipe 6–10 × c. 1 mm, sparsely adpressed-puberulent to glabrate, pericarp less than 1 mm thick. **Seeds** 1 per monocarp, subglobose to ellipsoid, c. 6 × 5 mm.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, known from Nee Soon (*Neo et al. SING2013-343*, 7 Dec 2013, SING [SING0202330]), Jurong (*Corner SFN 26151*, 11 Dec 1932, SING [SING0003181]) and Singapore Botanic Gardens' Rain Forest (*Ridley 5820*, 1899, SING [SING0000064]). It is also represented by leafy branch vouchers from Chestnut (*Gwee SING2010-702*, 31 Mar 2010, SING [SING0145754]), MacRitchie, Mandai (*Gwee SING2010-255*, 2 Feb 2010, SING [SING0144509]) and Upper Seletar.

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered

(EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Taxonomy. Sinclair (Gard. Bull. Singapore 14(2) (1955) 461) observed that this species is difficult and may hybridise with *Friesodielsia biglandulosa*. His statement to that effect was written on one of the two sheets at SING of *Sinclair SFN 40044*, from Mandai Road, collected on 10 October 1953 (SING0003179, SING0003180). In Peninsular Malaysia and Singapore the two species are readily distinguishable.

5. *Friesodielsia latifolia* (Hook.f. & Thomson) Steenis

(Latin, *latus* = broad, wide, *folium* = leaf; with wide leaves)

Blumea 12(2) (1964) 360; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 113; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 43. 103, 228; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 122, 285; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 497; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 142; Leeratiwong et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 114, pl. 13: A. **Basionym:** *Oxymitra latifolia* Hook.f. & Thomson, Fl. Ind. 1 (1855) 145; Ridley, Fl. Malay Penins. 1 (1922) 81; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 1617; Sinclair, Gard. Bull. Singapore 14(2) (1955) 456. **Type:** *Collector unknown s.n.*, [Malaysia], Penang (holotype K [K000691793]). **Fig. 34.**

Large liana to 24 m tall, stem c. 5 cm thick. **Twigs** twining, dark brown to blackish brown, densely (sub)erect-pubescent when young, eventually glabrate. **Leaves:** lamina subcoriaceous to chartaceous, glabrous above except the sparsely (sub)erect-pubescent midrib, densely erect-pubescent beneath, especially along midrib and lateral veins, often discolourous, drying greyish green above and greyish brown beneath, sometimes concolorous, drying greyish green or greyish brown, rarely faintly glaucous beneath, broadly oblong-obovate to broadly oblong-elliptic, 13–34 × 8.7–18 cm, base cordate, rarely rounded, apex rounded or slightly emarginate, rarely acute or acuminate, glands on lamina edge near petiole attachment inconspicuous, midrib sunken above, raised beneath, lateral veins 11–17 per side, weakly brochidodromous, slightly raised to flush above, raised beneath, higher-order veins scalariform between lateral veins, indistinct above, raised beneath; petioles 6–10(–15) mm long, 2–4 mm wide, hardly grooved above, densely (sub)erect-pubescent. **Inflorescences** supra-axillary, single-flowered. **Flowers** with pedicels stout, 5–10 mm long, 1.5–2.5 mm thick, densely suberect-pubescent, medial bract lanceolate, densely suberect-pubescent, 3–5 mm long, often on the middle of the pedicel; buds conical, weakly triquetrous, acute; sepals broadly ovate to orbicular, 2–4 × 4–6 mm, thinly coriaceous, densely suberect-pubescent outside, glabrous inside except for band of hairs at distal margin, apex obtuse or rounded; petals cream-white; outer petals ovate-lanceolate, without a distinct midvein, 20–37 mm long, 6–9 mm wide at midpoint, 7–11 mm wide at base, thick-coriaceous, glabrous inside, tomentose outside, apex acute; inner petals ovate-lanceolate, without a distinct midvein, 15–26 mm long, 4–5.5 mm wide at midpoint,

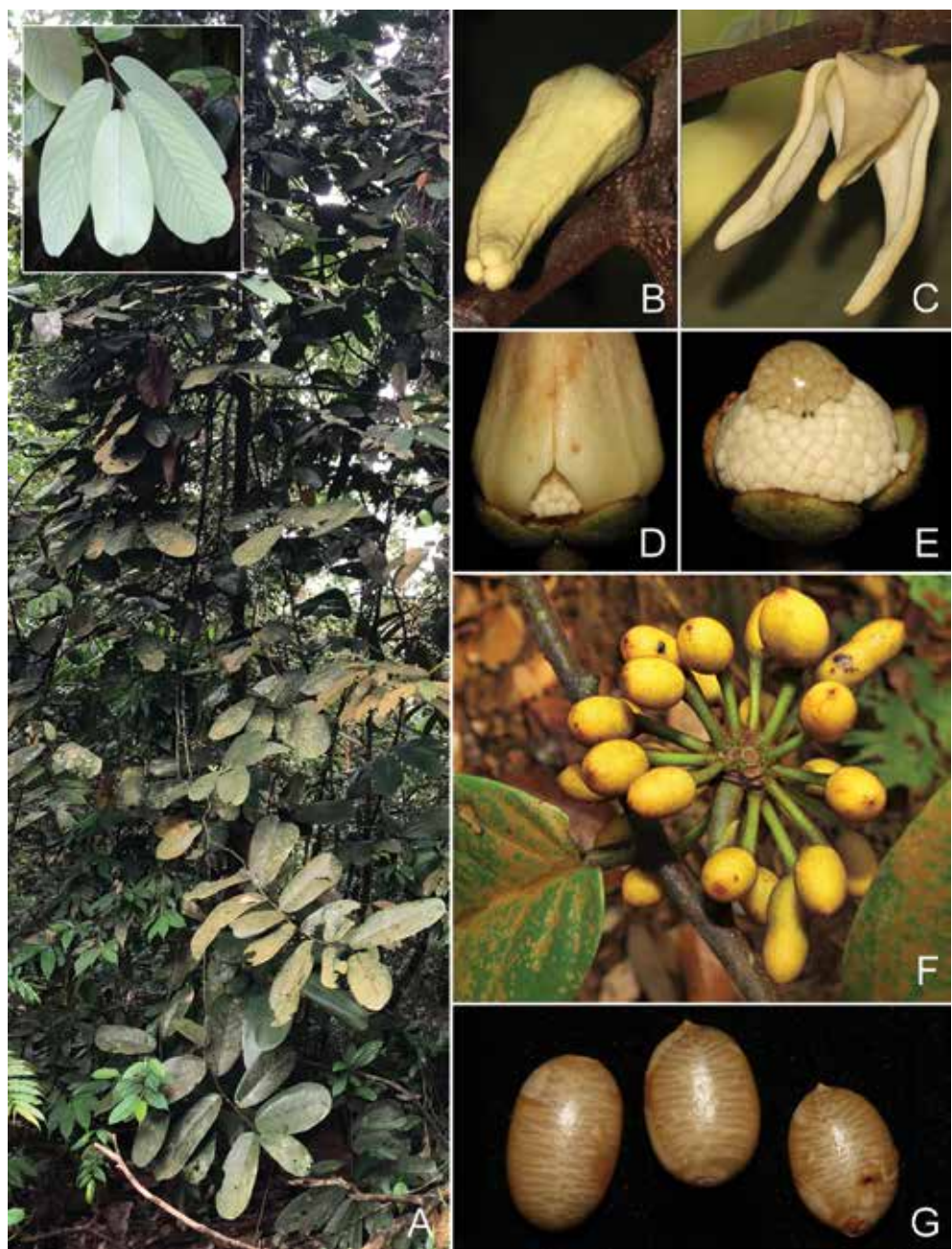


Figure 34. *Friesodielsia latifolia* (Hook.f. & Thomson) Steenis **A.** Habit. Inset: Leaves. **B.** Flower bud. **C.** Mature flower. **D.** Flower with outer petals removed, showing basal aperture of pollination chamber. **E.** Flower with all petals removed, showing the stamens and stigmas. **F.** Fruit. **G.** Seeds. (A–G including inset from Singapore; A & F, MacRitchie; A inset, B & G, Nee Soon; C, MacRitchie, *Leong et al. SING2018-005*; D & E, Chestnut, *Ng SING2016-157*. Photos: A, A inset, B–E & G, X.Y. Ng; F, R.C.J. Lim).

6–7 mm wide at base, thick-coriaceous, coherent at margins for most of length towards apex, glabrous inside and outside, apex acute; stamens c. 2 mm long, c. 0.5 mm wide, connective apex truncate, flat; carpels densely villose, ovaries c. 1.5 mm long, stigmas funnel-shaped (U-shaped when viewed from above), glabrous. **Fruit** of 12–35 monocarps, pedicels 7–15 × 1.7–3 mm, suberect-pubescent, torus 3–8 mm high, 4.5–9 mm diam., suberect-pubescent; monocarps ripening yellow, orange or red, seed-containing portion ellipsoid, 11–14 × 6–8 mm (up to 18 mm long in 2-seeded monocarps), verruculose, sparsely tomentose, glabrate, apex rounded or apiculate, apiculum to 1.5 mm long, stipe 9–15(–19) × 1–1.2 mm, densely suberect-pubescent, pericarp less than 0.5 mm thick. **Seeds** 1, rarely 2, per monocarp, pale brown, ellipsoid, 10–12 × 7–8 × c. 6.5 mm, smooth, with a flat circular scar c. 3 mm diam. across the micropylar end.

Distribution. Peninsular Malaysia. In Singapore, known from Bukit Timah (*Niissalo et al. SING2020-029*, 22 Jan 2020, SING [SING0312856]), Chestnut (*Ng SING2016-157*, 16 Sep 2016, SING [SING0251971]), MacRitchie (*Leong et al. SING2018-005*, 3 Jan 2018, SING [SING0274319]), Nee Soon (*Ng SING2018-282*, 25 Mar 2018, SING [SING0274048]), Singapore Botanic Gardens' Rain Forest and Upper Peirce (*Tang & Sidek 23*, 25 Aug 1994, SING [SING0016225]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Least Concern (LC) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Notes. The dense indumentum of erect hairs on the lower lamina surface may be less obvious in older specimens, often manifest as irregular patches of hairs on the lower lamina.

13. GONIOTHALAMUS (Blume) Hook.f. & Thomson

(Greek, *gonio* = angle, corner, *thalamos* = flower base; possibly referring to the shape of the receptacle)

Fl. Ind. 1 (1855) 105, nom. cons.; Bentham & Hooker, Gen. Pl. 1(1) (1862) 26; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 72; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 70; King, Ann. Roy. Bot. Calc. 4(1) (1893) 86; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 63; Sinclair, Gard. Bull. Singapore 14(2) (1955) 423; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 111; Kochummen, Tree Fl. Malaya 1 (1972) 74; Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 547, 660; Huber in Dassanayake & Fosberg (ed.), Rev. Handb. Fl. Ceylon 5 (1985) 61; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 119; Turner, Gard. Bull. Singapore 45 (1993) 30; Mat-Salleh, Folia Malaysiana 2 (2001) 75; Saunders, Bot. J. Linn. Soc. 139 (2002) 225; Saunders, Bot. J. Linn. Soc. 142 (2003) 321; Saunders & Chalermglin, Bot. J. Linn. Soc. 156 (2008) 356; Nakkuntod et al., Taxon 58 (2009) 127; Li & Gilbert, Fl. China 19 (2011) 684; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 42; Turner, Gard. Bull. Singapore 70 (2018) 500; Saunders & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 118. **Basionym:** *Polyalthia* Blume sect. *Goniothalamus* Blume, Fl. Javae, fasc. 28–29 (1830) 71. **Synonym:** *Polyalthia* Blume subgen. *Goniothalamus* (Blume) Rehb., Deut. Bot. Herb.-Buch. (1841) 193. **Type:** *Goniothalamus macrophyllus* (Blume) Hook.f. & Thomson, lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 259.

Richella A.Gray, Proc. Amer. Acad. Arts 2 (1852) 325. **Type:** *Richella monosperma* A.Gray (= *Goniothalamus monospermus* (A.Gray) R.M.K.Saunders).

Atruteigia Bedd., Madras J. Lit. Sci., ser. 3, 1 (1864) 37. **Type:** *Atruteigia wynadensis* Bedd. (= *Goniothalamus wynadensis* (Bedd.) Bedd.).

Beccariodendron Warb., Bot. Jahrb. Syst. 13(3–4) (1891) 452. **Type:** *Beccariodendron grandiflorum* Warb. (= *Goniothalamus grandiflorus* (Warb.) Boerl.).

Treelets, trees or shrubs. **Indumentum** of simple hairs. **Leaves:** lamina with midrib slightly sunken or flush above, lateral veins generally distinct, tertiary venation scalariform or reticulate. **Inflorescences** axillary, slightly supra-axillary or flowers in fascicles on woody tubercles at the base of the trunk. **Flowers** bisexual, with a series of small bracts at the base of the pedicel; sepals 3, sometimes persistent in fruit; petals coriaceous, 6 in two whorls of 3, not persistent in fruit; outer petals larger than sepals, clawed, inner petals shorter than outer ones, shortly clawed, cohering by the distal edges to form a mitriform dome over the stamens and carpels, with three lateral apertures at the base between the claws; stamens many, anther cells transversely septate, connective apex truncate or apiculate; style linear, stigma awl- or funnel-shaped, often with a longitudinal split; ovules 1–2(–3) in each carpel, basal or lateral. **Fruit** indehiscent, ellipsoid, subglobose, pyriform or torulose, shortly stipitate or sessile. **Seeds** usually 1 or 2 per monocarp or rarely more, often hairy, exarillate; endosperm ruminations lamellate.

Distribution. A genus of about 140 species, distributed from India to China, continental Southeast Asia, Malesia, to Australia and some Pacific islands. In Singapore, 4 native species.

Notes. Records for Singapore of *Goniothalamus giganteus* Hook.f. & Thomson (King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 73; Ridley, Fl. Malay Penins. 1 (1922) 65) and *G. tortilipetalus* M.R.Hend. (LaFrankie et al., Forest Trees Bukit Timah (2005) 162; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 46, 103, 228) are not accepted here. A doubtful specimen of Wallich's (EIC 6469B, K-W [K001123976]) includes more than one taxon and though part is possibly *Goniothalamus giganteus* it may have been collected in Penang as the attached label in Wallich's hand appears to indicate. Otherwise, no specimens from Singapore of this species have been confirmed.

The record of *Goniothalamus tortilipetalus* M.R.Hend. from Singapore remains unsupported by voucher specimens and so is not included in this account.

Key to *Goniothalamus* species

1. Midrib of leaf lamina abaxially prominent and sharp-edged for most of its length when dried; stamen connective apically truncate; monocarps frequently with more than 1 seed and then cylindrical and slightly contracted between the seeds (torulose) **2. *G. malayanus***
- Midrib of leaf lamina abaxially prominent and rounded for most of its length when dried; stamen connective apiculate; monocarps less frequently with more than 1 seed, ellipsoid, subglobose or pyriform, not torulose 2

2. Flowers and fruit in fascicles on woody tubercles at the base of the stem **3. *G. ridleyi***
Flowers, and fruit not restricted to the base of the trunk, solitary on trunks, older branches
or young growth 3
3. Leaf laminas 26–49 × 6–12 cm, abaxial lamina surface minutely bumpy and with distinct
brochidodromous looping of lateral veins when dried; sepals 5–12 × 5–11 mm **1. *G. macrophyllus***
Leaf laminas 15–24 × 4.3–8 cm, abaxial surface texture not minutely bumpy and
brochidodromous looping of lateral veins obscure when dried; sepals 3–6 × 3–6 mm
..... **4. *G. tapis***

1. *Goniothalamus macrophyllus* (Blume) Hook.f. & Thomson

(Greek, *macros* = large, *phyllon* = leaf; with large leaves)

Fl. Ind. 1 (1855) 109; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 74; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 76; Ridley, Fl. Malay Penins. 1 (1922) 84; Sinclair, Gard. Bull. Singapore 14(2) (1955) 446; Kochummen, Tree Fl. Malaya 1 (1972) 76; Maxwell, Gard. Bull. Singapore 36(2) (1984 [‘1983’]) 229; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 114; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Saunders, Bot. J. Linn. Soc. 139 (2002) 248; Saunders, Bot. J. Linn. Soc. 142 (2003) 330; LaFrankie et al., Forest Trees Bukit Timah (2005) 59, 162; Saunders & Chalermglin, Bot. J. Linn. Soc. 156 (2008) 366; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 45, 103, 221; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 134, 285; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 52; Turner, Gard. Bull. Singapore 70 (2018) 518; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 142; Saunders & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 130, pl. 15: B. **Basionym:** *Unona macrophylla* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 17. **Synonym:** *Polyalthia macrophylla* (Blume) Blume, Fl. Javae, fasc. 28–29 (1830) 79, t. 39. **Type:** *Blume s.n.*, [Indonesia], Java, in montium declivitatibus (lectotype L [L0100583], designated here; possible isoelectotype L [L0100584]). **Fig. 35.**

Goniothalamus forbesii Baker f., J. Bot. 62(Suppl.) (1924) 4. **Type:** *Forbes 1644a*, [Indonesia], Sumatra, Lampung, 1881–1882 (lectotype BM [BM0000601759], designated by Saunders, Bot. J. Linn. Soc. 139 (2002) 248; isoelectotype B [B 10 0272898]).

Goniothalamus macrophyllus (Blume) Hook.f. & Thomson var. *siamensis* J.Sinclair, Gard. Bull. Singapore 15 (1956) 17. **Type:** *Smitinand 821*, Thailand, Nakhon Si Thammarat Province, Khao Luang, 2 August 1951 (holotype BKF).

Goniothalamus macrophyllus (Blume) Hook.f. & Thomson var. *kerrii* Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 670, as ‘*kerri*’. **Type:** *Kerr 16887*, Siam [Thailand], Ranawng [Ranong], Klawng Kampuam, 30 January 1929 (holotype BM [BM000547157]).

Goniothalamus macrophyllus (Blume) Hook.f. & Thomson var. *lanceolatus* Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 670. **Synonym:** *Goniothalamus lanceolatus* (Bân) Mat-Salleh, Folia Malaysiana 2 (2001) 103, nom. illeg. non Miq. (1861). **Type:** *Clemens & Clemens 20357*, [Malaysia], Sarawak,



Figure 35. *Goniothalamus macrophyllus* (Blume) Hook.f. & Thomson. **A.** Habit. **B.** Immature flower. **C.** Leaves (upper surface). Inset: Leaf (lower surface). **D.** Fruit. (A–D including inset from Singapore, A & D, Nee Soon, *Leong et al. SING2016-021*; B, C & C inset, Bukit Timah. Photos: A & D, P.K.F. Leong; B, J. Chen; C & C inset, J. Leong-Škorničková).

Mt Poi, 9 September 1929 (holotype NY [NY00025943]; isotypes BO, K [K000691908], MO, NY [NY00025944]).

Treelets to 8 m tall. **Twigs** pale grey, striate-wrinkly, glabrous or very sparsely hairy. **Leaves:** lamina (sub-)coriaceous, glabrous, elliptic to obovate, 26–49 × 6–12 cm, base cuneate, apex acuminate, midrib slightly sunken above, abaxially prominent and rounded, lateral veins 12–22 per side; petiole 12–23 mm long. **Inflorescences** single-flowered, cauli- or ramiflorous, slightly supra-axillary. **Flowers** with pedicels 5–12 mm long, glabrous to sparsely hairy with adpressed hairs, with a series of bracts at the base, bracts triangular, to 2 mm long; sepals free or sometimes basally connate, broadly ovate to triangular, 5–12 × 5–11 mm, glabrous to sparsely hairy abaxially and adaxially, greenish-reddish to reddish purple, veins distinct and slightly raised abaxially; petals white-cream to pinkish, outer petals clawed-ovate, 12–28 × 5–11 mm, adpressed hairy to sparsely hairy abaxially, sparsely hairy to subglabrous adaxially except for velutinous region at the base, inner petals broadly clawed-ovate, coherent, 7–15 × 4–8 mm, hairy abaxially, velutinous adaxially; stamens 2–4 mm long, connective apiculate, papillate; carpels many, ovaries densely hairy, style glabrous to hairy, stigma funnel-shaped, sparsely to densely hairy. **Fruit** with pedicels up to 18 mm long, glabrous to sparsely hairy; without persistent calyx; monocarps up to 12, ellipsoid, 8–14 × 7–10 mm, apiculate, red to orange at maturity, sparsely adpressed hairy to glabrescent, shortly stipitate to sessile, stipes to c. 3 mm long, 1–2 mm thick. **Seeds** 1(–2) per monocarp, 9–12 × 7–9 mm, subglobose to ellipsoid, testa smooth to slightly rugose, glabrous to hairy, brown.

Distribution. Thailand, Peninsular Malaysia, Sumatra, Java and Borneo. In Singapore, known from Bukit Timah (*Leong et al. CTFS 7193*, 13 Sep 2018, SING [SING0274120]), MacRitchie (*Gwee SING2009-778*, 28 Dec 2009, SING [SING0144173]), Nee Soon (*Leong et al. SING2016-021*, 27 Jan 2016, SING [SING0232212]), Serangoon (*Ridley s.n.*, Mar 1897, SING [SING0003188]), Tuas (*Ridley s.n.*, 1891, SING [SING0003187]) and other parts of the Central Catchment.

Ecology. In Singapore, in primary and secondary lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

2. *Goniothalamus malayanus* Hook.f. & Thomson (of Malaya)

Fl. Ind. 1 (1855) 107; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 75; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 74; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 66; Sinclair, Gard. Bull. Singapore 14(2) (1955) 432; Kochummen, Tree Fl. Malaya 1 (1972) 75; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 30; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 114; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Saunders, Bot. J. Linn. Soc. 139 (2002) 227; Saunders, Bot. J. Linn. Soc. 142 (2003) 335; Saunders & Chalermglin, Bot.

J. Linn. Soc. 156 (2008) 371; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 45, 103, 221; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 135, 286; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 53, fig. 10, pl. 3: A; Turner, Gard. Bull. Singapore 70 (2018) 519; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 66; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 142; Saunders & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 131, fig. 26. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka] (lectotype K [K000691867], designated by Turner, Phytotaxa 36 (2011) 39; possible isotype K [K000691866]). **Fig. 36.**

Goniothalamus dispermus Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 34. **Synonym:** *Goniothalamus malayanus* Hook.f. & Thomson var. *dispermus* (Miq.) Boerl., Icon. Bogor. 1, fasc. 2 (1899) 136. **Type:** *Korthals s.n.*, Borneo australis [Indonesia, Kalimantan], [ad Fl. Doessen] (lectotype U [U0045097], designated here).

Goniothalamus slingerlandtianus Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1870) 341. **Synonym:** *Goniothalamus malayanus* Hook.f. & Thomson var. *slingerlandtianus* (Scheff.) Boerl., Icon. Bogor. 1, fasc. 2 (1899) 136. **Type:** *Teijsmann s.n.* [Herb. Bogor. no. 17970], [Indonesia], Bangka, Blijenjo (lectotype BO, designated by Turner, Gard. Bull. Singapore 70 (2018) 519; isotypes BM [BM000601814], C [C10005596, C10005597, C1005598], K [K000691907], PDA).

Goniothalamus puncticulatus Boerl. & Koord. in Koorders-Schumacher, Syst. Verz. 2 (1910) 19. **Type:** *Koorders 15769β*, [Indonesia], Sumatra, Riau, Rawah Sigati, 14 March 1891 (holotype BO).

Goniothalamus ventristylus Boerl. & Koord. in Koorders-Schumacher, Syst. Verz. 2 (1910) 20. **Type:** *Koorders 40197β*, [Indonesia], Sumatra, Riau, Rawah Sigati, 14 March 1891 (holotype BO).

Small trees to 15 m tall. **Twigs** drying pale, striate-wrinkly, young twigs densely adpressed hairy, older twigs glabrescent. **Leaves:** lamina papyraceous to coriaceous, glabrous above, glabrous to sparsely hairy abaxially, ovate, elliptic or obovate, $7.5\text{--}26 \times 3\text{--}8$ cm, base rounded, apex acuminate, midrib slightly sunken above, abaxially prominent and sharp-edged for most of its length, lateral veins 14–18 per side; petiole 5–12 mm long. **Inflorescences** single-flowered, on the trunk, older branches or young growth, axillary. **Flowers** with pedicels 8–16 mm long, hairy, with a series of clasping bracts at the base, bracts ovate, to c. 2 mm long; sepals basally connate to free, broadly ovate to broadly triangular, $3\text{--}8 \times 4\text{--}7$ mm, adpressed hairy abaxially, glabrous to sparsely hairy adaxially; petals yellow or green-yellow, outer petals clawed-ovate, $22\text{--}60 \times 7\text{--}27$ mm, adpressed hairy, with densely hairy base abaxially, and glabrous region at base adaxially; inner petals clawed-ovate, coherent, $7\text{--}13 \times 4\text{--}7$ mm, densely hairy abaxially, glabrous adaxially; stamens numerous, 1–2 mm long, connective truncate, papillate; carpels many, ovaries hairy, style glabrous, stigmas funnel- to awl-shaped, glabrous. **Fruit** with pedicels to 17 mm long, sparsely hairy; without persistent calyx; monocarps up to 15, ellipsoid to torulose, $16\text{--}40 \times 8\text{--}15$ mm, apex acute and apiculate, dark red, sparsely adpressed hairy to glabrescent, stipitate, stipes 3–10 mm long. **Seeds** 1–2(–3) per monocarp, $13\text{--}18 \times 8\text{--}12$ mm, flattened ellipsoid, testa smooth, hairy, brown.

Distribution. Andaman and Nicobar Islands, Thailand, Peninsular Malaysia, Sumatra, Java and Borneo. In Singapore, there are historical collections from Bukit Timah (*Ridley s.n.*, 1890, SING [SING0003194]) and Seletar (*Ridley s.n.*, Apr 1894, SING [SING0003193]) but all recent collections are from Nee Soon (*Leong et al. SING2012-164*, 27 Apr 2012, SING [SING0174851]; *Ng SING2014-336*, 11 Sep 2014, SING [SING0213762]).



Figure 36. *Goniothalamus malayanus* Hook.f. & Thomson. **A.** Habit. **B.** Leaves. **C.** Flower. **D.** Immature flower. **E.** Flower, outer petals removed (side view). **F.** Flower, petals removed, showing stamen connectives and white recurved stigmas in the middle. **G.** Young fruit. **H.** Two monocarps cut longitudinally and an intact seed. (A–H from Singapore, Nee Soon, Ng SING2014-336. Photos: A, B & H, R.C.J. Lim; C–G, X.Y. Ng).

Ecology. Lowland freshwater swamp forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

3. *Goniothalamus ridleyi* King

(Henry Nicholas Ridley, 1855–1956, English botanist and first Director of Singapore Botanic Gardens)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 76; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 68; Sinclair, Gard. Bull. Singapore 14(2) (1955) 437; Kochummen, Tree Fl. Malaya 1 (1972) 76; Keng, Gard. Bull. Singapore 27 (1974) 72; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 114; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Saunders, Bot. J. Linn. Soc. 139 (2002) 238; Saunders, Bot. J. Linn. Soc. 142 (2003) 326; Saunders & Chalermglin, Bot. J. Linn. Soc. 156 (2008) 371; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 45, 103, 221; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 135, 286; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 58, fig. 11, pl. 4; Turner, Gard. Bull. Singapore 70 (2018) 524; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 143; Saunders & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 133, fig. 27. **Type:** *Goodenough 2118*, Singapore, Sungei Murai, 15 February 1890 (lectotype K [K000691858], designated by Saunders, Bot. J. Linn. Soc. 139 (2002) 238; isoelectotypes CAL [CAL0000004515, CAL0000004516], SING [SING0003203]). **Fig. 37.**

Goniothalamus prainianus King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 72. **Type:** *King's Collector 5745*, [Malaysia], Perak, March 1884 (lectotype K [K000691855], designated by Saunders, Bot. J. Linn. Soc. 142 (2003) 326; isoelectotypes BM [BM000601781, BM000601782], CAL [CAL0000303163]).

Goniothalamus prainianus King var. *angustipetalus* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 72, as '*angustipetala*'. **Type:** *King's Collector 8348*, [Malaysia], Perak, December 1885 (lectotype K [K000691857], designated by Saunders, Bot. J. Linn. Soc. 142 (2003) 326; isoelectotypes BM [BM000601787], CAL, MO, SING [SING0030888]).

Goniothalamus fasciculatus Boerl., Icon. Bogor. 1, fasc. 3 (1899) [173], t. 59. **Synonym:** *Goniothalamus ridleyi* King var. *fasciculatus* (Boerl.) Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 669. **Type:** [Published illustration] *Goniothalamus fasciculatus* in Boerlage, Icon. Bogor. 1, fasc. 3 (1899) t. 59, lectotype designated by Turner, Gard. Bull. Singapore 70 (2018) 525.

Goniothalamus lateritius Becc., For. Borneo (1902) 324, 536. **Type:** *Beccari P.B. 3610*, [Malaysia], Sarawak, colline a ponente di Mattan [Mattang], July 1867 (lectotype FI-B [FI017636] [Erb. Coll. Becc. no. 322], designated by Turner, Gard. Bull. Singapore 70 (2018) 525; isoelectotype FI-B [Erb. Coll. Becc. no. 322A]).

Trees to 20 m tall. **Twigs** brownish, striate-wrinkly, young twigs adpressed hairy, older glabrescent. **Leaves:** lamina papyraceous, glabrous above, glabrous to sparsely adpressed

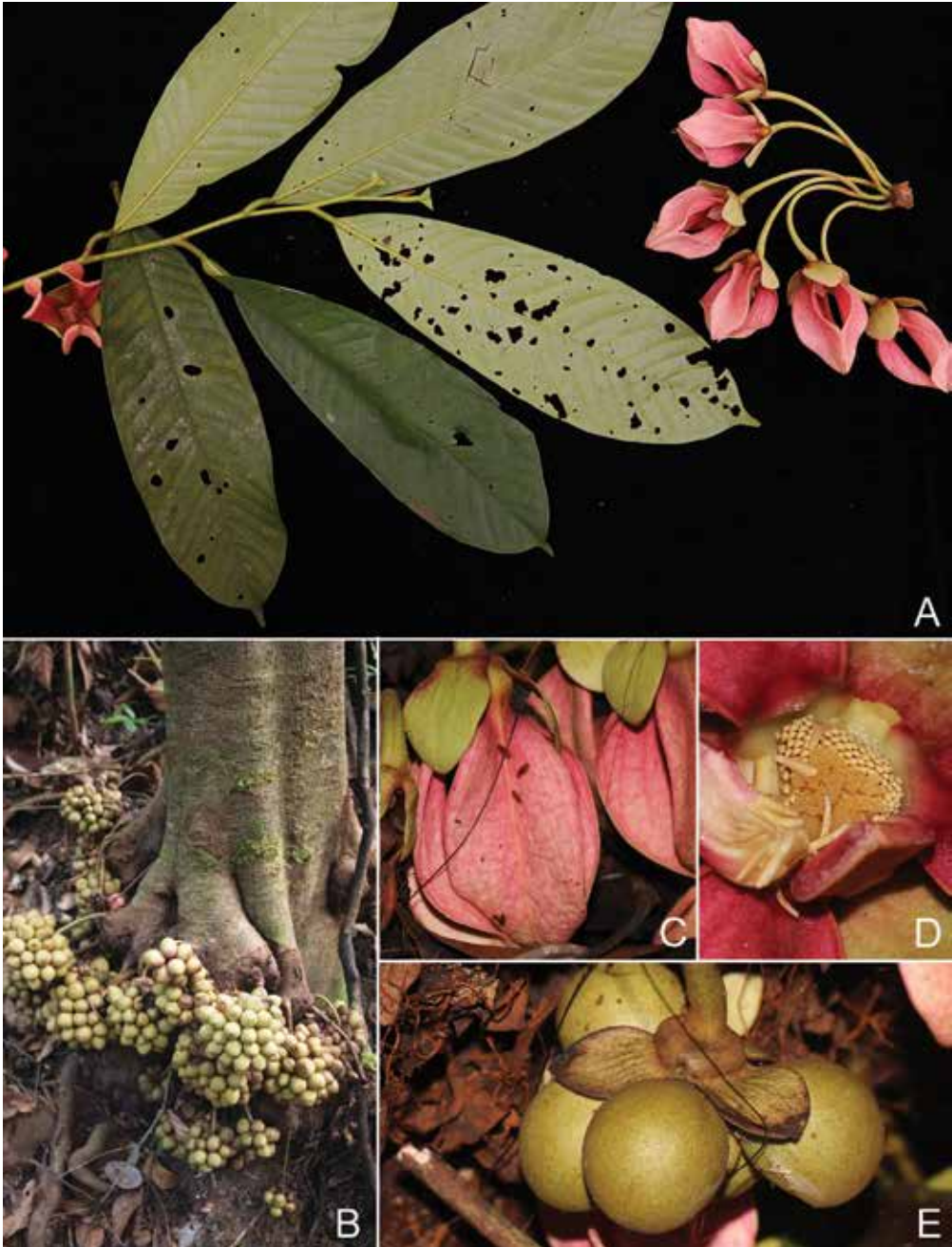


Figure 37. *Goniothalamus ridleyi* King. **A.** Leafy branch and an inflorescence. **B.** Trunk base with fruit. **C.** Flower (side view). **D.** Flower, front view with petals pushed aside to show stamen connectives and stigmas in the middle. **E.** Fruit. (A from Singapore, Nee Soon, *Leong et al. SING2016-075*; B from Borneo, Sarawak; C–E, Nee Soon, *Thomas 3439*. Photos: A, P.K.F. Leong, B, Zaki Jamil; C–E, J. Chen).

hairy abaxially, elliptic, elliptic-oblong or obovate, 14–29 × 5–10 cm, base cuneate to rounded, apex acuminate, midrib slightly sunken above, abaxially prominent and rounded, lateral veins 13–20 per side; petiole 6–20 mm long. **Inflorescences:** flowers in fascicles arising from woody tubercles at the base of the trunk. **Flowers** with pedicels 50–110 mm long, adpressed hairy, with several bracts in the basal part, bracts ovate to triangular, to c. 2 mm long; sepals basally connate, broadly ovate to suborbicular, or elliptic, 8–22 × 5–19 mm, hairy to subglabrous abaxially and adaxially, green, green tinged with pink, or purplish; petals cream to yellowish, tinged with pink, to pinkish or reddish; outer petals ovate to elliptic, clawed, 12–54 × 9–20 mm, sparsely to densely adpressed hairy and with densely hairy base abaxially, hairy with velutinous region at the base adaxially; inner petals ovate, clawed, coherent, 8–13 × 6–10 mm, hairy abaxially, velutinous adaxially; stamens 2–4 mm long, connective apiculate, papillate; carpels many, ovaries hairy, style glabrous or occasionally hairy, stigmas funnel-shaped, glabrous. **Fruit** with pedicels to 130 mm long, subglabrous to sparsely hairy; calyx persistent; monocarps many (up to 50 or more), pyriform, ellipsoid or obovoid, 24–40 × 17–30 mm, apex rounded, pinkish-purplish, red-brown, sparsely hairy to subglabrous, stipitate, stipes 4–14 mm long. **Seeds** 1–2(–3) per monocarp, 18–25 × 14–18 mm, flattened ellipsoid, testa smooth, hairy, brown.

Distribution. Thailand, Peninsular Malaysia, Sumatra, Java and Borneo. In Singapore, there are historical collections from Chan Chu Kang (*Ridley 3900*, 1892, SING [SING0003201]), Sungei Buloh (*Ridley 6227*, 1893, SING [SING0003195]), Bukit Mandai (*Corner s.n.*, 14 Sep 1930, SING [SING0003205]) and other places. More recent collections are from Bukit Timah (*Ho et al. BT2015-068*, 22 Apr 2015, SING [SING0268583]) and Nee Soon (*Ho et al. SING2016-066*, 10 Mar 2016, SING [SING0230851]).

Ecology. In Singapore, in freshwater swamp forest and lowland rain forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

4. *Goniothalamus tapis* Miq.

(from a vernacular name)

Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 371; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 77; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 67; Burkill, Dict. Econ. Prod. Malay Penins. 1 (1935) 1099; Sinclair, Gard. Bull. Singapore 14(2) (1955) 444; Kochummen, Tree Fl. Malaya 1 (1972) 76; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 114; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Saunders, Bot. J. Linn. Soc. 139 (2002) 237; Saunders, Bot. J. Linn. Soc. 142 (2003) 328; LaFrankie et al., Forest Trees Bukit Timah (2005) 162; Saunders & Chalermglin, Bot. J. Linn. Soc. 156 (2008) 376; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 45, 103, 221; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 135, 286; Turner, Gard. Bull. Singapore 70 (2018) 530; Ho et al., Gard. Bull. Singapore 71(Suppl. 1)

(2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 143; Saunders & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 143, pl. 16: G, K. **Type:** *Diepenhorst* 2125, [Indonesia], Sumatra, Priaman (lectotype U [U0000279], designated by Saunders, Bot. J. Linn. Soc. 139 (2002) 237). **Fig. 38, 39.**

Goniothalamus sumatranus Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 371. **Type:** *Teijsmann s.n.* [Herb. Bogor. no. 3663], [Indonesia], Sumatra, Palembang Province, Muara-enim (lectotype U [U0000278], designated by Turner, Gard. Bull. Singapore 70 (2018) 530; possible isoelectotypes A [A00135386], BO, K [K000691891], LE [LE00012543]).

Goniothalamus umbrosus J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 445. **Type:** *Sinclair SFN* 39356, [Malaysia], Penang, Waterfall Gardens, jungle behind no. 2 Plant House, 19 October 1951 (lectotype SING [SING0394634], designated by Turner, Gard. Bull. Singapore 70 (2018) 530; isoelectotypes E [E00124261], K [K000691863]).

Treelets or shrubs to 10 m tall. **Twigs** brownish, striate-wrinkly, young twigs glabrous to sparsely hairy, older twigs glabrescent. **Leaves:** lamina papyraceous to subcoriaceous, hairy when young but glabrous abaxially and adaxially when mature, elliptic or elliptic-oblong, 15–24 × 4.3–8 cm, base cuneate or rarely rounded, apex acuminate, midrib slightly sunken above, abaxially prominent and rounded, lateral veins 11–16 per side; petiole 4–12 mm long. **Inflorescences** single-flowered, usually on young growth, rarely on older branches, sometimes also along the trunk in younger plants, axillary. **Flowers** with pedicels 4–10 mm long, glabrous or sparsely adpressed hairy, with a series of bracts at the base, bracts ovate to triangular, to c. 1.5 mm long; sepals free, ovate, 3–6 × 3–6 mm, hairy abaxially, glabrous adaxially, green with red base, to pinkish or reddish; petals cream to pale yellowish, sometimes tinged with pink or red; outer petals clawed-ovate, 24–55 × 10–18 mm, glabrous to adpressed hairy abaxially and adaxially, with glabrous region at the base adaxially; inner petals clawed-ovate, coherent, 10–19 × 3–9 mm, sparsely to densely hairy abaxially, glabrous basally and granular distally; stamens 2–3 mm long, connective long apiculate, papillate-hairy; carpels many, ovaries densely hairy, style glabrous, stigmas funnel- or awl-shaped, glabrous to papillose-hairy. **Fruit** with pedicels 4–14 mm long, glabrous to sparsely hairy; without persistent calyx; monocarps many, ellipsoid or subglobose, 9–13 × 7–10 mm, apiculate, red, dark red, or purple to blackish, sparsely hairy to subglabrous, subsessile to shortly stipitate, stipes 1–4 mm long. **Seeds** 1 per monocarp, 8–12 × 6–9 mm, flattened ellipsoid, testa smooth to slightly rugose, sparsely hairy to subglabrous, brown.

Distribution. Thailand, Peninsular Malaysia and Sumatra. In Singapore, there are historical collections Chan Chu Kang, Jurong and other places. More recent collections are from Chestnut (*Gwee et al. SING2008-166*, 20 May 2008, SING [SING0113836]), Nee Soon (*Gwee et al. SING2009-180*, 24 Feb 2009, SING [SING0124455]), Mandai (*Lua et al. SING2015-230*, 13 Aug 2015, SING [SING0214533]), MacRitchie (*Lua et al. SING2018-378*, 10 Apr 2018, SING [SING0274373]) and Bukit Timah (*Lim CTF57265*, 15 Nov 2018, SING [SING0286177]).

Ecology. In Singapore, in primary and old secondary lowland rain forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

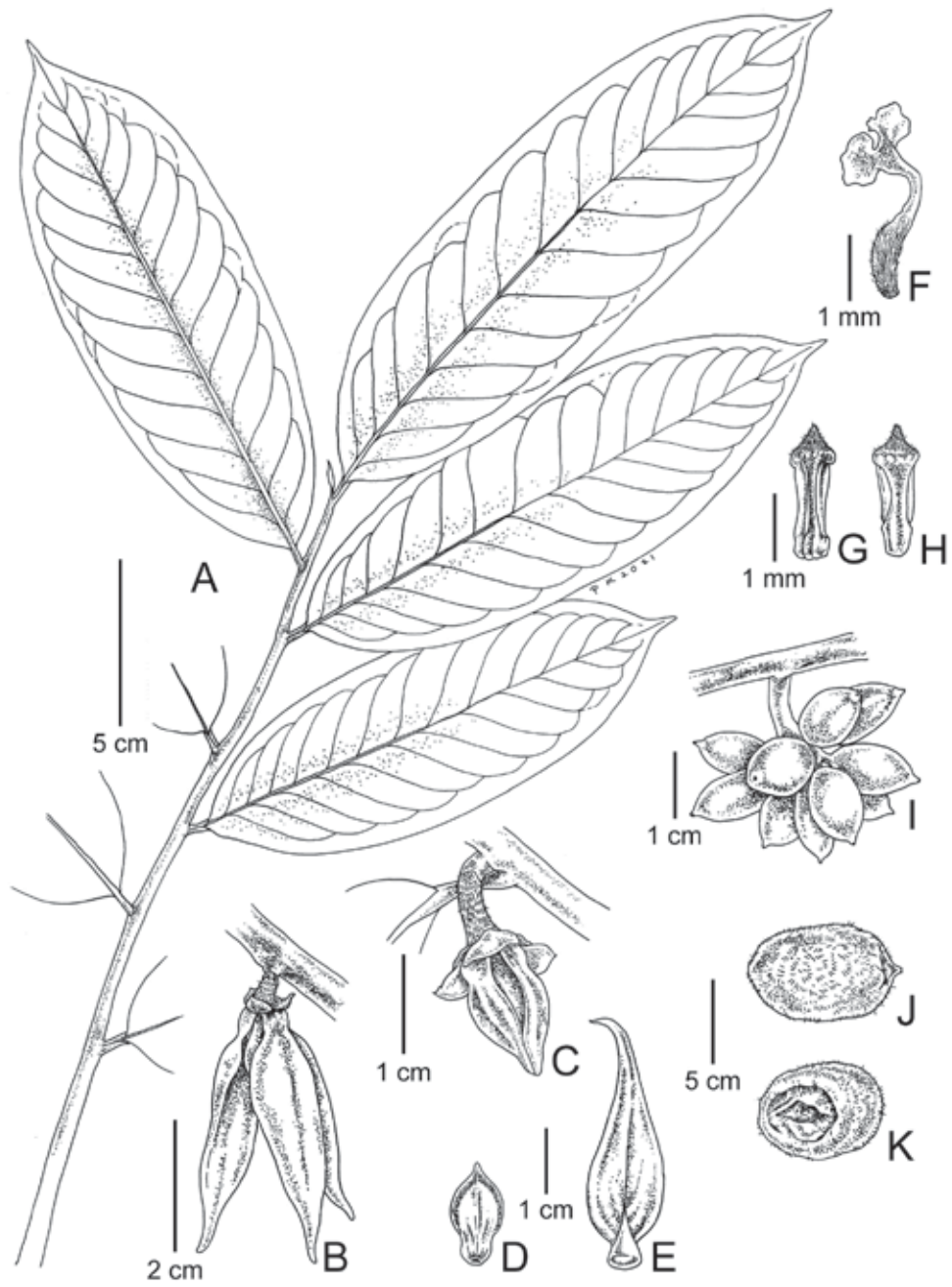


Figure 38. *Goniothalamus tapis* Miq. **A.** Leafy twig. **B.** Flower (side view). **C.** Flower, outer petals removed (side view). **D.** Inner petal (adaxial surface). **E.** Outer petal (adaxial surface). **F.** Ovary (side view). **G.** Stamen (abaxial surface). **H.** Stamen (adaxial surface). **I.** Fruit. **J.** Seed (side view). **K.** Seed (micropylar view). (A–K from Singapore, A–H, Upper Seletar, *Thomas 3401*; I, Singapore Botanic Gardens, *Thomas 3464*; J & K, Jurong, *Mat s.n.* Drawn by P.K. Cheng).



Figure 39. *Goniothalamus tapis* Miq. **A.** Habit. Inset: Young fruit. **B.** Leaves. **C.** Immature flower (side view). **D.** Mature flower (side view). Inset: Flower with petals removed showing stamen connectives and pale stigmas in the middle. **E.** Fruit. **F.** Seeds. (A–F including inset from Singapore, A, B, D inset, E & F, Singapore Botanic Gardens; C, MacRitchie, *Lua et al. SING2018-378*; D, Pasir Panjang Nursery. Photos: A, B, D inset, E & F, X.Y. Ng; C, P.K.F. Leong; D, Zaki Jamil).

Vernacular name. *Mempisang* (NParks' Flora & Fauna Web, 2026).

Notes. A specimen housed at K was selected by Turner (Gard. Bull. Singapore 70 (2018) 530) as the lectotype of *Goniothalamus umbrosus* J.Sinclair, here treated as a synonym of *Goniothalamus tapis* Miq. However, this specimen originated from SING and has since been returned there. Accordingly, it is cited in the text as housed in SING and with a SING barcode (*Sinclair SFN 39356* [SING0394634]).

14. HUBERANTHA Chaowasku

(Herbert Franz Josef Huber, 1931–2005, German botanist)

Kew Bull. 70-23 (2015) 1; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 4; Chaowasku in Johnson & Murray, Fl. Thailand 16(1) (2022) 148. **Synonym:** *Hubera* Chaowasku, Phytotaxa 69 (2012) 46, nom. illeg. non *Huberia* DC. (1828); Turner, Tree Fl. Sabah & Sarawak 8 (2014) 70. **Type:** *Huberantha cerasoides* (Roxb.) Chaowasku

Polyalthia auct. non Blume: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 49, p.p.; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 62, p.p.; Ridley, Fl. Malay Penins. 1 (1922) 48, p.p.; Sinclair, Gard. Bull. Singapore 14(2) (1955) 279, p.p.; Kochummen, Tree Fl. Malaya 1 (1972) 85, p.p.

Shrubs, treelets or larger trees, evergreen or rarely deciduous. **Indumentum** comprising simple hairs. **Twigs** glabrous or hairy, sometimes lenticellate. **Leaves** chartaceous to coriaceous, not white or glaucous beneath, base generally cuneate and symmetric, rarely (sub)cordate or asymmetric; midrib furrowed or flush above; venation brochidodromous; lateral veins looping well within margin, intramarginal veins indistinct; intercostal venation reticulate; domatia sometimes present abaxially. **Inflorescences** axillary and 1- or 2-flowered, or in few-flowered fascicles on main stem and branches. **Flowers** bisexual; perianth whorls valvate; sepals 3, free; petals 6 in two whorls of 3, outer and inner petals more or less similar in size and shape, at least 4 cm long at maturity, bases not saccate, upper parts more or less flat, erect or spreading at anthesis, not persistent in fruit, sometimes with white or yellow powdery patches; inner petals not clawed, bases not tightly pressed over reproductive structures, smooth or wrinkled; stamens many (> 40), apex of connectives truncate; carpels many (> 10), ovules 1 in each carpel. **Fruit** with monocarps few to many, generally ripening red, subglobose to ellipsoidal, stipitate or more rarely (sub)sessile. **Seeds** 1 per monocarp, surface smooth without a marked circumferential groove, exarillate; endosperm rumination spiniform.

Distribution. A genus of about 40–50 species in Madagascar and East Africa, through tropical Asia to Australia and the Southwest Pacific, of which 23 in the Asia-Pacific region. In Singapore, 2 native species.

Taxonomy. *Huberantha* has only recently been segregated from *Polyalthia* Blume. It is distinguished from *Polyalthia* sensu stricto by the leaf base generally being cuneate and symmetrical (vs generally subcordate and asymmetrical), domatia sometimes present on the lower leaf surface (vs absent), inflorescences axillary (vs axillary or terminal), ovules 1 in each carpel (vs 2–6) and flat to slightly raised seed raphe (vs generally slightly grooved). Species of

Huberantha can be distinguished from those of *Monoon* (another *Polyalthia* segregate) by the looping (brochidodromous) lateral venation and reticulate intercostal venation (vs herringbone (eucaptodromous) and subscalariform to scalariform), presence of domatia on the lower leaf surface (vs absent) and flat to slightly raised seed raphe (vs distinctly grooved).

Key to *Huberantha* species

1. Sepals suborbicular, to 3 mm long; petals drying uniformly pale brown ... **1. *H. jenkinsii***
 Sepals triangular, c. 6 mm long or more; petals often drying with powdery yellow patches
 **2. *H. rumphii***

1. *Huberantha jenkinsii* (Hook.f. & Thomson) Chaowasku

(Francis Jenkins, 1793–1866, English botanist and administrator
 with the East India Company in Assam)

Kew Bull. 70-23 (2015) 2; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 4; Turner, Gard. Bull. Singapore 70 (2018) 538; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 143; Chaowasku in Johnson & Murray, Fl. Thailand 16(1) (2022) 149, fig. 31, pl. 17: D, E. **Basionym:** *Guatteria jenkinsii* Hook.f. & Thomson, Fl. Ind. 1 (1855) 141. **Synonyms:** *Polyalthia jenkinsii* (Hook.f. & Thomson) Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 64; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 56; Sinclair, Gard. Bull. Singapore 14(2) (1955) 305, as '*jenkensii*'; Kochummen, Tree Fl. Malaya 1 (1972) 88; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13, as '*jenkensii*'; Turner, Gard. Bull. Singapore 45 (1993) 32, as '*jenkensii*'; Wong et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 75, as '*jenkensii*'; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 118, as '*jenkensii*'; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171, as '*jenkensii*'; LaFrankie et al., Forest Trees Bukit Timah (2005) 165; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 210, as '*jenkensii*'; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9. – *Hubera jenkinsii* (Hook.f. & Thomson) Chaowasku, Phytotaxa 69 (2012) 48; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 71. **Type:** *Jenkins s.n.*, India, Assam (lectotype K [K000691481], designated by Turner, Phytotaxa 36 (2011) 73). **Fig. 40.**

Polyalthia andamanica Kurz ex King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 53. **Type:** *King's Collector s.n.*, India, Andaman Islands, South Andaman, Namanagha, 13 December 1890 (lectotype K [K000739193], designated by Turner, Phytotaxa 36 (2011) 74; isolectotype K [K000739192]).

Polyalthia havilandii Boerl., Icon. Bogor. 1, fasc. 2 & 3 (1899) 107, [189], t. 66, as '*havilandi*'. **Type:** *Haviland 2*, [Malaysia], Borneo, Sarawak, near Kuching, 15 February 1894 (lectotype BO [sheet no. BO-1352593], designated here; isotype L [L0188829]).

Polyalthia cumingiana Merr., Publ. Bur. Sci. Gov. Lab. 35 (1906) 71. **Type:** *Cuming 827*, Philippines, Luzon, Prov. Tayabas (lectotype K [K000739193], designated by Turner, Phytotaxa 36 (2011) 74; isolectotypes BM [BM000754131], E [E00499977], K [K000691637, K000691638], LE [LE00012478], M [M0240047], MEL [MEL2382303], NY [NY00026204], WU [WU0059360]).

Unona agusanensis Elmer, Leaf. Philipp. Bot. 5 (1913) 1743. **Synonym:** *Polyalthia agusanensis* (Elmer) Merr., Philipp. J. Sci., C 10(4) (1915) 250. **Type:** *Elmer 13654*, Philippines, Mindanao, Province

of Agusan, Cabadbaran (Mt Urdaneta), September 1912 (lectotype NY [NY00026313], designated by Turner, *Phytotaxa* 36 (2011) 74; isolectotypes A [A00039688], C [C10005668], CAL [CAL0000004318], K [K000691623], L [L0038106], U [U0147304]).

Trees to 20 m tall. **Twigs** generally drying pale grey, shallowly latticed, younger parts with short brown tomentum, sometimes sparse and difficult to see. **Leaves:** lamina chartaceous, scattering of adpressed brown hairs on midrib and veins beneath, generally glabrous above or with a few short erect hairs on midrib near base, drying a fairly uniform grey or grey-brown above, rather shiny, grey with contrasting pale brown midrib and lateral veins beneath, lanceolate, elliptic or obovate, $9\text{--}21 \times 3\text{--}6.5$ cm, base obtuse to acute, apex acuminate, midrib slightly sunken above in dry leaves, lateral veins very slightly raised, midrib prominent beneath, lateral veins slightly raised, lateral veins 10–12 pairs, arching forward and looping distinctly well within the margin, domatia frequent in axils of lateral veins; petiole 3–12 mm long, 1–2 mm thick, drying brown with short decumbent hairs. **Inflorescence** axillary, on a very short axis 1–2 mm long, mostly bearing one flower at a time, leaving small knobs on the twigs. **Flowers** with pedicels 10–30 mm long, 0.75–1 mm thick, drying brown, longitudinally striate, dense short brown tomentum, medial bract absent or tiny, c. 1×1 mm; sepals ovate-triangular, $1.5\text{--}2 \times 2.5\text{--}3$ mm, apex blunt to pointed, drying dark brown, brown hairy outside, glabrous within; petals ultimately ovate-elliptic, to 8×3.5 cm, but often collected before full expansion, drying dark brown, quite thin textured, with very short pale or brown hairs densest externally; stamens many, c. 1 mm long; carpels many, c. 1.5 mm long, pale hairy. **Fruit** with pedicels to 2 mm thick; monocarps to 40 or more, ellipsoidal or cylindrical, $9\text{--}11 \times 6$ mm, drying black or very dark brown, minutely pimpled, apiculate, scattered short adpressed red-brown hairs only dense near apex, stipe long and slender, to 17 mm long, 0.5 mm thick. **Seeds** 1, rarely 2, per monocarp.

Distribution. From northern India to the Philippines. In Singapore, known only from Bukit Timah (*Ngadiman SFN 34691*, 21 Feb 1938, KEP, SING [SING0003281]; *Lim et al. SING2019-121*, 14 Feb 2019, SING [SING0285703]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), *Singapore Red Data Book*, ed. 3 (2024) 467).

2. *Huberantha rumphii* (Blume ex Hensch.) Chaowasku

(Georg Eberhard Rumpf, latinised as Rumphius, 1627–1702, German-born botanist in the Moluccas)

Kew Bull. 70-23 (2015) 3; Turner & Utteridge, *Eur. J. Taxon.* 183 (2016) 4; Turner, *Gard. Bull. Singapore* 70 (2018) 541; Ho et al., *Gard. Bull. Singapore* 71(Suppl. 1) (2019) 67; Lindsay et al., *Gard. Bull. Singapore* 74(Suppl. 1) (2022) 143. **Basionym:** *Guatteria rumphii* Blume ex Hensch., *Vita Rumphii* (1833) 153. **Synonyms:** *Polyalthia rumphii* (Blume ex Hensch.) Merr., *Enum. Philipp. Fl. Pl.* 2 (1923) 162; Sinclair, *Gard. Bull. Singapore* 14(2) (1955) 306; Kochummen, *Tree Fl. Malaya* 1 (1972) 89; Keng, *Gard. Bull. Singapore* 27 (1974) 73; Keng, *Concise Fl. Singapore*, vol. 1, *Gymn. Dicot.* (1990) 14;

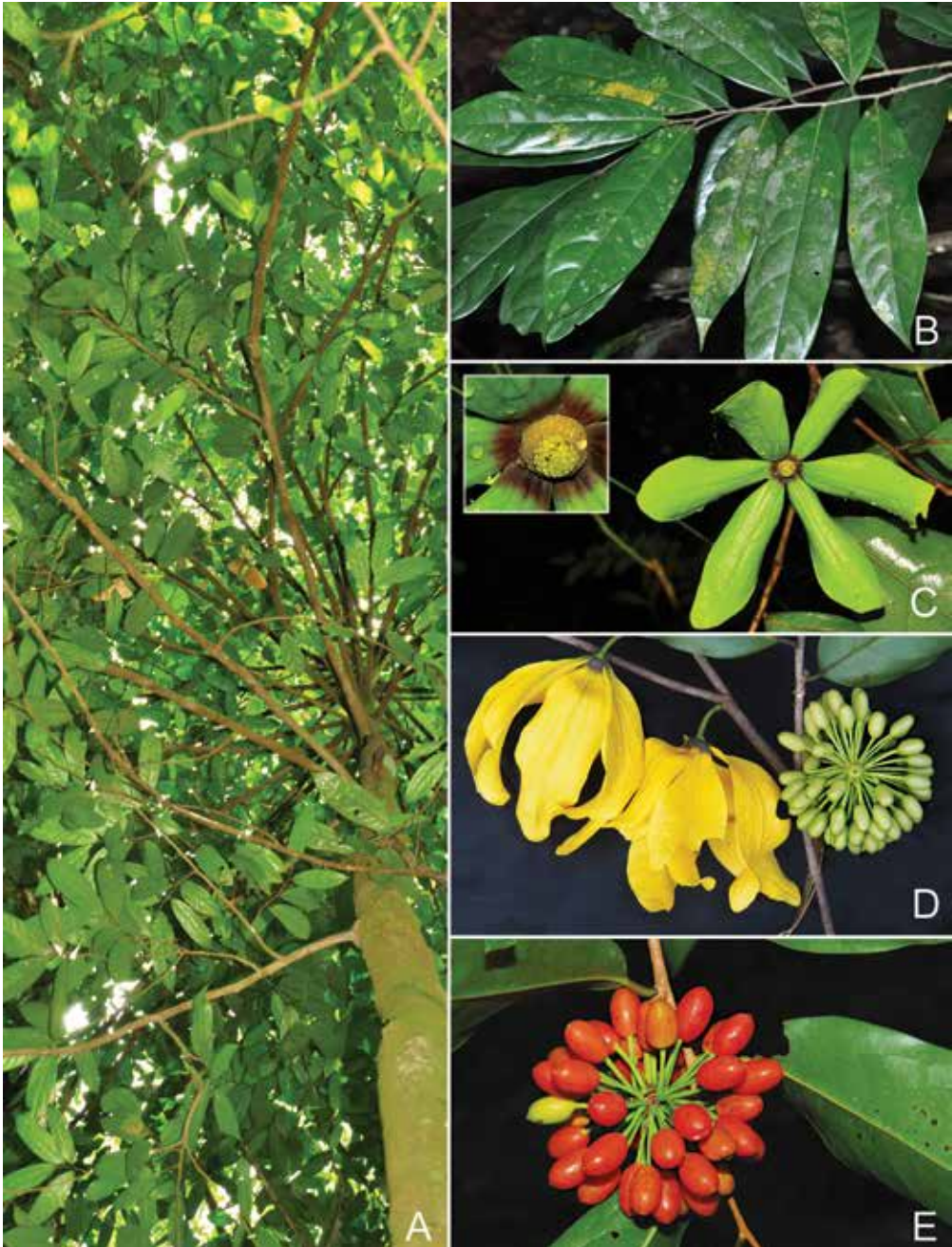


Figure 40. *Huberantha jenkinsii* (Hook.f. & Thomson) Chaowasku. **A.** Habit. **B.** Leafy branch. **C.** Young flower. Inset: Close-up of stamens and stigmas. **D.** Mature flowers and a young infructescence. **E.** Ripening infructescence. (A–E including inset from Thailand. Photos: A–C, C inset & E, C. Leeratiwong; D, P. Chalermglin, all reproduced with kind permission).

Turner, Gard. Bull. Singapore 45 (1993) 32; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 75; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 119; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 165; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 104, 210; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 207, 287. – *Hubera rumphii* (Blume ex Hensch.) Chaowasku, Phytotaxa 69 (2012) 50; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 72, fig. 15. **Type:** [Published illustrations] Rumphius, Herb. Amboin. 3 (1743) t. 4: fig. 2, t. 5. **Fig. 41, 42.**

Guatteria canangioides Rchb.f. & Zoll., Linnaea 29(3) (1858) 322, 323. **Synonyms:** *Monoon canangioides* (Rchb.f. & Zoll.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 18. – *Polyalthia canangioides* (Rchb.f. & Zoll.) Boerl., Cat. Pl. Phan. 1 (1899) 19; Ridley, Fl. Malay Penins. 1 (1922) 56. **Type:** Zollinger 3047, [Indonesia], Sumatra, province of Lampung (lectotype P [P01983362], designated by Turner, Phytotaxa 36 (2011) 78; isoelectotypes MEL, P [P01983361]).

Guatteria parveana Miq., Fl. Ned. Ind. 1(2), fasc. 1 (1858) 48. **Synonym:** *Polyalthia canangioides* (Rchb.f. & Zoll.) Boerl. var. *parveana* (Miq.) Boerl., Cat. Pl. Phan. 1 (1899) 20. **Type:** Zollinger 1858, [Indonesia], Java (not traced).

Unona borneensis Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 11. **Synonym:** *Desmos borneensis* (Miq.) Merr., J. Straits Branch Roy. Asiat. Soc., Special No. [Bibliogr. Enum. Born. Pl.] (1921) 255. **Type:** Korthals s.n., [Indonesia], Borneo, [Kalimantan], Poeloe [Pulau] Lampei (lectotype L [L0187189], designated by Turner, Phytotaxa 36 (2011) 78).

Polyalthia kunstleri King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 55; Ridley, Fl. Malay Penins. 1 (1922) 55. **Type:** King’s Collector 3767, [Malaysia], Perak, Larut, January 1883 (lectotype K [K000691450], designated by Turner, Phytotaxa 36 (2011) 78; isoelectotypes CAL [CAL0000303178], DD, K [K000691451], MEL [MEL295843]).

Polyalthia scortechinii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 56; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 56. **Type:** King’s Collector 6125, [Malaysia], Perak, Larut, May 1884 (lectotype K [K000739187], designated by Turner, Phytotaxa 36 (2011) 78; isoelectotypes CAL [CAL0000303130], DD, K [K000739186]).

Polyalthia glandulosa Merr., Philipp. J. Sci., C 10(4) (1915) 247. **Type:** Reillo Bur. Sci. 16460, Philippines, Mindanao, District of Zamboanga, Santa Maria, near Mt Pulangbato, 4 October 1912 (lectotype US [US00098663], designated by Turner, Phytotaxa 36 (2011) 78; isoelectotypes BM [BM000754115], K [K000691642], L [L0189965], P [P00372685]).

Trees to 25 m tall. **Twigs** drying grey, grey-brown to dark grey with pale lenticels, latticed or ridged, with brown tomentum covering youngest parts. **Leaves:** lamina chartaceous, hairs along midrib above, sometimes quite sparse, hairy beneath, sometimes densely so, particularly on veins, drying brown or grey-brown and shiny above, generally browner beneath, lanceolate, elliptic-ovate, elliptic-obovate, 8.5–21 × 2.5–6 cm, base acute to obtuse or rounded, apex acute to acuminate, midrib sunken and lateral veins more or less flush above, midrib prominent, lateral veins raised beneath, lateral veins 8–12 pairs, arching forward and looping distinctly within margin; petiole 4–7 mm long, 1–2 mm thick, drying brown to black, hairy. **Inflorescences** axillary from attached or fallen leaves, 1–2-flowered. **Flowers** with pedicels 7–21 mm long, c. 1.5 mm thick, drying dark brown, hairy, medial bract ovate, 4.5–7 mm long, 3–4 mm wide, apex acute, brown hairy outside, glabrous within; sepals ovate-triangular, 5–10 × 4–6 mm, apex acute, drying black or dark brown, drying hairy outside, densest apically; petals ovate-

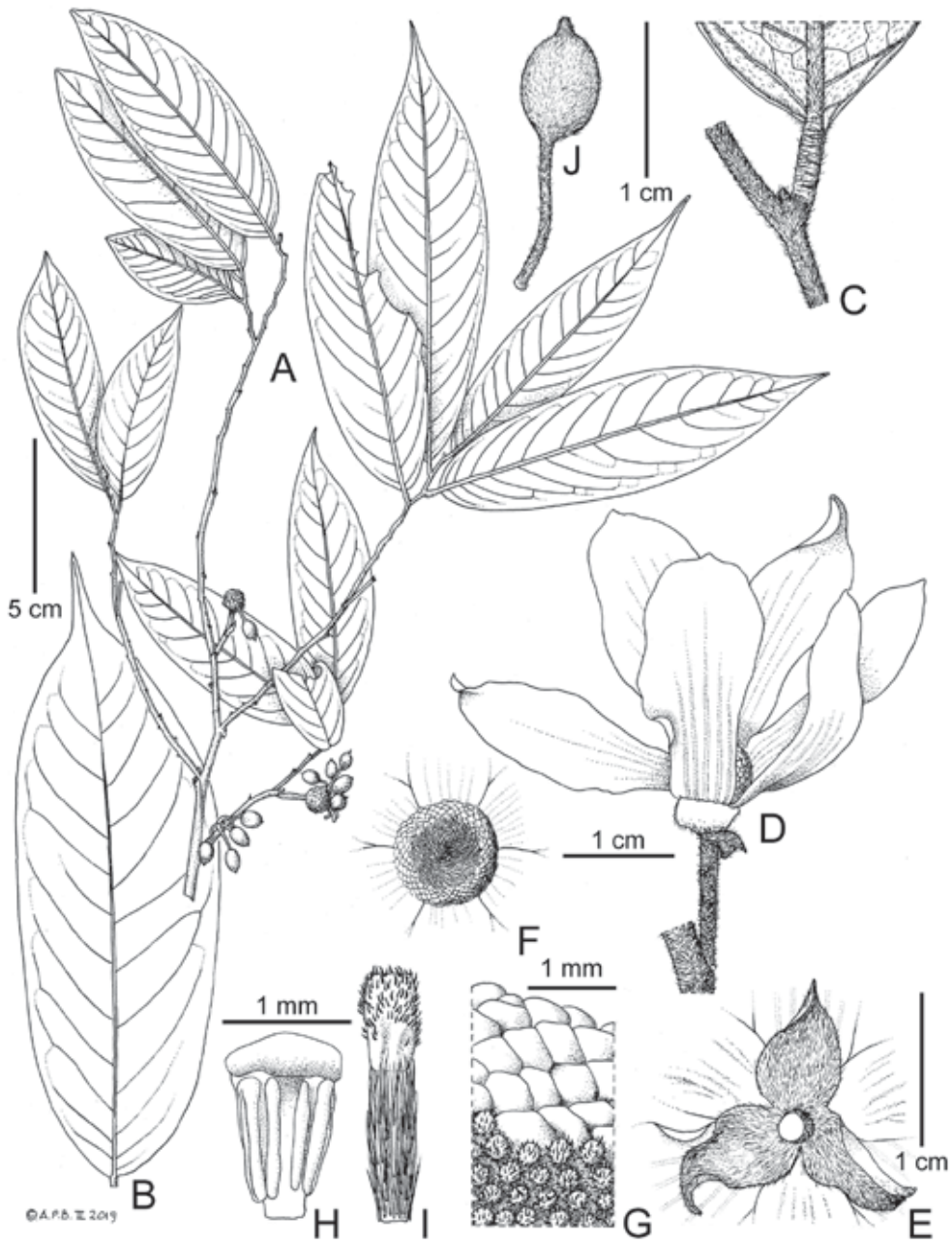


Figure 41. *Huberantha rumphii* (Blume ex Hensch.) Chaowasku. **A.** Habit of fruiting shoot. **B.** Larger leaf. **C.** Section of twig with section of leaf (lower surface). **D.** Flower. **E.** Flower from below to show calyx. **F.** Flower (interior view). **G.** Detail from F showing tops of carpels and stamens. **H.** Stamen. **I.** Carpel. **J.** Monocarp. (A–J from Singapore, A, C & J, Singapore Botanic Gardens Rain Forest, *Ridley* 6526; B & D–I, Singapore Botanic Gardens' Rain Forest, *Ridley* s.n. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

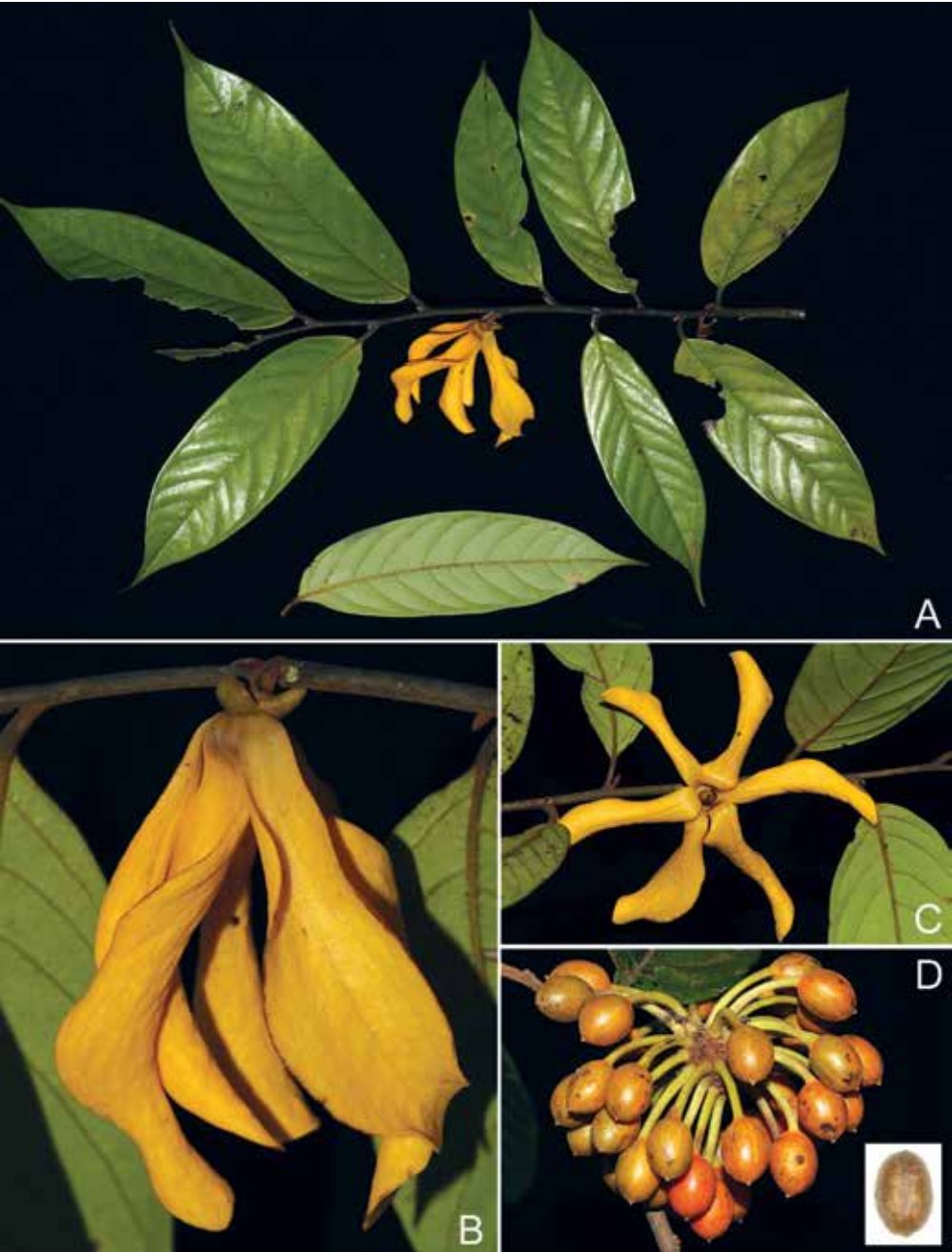


Figure 42. *Huberantha rumphii* (Blume ex Hensch.) Chaowasku. **A.** Flowering leafy branch. **B.** Flower (side view). **C.** Anthetic flower with a large apical aperture. **D.** Maturing infructescence. Inset: Seed. (A–D from Singapore, A–C, MacRitchie; D & D inset, MacRitchie, Ng SING2020-223. Photos: X.Y. Ng).

elliptic, to 5 cm long, 2 cm wide, apex obtuse, inner petals slightly narrower at base than outer (c. 3 mm vs 4 mm), drying brown with short pale hairs, often with yellow powdery spots and splashes; stamens many, to 1 mm long, apex truncate; carpels many, drying dark brown apically. **Fruit** with pedicels 2–3 mm thick, persistently brown hairy, sepals often persisting, torus globose; monocarps to 50 or more, globose, c. 8–10 × 6 mm, drying black or dark brown, surface relatively smooth and dull, apex apiculate, brown hairs sometimes restricted to base and apex, stipe to 2 cm long, 1 mm thick brown hairy. **Seeds** 1 per monocarp.

Distribution. Peninsular Malaysia to Sulawesi and the Philippines. In Singapore, known from Bukit Timah (*Mohd. Shah MS 3955*, 4 Aug 1976, KEP, SING [SING0003280]), MacRitchie (*Sinclair SFN 40677*, 14 Jul 1955, SING [SING0003292]), Nee Soon (*Gwee et al. SING2009-178*, 24 Feb 2009, SING [SING0124437]) and Singapore Botanic Gardens' Rain Forest (*Samsuri Ahmad SA 1229*, 15 May 1976, SING [SING0003293]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Note. The name *Guatteria rumphii* Blume ex Hensch. has not yet been typified pending clarification of its nomenclaturally correct application. The elements on which it is based were reported by Rumphius to come from Sulawesi, Buru and Ambon, though it seems more likely the illustrations were made from Moluccan material rather than from Sulawesi. No specimens of what is currently referred to as *Huberantha rumphii* have been seen from the Moluccas. It may eventually prove necessary to propose conservation of the name *Guatteria rumphii* with a conserved type in order to maintain the current usage.

15. MAASIA Mols et al.

(Paulus Johannes Maria Maas, 1939–present, Dutch Annonaceae specialist)

Syst. Bot. 33 (2008) 493; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 74; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 2; Sirichamorn & Sutthisaksopon in Johnson & Murray, Fl. Thailand 16(1) (2022) 151. **Type:** *Maasia hypoleuca* (Hook.f. & Thomson) Mols et al.

Polyalthia auct. non Blume: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 49, p.p.; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 62, p.p.; Ridley, Fl. Malay Penins. 1 (1922) 48, p.p.; Sinclair, Gard. Bull. Singapore 14(2) (1955) 279, p.p.; Kochummen, Tree Fl. Malaya 1 (1972) 85, p.p.

Evergreen trees. **Bark** smooth, white. **Leaves** glabrous above, densely minutely papillate beneath giving a glaucous appearance, lateral veins fine and almost indistinguishable from tertiary venation. **Inflorescences** axillary or from tubercles behind the leaves, 1–10-flowered. **Flowers** bisexual, ovoid in bud; sepals 3, valvate, shorter than petals; petals in 2 whorls of 3, free, valvate, flat and thin, outer and inner petals of similar size, linear to narrowly elliptic;

stamens many, apex of connective truncate; carpels many, oblong, hairy or not, stigmas globose, 1 basal or ventral ovule. **Fruit** with monocarps numerous, ellipsoidal or globose, stipitate. **Seeds** 1(–2) per monocarp, ellipsoid or globose, smooth, exarillate; endosperm ruminations spiniform.

Distribution. A genus of 6 species from the Andaman Islands, Thailand and Peninsular Malaysia to New Guinea. In Singapore, 3 native species.

Ecology. Lowland forest.

Taxonomy. All the species of *Maasia* were first described under *Polyalthia*. They form a coherent group with smooth pale bark and leaves white or glaucous beneath. Molecular evidence strongly supports their separation as an independent genus (Mols et al., Syst. Bot. 33 (2008) 490–494).

Key to *Maasia* species

1. Leaves generally not exceeding 8 cm long, 3 cm wide; flowering pedicels to 5 mm long, petals to 6 mm long; monocarps ellipsoidal, few (5 or fewer), not exceeding 20 mm long **2. *M. hypoleuca***
 Leaves generally more than 8 cm long, 3 cm wide; flowering pedicels more than 5 mm long, petals more than 6 mm long; monocarps globose or if ellipsoidal then many (generally 10 or more) and more than 20 mm long at maturity 2
2. Flowering pedicels to 17 mm long, c. 0.5 mm thick, petals to 10 mm long; monocarps globose **1. *M. glauca***
 Flowering pedicels more than 17 mm long, c. 1 mm thick, petals more than 20 mm long; monocarps ellipsoidal **3. *M. sumatrana***

1. *Maasia glauca* (Hassk.) Mols et al.

(Greek, *glaukos* = bluish grey or bluish green; referring to the undersides of the leaves)

Syst. Bot. 33 (2008) 493; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 74; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 3; Turner, Gard. Bull. Singapore 70 (2018) 544; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 144; Sirichamorn & Sutthisaksopon in Johnson & Murray, Fl. Thailand 16(1) (2022) 152, fig. 32, pl. 17: G, H. **Basionym:** *Uvaria glauca* Hassk., Flora 25(2, Beibl.) (1842) 31. **Synonyms:** *Guatteria glauca* (Hassk.) Miq., Fl. Ned. Ind. 1(2), fasc. 1 (1858) 49, nom. illeg. non Ruiz & Pav. (1798). – *Monoon glaucum* (Hassk.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19. – *Polyalthia glauca* (Hassk.) F.Muell., Descr. Notes Papuan Pl. 1 (1877) 95; Sinclair, Gard. Bull. Singapore 14(2) (1955) 321; Kochummen, Tree Fl. Malaya 1 (1972) 88; Keng, Gard. Bull. Singapore 27 (1974) 73; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Rogstad, J. Arnold Arbor. 70 (1989) 209; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 32; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 75; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 118; Turner et al., Gard. Bull. Singapore

48 (1998 [‘1996’]) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 217; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 206, 286. **Type:** *Hasskarl s.n.*, [Indonesia], Java (lectotype L [L0188666], designated by Turner, Phytotaxa 36 (2011) 46). **Epitype:** *Kostermans et al. UNESCO 165*, Indonesia, Java, Ujung Kulon Reserve, Mt Pajung, 17 November 1960 (epitype L [L0188665], designated by Turner, Phytotaxa 36 (2011) 46; isoeotypes A, BO, G, K [K000779810]). **Fig. 43.**

Guatteria hypoleuca Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 381. **Type:** *Diepenhorst s.n.* [Herb. Bogor. no. 2095], [Indonesia], Sumatra, Priaman (lectotype U [U0000368], designated by Rogstad, J. Arnold Arbor. 70 (1989) 209).

Unona merrittii Merr., Philipp. J. Sci. 1(Suppl. 3) (1906) 190. **Synonym:** *Polyalthia merrittii* (Merr.) Merr., Philipp. J. Sci., C 10(4) (1915) 250. **Type:** *Whitford 1447*, Philippines, Mindoro, Bongabong River, February 1906 (lectotype K [K000691469], designated by Turner, Phytotaxa 36 (2011) 46; isoelectotype US [US00098671]).

Polyalthia parkinsonii Hutch., Bull. Misc. Inform. Kew 1917 (1917) 25. **Type:** *Parkinson 765*, India, Andaman Islands, Long Island, 10 December 1915 (lectotype K [K000691470], designated by Turner, Phytotaxa 36 (2011) 46; isoelectotype K [K000691468]).

Trees to 30 m tall. **Twigs** drying whitish, rather smooth with flaky patches, youngest parts brown or grey-brown with adpressed pale hairs. **Leaves:** lamina chartaceous to subcoriaceous, glabrous above, adpressed pale hairs on midrib beneath, drying typically brown above, pale grey-brown beneath with contrasting dark brown midrib, lower lamina surface grainy under magnification due to the presence of tiny white hairs, elliptic or lanceolate, 8.5–20 × 3.5–7 cm, base acute, apex shortly acuminate, midrib sunken above, prominent beneath, lateral veins more or less invisible to the naked eye; petiole 5–10 mm long, 1–2 mm thick, drying brown or black, wrinkled, sometimes with brown hairs. **Inflorescences** mostly of congested fascicles from raised tubercles on twigs behind leaves. **Flowers** with pedicels to 17 mm long, 0.5 mm thick, drying brown, glabrous or with a scattering of pale hairs, medial bract sometimes present, ovate, c. 1 × 1 mm, hairy outside, glabrous within; sepals ovate, c. 1 × 1 mm, hairy outside, glabrous within; petals drying brown, linear-oblong, c. 8 × 2 mm, pale hairy outside and distally inside; stamens c. 2 whorls, c. 1 mm long; carpels c. 20. **Fruit** with pedicels to 25 mm long, 2 mm thick; monocarps to 10 or more, globose, 10–15 mm diam., drying dark brown, surface minutely pimpled, stipe to 10 mm long, 1 mm thick. **Seeds** 1 per monocarp.

Distribution. Andaman Islands and Thailand to New Guinea. In Singapore, fertile collections have been gathered from Jurong (*Corner SFN 26099*, 15 Oct 1932, KEP, SING [SING0003276]) and Mandai Road (*Holtum SFN 37707*, 24 Jul 1940, SING [SING0014583]). More recently sterile and juvenile collections from Seletar (*Gwee et al. SING2009-128*, 3 Feb 2009, SING [SING0120469]) and Nee Soon (*Thomas 3435*, 29 Mar 2020, SING [SING0386235]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

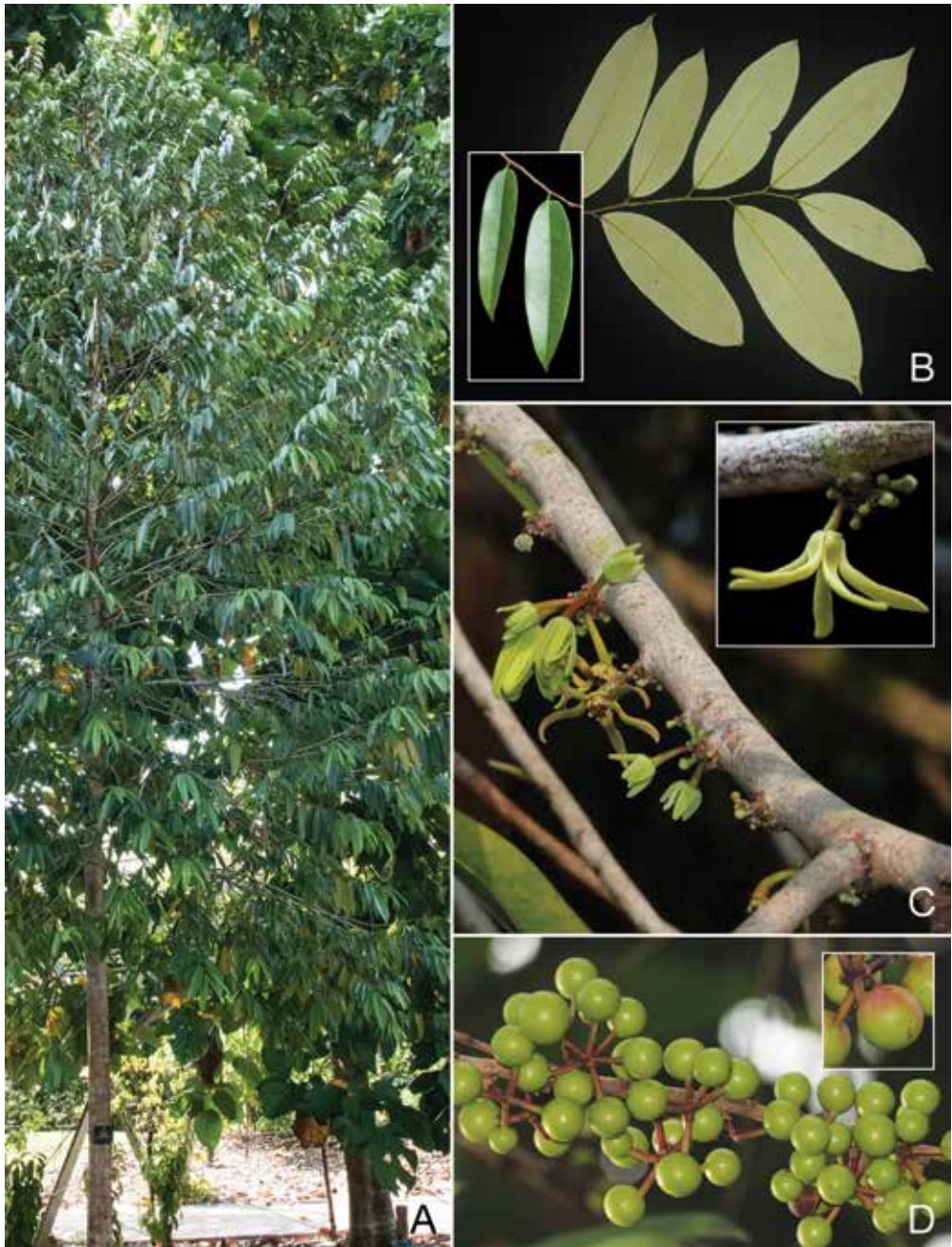


Figure 43. *Maasia glauca* (Hassk.) Mols et al. **A.** Habit. **B.** Leaves (lower surface). Inset: Leaves (upper surface). **C.** Flowers in different stages of maturation. Inset: Mature flower. **D.** Fruiting branch. Inset: Slightly ripe fruit. (A–D including insets from Singapore, A, B inset, C, C inset, D & D inset, cultivated in Singapore Botanic Gardens; B, Nee Soon. Photos: A, B inset & C inset, Zaki Jamil; B, C, D & D inset, X.Y. Ng).

2. *Maasia hypoleuca* (Hook.f. & Thomson) Mols et al.

(Greek, *hypo*- = under, *leucon* = white; referring to the pale undersides of the leaves)

Syst. Bot. 33 (2008) 493; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 75; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 3; Turner, Gard. Bull. Singapore 70 (2018) 545; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 144; Sirichamorn & Sutthisaksopon in Johnson & Murray, Fl. Thailand 16(1) (2022) 154, pl. 17: 1. **Basionym:** *Polyalthia hypoleuca* Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 63; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 52; Ridley, Fl. Malay Penins. 1 (1922) 53; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 1787; Sinclair, Gard. Bull. Singapore 14(2) (1955) 320; Kochummen, Tree Fl. Malaya 1 (1972) 88; Keng, Gard. Bull. Singapore 27 (1974) 73; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Rogstad, J. Arnold Arbor. 70 (1989) 227; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 118; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 210. **Type:** *Maingay 1516A* [Kew Distribution 50], Singapore, September 1867 (lectotype K [K000691444], designated by Rogstad, J. Arnold Arbor. 70 (1989) 227). **Fig. 44, 45.**

Trees to 30 m tall. **Twigs** drying pale grey to whitish, latticed, young twigs reddish brown or dark grey-brown with minute pale hairs, longitudinally wrinkled. **Leaves:** lamina chartaceous to subcoriaceous, glabrous above, short adpressed hairs on midrib and scattered on lamina surface beneath, drying brown or grey-brown above, pale grey-brown beneath with contrasting dark brown midrib, lower lamina with a characteristic grainy appearance under magnification due to tiny white hairs or warts, elliptic or lanceolate, generally quite narrowly so, 5–9(–14) × 1.5–3(–5) cm, base acute to cuneate, apex narrowly long acuminate, midrib slightly sunken above in dry leaves, raised beneath, lateral veins more or less invisible to the naked eye; petiole drying dark brown, sometimes with pale hairs. **Inflorescences** axillary, sometimes from fallen leaves, few-flowered, sometimes with a distinct short axis. **Flowers** with pedicels to 5 mm long, 0.5 mm thick, drying dark brown, longitudinally ridged/furrowed, with pale hairs, medial bract absent; sepals tiny, apparently soon lost, ovate, c. 1 × 1 mm, pale hairy outside, glabrous within; petals lanceolate to 6 mm long, outer wider at base, c. 2 mm, than inner, c. 1 mm, drying dark brown with pale hairs denser outside, particularly near the base; stamens many, c. 3 whorls, c. 0.5 mm long; carpels many. **Fruit** with pedicels to 1 mm thick; monocarps to 5, ellipsoidal, c. 15 × 8 mm, drying shiny, dark brown to blackish, apex rounded to obtuse, stipe c. 3 mm long, 1 mm thick. **Seeds** 1 per monocarp.

Distribution. Andaman Islands and Peninsular Malaysia to New Guinea. In Singapore, there is a 19th century collection from an unspecified location (*Maingay s.n.*, K [K000691444]) and another old collection from Jurong (*Corner SFN 26163*, 7 Jan 1933, SING [SING0208802]). More recent collections are from Bukit Timah (*Khoo & Nik Faizu KMS 41*, 12 Dec 2008, SING [SING0123462]) and Nee Soon (Chong et al. NSSF2-Q220U108, 22 Jan 2014, SING [SING0354961]).

Ecology. Lowland forest including swamps.

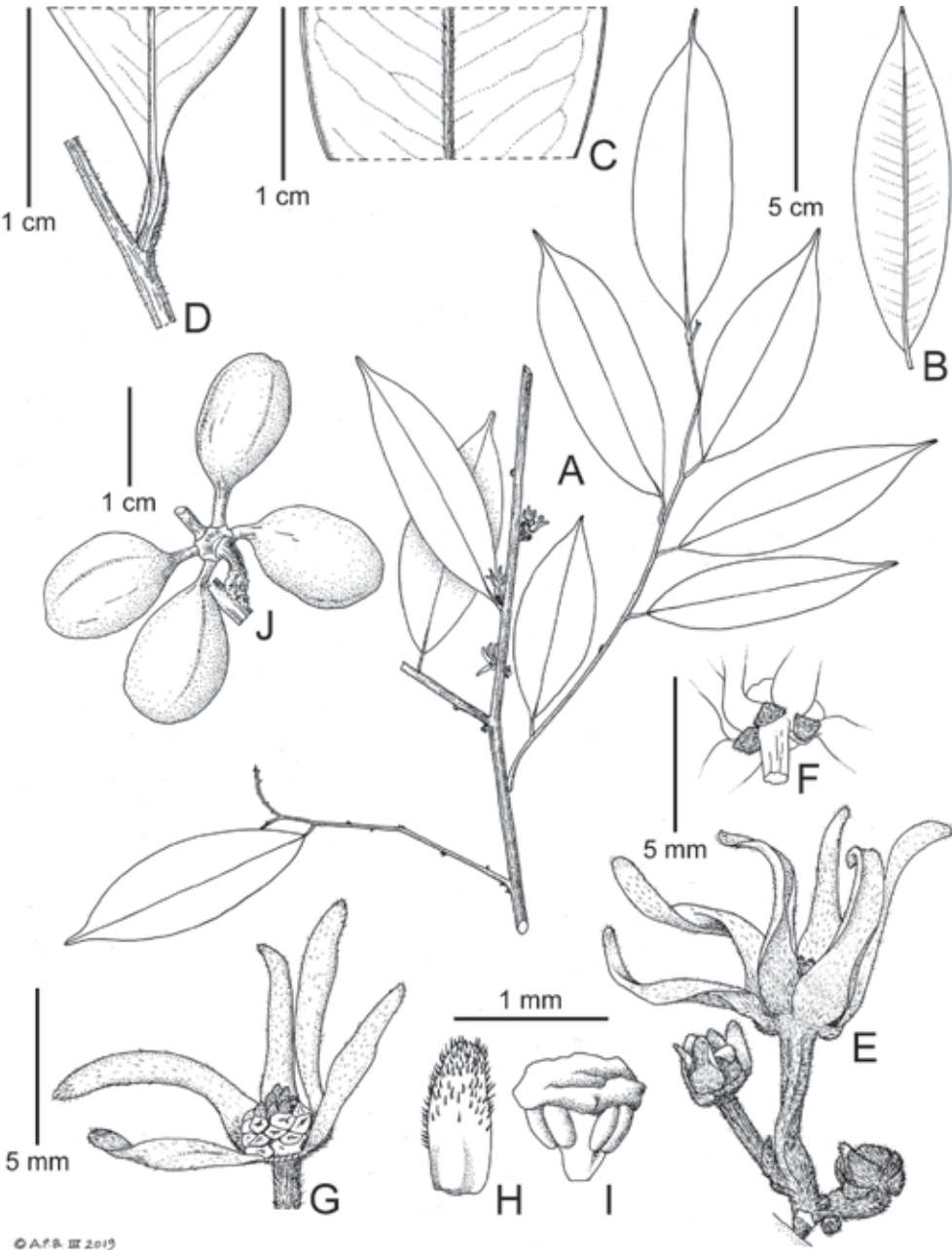


Figure 44. *Maasia hypoleuca* (Hook.f. & Thomson) Mols et al. **A.** Habit of flowering shoot. **B.** Leaf lower surface. **C.** Detail of venation on lamina lower surface. **D.** Section of twig with section of leaf (upper surface). **E.** Inflorescence. **F.** Flower from below to show calyx. **G.** Flower interior view after removal of 1 sepal and 1 outer petal. **H.** Carpel. **I.** Stamen. **J.** Infructescence. (A–J from Peninsular Malaysia, A–I, *Hamid & Yeop CF 3267*; J, *Everett FRI 14216*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 45. *Maasia hypoleuca* (Hook.f. & Thomson) Mols et al. The very pale lower surface of leaves. Inset: Leaves (upper surface). (From Singapore, Nee Soon. Photos: X.Y. Ng).

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

3. *Maasia sumatrana* (Miq.) Mols et al. (of Sumatra)

Syst. Bot. 33 (2008) 493; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 76, fig. 16; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 3; Turner, Gard. Bull. Singapore 70 (2018) 545; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 144. **Basionym:** *Guatteria sumatrana* Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 380. **Synonyms:** *Monoon sumatranum* (Miq.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19. – *Polyalthia sumatrana* (Miq.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43(2) (1874) 53; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 53; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 52; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 1788; Sinclair, Gard. Bull. Singapore 14(2) (1955) 319; Kochummen, Tree Fl. Malaya 1 (1972) 91; Keng, Gard. Bull. Singapore 27 (1974) 73; Rogstad, J. Arnold Arbor. 70 (1989) 220; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 75; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 119; Chew et al., Gard. Bull. Singapore 49(2) (1999

['1997']) 171; Chong et al., *Checkl. Vasc. Pl. Fl. Singapore* (2009) 71, 104, 210. **Type:** *Diepenhorst s.n.* [Herb. Bogor. no. 2342], [Indonesia], Sumatra, Priaman Province (lectotype U [U0000372], designated by Rogstad, *J. Arnold Arbor.* 70 (1989) 220). **Fig. 46.**

Trees to 35 m tall. **Twigs** drying pale grey, youngest parts red-brown or pale brown, finely longitudinally striate, more or less glabrous. **Leaves:** lamina chartaceous to subcoriaceous, sometimes a few scattered adpressed hairs on midrib beneath near the base, otherwise glabrous, drying brown to grey above, pale grey-brown beneath (glaucous in vivo) with contrasting brown midrib and margins, oblong-elliptic, 12–20 × 4–5.5 cm, base acute to cuneate, apex acuminate, midrib slightly sunken above in dry leaves, prominent beneath, lateral veins immersed on both surfaces, difficult to see, more or less invisible to the naked eye, looping within the margin; petiole 6–8 mm long, c. 2 mm diam., drying dark brown, finely wrinkled, glabrous. **Inflorescences** single- or few-flowered fascicles on twigs, mostly behind leaves. **Flowers** with pedicels drying red-brown, longitudinally wrinkled, to 2 cm long, 1 mm thick, widening slightly distally, glabrous, medial bract absent; sepals not touching, under inner petals, ovate-triangular, c. 1.5 × 1.5 mm, short brown hairy outside, glabrous within; petals linear-lanceolate, to 4.5 cm long, little difference between whorls, drying dark brown or reddish brown, tomentum of very short adpressed pale hairs with scattering of longer ones on outside, quite dense near base, inside only distal portion tomentose, glabrous basally; stamens many, c. 1 mm long, connective apex truncate, flat-topped, glabrous; carpels many, c. 1.5 mm long, hairy apically. **Fruit** with pedicels 2.5–4 cm long, 2 mm thick; monocarps to 20 or more, ellipsoidal, to 25 × 15 mm, drying black or dark brown, apex with short, broad beak, point obtuse, sometimes with a series of faint longitudinal ridges, glabrous, surface minutely pimpled, stipe to 10 mm long, 2 mm thick. **Seeds** 1 per monocarp.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, most collections are from Bukit Timah (e.g., *Ngadiman SFN 35583*, 15 Jul 1938, SING [SING0003297]; *Mohd. Shah MS 4209*, 23 Dec 1982, SING [SING0042250]). Also known from Seletar (*Wee W338*, 8 Feb 1962, SING [SING0355172]) and Nee Soon (*Chong et al. NSSF2-Q101U115*, 19 Jan 2014, SING [SING03544963]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), *Singapore Red Data Book*, ed. 3 (2024) 467).

16. MEIOGYNE Miq.

(Greek, *meio* = less, smaller, fewer, *gyno* = female or pertaining to female organs; referring to the relatively few carpels per flower)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 12, nom. cons.; Sinclair, *Gard. Bull. Singapore* 14(2) (1955) 276; Kessler in Kubitzki et al. (ed.), *Fam. Gen. Vasc. Pl.* 2 (1993) 119; van Heusden, *Blumea* 38(2) (1994) 487; Thomas et al., *Taxon* 61 (2012) 559; Turner et al., *Tree Fl. Sabah & Sarawak* 8 (2014)

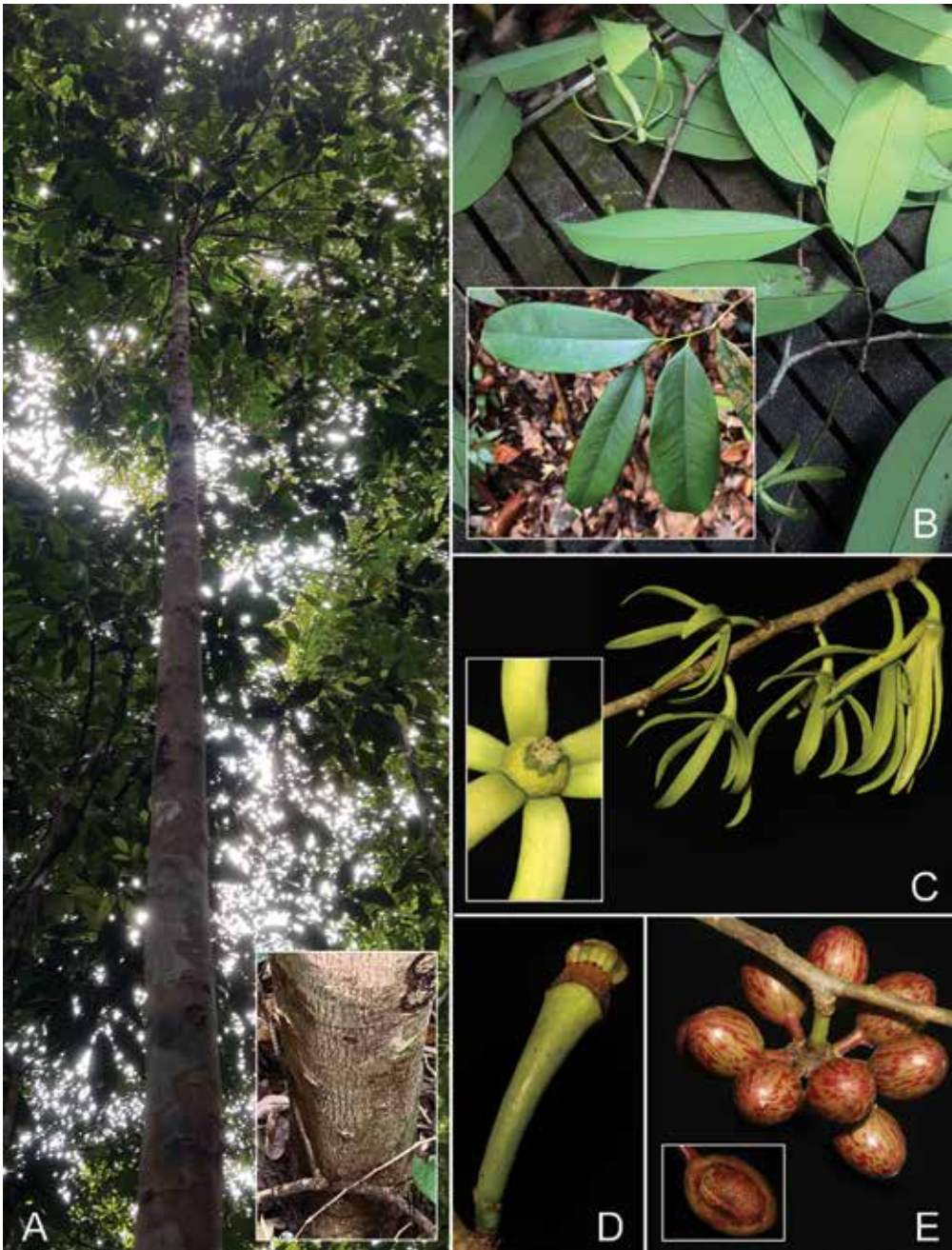


Figure 46. *Maasia sumatrana* (Miq.) Mols et al. **A.** Habit. Inset: Trunk. **B.** Leafy branch. Inset: Upper surface of leaves. **C.** Branch with flowers. Inset: Flower (front view). **D.** Early developing fruit. **E.** Fruit. Inset: Carpel with part removed to show seed. (A–G including insets from Singapore, MacRitchie, Ng *et al.* SING2024-494 [SING0400623]. Photos: X.Y. Ng).

80; Johnson et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 157. **Synonym:** *Unona* L.f. sect. *Meiogyne* (Miq.) Baill., Hist. Pl. 1(4) (1868) 213. **Type:** *Meiogyne virgata* (Blume) Miq.

Fitzalania F.Muell., Fragm. 4(25) (1863) 33, nom. rej.; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 126. **Type:** *Fitzalania heteropetala* (F.Muell.) F.Muell. (= *Meiogyne heteropetala* (F.Muell.) D.C.Thomas et al.).

Ancana F.Muell., Fragm. 5(32) (1865) 27, t. 35. **Type:** *Ancana stenopetala* F.Muell. (= *Meiogyne stenopetala* (F.Muell.) Heusden).

Ararocarpus Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 [‘1885’]) 10. **Type:** *Ararocarpus velutinus* Scheff. (= *Meiogyne virgata* (Blume) Miq.).

Oncodostigma Diels, Bot. Jahrb. Syst. 49(1) (1912) 143; Sinclair, Gard. Bull. Singapore 14(2) (1955) 274; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 115. **Type:** *Oncodostigma leptoneurum* Diels (= *Meiogyne leptoneura* (Diels) I.M.Turner & Utteridge).

Guamia Merr., Philipp. J. Sci., C 10(4) (1915) 243; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 116. **Type:** *Guamia mariannae* (Saff.) Merr. (= *Meiogyne cylindrocarpa* (Burck) Heusden).

Polyaulax Backer, Blumea 5(3) (1945) 492; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 114. **Type:** *Polyaulax cylindrocarpa* (Burck) Backer (= *Meiogyne cylindrocarpa* (Burck) Heusden).

Chieniodendron Tsiang & P.T.Li, Acta Phytotax. Sin. 9 (1964) 374; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 116. **Type:** *Chieniodendron hainanense* (Merr.) Tsiang & P.T.Li (= *Meiogyne hainanensis* (Merr.) Bân).

Evergreen trees to 23 m tall. **Twigs** sometimes hirsute when young, otherwise glabrous, sometimes lenticellate. **Leaves** chartaceous to coriaceous, blades drying brown to green. **Inflorescences** axillary, sometimes terminal or borne on branches or trunk, 1–4-flowered, rarely more. **Flowers** bisexual, conical to ovoid in bud; sepals 3, free or partially connate, valvate or imbricate, ovate to triangular, hairy outside, much shorter than petals; petals in 2 whorls of 3, at first erect, then spreading, inner whorl sometimes cohering at first, generally hairy (shortly tomentose to densely villose) except for grooved, warty basal portion of adaxial surface of inner petals; stamens many, apex shield-shaped; carpels 1–17, stigmas globose to ovoid, ovules 3–16, lateral, in 1–2 rows. **Fruit** with 1–12 cylindrical to ellipsoidal monocarps, stipitate or sessile, smooth or verrucose, generally pubescent. **Seeds** 1–12 per monocarp, in 1 or 2 rows, semicircular to elliptic, laterally compressed, pitted or smooth, endosperm ruminations lamellate or spiniform.

Distribution. A genus of about 30 species distributed from India to Australia and the western Pacific. In Singapore, 1 native species.

Taxonomy. It has taken a long time for the species of *Meiogyne* to be brought together under a single generic name, though the monophyly of the group has been clearly established (Thomas et al., Taxon 61 (2012) 559–575).

Notes. The record of *Meiogyne monosperma* (Hook.f. & Thomson) Heusden in Singapore by LaFrankie et al. (Forest Trees Bukit Timah (2005) 164) and Chong et al. (Checkl. Vasc. Pl.

Fl. Singapore (2009) 59, 103, 229) appears to be erroneous as no herbarium specimens have been found.

Meiogyne virgata (Blume) Miq.

(Latin, *virgatus* = twiggy, rod-like, striped; possibly referring to the straight, slender twigs)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 12; Sinclair, Gard. Bull. Singapore 14(2) (1955) 277, Kochummen, Tree Fl. Malaya 1 (1972) 77; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13, fig. 10.8; van Heusden, Blumea 38(2) (1994) 495; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 115; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 59, 103, 208; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 83, fig. 18; Turner, Gard. Bull. Singapore 70 (2018) 556; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 144; Johnson et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 164, pl. 19: A. **Basionym:** *Unona virgata* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 14. **Synonyms:** *Uvaria virgata* (Blume) Blume, Fl. Javae, fasc. 23–24 (1830) 43, t. 19, t. 25: B, nom. illeg. non Sw. (1800). – *Cananga virgata* (Blume) Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 57. – *Cyathocalyx virgatus* (Blume) King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 28; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 36; Burkill, Dict. Econ. Prod. Malay Penins. 1 (1935) 717. **Type:** *Blume s.n.*, [Indonesia], Java (lectotype L [L0037998], designated by van Heusden, Blumea 38(2) (1994) 495; possible isoelectotypes K [K000691137], P [P00751167]). **Fig. 47, 48.**

Uvaria montana Blume, Fl. Javae, fasc. 23–24 (1830) 45. **Synonyms:** *Stelechocarpus montanus* (Blume) Miq., Fl. Ned. Ind. 1(2), fasc. 1 (1858) 22, as '*montana*'. – *Meiogyne stipitata* Koord. & Valetton, Meded. Lands Plantentuin 61 [Bijdr. Boomsoort. Java 9] (1903) 305, nom. illeg. superfl. – *Meiogyne montana* (Blume) Backer, Schoolfl. Java (1911) 29. **Type:** *Blume s.n.* [Indonesia], Java, Gede, Pangerango (lectotype L [L0037999], designated by van Heusden, Blumea 38(2) (1994) 495; possible isoelectotypes B [B_10_0272874], BM, L [L0038000]).

Ararocarpus velutinus Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 ['1885']) 10. **Type:** *Scheffer s.n.* [Herb. Bogor no. 7708], [Indonesia], Java, Tjipantjar, Preanger (lectotype L [L0038001], designated by Turner, Gard. Bull. Singapore 70 (2018) 557).

Ararocarpus velutinus Scheff. var. *tenuifolius* Boerl., Cat. Pl. Phan. 1 (1899) 24. **Type:** *Collector unknown s.n.*, [Indonesia], Java, cult. in Hort. Bot. Bogor. sub IV.H.54a (not traced).

Polyalthia eriantha Ridl., Bull. Misc. Inform. Kew 1912 (1912) 384. **Synonyms:** *Enicosanthum erianthum* (Ridl.) Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 276. – *Meiogyne eriantha* (Ridl.) J.Sinclair, Sarawak Mus. J. 5 (1951) 604. **Type:** *Haviland 410* [d.e.q.b.], [Malaysia], Borneo, Sarawak, Kuching (holotype K [K000691133]; isotypes K [K000691134, K000691135], SAR).

Meiogyne philippinensis Elmer, Leaf. Philipp. Bot. 5 (1913) 1714. **Type:** *Elmer 11318*, Philippines, Mindanao, Davao, Todaya (Mt Apo), August 1909 (lectotype NY [NY00026108], designated by Turner, Phytotaxa 36 (2011) 49; isoelectotypes A [A00003553], BM [BM000546396], BO, CAL [CAL0000004719], E [E00499971], GH [GH00003554], HBG, K [K000691241], L, NSW, NY, P [P00601055], US).

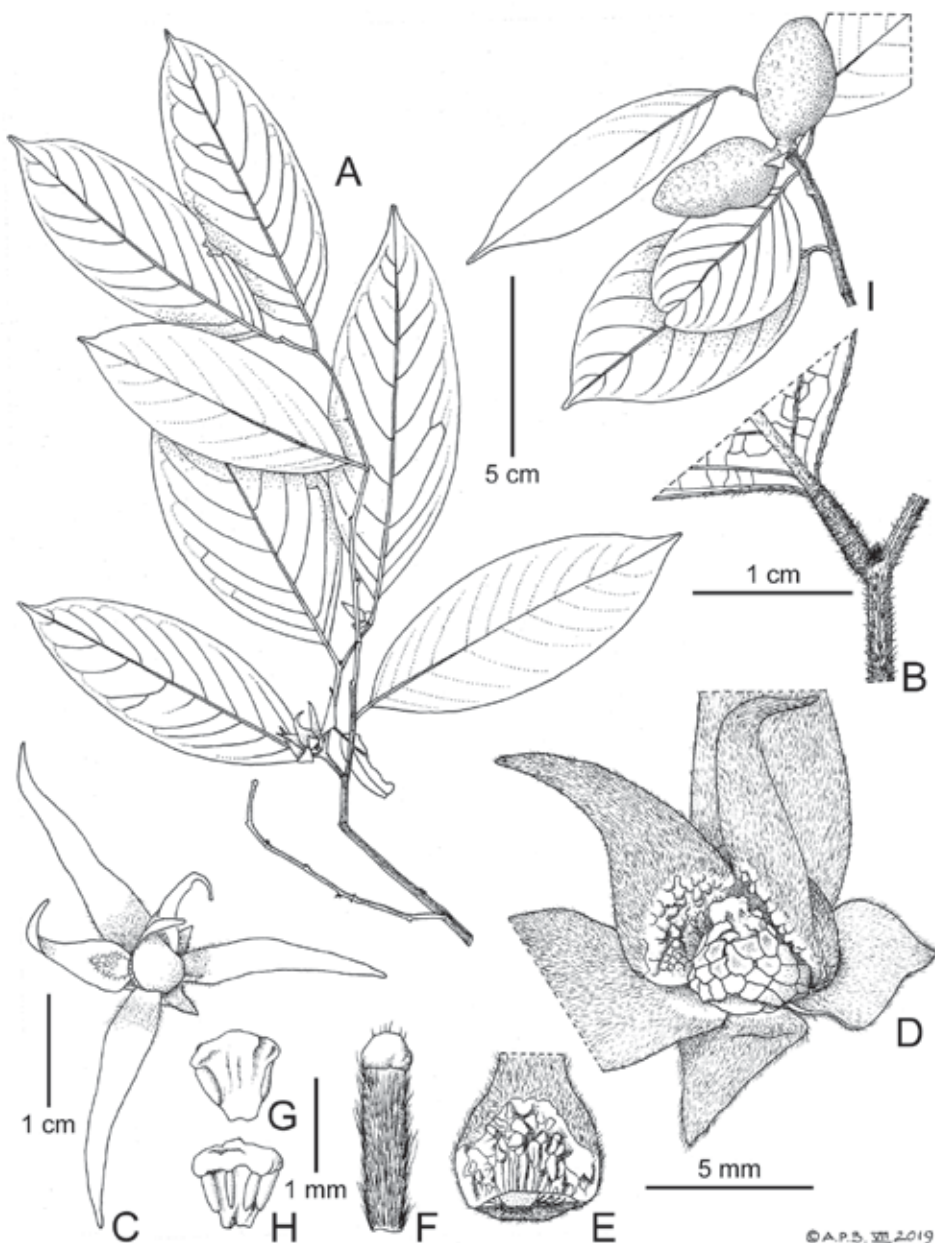


Figure 47. *Meiogyne virgata* (Blume) Miq. **A.** Habit of a flowering shoot. **B.** Section of twig with section of leaf (lower surface). **C.** Flower (front view). **D.** Flower (internal view facilitated by removal of one outer petal and one inner petal). **E.** Base of inner petal (adaxial surface showing verruculose glandular surface). **F.** Carpel. **G.** Stamen (abaxial view). **H.** Stamen (adaxial view). **I.** Leafy twig bearing infructescence. (A, B & I from Singapore, Bukit Timah, *Sinclair SFN 39472*; C from Indonesia, Borneo, *Ambriansyah et al. 552*; D–H from Indonesia, Borneo, *Kostermans 9720*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 48. *Meigyne virgata* (Blume) Miq. **A.** Leafy branch with fruit. **B.** Flower. **C.** Fruit. (A–C from Singapore; A, Bukit Timah, Ho et al. SING2017-181; B, Bukit Timah, *Thomas 3495*; C, Bukit Timah, *Thomas & Nge 3498*. Photos: A, P.K.F. Leong; B & C, D.C. Thomas).

Meiogyne lucida Elmer, Leaf. Philipp. Bot. 5 (1913) 1715. **Type:** *Elmer 13984*, Philippines, Mindanao, Province of Agusan, Cabadbaran (Mt Urdaneta), October 1912 (lectotype NY [NY00026105], designated by Turner, Phytotaxa 36 (2011) 49; islectotypes A [A00003551], BISH [BISH1000674], BM [BM000632904], BO, CAL [CAL0000004718], CAS [CAS0007382], E [E00499970], F, G [G00237909], GH [GH00003552], HBG, K [K000691245], L, LE [LE00012552], MICH [MICH1115435], MO [MO-247090], NSW, NY [NY00026106], P [P00601053], U [U0045325], US [US00098787], Z).

Meiogyne paucinervia Merr., Philipp. J. Sci., C 10(4) (1915) 241. **Type:** *Ramos Bur. Sci. 15381*, Philippines, Leyte, Dagami, August 1912 (lectotype US [US00098788], designated by Turner, Phytotaxa 36 (2011) 49; islectotypes B [B_10_0272875], BM [BM000546397], K [K000691243, K000691244], P [P00601054]).

Cyathocalyx subsessilis Ast, [Fl. Indo-Chine, Suppl. (1938) 90, nom. inval.] Notul. Syst. (Paris) 9(2) (1940) 80. **Synonym:** *Meiogyne subsessilis* (Ast) J.Sinclair, Gard. Bull. Singapore 15 (1956) 14. **Type:** *Poilane 10600*, [Vietnam], Annam, massif de Đông-che, 26 May 1924 (lectotype P [P00432196], designated by van Heusden, Blumea 38(2) (1994) 495; islectotypes HN, K [K000691136], L [L0037997], P [P00432194, P00432195], SING [SING0065791], US [US00432928]).

Desmos monogynus Merr., J. Arnold Arbor. 23 (1942) 163. **Synonym:** *Meiogyne monogyna* (Merr.) Bân, Bot. Zhurn. (Moscow & Leningrad) 59 (1974) 1778. **Type:** *Pételot 2597*, [Vietnam], Tonkin, Son Tay, Mt Bavi, 28 August 1940 (holotype A [A12216]; isotypes HN, LE, P).

Trees to 20 m tall. **Twigs** typically drying pale brown or grey, striate or latticed, youngest parts with a tomentum of pale brown hairs. **Leaves:** lamina chartaceous, scattering of adpressed brown hairs on veins beneath, erect hairs along midrib above, drying grey, grey-green or grey-brown above, green or brown beneath, ovate-lanceolate, ovate, elliptic or oblong-elliptic, 5–21 × 3–8 cm, base cuneate, apex acute to acuminate, midrib slightly sunken above, prominent beneath, lateral veins more or less flush above, raised beneath, lateral veins 9–11 pairs, arching forward and looping obscurely within margin, tertiary venation scalariform, visible from both surfaces but clearer beneath; petiole 4–10 mm long, 1–2 mm thick, transversely wrinkled, hairy. **Inflorescences** axillary, 1–2-flowered. **Flowers** with pedicels short, 3–5 mm long, 1 mm thick, drying dark brown, densely covered in pale brown hairs, medial bract ovate, c. 2 × 2 mm, densely hairy outside; sepals ovate-lanceolate, c. 6 × 3 mm, densely brown hairy outside and in; outer petals narrowly ovate-lanceolate, c. 20 × 3 mm, apex acute, densely pale brown hairy on both surfaces, inner petals spoon-shaped, c. 12 × 3–4 mm, blade ovate-lanceolate, base convex, densely hairy outside and inside except the base which is glabrous and verrucose; stamens many, c. 1 mm long; carpels many. **Fruit** with pedicels to 5 mm thick; monocarp to 4, cylindrical ovoid, to 55 × 35 mm, more or less sessile, covered in dense velvety brown tomentum, pericarp 4–5 mm thick. **Seeds** c. 12 per monocarp.

Distribution. Mainland Southeast Asia, western Malesia and the Philippines. In Singapore, most collections are from Bukit Timah (*Ridley 8116*, Dec 1896, SING [SING0003224]; *Sinclair SFN 39472*, 30 Jan 1953, SING [SING0003218]; *Tang & Hj Sidek 1000*, 12 Oct 1995, SING [SING0016227]; *Ho et al. SING2017-181*, 6 Jun 2017, SING [SING0259011]). There are also historical collections from Stagmont (*Ridley 11254*, 1901, SING [SING0003217]) and Bukit Panjang.

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Taxonomy. In her revision, van Heusden (*Blumea* 38(2) (1994) 487–511) took a fairly broad view of this species, particularly in Borneo and continental Southeast Asia. The Singapore material seems reasonably congruent with the species as found in Java, the type locality.

17. MEZZETTIA Becc.

(Abbot Ignazio Mezzetti, 1821–1876, mentor in science, particularly in botany, to Beccari when he was a child)

Nuovo Giorn. Bot. Ital. 3 (1871) 187; Ridley, Fl. Malay Penins. 1 (1922) 100; Sinclair, Gard. Bull. Singapore 14(2) (1955) 327; Kochummen, Tree Fl. Malaya 1 (1972) 77; van der Heijden & Kessler, *Blumea* 35(1) (1990) 217; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 122; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 85; Sutthisaksopon et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 164. **Type:** *Mezzettia umbellata* Becc., lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 259.

Lonchomera Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 93. **Type:** *Lonchomera leptopoda* Hook.f. & Thomson (= *Mezzettia parviflora* Becc.).

Large evergreen trees. **Leaves** glabrous, often shiny above. **Inflorescences** axillary, fascicled or pedunculate, often ramiflorous, 2–9-flowered. **Flowers** small, bisexual, ovoid in bud; sepals 3, valvate, free or connate at very base, much shorter than petals; petals valvate, flat, densely pubescent on both surfaces, two whorls of 3, inner whorl shorter; stamens 9–21 in 2 or 3 whorls, connectives with truncated, dilated apex; carpel 1, bottle-shaped, with a longitudinal groove, stigma flat to capitate, horseshoe-shaped, ovules 2, biseriate. **Fruit** with a single, ellipsoidal or globose, sessile monocarp, pericarp thick and woody, surface sometimes glaucous and waxy. **Seeds** 1–2 per monocarp, large, smooth, flattened on one side, testa thick and woody, exarillate; endosperm ruminations lamellate.

Distribution. A genus of 4 species in Peninsular Malaysia, Sumatra and Borneo. In Singapore, 1 native species.

Ecology. Trees of lowland forest including peat swamps.

Mezzettia parviflora Becc.

(Latin, *parvus* = small, *flos* = flower; referring to the small flowers)

Nuovo Giorn. Bot. Ital. 3 (1871) 188; van der Heijden & Kessler, *Blumea* 35(1) (1990) 222; Turner, Gard. Bull. Singapore 45 (1993) 31; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 73; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 115; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’])

141; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 61, 103, 208; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 87, fig. 19; Turner, Gard. Bull. Singapore 70 (2018) 558; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 145; Sutthisaksopon et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 167, fig. 35, pl. 19: B, C. **Type:** *Beccari P.B.* 2558, Borneo, Sarawak, Mt Mattan, September 1866 (lectotype FI-B [FI007557] [Erb. Coll. Becc. no. 577], designated by Turner, Phytotaxa 36 (2011) 52; isoelectotypes A [A00039446], B [B 10 0272870-A], BO, G [G00237904, G00237927], K [K000574878], M [M0240078], NY [NY00026112], P [P00389967], S). **Fig. 49, 50.**

Lonchomera leptopoda Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 94. **Synonym:** *Mezzettia leptopoda* (Hook.f. & Thomson) Oliv. [Hooker’s Icon. Pl. 16 [ser. 3, 6], fasc. 3 (1887) sub. pl. 1560, nom. inval.] ex King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 129; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 42; Ridley, Fl. Malay Penins. 1 (1922) 100; Sinclair, Gard. Bull. Singapore 14(2) (1955) 327; Kochummen, Tree Fl. Malaya 1 (1972) 78; Keng, Gard. Bull. Singapore 27 (1974) 72; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13. **Type:** *Maingay 1338A* [Kew Distribution 102], [Malaysia], Malacca [Melaka], 30 November 1866 (lectotype K [K000574881], designated by Turner, Phytotaxa 36 (2011) 52).

Mezzettia curtisii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 129; Sinclair, Gard. Bull. Singapore 14(2) (1955) 328. **Type:** *Curtis 2266*, [Malaysia], Penang, Government Hill, March 1890 (lectotype CAL [CAL0000025019], first step designated by van der Heijden & Kessler, Blumea 35(1) (1990) 223, second step designated here; isoelectotypes BM [BM000546403], CAL [CAL0000025017], K [K000574885], SING).

Mezzettia parviflora Becc. var. *floribunda* Boerl., Cat. Pl. Phan. 1 (1899) 21. **Type:** *Ruloffs 5792* [Bogor distrib. no. 108], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub IV-H-32 (lectotype BO, designated by van der Heijden & Kessler, Blumea 35(1) (1990) 222; isoelectotypes B, L [L0038006], MEL [MEL2381888], US [US00345084]).

Mezzettia parviflora Becc. var. *subtetramera* Boerl., Cat. Pl. Phan. 1 (1899) 21. **Type:** *Collector unknown s.n.* [Bogor. distrib. no. 109], [Indonesia], Java, cult. in Hort. Bot. Bogor. sub IV-G-64 (lectotype BO, designated by van der Heijden & Kessler, Blumea 35(1) (1990) 222; isoelectotypes K [K000574866], L [L0038008]).

Trees to 40 m tall. **Twigs** drying brown or grey-brown, longitudinally wrinkled or latticed, sometimes lenticellate, glabrous; youngest parts drying brown, longitudinally wrinkled. **Leaves:** lamina chartaceous to more commonly coriaceous, glabrous, drying various shades of brown, often rather dark, shiny above, dull beneath, oblong to elliptic or lanceolate, 4–11 × 2–4.5 cm, base acute to obtuse, apex acuminate, midrib flush to slightly raised above in dry leaves, prominent beneath, lateral veins 8–10 pairs, raised on both surfaces in dry leaves, looping distinctly well within lamina margin, reticulations obvious on both surfaces; petiole 6–8 mm long, 1–1.5 mm thick, glabrous. **Inflorescences** on woody tubercles behind leaves, 2–4-flowered, peduncle to 2 mm long, pubescent. **Flowers** with pedicels 4–14 mm long, c. 0.5 mm thick, pubescent; sepals free, ovate, 2–3.5 mm long, 1.5–2.5 mm wide, pubescent inside; outer petals lanceolate, 7–13 × 1–1.5 mm, inner petals ovate-oblong to ovate-lanceolate, 5–8 × 1.5–2.5 mm; stamens 9–17; carpel 1, glabrous, white-bloomed, stigma flat or subcapitate. **Fruit** with pedicels 10–18 mm long, 3–7 mm thick; monocarp 1, sessile, globose, 40–70 mm diam., drying black or dark brown, generally with a pale waxy bloom. **Seeds** 2 per monocarp, lenticular, 30–40 × c. 25 × c. 20 mm, walls thick and hard.

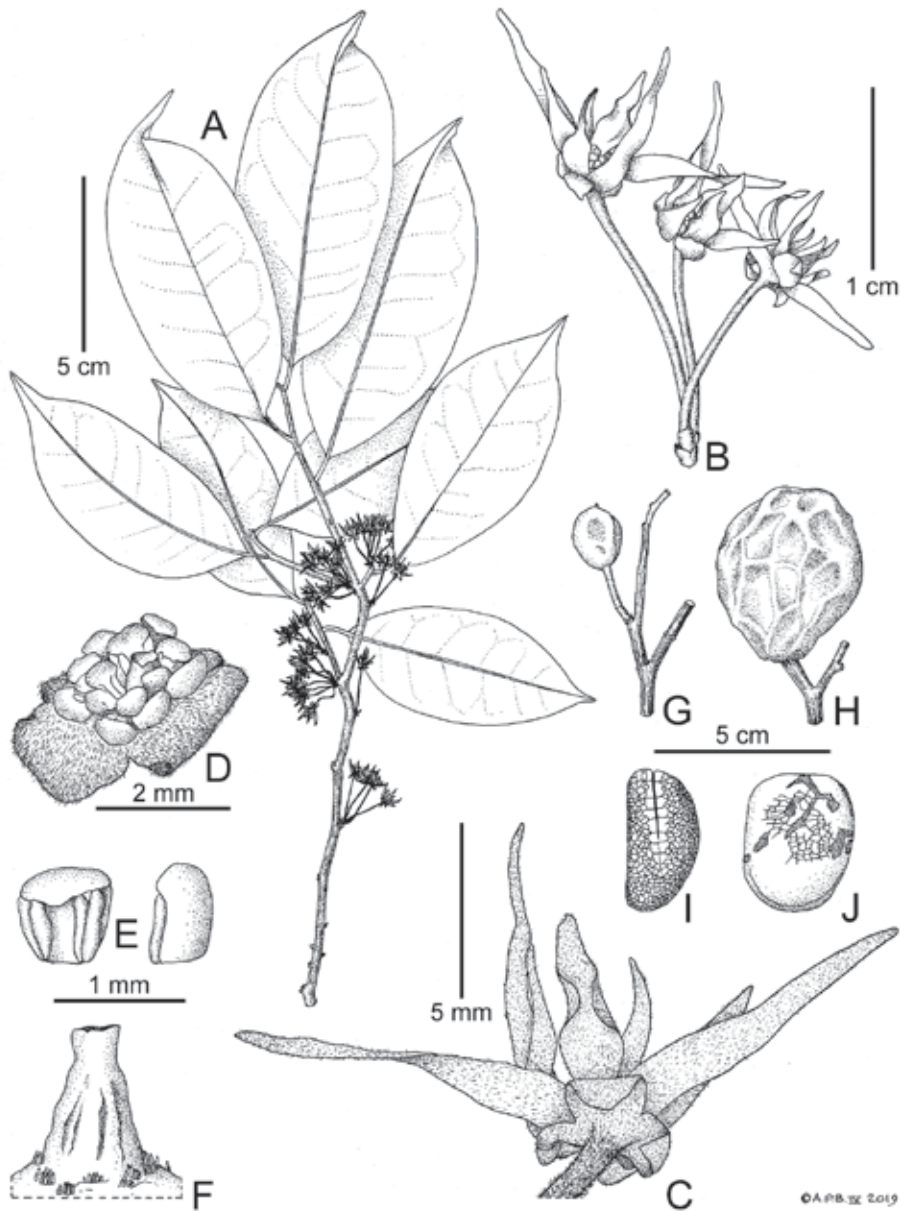


Figure 49. *Mezzettia parviflora* Becc. **A.** Habit of flowering shoot. **B.** Inflorescence. **C.** Flower showing only top of the pedicel. **D.** Interior view of flower with corolla removed, sepals strongly reflexed. **E.** Stamen inner face and side view. **F.** Carpel. **G.** Twig with infructescence (single monocarp) attached. **H.** Mature monocarp. **I.** Seed (side view). **J.** Seed (top view). (A–F from Singapore, Singapore Botanic Gardens' Rain Forest, *Ridley* 5592; G from Peninsular Malaysia, *Sohedi* FRI 16801; H from Peninsular Malaysia, *Kamarudin* FRI 31283; I & J from Peninsular Malaysia, *Ridley* s.n. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

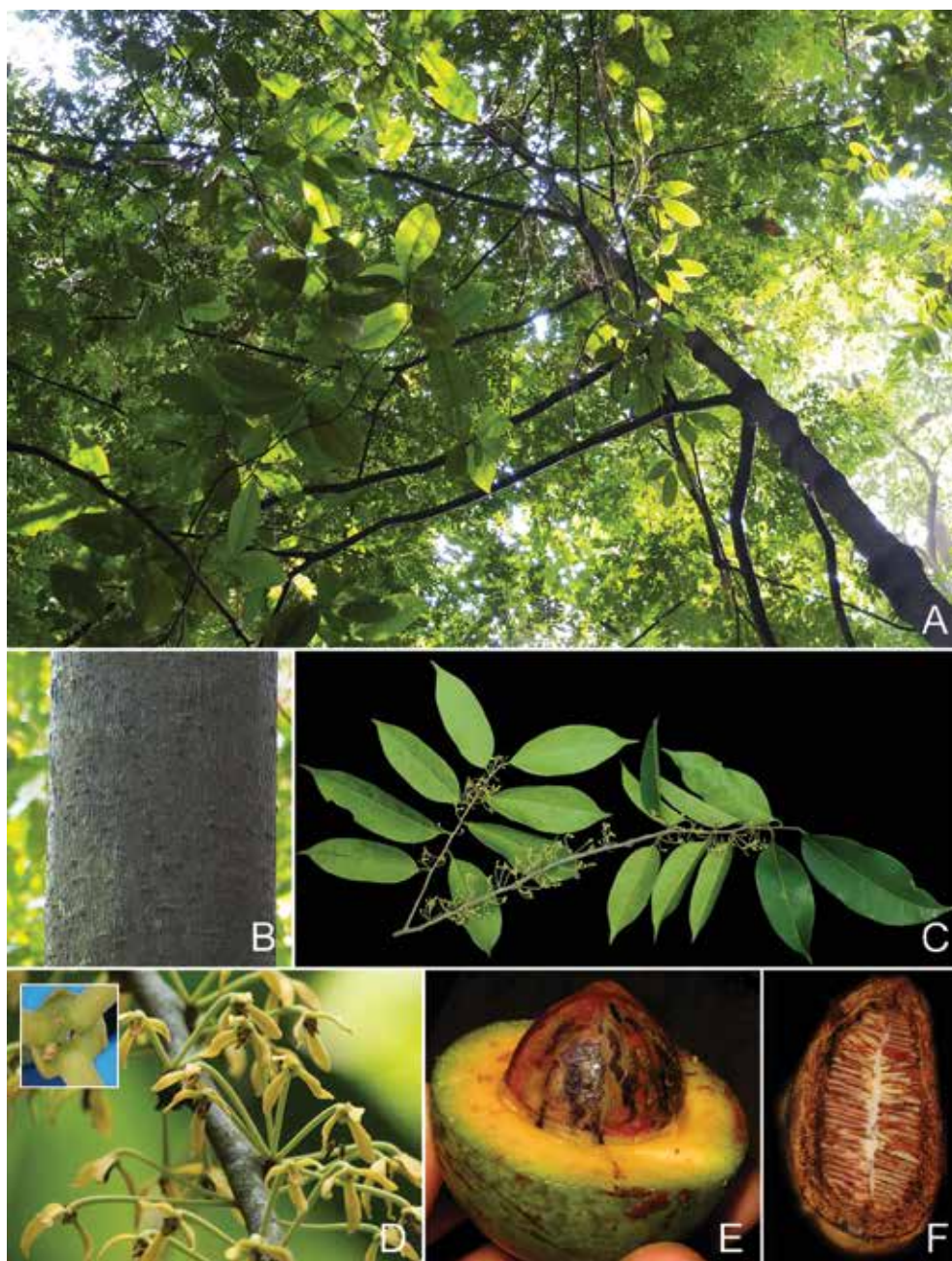


Figure 50. *Mezzettia parviflora* Becc. **A.** Habit. **B.** Trunk. **C.** Leafy branch with flowers. **D.** Flowers in different stages of maturity. Inset: Close-up of flower. **E.** Monocarp with pericarp partially removed to show seed. **F.** Seed cross-section showing ruminations in endosperm. (A–D & D inset from Singapore, A & B, Bukit Timah, *Leong et al. CTF57579*; C, D & D inset, Singapore Botanic Gardens, *Leong SING2019-431*; E & F, from Indonesia, West Kalimantan. Photos: A–C & D inset, P.K.F. Leong; D, Zaki Jamil; E & F, Endro Setiawan & Xmalesia Project, reproduced with their kind permission).

Distribution. Andaman Islands and southern Thailand, through Peninsular Malaysia to Borneo. In Singapore, known from Bajau (*Ridley s.n.*, 1894, SING [SING0003234]), Bukit Timah (*Ngadiman SFN 36461*, 14 Jun 1939, SING [SING0003232]; *Lim et al. SING2019-708*, 7 Aug 2019, SING [SING0293092]) and Singapore Botanic Gardens' Rain Forest (*Ali Ibrahim et al. SING2017-071*, 1 Mar 2017, SING [SING0230814]).

Ecology. A large tree of lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Vernacular names. *Mempisang*, *meroyan hutan* (NParks' Flora & Fauna Web, 2026).

18. MILIUSA Lesch. ex A.DC.

(Pierre Bernard Milius, 1773–1829, French naval and colonial officer, participant with Leschenault in the Baudin Expedition, 1800–1804)

Mém. Soc. Phys. Genève 5 (1832) 190, 213; de Candolle, Mém. Anon. (1832) 14, 37; Ridley, Fl. Malay Penins. 1 (1922) 96; Sinclair, Gard. Bull. Singapore 14(2) (1955) 377; Kochummen, Tree Fl. Malaya 1 (1972) 79; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 122; Mols & Kessler, Blumea 48 (2003) 421; Chaowasku & Kessler, Nordic J. Bot. 31 (2013) 680; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 90; Damthongdee & Chaowasku in Johnson & Murray, Fl. Thailand 16(1) (2022) 167. **Type:** *Miliusa indica* Lesch. ex A.DC.

Hyalostemma Wall., Numer. List no. 6434 (1832). **Type:** *Hyalostemma roxburghianum* Wall., nom. illeg. superfl. (= *Miliusa dioeca* (Roxb.) Chaowasku & Kessler).

Saccopetalum Benn., Pl. Jav. Rar., fasc. 2 (1840) 165. **Type:** *Saccopetalum horsfieldii* Benn. (= *Miliusa horsfieldii* (Benn.) Baill. ex Pierre).

Shrubs or small trees, evergreen or deciduous. **Leaves** petiolate or more rarely sessile. **Inflorescences** axillary, solitary or in few-flowered fascicles, pedunculate or more often not. **Flowers** bisexual, occasionally unisexual, often with long slender pedicels; sepals 3, valvate, free or basally connate, much shorter than inner petals, similar to outer petals; petals valvate, two whorls of 3, outer petals similar to sepals, inner petals much larger than outer, often saccate at base, sometimes glandular adaxially or with translucent windows; stamens few to many, clavate, connectives with prolonged apex (miliusoid); carpels few to many, ovules 1–12, basal or lateral, in 1 or 2 rows. **Fruit** generally numerous, ellipsoidal or globose, thin-walled, generally glabrous, stipitate or more rarely sessile, stipe often attached obliquely to the seed-containing portion. **Seeds** up to 9 per monocarp in 1 or 2 rows, generally globose or ellipsoidal, smooth, glabrous, endosperm ruminations lamellate.

Distribution. A genus of approximately 57 species from India to Australia. In Singapore, 1 native species.

Ecology. Lowland forest.

Notes. In 1822, Wallich collected a specimen from Singapore of what is possibly *Miliusa dioeca* (Roxb.) Chaowasku & Kessler (EIC 6434C, K-W [K001123886]). In Wallich's Numerical List, however, the record for Singapore is qualified with a question mark. This is doubtless the source of King's record (J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 123) of *Miliusa roxburghiana* Hook.f. & Thomson (synonym of *M. dioeca*) from Singapore. The species has never been found again in Singapore nor closer to Singapore than Myanmar, so it is concluded that the material was wrongly localised, as suspected by Wallich himself, and the record is not accepted here.

***Miliusa eupoda* (Miq.) I.M. Turner**

(Greek, *eu-* = well, truly, good, *-poda* = foot; referring to the long pedicel)

Webbia 70 (2015) 113; Turner, Gard. Bull. Singapore 70 (2018) 563; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 145; Damthongdee & Chaowasku in Johnson & Murray, Fl. Thailand 16(1) (2022) 172, pl. 19: F. **Basionym:** *Guatteria eupoda* Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 380. **Type:** *Junghuhn s.n.*, [Indonesia], Sumatra, Province of Tobing (lectotype U [U0000366], designated by Turner, Webbia 70 (2015) 113). **Fig. 51, 52.**

Miliusa longipes King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 124; Ridley, Fl. Malay Penins. 1 (1922) 96; Sinclair, Gard. Bull. Singapore 14(2) (1955) 379; Kochummen, Tree Fl. Malaya 1 (1972) 79; Keng, Gard. Bull. Singapore 27 (1974) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 115; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 61, 103, 195; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 8. **Type:** *King's Collector 7162*, [Malaysia], Perak, Larut, January 1886 (lectotype K [K001089891], designated by Turner, Gard. Bull. Singapore 70 (2018) 564).

Miliusa smithiae Craib, J. Nat. Hist. Soc. Siam 6 (1923) 44. **Type:** *Smith 684*, Siam [Thailand], Nakawn Sritamarat [Nakhon Si Thammarat], Khao Ram, March 1922 (lectotype K [K001089920], designated by Turner, Gard. Bull. Singapore 70 (2018) 564; isoelectotypes BK [BK257666], BM).

Small trees. **Twigs** drying pale brown or grey-brown, shallowly latticed, youngest parts sometimes with very short pale hairs, otherwise glabrous. **Leaves:** lamina membranous to chartaceous, more or less glabrous, drying grey, grey-brown or brown above, grey-brown or brown beneath with main veins paler brown, elliptic to obovate, 7–23 × 3–8 cm, base cuneate (acute to obtuse), apex acuminate, midrib flush to slightly sunken above, prominent beneath, drying with a rather sharp edge, lateral veins impressed above, slightly raised beneath, 9–12 pairs, running out more or less parallel and then looping distinctly well within the margin, decurrent to midrib at base, tertiary venation rather open, reticulate, only visible from beneath; petiole 3–11 mm long, 1–2 mm wide, drying dark brown, ringed and bumpy. **Inflorescences** axillary, single-flowered. **Flowers** with pedicels 9–25 mm long, c. 0.3 mm wide (when dry), drying red-brown, more or less glabrous, basally with tiny bracts in a distichous arrangement; sepals ovate-triangular, c. 1 × 1 mm, apex acute, with scattered brown hairs abaxially and a dense line of short hairs on margin, glabrous within; outer petals similar to sepals but slightly

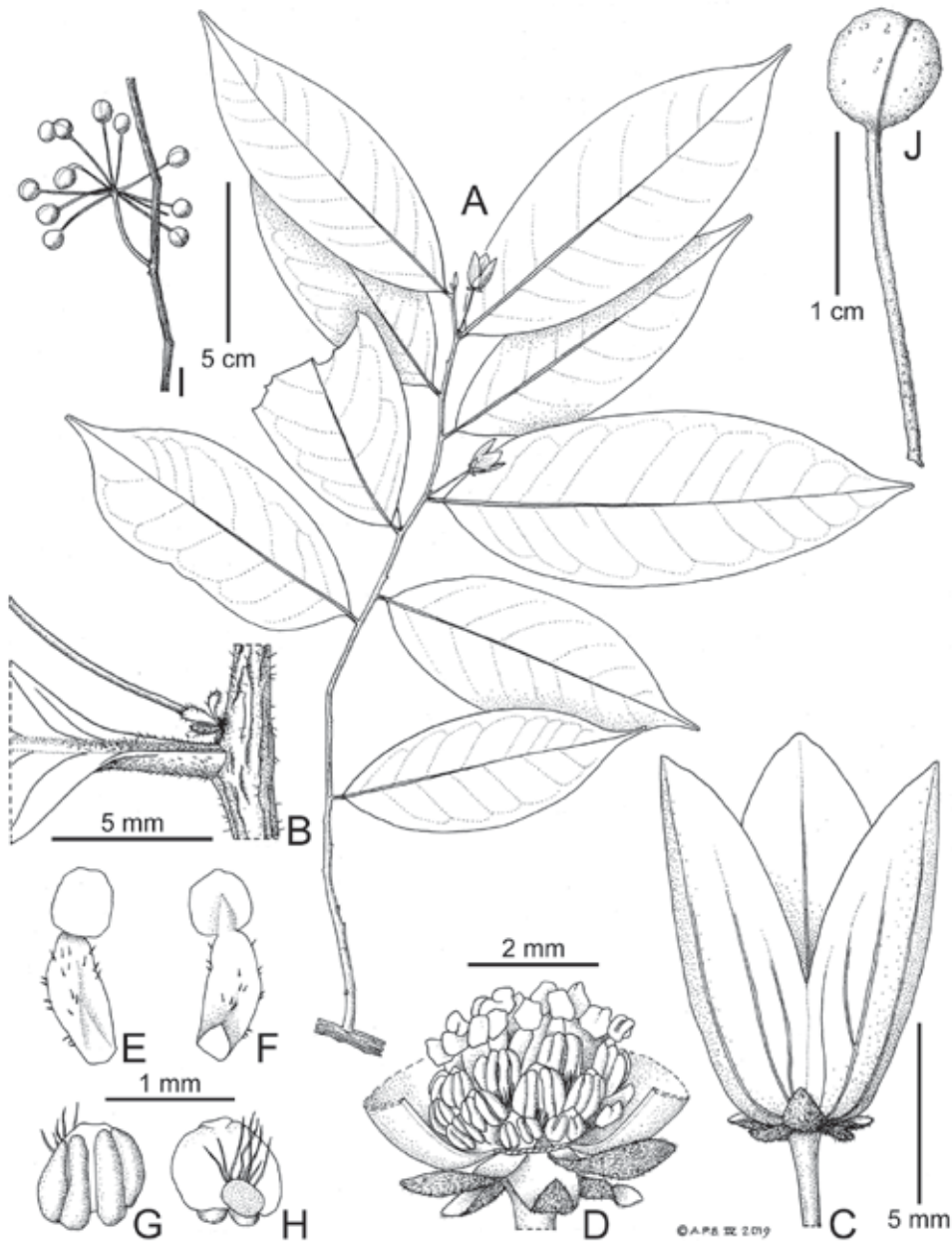


Figure 51. *Miliusa eupoda* (Miq.) I.M.Turner. **A.** Habit of a flowering shoot. **B.** Section of twig with section of leaf (upper surface) and base of flower. **C.** Flower (only top of pedicel shown). **D.** Flower interior view with inner petals excised above base. **E.** Carpel (adaxial view). **F.** Carpel (abaxial view). **G.** Stamen (adaxial view). **H.** Stamen (abaxial view). **I.** Section of twig bearing infructescence. **J.** Monocarp (A–J from Peninsular Malaysia, A–H, *Kiah SFN 35049*; I & J, *Latiff et al. 3950*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 52. *Miliusa eupoda* (Miq.) I.M. Turner. Habit. Inset: Fruit. (From Thailand. Photos: C. Leeratiwong, reproduced with kind permission).

longer, c. 1.3 mm; inner petals saccate, ovate, c. 11–13 mm long, 7 mm wide, drying blackish or dark brown, main veins distinct, more or less glabrous; stamens many; carpels many. **Fruit** with pedicels to 7 cm long, 1 mm wide, drying pale brown or pale grey, glabrous, sepals and outer petals often persisting; monocarps to 30 or more, more or less globose-ellipsoidal c. 7–9 mm long, drying dark brown, glabrous with scattered pimples, apiculate, often drying with a longitudinal furrow, stipe to 25 mm long, c. 0.7 mm wide. **Seeds** 1 per monocarp, rarely 2.

Distribution. Myanmar, Thailand, Peninsular Malaysia, Sumatra and Java. In Singapore, known only from historical collections from Bukit Timah (*Ridley s.n.*, 1890, SING [SING0003238]; *Ridley 4709*, 1892, SING [SING0003239]; *Ridley 8450*, Apr 1897, SING [SING0003237]; *Ridley s.n.*, 1909, SING [SING0003240]).

Ecology. Tree of lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Nationally Extinct (NEx) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

19. MITRELLA Miq.

(diminutive of Greek, *mitra* = mitre, cap; referring to the coherent inner petals forming a small dome over the reproductive structures)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 38; Sinclair, Gard. Bull. Singapore 14(2) (1955) 364; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 121; Turner, Gard. Bull. Singapore 64 (2012) 428; Johnson & Murray, Fl. Thailand 16(1) (2022) 186. **Synonyms:** *Polyalthia* Blume sect. *Kentia* Blume, Fl. Javae, fasc. 28–29 (1830) 71. – *Polyalthia* Blume subgen. *Schnittspahnia* Rchb., Deut. Bot. Herb.-Buch. (1841) 179. – *Melodorum* Lour. sect. *Kentia* (Blume) Hook.f. & Thomson, Fl. Ind. 1 (1855) 122. – *Unona* L.f. sect. *Kentia* (Blume) Baill., Hist. Pl. 1(4) (1868) 213. **Type:** *Polyalthia kentii* (Blume) Blume (= *Mitrella kentii* (Blume) Miq.).

Evergreen woody climbers. **Leaves** with tertiary venation reticulate. **Inflorescences** axillary or terminal, solitary or more rarely paired. **Flowers** bisexual, ellipsoid and trigonous in bud; sepals 3, valvate, basally connate or not, much shorter than petals; petals valvate, 2 whorls of 3, inner much shorter than outer petals; outer petals fleshy, concave at base, spreading at anthesis, inner petals forming a dome over reproductive structures; stamens many, connectives with truncate or obtuse apex; carpels 6–15, ovules 1 to many, biseriate. **Fruit** ellipsoidal or globose, stipitate. **Seeds** 1 to many per monocarp, circular, laterally flattened, smooth, shiny, sometimes pitted, exarillate; endosperm ruminations spiniform.

Distribution. A genus of about 6 species in Thailand and the Malay Peninsula through to New Guinea and Australia. In Singapore, 1 native species.

Taxonomy. Bangkomnate et al. (Willdenowia 51 (2021) 383–394) reduced *Mitrella* to a taxonomic synonym of *Pyramidanthe* Miq. and made the nomenclatural combinations. We maintain the two genera for this Flora treatment, however, given the sharp contrast between the acute stigmas, thin red pericarp, and pitted seeds of *Mitrella* and the cupular stigmas, thick greenish yellow pericarp, and smooth seeds of *Pyramidanthe* in their historical circumscriptions.

Mitrella kentii (Blume) Miq.

(William Kent, 1779–1827, Dutch gardener, first curator of the Botanic Garden in Buitenzorg, now Bogor, Java)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 39; Sinclair, Gard. Bull. Singapore 14(2) (1955) 365; Keng, Gard. Bull. Singapore 27 (1974) 72; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 115; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 61, 103, 229; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 182, 286; Neo et al., Nat. Singapore 7 (2014) 61; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 64 (2012) 431; Turner, Gard. Bull. Singapore 70 (2018) 576; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull.

Singapore 74(Suppl. 1) (2022) 145. **Basionym:** *Unona kentii* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 16. **Synonyms:** *Polyalthia kentii* (Blume) Blume, Fl. Javae, fasc. 28–29 (1830) 77. – *Melodorum kentii* (Blume) Hook.f. & Thomson, Fl. Ind. 1 (1855) 116. – *Fissistigma kentii* (Blume) Merr., Philipp. J. Sci. 15(2) (1919) 132. – *Pyramidanthe kentii* (Blume) Bangk. & Chaowasku, Willdenowia 51 (2021) 389. **Type:** *Collector unknown s.n.*, [Indonesia], Java (lectotype L [L0183051], designated by Turner, Phytotaxa 36 (2011) 54). **Fig. 53, 54.**

Uvaria mabiformis Griff., Not. Pl. Asiat. 4 (1854) 709. **Synonyms:** *Fissistigma mabiforme* (Griff.) Merr., Philipp. J. Sci. 15(2) (1919) 133. – *Pyramidanthe mabiformis* (Griff.) Bangk. & Chaowasku, Willdenowia 51 (2021) 389. **Type:** *Verupha s.n.* [Kew Distribution 389], [Malaysia], Malacca [Melaka], Aloor Gajah (lectotype K [K000574743], designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 367).

Melodorum elegans Hook.f. & Thomson, Fl. Ind. 1 (1855) 122; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 111; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 88. **Synonyms:** *Fissistigma elegans* (Hook.f. & Thomson) Merr., Philipp. J. Sci. 15(2) (1919) 131. – *Mitrella elegans* (Hook.f. & Thomson) D.M.Johnson & N.A.Murray, Thai Forest Bull., Bot. 49 (2021) 167. – *Pyramidanthe elegans* (Hook.f. & Thomson) Bangk. & Chaowasku, Willdenowia 51 (2021) 388. **Type:** *Collector unknown s.n.* [EIC 6474A], [Malaysia], Penang, 1822 (lectotype K [K000574739], designated by Turner, Phytotaxa 36 (2011) 55; isoelectotypes A [A00353977], C [C10005636], CAL, CGE, E [E00699581], GZU, K-W [K001123987, K001123988], L, LE [LE00012561], M [M0240161], NY [NY00026109], PH).

Melodorum pisocarpum Hook.f. & Thomson, Fl. Ind. 1 (1855) 123; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 112; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 88. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka] (lectotype K [K000574741], designated by Turner, Phytotaxa 36 (2011) 55).

Orophea borneensis Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 26. **Type:** *de Vriese s.n.*, [Indonesia], Borneo (lectotype L [L0038052], designated by Kessler, Blumea 33 (1988) 68; isoelectotype L [L0038053]).

Large woody climbers. **Twigs** drying blackish, dark brown or dark grey, sometimes with shallow longitudinal wrinkles or latticing, youngest parts with red-brown or pale hairs. **Leaves:** lamina chartaceous to subcoriaceous, glabrous above, beneath with tiny adpressed, red-brown or pale hairs, hairy on lamina and along veins, drying pale grey brown to almost black above, uniform matt brown beneath, midrib generally rather pale brown, elliptic, ovate or ovate-lanceolate, 4–13 × 2–6 cm, base obtuse to rounded, apex shortly acuminate, midrib very slightly sunken above, raised beneath, lateral veins flush above, very slightly raised beneath, 9–13 pairs, arching forward, looping obscurely, reticulations faintly visible from both surfaces in dry leaves; petiole 8–16 mm long, 1–2 mm thick. **Inflorescences** 1–3-flowered, axillary. **Flowers** fragrant, with pedicels 5–10 mm long, c. 1 mm thick, widening distally, drying dark brown with decumbent red-brown or brown hairs; medial bract absent; sepals connate, 2–2.5 × c. 3 mm, forming shallow triangular dish, externally red-brown hairy, glabrous within; outer petals coriaceous, ovate to elliptic, 9–15 × 5–11 mm, thickening distally, externally very densely covered with very short red-brown hairs, inside very short pale grey woolly except lower part of excavation; inner petals concave, ovate, c. 5 × 2.5 mm, pale grey woolly outside, glabrous within except for long pale woolly hairs on distal region, stamens many, 1–1.5 mm long, connective apex prolonged, carpels many, glabrous. **Fruit** with pedicels 7–15 mm long, 1.4–2 mm thick, calyx persistent; monocarps to 12, globose or irregularly ellipsoidal, 9–11

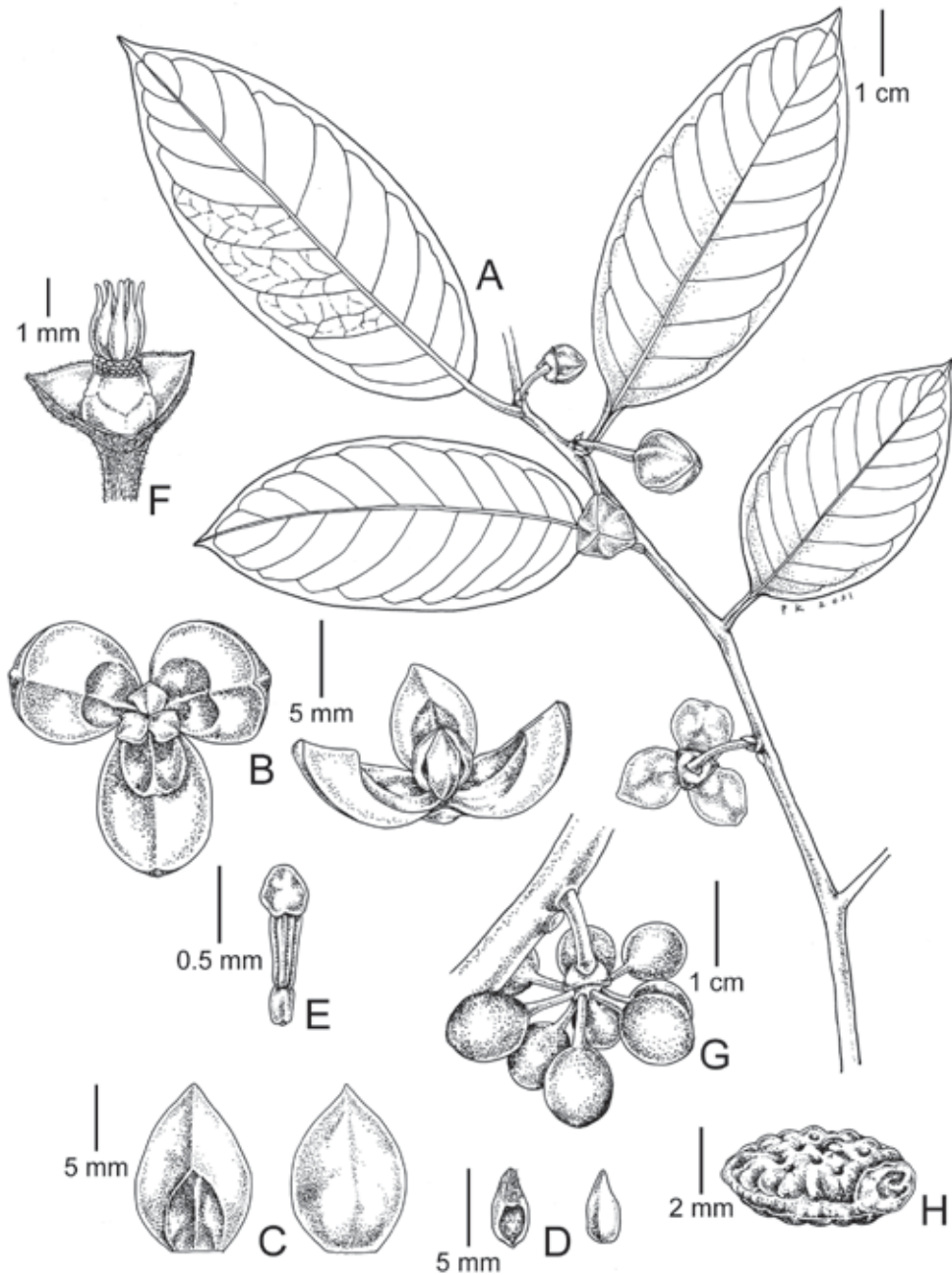


Figure 53. *Mitrella kentii* (Blume) Miq. **A.** Habit. **B.** Mature flower. **C.** Outer petals. **D.** Inner petals. **E.** Stamen. **F.** Flower with petals and stamens detached, showing sepals and carpels. **G.** Fruit. **H.** Seed. (A–H from Singapore, A–D, Nee Soon, Ng & Lim SING2018-738; E, F & H, Upper Peirce, Maxwell 82-232; G, Upper Peirce, Liew SING2005-271. Drawn by P.K. Cheng).



Figure 54. *Mitrella kentii* (Blume) Miq. **A.** Habit. **B.** Flower buds and anthetic flowers. **C.** Flowers showing basal apertures. **D.** Unripe fruit. Inset: Developing carpels after fertilisation. **E.** Ripe fruit with a single monocarp remaining. **F.** Dissected flower showing inner petals (top) and outer petals (bottom). Inset: Close-up of stigmas and stamens. **G.** Seeds showing pitted surface. (A–G including insets from Singapore, A, B & G, Nee Soon; C–E, Nee Soon, Ng & Lim SING2018-738; D inset, F & F inset, Nee Soon, Ng SING2014-347. Photos: X.Y. Ng).

mm long, 7–9 mm wide, drying brown, relatively smooth, glabrous, apex typically rounded, stipe 4–9 mm long, c. 1 mm thick. **Seeds** 2 or more per monocarp, hemispherical, c. 6 mm diam., c. 3 mm high, pitted, drying shiny dark brown.

Distribution. Peninsular Malaysia, Java and Borneo. In Singapore, there are historical collections from Chan Chu Kang (*Ridley s.n.*, Nov 1889, SING [SING0003248]), Bukit Mandai, Bukit Timah, and Tuas. More recent collections are mostly from MacRitchie (*Wilkie et al. PW 524*, 19 Jan 2007, K [K003818006], SING [SING0097981]), Upper Peirce (*Liew SING2005-271*, 11 Jul 2005, SING [SING0065321]) and Nee Soon (*Ang et al. s.n.*, 20 Sep 2010, SING [SING0154972], SINU [SING0354872]; *Ng & Lim SING2018-738*, 29 Jul 2018, SING [SING0274272]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

20. MONOCARPIA Miq.

(Greek, *monos* = alone, solitary, *carpos* = fruit; referring to the single carpel per flower in some species)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 12; Sinclair, Gard. Bull. Singapore 14(2) (1955) 272; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 115; Mols & Kessler, Bot. Jahrb. Syst. 122 (2000) 233; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 104; Sutthisaksopon & Sirichamorn in Johnson & Murray, Fl. Thailand 16(1) (2022) 198. **Synonym:** *Unona* L.f. sect. *Monocarpia* (Miq.) Baill., Hist. Pl. 1(4) (1868) 213. **Type:** *Monocarpia euneura* Miq.

Medium or large evergreen trees to 35 m tall. **Twigs** pubescent or glabrous. **Leaves** membranous to chartaceous, lateral veins 9–20 pairs, looping to form a more or less distinct intramarginal vein. **Inflorescences** 1–3-flowered, opposite leaves or intranodal, often behind the leaves on a branch. **Flowers** bisexual; sepals 3, valvate, connate at base or up to half way, shorter than petals; petals valvate in two whorls of 3, spreading at anthesis, inner whorl slightly smaller; stamens numerous, connective with a truncate apex; carpels 1–5, stigmas peltate or discoid, ovules c. 10, lateral, in 2 rows. **Fruit** with 1–3 sessile, globose to cylindrical monocarps, pericarp thick, leathery, stony or fleshy. **Seeds** c. 12 per monocarp, in 2 rows, compressed, wrinkled, exarillate; endosperm ruminations spiniform.

Distribution. A genus of 4 species in Peninsular Malaysia, Sumatra and Borneo. In Singapore, 1 native species.

Ecology. Trees of lowland forest including fairly wet sites along rivers.

Notes. The regular venation with distinct intramarginal vein is distinctive. The large, few, sessile, multi-seeded monocarps are not easily confused with other genera except perhaps

Pseuduvaria Miq. Flowering *Monocarpia* specimens are somewhat similar to some of the larger-flowered *Monoon* Miq. species.

***Monocarpia maingayi* (Hook.f. & Thomson) I.M.Turner**

(Alexander Carroll Maingay, 1836–1869, English physician, colonial administrator and botanist)

Edinburgh J. Bot. 69 (2012) 97; Turner, Gard. Bull. Singapore 70 (2018) 591; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 146; Sutthisaksopon & Sirichamorn in Johnson & Murray, Fl. Thailand 16(1) (2022) 199, fig. 41, pl. 24: A, B. **Basionym:** *Cyathocalyx maingayi* Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 53; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 29; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 37. **Type:** *Maingay 1344A* [Kew Distribution 94], [Malaysia], Malacca [Melaka], 26 July 1867 (lectotype K [K000691263, K000691264 – a single specimen over 2 sheets], designated by Turner, Edinburgh J. Bot. 69 (2012) 97). **Fig. 55, 56.**

Cyathocalyx marginalis Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 [‘1885’]) 6. **Synonym:** *Monocarpia marginalis* (Scheff.) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 272, 273; Kochummen, Tree Fl. Malaya 1 (1972) 80; Keng, Gard. Bull. Singapore 27 (1974) 73; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 31; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 73; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 116; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 61, 103, 222. **Type:** *Teijsmann s.n.* [Herb. Bogor no. 17662], [Indonesia], Sumatra, Bangka prope Sg Liar, Bukit Itam (lectotype BO [sheet no. BO-76669], designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 273; isolectotype L [L0048000]).

Monopodial trees to 35 m tall, bole to 40 cm diam. **Twigs** drying black or dark brown, longitudinally wrinkled or latticed, variably tomentose, densely and persistently pubescent with pale or red-brown hairs, to more or less glabrous. **Leaves:** lamina chartaceous, typically glabrous above and sparsely hairy beneath with adpressed golden brown hairs on main veins and scattered on lamina surface, occasional specimens more densely tomentose including with a fringe of hairs on midrib above, drying dark brown, brown, grey-brown, grey or mottled of these shades above, more consistently dark chestnut brown or purple-brown beneath with lateral veins distinctly darker, ovate, elliptic or obovate, frequently narrowly oblong, 9–31 × 3–10 cm, base rounded to narrowly cuneate, apex acute to acuminate, midrib distinctly sunken above, prominent beneath, lateral veins slightly impressed above in dry leaves, raised beneath, 12–16 pairs, arising more or less straight and parallel at c. 45° to the midrib, curving and looping to form a very distinct intramarginal vein 1–2 mm from lamina margin, tertiary venation scalariform, visible to the naked eye on both surfaces in dry leaves, quaternary venation more or less reticulate; petiole 4–7 mm long, 1–2 mm wide, flat adaxially with raised margins, convex abaxially, drying black with horizontal rings and longitudinal wrinkles. **Inflorescences** supra-axillary, mostly behind leaves, sometimes subtended by leaf-like bracts. **Flowers** with pedicels 12–20 mm long, c. 1 mm thick, drying brown, tomentose; medial bract broadly ovate, c. 5 × 6 mm, base truncate, apex blunt, densely hairy abaxially, more sparsely hairy adaxially; sepals ovate-lanceolate, c. 12 × 5–6 mm, base truncate, apex acute, drying brown, densely brown hairy outside, more sparsely hairy inside; corolla green to yellow; outer petals rhomboidal or ovate-lanceolate, to 45 × 25 mm, base slightly clawed, apex blunt, drying

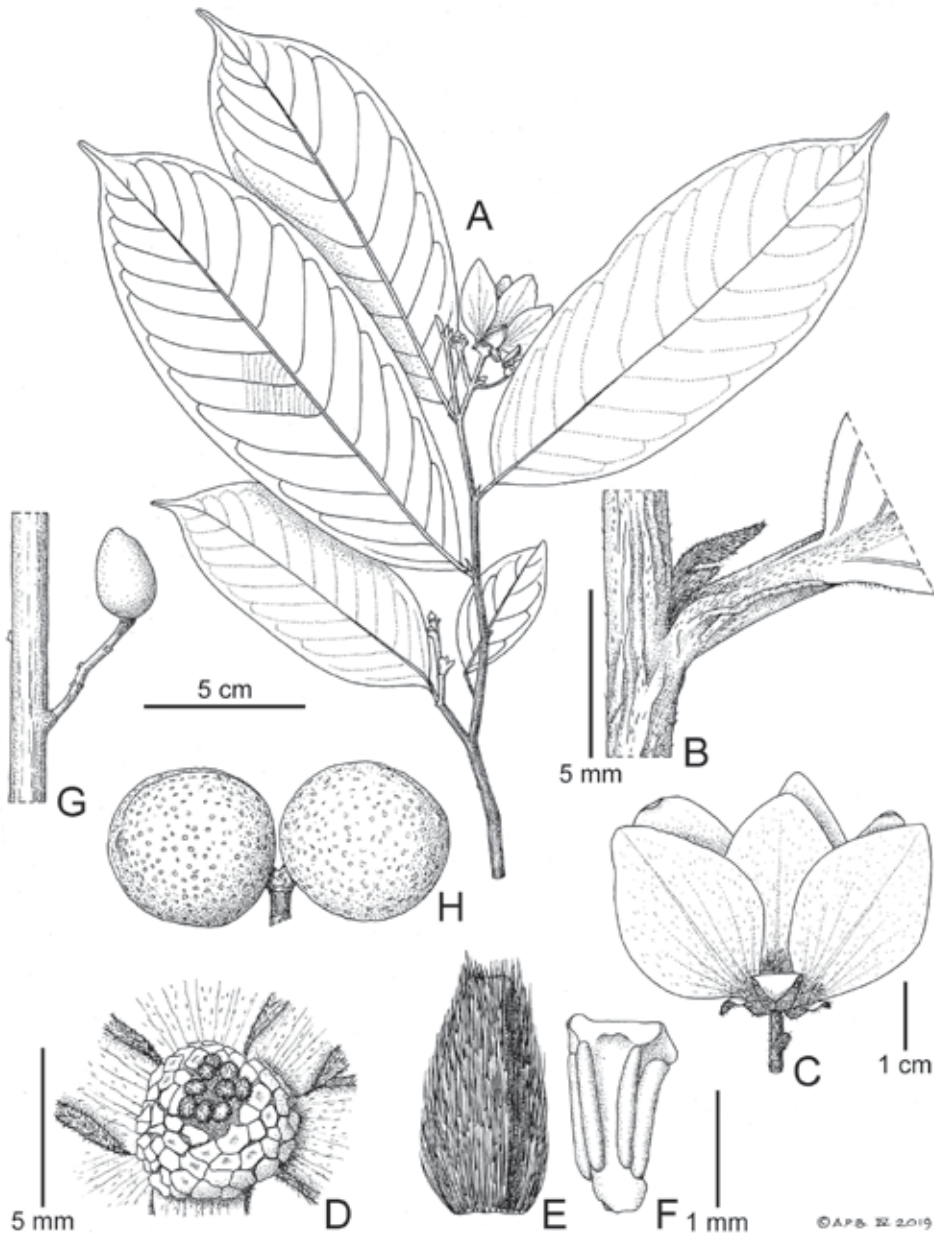


Figure 55. *Monocarpia maingayi* (Hook.f. & Thomson) I.M.Turner. **A.** Habit of flowering shoot. **B.** Section of twig with section of leaf (upper surface). **C.** Flower. **D.** Interior view of flower. **E.** Carpel. **F.** Stamen (adaxial view). **G.** Twig section with young infructescence (single monocarp) attached. **H.** Mature infructescence (2 monocarps). (A–H from Peninsular Malaysia, A & B, *Selvaraj FRI 11155*; C, E & F, *Teo & Pachiappan KL 3462*; D, *Loh FRI 17920*; G, *Henderson s.n.*; H, *Whitmore FRI 8692*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

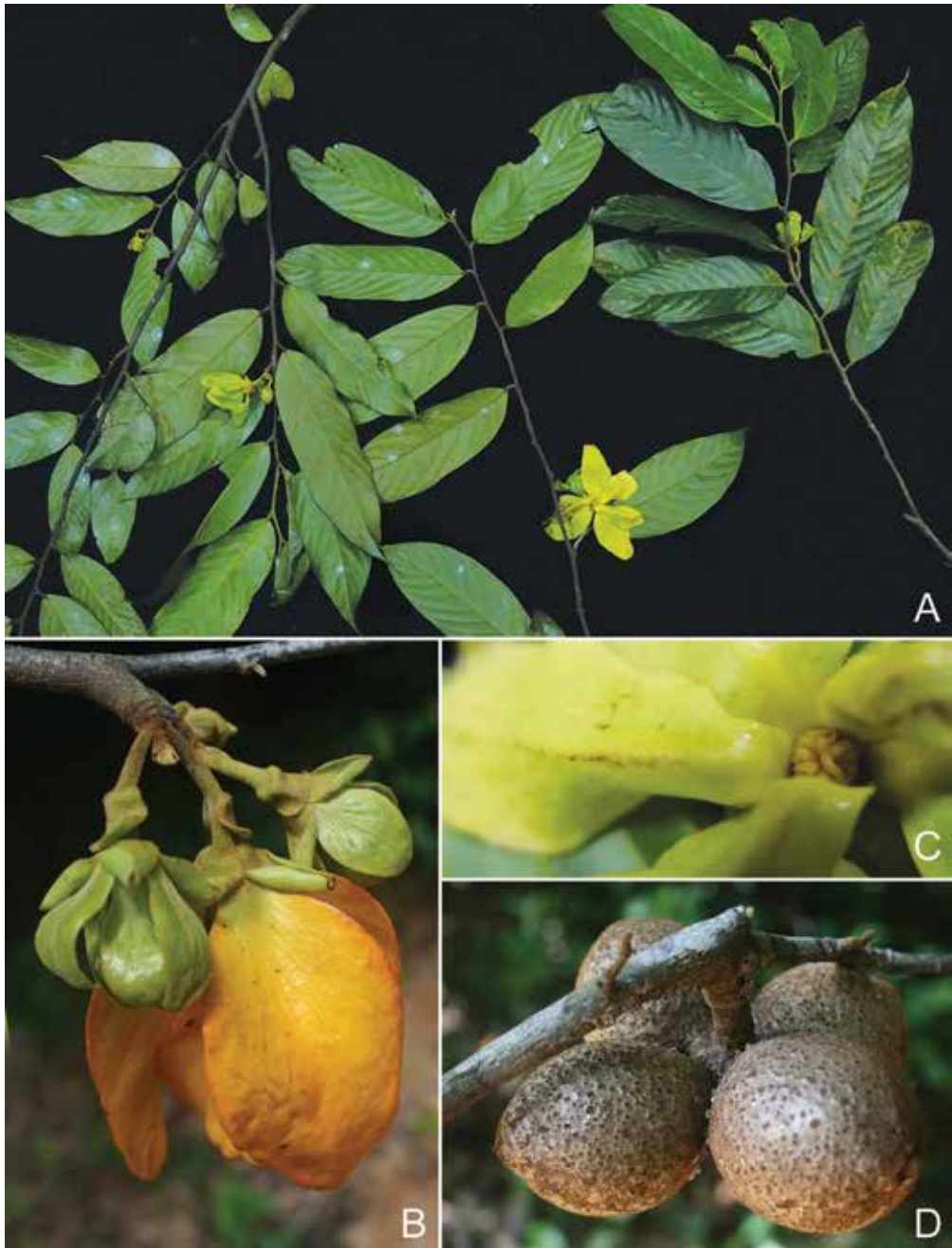


Figure 56. *Monocarpia maingayi* (Hook.f. & Thomson) I.M.Turner. **A.** Leaves. **B.** Inflorescence bearing flowers in different stages of maturity. **C.** Close-up of flower centre. **D.** Infructescence. (A & C from Singapore, Bukit Kalang, *Ali Ibrahim et al. SING2019-106*; B & D from Thailand. Photos: A & C, P.K.F. Leong; B & D, P. Chalermglin, reproduced with kind permission).

brown with a central, longitudinal band of pubescence abaxially, less hairy within except for some long hairs near base; inner petals oblong-elliptic to ovate, generally slightly longer and narrower than the outer petals; stamens many, 1–1.5 mm long, connective apex truncate, flat, glabrous; carpels 3, c. 1.5 mm long, densely brown hairy. **Fruit** with pedicels c. 20×5 –10 mm; monocarps 1–3, mostly 2, globose, more or less spherical, c. 60 mm diam., unbeaked, drying grey-brown with red-brown spots, pericarps c. 5 mm thick, hard and stony, seeds embedded in translucent pulp. **Seeds** c. 12 per monocarp, lunar, c. 32 – 35×18 – 20×6 –10 mm.

Distribution. Southern Thailand, Peninsular Malaysia and Sumatra. In Singapore, known from Bukit Timah (*Niissalo CTFS H5-11713*, 4 Sep 2019, SING [SING0295383]) and the Central Catchment (*Gwee SING2009-468*, 17 Nov 2009, SING [SING 0138024]; *Yeo SING2012-396*, 18 Sep 2012, SING [SING0194907]; *Leong et al. MR 2015-029*, 17 Mar 2015, SING [SING0213507]; *Ali Ibrahim et al. SING2019-106*, 21 Feb 2019, SING [SING0286137]).

Ecology. A large tree of lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

21. MONOON Miq.

(Greek, *monos* = alone, solitary, *oon* = egg; referring to the single ovule per carpel)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 15; Xue et al., Taxon 61 (2012) 1021; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 108; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 5; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 200. **Synonyms:** *Polyalthia* Blume sect. *Monoon* (Miq.) Benth. & Hook.f., Gen. Pl. 1(3) (1867) 956. – *Unona* L.f. sect. *Monoon* (Miq.) Baill., Hist. Pl. 1(4) (1868) 213. **Type:** *Monoon lateriflorum* (Blume) Miq., lectotype designated by Saunders & Xue, Taxon 60 (2011) 236.

Marcuccia Becc., Nuovo Giorn. Bot. Ital. 3 (1871) 181. **Type:** *Marcuccia grandiflora* Becc. (= *Monoon grandiflorum* (Becc.) B.Xue & R.M.K.Saunders).

Enicosanthum Becc., Nuovo Giorn. Bot. Ital. 3 (1871) 183; Sinclair, Gard. Bull. Singapore 14(2) (1955) 185; Kochummen, Tree Fl. Malaya 1 (1972) 74; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 114. **Type:** *Enicosanthum paradoxum* Becc. (= *Monoon paradoxum* (Becc.) B.Xue & R.M.K.Saunders).

Griffithia Maingay ex King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 8 bis, nom. illeg. non Wight & Arn. (1834). **Synonym:** *Griffithianthus* Merr., Philipp. J. Sci., C 10(4) (1915) 231. **Type:** *Griffithia magnoliipetala* Maingay ex King, nom. illeg. superfl. (= *Monoon magnoliiflorum* (Maingay ex Hook.f. & Thomson) B.Xue & R.M.K.Saunders).

Woodiella Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 187, nom. illeg. non Sacc. & P.Syd. (1899), fungal genus. **Synonym:** *Woodiellantha* Rauschert, Taxon 31 (1982) 555; Kessler in Kubitzki et al. (ed.),

Fam. Gen. Vasc. Pl. 2 (1993) 117. **Type:** *Woodiella sympetala* Merr. (= *Monoon sympetalum* (Merr.) B.Xue & R.M.K.Saunders).

Cleistopetalum H.Okada, Acta. Phytotax. Geobot. 47(1) (1996) 4. **Type:** *Cleistopetalum borneense* H.Okada (= *Monoon borneense* (H.Okada) B.Xue & R.M.K.Saunders).

Polyalthia auct. non Blume: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 49, p.p.; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 62, p.p.; Ridley, Fl. Malay Penins. 1 (1922) 48, p.p.; Sinclair, Gard. Bull. Singapore 14(2) (1955) 279, p.p.; Kochummen, Tree Fl. Malaya 1 (1972) 85, p.p.

Evergreen or more rarely deciduous trees. **Indumentum** comprising simple hairs. **Twigs** sometimes lenticellate. **Leaves:** lamina chartaceous to coriaceous, not white or glaucous beneath, sometimes with pellucid gland dots; base acute to rounded (rarely (sub)cordate), symmetrical; midrib flush or immersed above, prominent beneath, venation eucamptodromous with lateral veins often decurrent to midrib, arching forward and looping obscurely close to the margin, intercostal venation typically scalariform to subscalariform. **Inflorescences** in leaf axils, or axils of fallen leaves or arising in fascicles from woody tubercles on branches or main stem, or on twiggy inflorescences from around trunk base, 1- to many-flowered. **Flowers** bisexual; perianth whorls imbricate or valvate; sepals 3, connate or free, shorter than petals; petals 6 in two whorls of 3, whorls generally similar in size and shape, at least 4 cm long, partially connate or free, not saccate, spreading or erect, often fleshy, typically white to yellow at anthesis, rarely pink or red, not persistent in fruit; inner petals not clawed or verrucose, bases not tightly pressed over reproductive structures; stamens many, apex of connective truncate; carpels many, ovules 1 in each carpel, basal. **Fruit** with monocarps few to many, subglobose to ellipsoidal, mostly more than 20 mm long, generally stipitate with stipe more than 10 mm long, rarely sessile or subsessile. **Seeds** 1 per monocarp, more than 10 mm long, smooth, often shiny, with a distinct circumferential groove, exarillate; endosperm soft, ruminations lamellate.

Distribution. A genus of about 70 species in India, Sri Lanka, China, continental Southeast Asia, Malesia and Australia. In Singapore, 5 native species.

Taxonomy. *Monoon*, as recognised here, includes the species included in *Polyalthia* sect. *Monoon* as recognised by earlier authors, but also includes species of *Enicosanthum*, *Woodiellantha* and *Cleistopetalum*. Molecular analyses confirm *Monoon* as monophyletic when including these three genera (Xue et al., Taxon 61 (2012) 1021–1039). All the Singapore species were formerly recognised as part of *Polyalthia* sensu lato. The key characters of *Monoon* in its current taxonomic incarnation are the leaves being eucamptodromous with more or less scalariform reticulations and symmetrical bases, single ovules per carpel and seeds with a longitudinal groove and relatively soft endosperm.

Notes. A Lobb specimen, noted as collected in Singapore, was initially identified as *Guatteria nitida* A.DC. (Hooker & Thomson, Fl. Ind. 1 (1855) 143; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 46) and later as *Polyalthia nitida* (A.DC.) Hook.f. & Thomson (Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 64; Ridley, Fl. Malay Penins. 1 (1922) 61). Sinclair (Gard. Bull. Singapore 14(2) (1955) 191) indicated that the Lobb specimen was possibly *Enicosanthum membranifolium* J.Sinclair (= *Monoon membranifolium* (J.Sinclair) B.Xue & R.M.K.Saunders). This species has not been found again in Singapore and it is assumed here

that the collecting locality is wrong, possibly an error for Penang (see also Middleton & Turner, Fl. Singapore 1 (2019) 32 for a further discussion on problems with Lobb collection localities).

A recent record (Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 207, 287) of *Polyalthia hypogaea* King (= *Monoon hypogaeum* (King) B.Xue & R.M.K.Saunders) from Nee Soon Swamp Forest was based on sterile, juvenile material and is likely wrongly determined.

Key to *Monoon* species

1. Inflorescences on trunk; twigs pale grey or brown; monocarps drying black and strongly wrinkled, prominently beaked, with stipe shorter than seed-bearing portion 2
 Inflorescences in leaf axils, or on twigs and branches behind leaves; twigs grey-brown, not pale; monocarps drying brown and relatively smooth, apex rounded or apiculate, stipe longer than seed-bearing portion 3
2. Inflorescences on woody tubercles **1. *M. anomalum***
 Inflorescences on short, much-branched axes **2. *M. borneense***
3. Outer petals drying black, obovate (widest above midway), claw and blade distinct **3. *M. hookerianum***
 Outer petals generally drying brown, lanceolate to oblong-linear (widest at or below midway), little distinction between claw and blade 4
4. Leaves generally more than 20 cm long and 5 cm wide, lateral veins 14–15 pairs; sepals to 3 mm long **4. *M. lateriflorum***
 Leaves generally less than 20 cm long and 5 cm wide, lateral veins 9–13 pairs; sepals 3–4 mm long **5. *M. sclerophyllum***

1. *Monoon anomalum* (Becc.) B.Xue & R.M.K.Saunders

(Greek, *anomalos* = uneven, unequal, abnormal, anomalous; possibly reflecting how distinct it was from related species)

Taxon 61 (2012) 1030; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 110; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 7; Turner, Gard. Bull. Singapore 70 (2018) 593; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 146; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 202. **Basionym:** *Polyalthia anomala* Becc., Nuovo Giorn. Bot. Ital. 3 (1871) 188; Turner, Phytotaxa 8 (2010) 43; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9. **Type:** *Beccari P.B. 1605*, [Malaysia], Borneo, Sarawak, Mt Mattan, May 1866 (holotype FI-B [FI007570] [Erb. Coll. Becc. no. 481]).

Polyalthia clavigera King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 60; Sinclair, Gard. Bull. Singapore 14(2) (1955) 318; Kochummen, Tree Fl. Malaya 1 (1972) 87; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 117; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Chong

et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 197. **Type:** *Wray 2075*, [Malaysia], Perak, Waterfall Hill, June 1888 (lectotype K [K000691553], designated by Turner, Phytotaxa 8 (2010) 43; isoelectotypes CAL, SING [SING0390820]).

Polyalthia glomerata King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 61; Ridley, Fl. Malay Penins. 1 (1922) 59. **Type:** *King's Collector 3817*, [Malaysia], Perak, January 1883 (lectotype K [K000691552], designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 318; isoelectotypes BM [BM000753854], CAL [CAL0000004389], L [L0038110], P [P00601063]).

Cleistopetalum sumatranum H.Okada, Acta Phytotax. Geobot. 47(1) (1996) 5, fig. 1: A, B, fig. 4; Turner, Phytotaxa 8 (2010) 41. **Type:** *Okada 4607*, Indonesia, Sumatra, West Sumatra, Gunung Gadut, Bukit Pinang Pinang, c. 20 km east of Padang, 14 December 1987 (holotype BO [sheet no. BO-99407]; isotype KYO).

Treelets or small trees. **Twigs** drying pale grey-brown, irregularly latticed, younger parts sometimes a more reddish brown, longitudinally ridged, pale brown hairs sometimes dense. **Leaves:** lamina chartaceous, midrib with short pale more or less erect hairs, particularly near base, but sometimes more or less glabrous, scattered adpressed hairs on midrib and lateral veins beneath, generally drying dark brown above, paler beneath, generally oblong-elliptic, sometimes narrowly so, more rarely ovate, 13–21.5 × 3–6.5 cm, base cuneate to obtuse, rarely almost rounded, apex acute to obtuse and ultimately acuminate; midrib slightly sunken above, lateral veins more or less flush, midrib prominent beneath, lateral veins slightly raised, 7–8 pairs; petiole 4–7 mm long, 1–2 mm diam., drying blackish with scattered brown hairs. **Inflorescences** cauliflorous on woody tubercles, fascicles multi-flowered. **Flowers** with pedicels drying brown, to 6 cm long, with fine pale short hairs; medial bract narrowly triangular, c. 3 × 1, apex acute, brown hairy outside, glabrous within; sepals quite thin-textured, ovate to triangular c. 9 × 5 mm, apex subacuminate, sparse adpressed brown hairs outside, more sparsely hairy within except near margin; petals drying brown, outer wider than inner; outer petals linear-lanceolate c. 50 × 12 mm, inner narrowly linear-lanceolate c. 50 × 6 mm, covered with fine pale short hairs, dense in young flowers; stamens many c. 1.5 mm long; carpels many, densely hairy. **Fruit** with pedicels to 5 mm thick; monocarps many, to 20 or more, monocarps clavate to 110 mm long, drying brown, irregularly deeply wrinkled, more or less glabrous, seed-bearing portion to 70 × 30 mm, apex a short, broad beak, sometimes pointed, otherwise rounded apically, tapering into the stipe so difficult to recognise the distinction between the two, but stipe to at least 30 mm long. **Seeds** 1 per monocarp, c. 40 × 15 mm, circumferential groove distinct.

Distribution. Thailand, Peninsular Malaysia, Sumatra and Borneo. In Singapore, known from Stagmont (*Ridley s.n.*, 1907, SING [SING0003271]), Bukit Timah (*Hamzah Tambi H19*, 15 Sep 1970, SING [SING0042255]; *Md. Nur 1586*, 5 Mar 1973, SING [SING0042179]) and the Central Catchment (*Corner s.n.*, 19 Mar 1940, SING [SING0003289]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Nationally Extinct (NEx) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

2. *Monoon borneense* (H.Okada) B.Xue & R.M.K.Saunders (of Borneo)

Taxon 61 (2012) 1030; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 8; Turner, Gard. Bull. Singapore 70 (2018) 595; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 146. **Basionym:** *Cleistopetalum borneense* H.Okada, Acta Phytotax. Geobot. 47(1) (1996) 4; Turner, Phytotaxa 8 (2010) 41. **Type:** *Kato & Wiriadinata 7119*, Indonesia, East Kalimantan, Sungai Menubar, 12 December 1980 (holotype KYO; isotypes BO, L). **Fig. 57, 58.**

Polyalthia macropoda King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 60, nom. illeg. non (Miq.) F.Muell. (1877); Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 60; Sinclair, Gard. Bull. Singapore 14(2) (1955) 316; Kochummen, Tree Fl. Malaya 1 (1972) 87; Keng, Gard. Bull. Singapore 27 (1974) 73; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10, as '*Polyalthia*'; Wong et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 75; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 118; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 61, 165; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 104, 217; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 207, 287. **Synonym:** *Polyalthia sinclairiana* I.M.Turner, Gard. Bull. Singapore 58(2) (2007) 275; Turner, Phytotaxa 8 (2010) 42; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9. **Type:** *Ridley 429*, Singapore, Selitar, November 1889 (lectotype K [K000691558], first step designated by Keng, Gard. Bull. Singapore 27 (1974) 73, second step designated here; isolectotype SING [SING0003290]).

Small trees. **Twigs** generally drying a pale straw colour, sometimes darker reddish brown, ridged or latticed, youngest parts with short brown hairs. **Leaves:** lamina chartaceous, more or less glabrous, sometimes a few scattered hairs at the base of the midrib both above and beneath, drying grey-green-brown, darker above, narrowly oblong-elliptic, lanceolate or oblanceolate, 10–21.5 × 2.5–6 cm, base acute, apex acuminate, sometimes prolonged to 2.5 cm, midrib slightly sunken above, prominent beneath, lateral veins more or less flush above, slightly raised beneath, 8–10 pairs; petiole 4–6 mm long, 1–2 mm thick, drying blackish with scattered hairs. **Inflorescences** cauliflorous or ramiflorous, inflorescence axis much branched, to 1 cm diam. basally. **Flowers** with pedicels to 3 cm long, 1 mm thick, drying black or dark brown, glabrous; medial bract ovate, c. 2 × 2 mm, apex acute, a few scattered hairs outside, glabrous within; sepals acute-triangular, c. 6 × 6 mm, very slightly connate at base, drying black or dark brown, with very short pale brown hairs, densest near apex on both surfaces; outer petals linear-lanceolate, c. 25 × 5 mm; inner petals linear-obovate, c. 3 mm wide near base, 5 mm wide apically; stamens many; carpels many. **Fruit** with pedicels to 5 mm thick; monocarps to 40 or more, irregularly ellipsoidal, to 50 × 25 mm, drying black or dark brown, glabrous, surface irregularly wrinkled, apex extended to a straightish, blunt-ended beak, stipe short in relation to the seed-bearing portion, to 6 mm long, 3 mm diam. **Seeds** 1 per monocarp.

Distribution. Peninsular Malaysia and Borneo. In Singapore, known from Bukit Timah (*Henderson SFN 35906*, 30 Sep 1938, SING [SING0003291]; *Ho et al. SING2016-096*, 26 Apr 2016, SING [SING0236453]), MacRitchie (*Ng YK2007-07*, 27 Nov 2007, KEP, SING [SING0079275]), Seletar (*Wee W 360*, 12 Feb 1962, SINU [SING0354879]) and Upper Peirce (*Tan et al. NRS 1311*, 12 Jun 1992, SINU [SING0354883]).

Ecology. Lowland forest, including freshwater swamp forest.

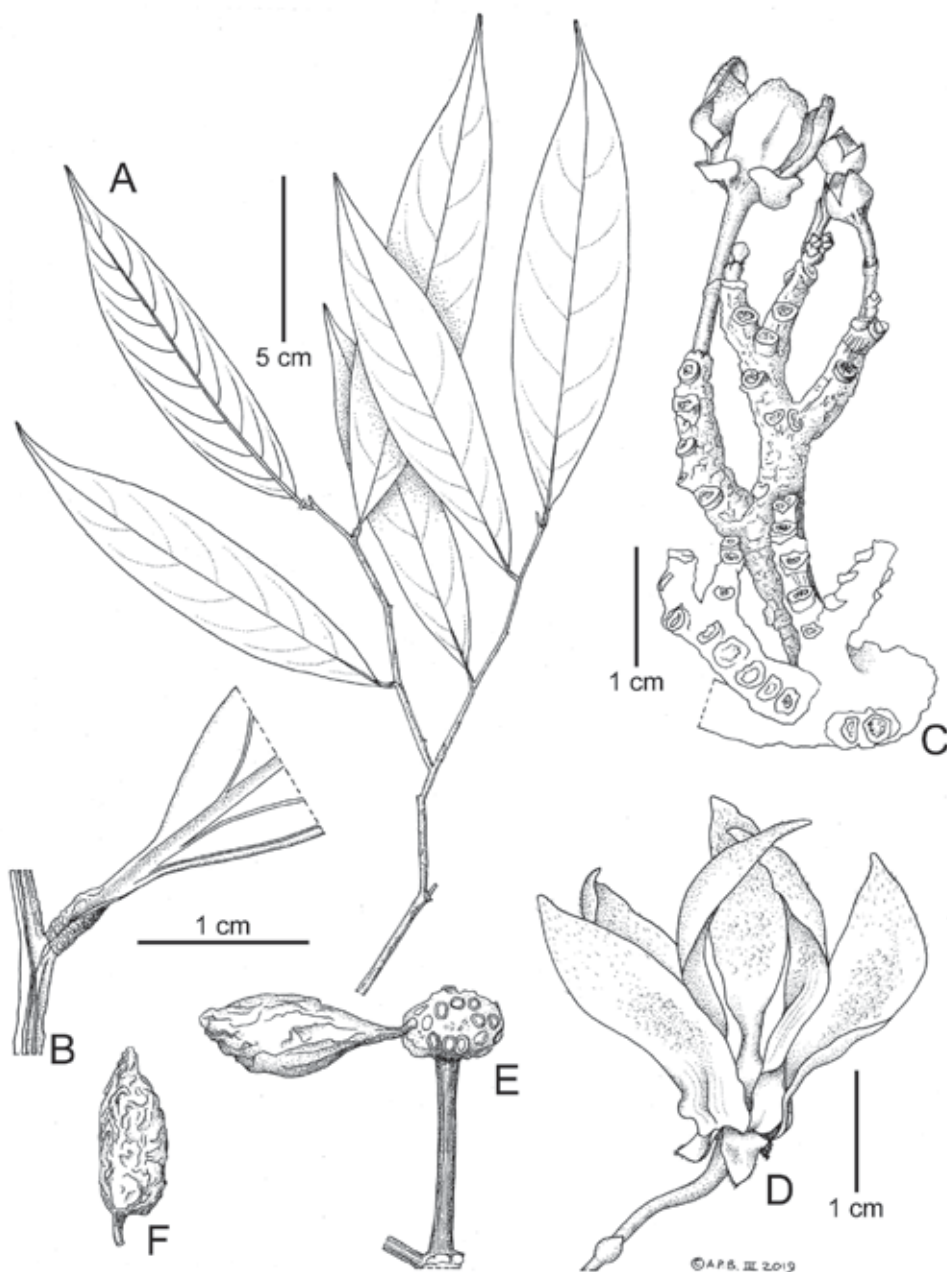


Figure 57. *Monoon borneense* (H.Okada) B.Xue & R.M.K.Saunders. **A.** Habit of leafy shoot. **B.** Section of twig with section of leaf (upper surface). **C.** Part of inflorescence showing developing flowers. **D.** Flower. **E.** Infructescence with all but one monocarp detached. **F.** Monocarp. (A–F from Peninsular Malaysia, A, B & D, *Aniff* 15550; C & F, *Corner SFN* 26168; E, *King's Collector* 4279. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 58. *Monoon borneense* (H.Okada) B.Xue & R.M.K.Saunders. **A.** Habit. **B.** Trunk with cauliflorous inflorescence. **C.** Flowers in different stages of maturity. Inset: Close-up of flower centre. **D.** Fruit. (A–C including inset from Singapore, Bukit Timah, *Ho et al. SING2016-096*; D from Thailand. Photos: A–C, P.K.F. Leong; C inset, J. Chen; D, C. Leeratiwong, reproduced with kind permission).

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

3. *Monoon hookerianum* (King) B.Xue & R.M.K.Saunders

(Joseph Dalton Hooker, 1817–1911, English botanist, explorer and Director of the Royal Botanic Gardens Kew)

Taxon 61 (2012) 1032; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 113; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 9; Turner, Gard. Bull. Singapore 70 (2018) 600; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 146; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 206. **Basionym:** *Polyalthia hookeriana* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 57; Ridley, Fl. Malay Penins. 1 (1922) 58; Sinclair, Gard. Bull. Singapore 14(2) (1955) 312; Kochummen, Tree Fl. Malaya 1 (1972) 87; Keng, Gard. Bull. Singapore 27 (1974) 73; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 118; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 210; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 206, 287. **Type:** *King’s Collector 5550*, [Malaysia], Perak, February 1884 (lectotype K [K000691563], designated by Turner, Phytotaxa 36 (2011) 72; isoelectotypes CAL [CAL0000004353, CAL0000004354, CAL0000004366], P [P00601064]). **Fig. 59.**

Small trees. **Twigs** drying dark grey-brown longitudinally wrinkled, youngest parts with dense pale brown tomentum. **Leaves:** lamina chartaceous, hairy on major veins above and beneath, becoming glabrous above with age, elliptic to obovate, often narrowly rectangular, 7.5–22.5 × 2.5–9.5 cm, base cuneate, apex acuminate, midrib sunken above in dry leaves, prominent beneath, lateral veins more or less flush above, raised beneath, 8–12 pairs; petiole 5–9 mm long, 1.5–2 mm thick, drying black, pale brown hairy. **Inflorescences** few-flowered on short axes with limited branching, mostly arising from behind leaves. **Flowers** with pedicels 15–20 mm long, 2 mm thick, densely brown hairy; medial bract ovate, c. 2 × 2 mm, outside brown hairy, glabrous within, drying black; sepals ovate, c. 4 × 3 mm, densely brown hairy outside, inside glabrous except at margins; outer petals ovate-lanceolate, c. 30 × 12 mm, drying black with scattered pale hairs outside, dense near base, more or less glabrous inside; inner petals similar to outer, sometimes narrower; stamens many, c. 1.5 mm long, drying dark brown; carpels many, densely packed. **Fruit** with pedicels to 5 cm long, 2 mm thick, widening distally; monocarps to 25 or more, ellipsoidal, to 30 × 20 mm, drying black or very dark brown, surface smooth, very slightly apiculate, glabrous at maturity, stipe longer than seed-bearing portion, to 45 mm long, 2 mm wide, finely longitudinally wrinkled. **Seeds** 1 per monocarp, drying brown with a circumferential groove.

Distribution. Peninsular Malaysia and Borneo. In Singapore, known from a single collection from Bukit Timah (*Sinclair SFN 39149*, 10 Mar 1951, SING [SING0003279]).

Ecology. Lowland forest.

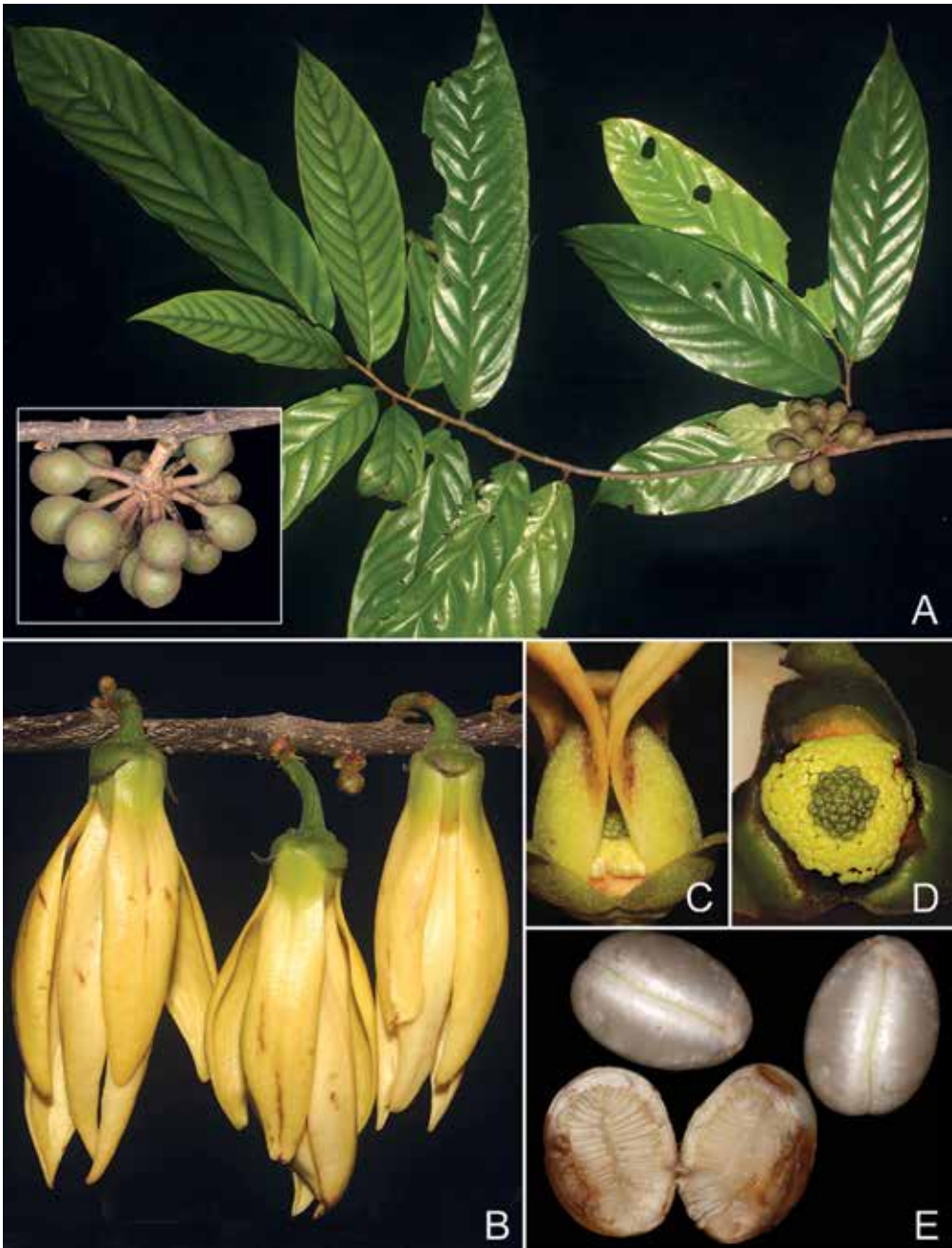


Figure 59. *Monoon hookerianum* (King) B.Xue & R.M.K.Saunders. **A.** Leafy branch with fruit. Inset: Close-up of fruit. **B.** Flowers. **C.** Flower after removal of 3 outer petals. **D.** Flower centre showing stigmas and anthers after corolla removed. **E.** Immature seeds with one cut to show rumiations in endosperm. (A–E including inset from Singapore, cultivated in Singapore Botanic Gardens. Photos: X.Y. Ng).

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Nationally Extinct (NEx) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Vernacular names. *Mempisang, sinai* (NParks' Flora & Fauna Web, 2026).

Note. Although Wong et al. (Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 206, 287) recorded the species for Nee Soon Freshwater Swamp Forest, there is no specimen evidence to support this.

4. *Monoon lateriflorum* (Blume) Miq.

(Latin, *lateri-* = at the side, lateral to, *flos* = flower; with lateral flowers)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19; Xue et al., Taxon 61 (2012) 1039; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 116; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 9; Turner, Gard. Bull. Singapore 70 (2018) 601; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 147; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 208, fig. 42. **Basionym:** *Guatteria lateriflora* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 20. **Synonyms:** *Polyalthia lateriflora* (Blume) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43(2) (1874) 52; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 58; Ridley, Fl. Malay Penins. 1 (1922) 59; Sinclair, Gard. Bull. Singapore 14(2) (1955) 310; Kochummen, Tree Fl. Malaya 1 (1972) 88; Keng, Gard. Bull. Singapore 27 (1974) 73; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 118; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 165; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 210; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 207, 287. – *Polyalthia lateriflora* (Blume) Kurz var. *typica* Boerl., Icon. Bogor. 1, fasc. 2 (1899) 105, nom. inval. **Type:** *Collector unknown s.n.*, [Indonesia], Java (lectotype L [L0188880], designated by Turner, Phytotaxa 36 (2011) 74). **Fig. 60.**

Guatteria pondok Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 380. **Synonym:** *Polyalthia pondok* (Miq.) Boerl., Icon. Bogor. 1, fasc. 2 (1899) 107. **Type:** *Diepenhorst s.n.* [Herb. Bogor. no. 2211], [Indonesia], Sumatra, Priaman (holotype U [U0006299]).

Polyalthia lateriflora (Blume) Kurz var. *elongata* Boerl., Meded. Lands Plantentuin 19 [Versl. Minahasa] (1898) 338. **Type:** *Koorders 17523β*, Indonesia, Celebes [Sulawesi], Minahassa (lectotype L [L0038122], designated by Turner, Gard. Bull. Singapore 70 (2018) 602).

Polyalthia lateriflora (Blume) Kurz var. *kallak* Boerl., Cat. Pl. Phan. 1 (1899) 19. **Type:** Indonesia, Java, cult. in Hort. Bot. Bogor. sub IV.H.42 and X.F.8 (not traced).

Polyalthia lateriflora (Blume) Kurz var. *macrophylla* Boerl., Cat. Pl. Phan. 1 (1899) 19. **Type:** Indonesia, Java, cult. in Hort. Bot. Bogor. sub IV.H.59 and X.F.22 (not traced).

Polyalthia lateriflora (Blume) Kurz var. *siamensis* Boerl., Cat. Pl. Phan. 1 (1899) 19. **Type:** Indonesia, Java, cult. in Hort. Bot. Bogor. sub IV.G.47 and X.F.10 (not traced).



Figure 60. *Monoon lateriflorum* (Blume) Miq. **A.** Leaves and fruit. **B.** Fruit. **C.** Seeds. **D.** Seedlings germinated for species re-introduction. (A–D from Singapore, Mandai, *Ng et al. SING2013-209*. Photos: X.Y. Ng).

Polyalthia lateriflora (Blume) Kurz var. *ramuliflora* Boerl., Icon. Bogor. 1, fasc. 2 (1899) 107. **Type:** *Collector unknown s.n.*, locality unknown [possibly from Java] (not traced).

Large trees. **Twigs** drying grey-brown, latticed, younger twigs generally darker and glabrous except perhaps for the very youngest parts. **Leaves:** lamina chartaceous to subcoriaceous, more or less glabrous, drying brown, often more olive-brown beneath, oblong-elliptic, lanceolate, oblanceolate or obovate, 14–42 × 5–20 cm, base cuneate, truncate, rounded to subcordate, apex shortly acuminate, midrib slightly sunken above, prominent beneath, lateral veins flush above, slightly raised beneath, 14–15 pairs; petiole c. 10 mm long, 2–5 mm thick. **Inflorescences** as fascicles of flowers on twigs and branches behind leaves. **Flowers** with pedicels to 6 cm long, c. 1 mm thick, drying brown, longitudinally striate, glabrous to sparsely hairy; medial bract ovate, c. 3 × 2 mm, hairy outside, glabrous inside; sepals, thin-textured, sometimes reflexing, ovate, c. 3 × 2 mm, brown hairy outside, more or less glabrous within; petals yellow at anthesis, drying red-brown to black, narrowly oblanceolate, to 65 × 9 mm; inner petals slightly longer and wider; stamens many, c. 1 mm long; carpels many. **Fruit** with pedicels to 6 mm thick; monocarps to 30 or more, ellipsoidal-oblong, c. 25 × 20 mm, apex rounded, drying red-brown to blackish, glabrous, stipe to 30–60 mm long, 2 mm thick. **Seeds** 1 per monocarp.

Distribution. Continental Southeast Asia to Sulawesi. In Singapore, known from Nee Soon (*Sinclair SFN 40375*, 25 Sep 1954, SING [SING0003284]; *Vijayakumar SING2014-098*, 20 Mar 2014, SING [SING0205518]; *Ng SING2017-425*, 14 Aug 2017, SING [SING0258958]) and Mandai (*Corner SFN 33141*, 2 Feb 1937, SING [SING0003286]; *Ng et al. SING2013-209*, 17 Sep 2013, SING [SING0200459]).

Ecology. Lowland forest, including freshwater swamp forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Taxonomy. *Monoon lateriflorum* is a variable species, leading Boerlage, in particular, to describe a number of different varieties under *Polyalthia lateriflora*. They are all included as synonyms here. The Singapore plant seems to be a species of the swamp forest. It has rather narrower leaves than is usual, and vegetatively appears to come close to *Monoon sclerophyllum* (Hook.f. & Thomson) B.Xue & R.M.K.Saunders.

5. *Monoon sclerophyllum* (Hook.f. & Thomson) B.Xue & R.M.K.Saunders

(Greek, *sclero*- = hard, *phyllon* = leaf; sclerophyllous, tough-leaved)

Taxon 61 (2012) 1033; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 11; Turner, Gard. Bull. Singapore 70 (2018) 608; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 147; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 217, pl. 26: E. **Basionym:** *Polyalthia sclerophylla* Hook.f. &

Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 65; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 59; Ridley, Fl. Malay Penins. 1 (1922) 58; Sinclair, Gard. Bull. Singapore 14(2) (1955) 311; Kochummen, Tree Fl. Malaya 1 (1972) 87; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 119; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 104, 210. **Type:** *Maingay 1340* [Kew Distribution 101], [Malaysia], Malacca [Melaka], 9 May 1867 (lectotype K [K000691575, K000691576 – a single specimen over 2 sheets], designated by Turner & Utteridge, Eur. J. Taxon. 183 (2016) 11). **Fig. 61.**

Polyalthia purpurea Ridl., J. Straits Branch Roy. Asiat. Soc. 82 (1920) 168. **Type:** *Ridley 12014*, Singapore, cultivated in Singapore Botanic Gardens, June 1904 (lectotype K [K000691573], designated by Turner, Gard. Bull. Singapore 64 (2012) 242; isolectotype SING [SING0219032]).

Trees. **Twigs** drying brown or grey-brown, young twigs quite prominently ridged, older twigs more shallowly latticed, only very youngest parts with scattered pale hairs, otherwise glabrous. **Leaves:** lamina chartaceous to subcoriaceous, looking more leathery than they feel due to a rather waxy, shiny appearance, glabrous, drying brown, generally darker above, lanceolate or ovate-lanceolate, 10–19.5 × 2.5–6.5, base rounded, obtuse or acute, apex shortly acuminate, midrib slightly sunken above in dry leaves, prominent beneath, lateral veins more or less flush above, raised beneath, 9–13 pairs, rather fine, with tertiary venation relatively prominent and raised on both surfaces in dry leaves; petiole 5–12 mm long, 1–2 mm thick, drying brown or blackish, glabrous. **Inflorescences** ramiflorous, few-flowered, borne on short axes, 5–7 mm long. **Flowers** with pedicels 1.5–4.5 cm long, 1 mm diam., sometimes widening distally, drying brown and finely longitudinally wrinkled, often with a fine covering of very short pale hairs, medial bract ovate, c. 2 × 1 mm, hairy outside, glabrous within; sepals rather thin, broadly ovate, 3–4 × 6 mm, brown hairy outside, glabrous within, drying brown; outer petals oblong-lanceolate, to 45 × 10 mm, drying dark brown, with scattered, short, more or less adpressed pale hairs outside, inside more densely curly hairy, inner petals narrower than outer, 5–6 mm wide; stamens many, c. 1 mm long; carpels many. **Fruit** with pedicels to 7 mm thick; monocarps many (at least 40), cylindrical or ellipsoidal, 30–35 × 15–20 mm, glabrous, drying dark brown or blackish, relatively smooth, apex obtuse with a scarcely discernible short broad apiculus, stipe to 60 mm long, 2 mm thick. **Seeds** 1 per monocarp, drying pale golden brown with an irregular circumferential groove.

Distribution. Peninsular Malaysia. In Singapore, known from Singapore Botanic Gardens Rain Forest (*Chua et al. D 113*, 1992, SING [SING0007115]), Mandai Road (*Kiah s.n.*, 20 Aug 1940, SING [SING0200139]), Nee Soon (*Chong et al. NSSF 2-Q308aT03*, 9 May 2014, SINU [SING0354971]) and Bukit Timah (*Morawetz 18-26285*, 26 Feb 1985, SING [SING0208797]).

Ecology. Lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

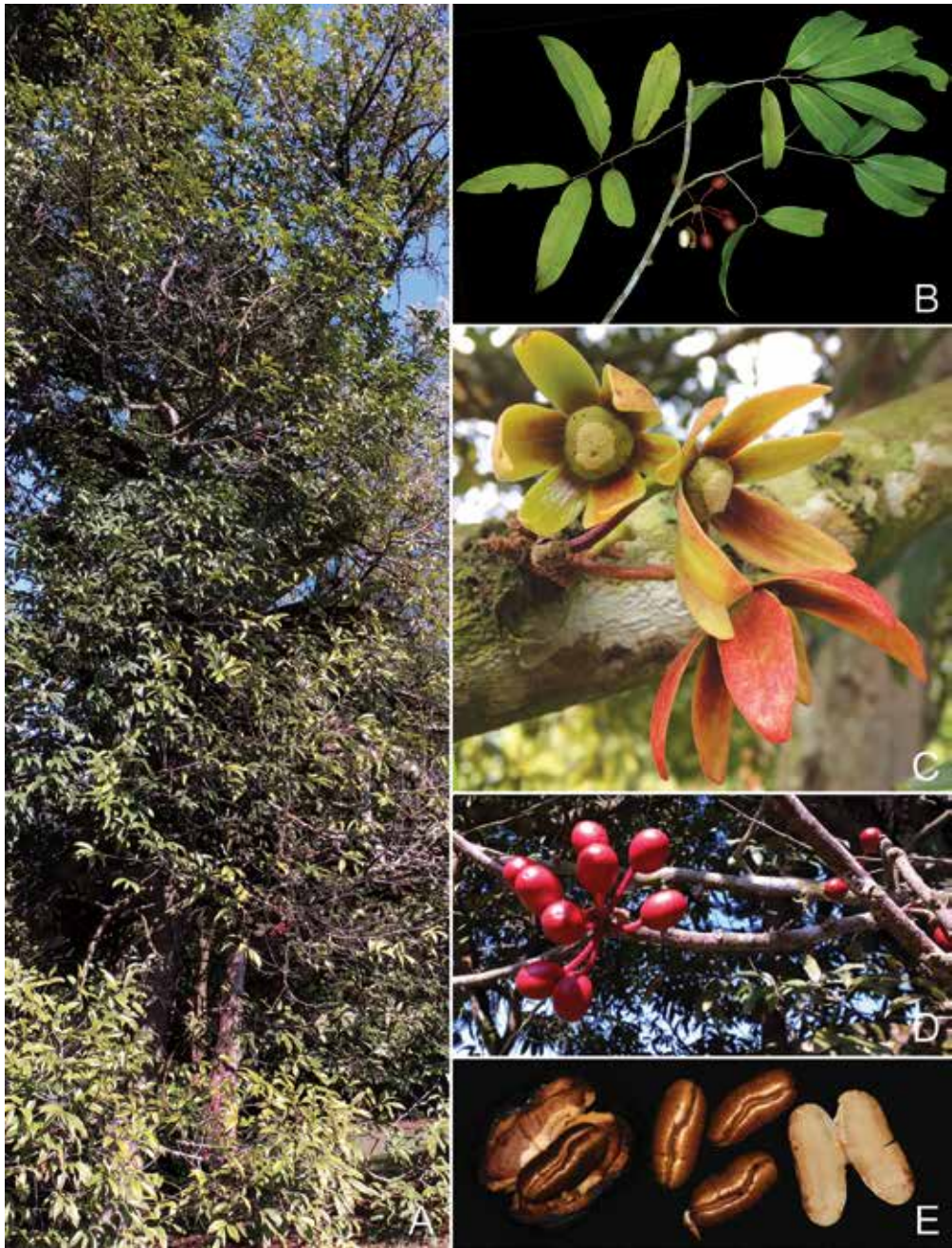


Figure 61. *Monoon sclerophyllum* (Hook.f. & Thomson) B.Xue & R.M.K.Saunders. **A.** Habit. **B.** Leaves and fruit. **C.** Ramiflorous inflorescence. **D.** Fruit. **E.** Seeds. (A–E from Singapore, A, B & D, Singapore Botanic Gardens, *Leong SING2017-397*; C & E, Nee Soon, *Ng SING2017-425*. Photos: A, B & D, P.K.F. Leong; C & E, X.Y. Ng).

22. OROPHEA Blume

(Greek, *orophe* = roof, ceiling; referring to the petals covering the reproductive structures)

Bijdr. Fl. Ned. Ind., pt 1 (1825) 18; Ridley, Fl. Malay Penins. 1 (1922) 69; Sinclair, Gard. Bull. Singapore 14(2) (1955) 390; Kessler, Blumea 33 (1988) 1, 34 (1990) 505; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 122; Leonardia & Kessler, Blumea 46 (2001) 141; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 125; Damthongdee & Chaowasku in Johnson & Murray, Fl. Thailand 16(1) (2022) 224. **Type:** *Orophea hexandra* Blume, lectotype designated by Fries in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 17a(2) (1959) 130.

Mezzettiopsis Ridl., Bull. Misc. Inform. Kew 1912 (1912) 389; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 122. **Type:** *Mezzettiopsis creaghii* Ridl. (= *Orophea creaghii* (Ridl.) Leonardia & Kessler).

Small evergreen trees. **Inflorescences** axillary or supra-axillary, few- to many-flowered fascicles or cymes. **Flowers** bisexual, typically small; sepals 3, valvate, free or basally connate, shorter than petals; petals valvate, two whorls of 3, outer shorter than inner petals, inner petals clawed, often mitriform, blades forming dome over reproductive structures, inner surface often with nectar glands; stamens 3, 6, 9 or 12, clavate, connectives generally not prolonged apically, staminodes 0, 3, 6 or 9; carpels 3, 6, 9, 12 or 18, ovules 1 to several, lateral, in 1 row. **Fruit** cylindrical (and sometimes moniliform), ellipsoidal or globose, stipitate or more rarely sessile, pericarp thin. **Seeds** 1–8 per monocarp, globose, hemispherical or cylindrical, smooth or pitted, drying wrinkled, exarillate; endosperm ruminations spiniform.

Distribution. A genus of about 60 species in India, Sri Lanka, China, continental Southeast Asia and through Malesia to the Philippines and the Moluccas. In Singapore, 1 native species.

Ecology. Lowland forest.

Orophea hastata King

(Latin, *hastatus* = spear-shaped; referring to the limb of the inner petals)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 83; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 71; Sinclair, Gard. Bull. Singapore 14(2) (1955) 397; Kochummen, Tree Fl. Malaya 1 (1972) 83; Kessler, Blumea 33 (1988) 68; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 116; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 65, 103, 195; Turner, Gard. Bull. Singapore 70 (2018) 618; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 147; Thomas et al., Nat. Singapore 16 e2023001, 4. **Type:** *King’s Collector 7323*, [Malaysia], Perak, Larut, March 1885 (lectotype K [K000574783], designated by Leonardia & Kessler, Blumea 46 (2001) 152; isolectotypes BM [BM000547322], CAL [CAL0000004643, CAL0000004644, CAL0000004645], G [G00237992], L [L0047804], LE [LE00012513]). **Fig. 62.**

Orophea sp.: LaFrankie et al., Forest Trees Bukit Timah (2005) 164.

Small trees to 13 m tall. **Twigs** drying dark, glossy, longitudinally wrinkled and more or less glabrous, youngest parts more finely wrinkled, paler with sparse brown straightish hairs. **Leaves:** lamina chartaceous to subcoriaceous, glabrous above, with long straight adpressed

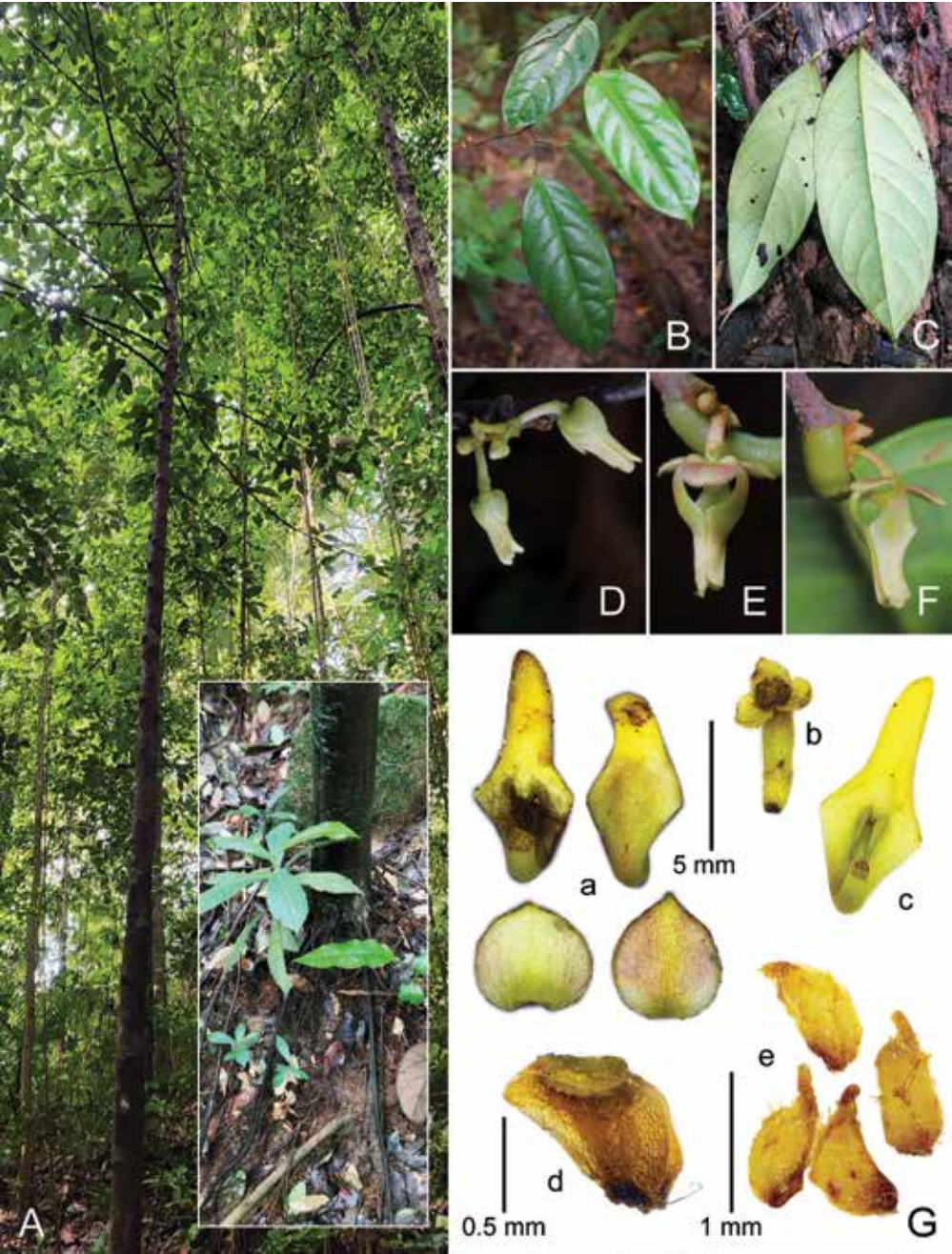


Figure 62. *Orophea hastata* King. **A.** Habit. Inset: Stem base. **B.** Leaves (upper surface). **C.** Leaves (lower surface). **D.** Inflorescence. **E.–F.** Flower (side view). **G.** a. Petals (lower: outer petals, upper: inner petals). b. Pedicel, calyx and sepals. c. Inner petals with nectaries on adaxial surface. d. Stamen (side view). e. Ovaries. (A–G including inset from Singapore, Bukit Timah, *Thomas & Niissalo 3496*. Photos: A, A inset, B, C & G, D.C. Thomas; D–F, M.A. Niissalo).

brown hairs along midrib beneath, drying brown, grey-brown or grey, slightly shiny above, frequently with contrasting straw-coloured venation beneath, elliptic, more rarely ovate, 7–22 × 3–9.9 cm, base obtuse to rounded, apex bluntly acuminate, midrib slightly sunken above in dry leaves, prominent and more or less rounded beneath, lateral veins flush to very slightly raised above, raised beneath, 6–7 pairs, sometimes shortly decurrent to midrib, arching forward and looping within margin, tertiary venation subscalariform to reticulate; petiole 2–7 mm long, 1–2 mm wide, channelled above, drying brown, with ascending long, straight brown hairs. **Inflorescences** in leaf axils, c. 1.5 cm long, bearing a few flowers, axis covered in ascending, more or less straight, golden brown hairs. **Flowers** with pedicels 1.5–3 mm long, 0.5 mm wide basally, widening distally, drying dark brown with many ascending adpressed golden brown hairs; sepals ovate-triangular, c. 1 × 1.5 mm, relatively thick, with short adpressed golden brown hairs outside, glabrous within; outer petals yellowish or yellowish tinged with red, broadly ovate, 2–4 × 2.5–5 mm, with scattered adpressed golden brown hairs outside and a dense marginal fringe, glabrous within; inner petals yellowish, clawed, hastate, claw 2–3 mm long, 0.5 mm wide, limb long acute-triangular, c. 5–9 mm long, 2–4 mm wide, apex long acute, drying dark brown with very short pale hairs on margins and paired glands in slits adaxially; stamens 9 in two whorls (6 + 3); carpels 12(–16). **Fruit** with pedicels c. 10 mm long, to 2 mm wide; monocarps to 6, globose, c. 15 mm diam., drying red-brown, rather shiny, stipe 2–4 mm long, 1–1.5 mm wide. **Seeds** 1 per monocarp.

Distribution. Peninsular Malaysia. In Singapore, known only from Bukit Timah (*Ridley 8119*, Oct 1896, SING [SING0044222]; *Niissalo SING2022-1095*, 1 Dec 2022, SING [SING0389138]; *Thomas & Niissalo 3496*, 6 Dec 2022, SING [SING0389687]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

23. PHAEANTHUS Hook.f. & Thomson

(Greek, *phaios* = dark, dusky, *anthos* = flower; referring to the flowers which dry a dark colour)

Fl. Ind. 1 (1855) 146; Ridley, Fl. Malay Penins. 1 (1922) 95; Sinclair, Gard. Bull. Singapore 14(2) (1955) 373; Kochummen, Tree Fl. Malaya 1 (1972) 84; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 121; Mols & Kessler, Blumea 45 (2000) 205; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 136; Leeratiwong & Sattaporn in Johnson & Murray, Fl. Thailand 16(1) (2022) 233. **Type:** *Phaeanthus nutans* Hook.f. & Thomson, nom. illeg. superfl. (= *Phaeanthus ophthalmicus* (Roxb. ex G.Don) J.Sinclair).

Evergreen treelets or trees to 25 m tall. **Leaves** membranous to chartaceous, often drying black and shiny. **Inflorescences** extra-axillary, occasionally terminal, cymose, short peduncled, 1–4-flowered. **Flowers** bisexual; sepals 3, valvate, free or shortly connate at base, triangular, apex acute; outer petals valvate, similar to sepals, much smaller than inner petals, sepals and

outer petals often persisting in fruit; inner petals 3, valvate, fleshy, base sometimes saccate, drying dark, triangular; stamens numerous, truncate; carpels many, cylindrical, style short or absent, stigma ellipsoid to clavate, ovules 1, or rarely 2, per carpel, lateral. **Fruit** with many, globose to ellipsoidal monocarps, drying black or dark brown, apiculate, stipitate, thin-walled. **Seeds** 1 or rarely 2 per monocarp, smooth or wrinkled, often with a longitudinal groove, exarillate; endosperm ruminations lamellate.

Distribution. A genus of 8 species from continental Southeast Asia and Malesia to New Guinea. In Singapore, 2 native species.

Ecology. Lowland forest.

Uses. Species of *Phaeanthus* are used in traditional medicines for eye complaints.

Key to *Phaeanthus* species

1. Leaves and twigs more or less hairy; leaves not drying shiny above; sepals 6 mm or more long; inner petals with 3–5 distinct veins; mature monocarps to 14 mm long **1. *P. intermedius***
 Leaves and twigs more or less glabrous; leaves drying shiny above; sepals c. 1 mm long; inner petals lacking distinct veins; mature monocarps more than 20 mm long **2. *P. splendens***

1. *Phaeanthus intermedius* (P.Parm.) I.M.Turner & Veldkamp

(Latin, *intermedius* = intermediate; referring to the petiole anatomy
 intermediate between *Magnolia* L. and *Illicium* L.)

Kew Bull. 66 (2012 [‘2011’]) 577; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 199, 286; Turner, Gard. Bull. Singapore 70 (2018) 628; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 148; Leeratiwong & Satthaporn in Johnson & Murray, Fl. Thailand 16(1) (2022) 233. **Basionym:** *Magnolia intermedia* P.Parm., Bull. Sci. France Belgique 27(2) (1896) 204, 266, 325, 333, pl. 10: fig. 27. **Type:** *Collector unknown* [Ralph] *s.n.*, India [probably an error] (holotype P [P01960440]). **Fig. 63, 64.**

Phaeanthus nutans auct. non Hook.f. & Thomson: Hooker & Thomson, Fl. Ind. 1 (1855) 147, p.p.; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 51; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 122; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 95; Mols & Kessler, Blumea 45 (2000) 221.

Phaeanthus ophthalmicus auct. non (Roxb. ex G.Don) J.Sinclair: Sinclair, Gard. Bull. Singapore 14(2) (1955) 374; Kochummen, Tree Fl. Malaya 1 (1972) 84; Keng, Gard. Bull. Singapore 27 (1974) 73; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13, fig. 10.9; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 116; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Lee et al., Gard.

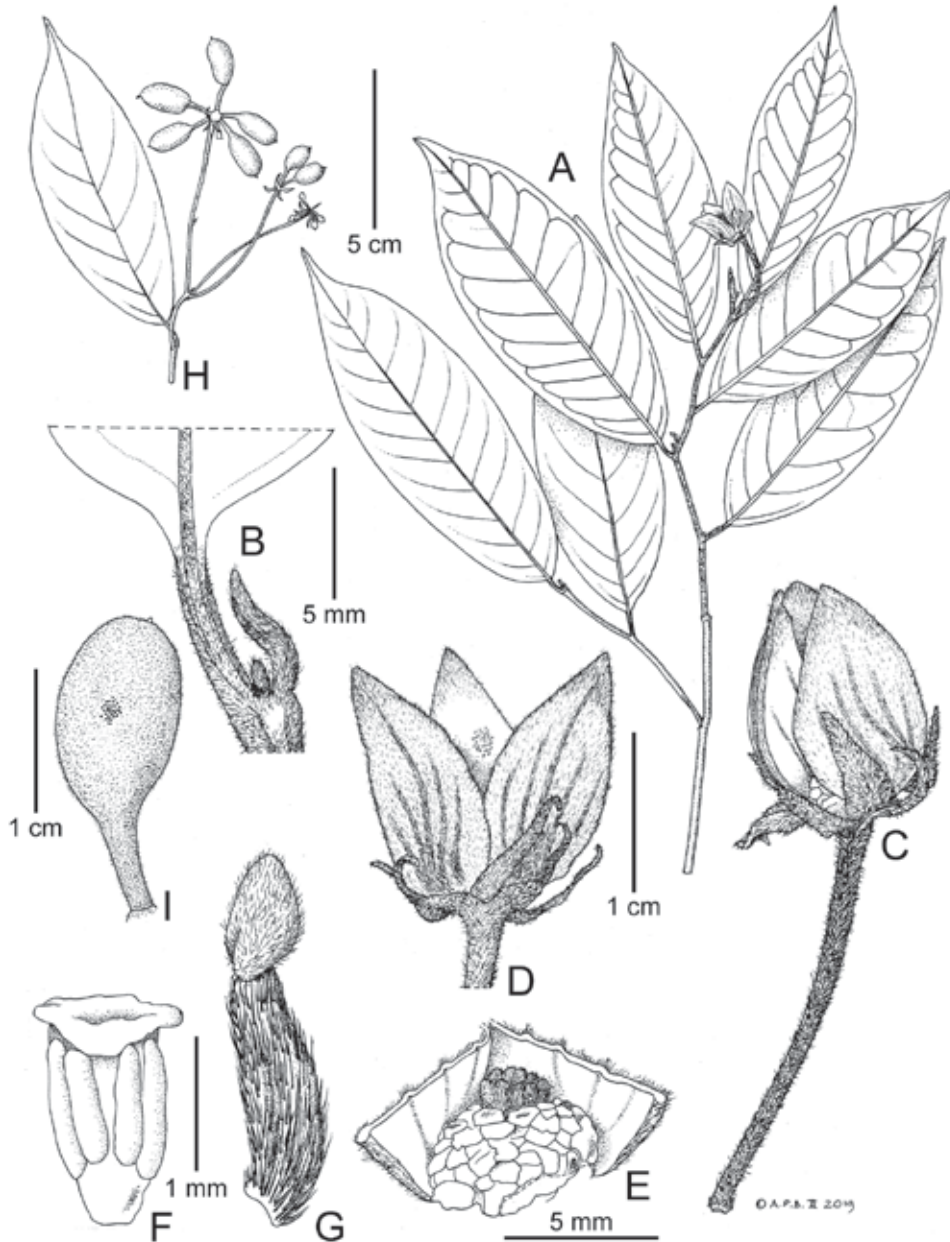


Figure 63. *Phaeanthus intermedius* (P.Parm.) I.M. Turner & Veldkamp. **A.** Habit of flowering shoot. **B.** Shoot apex with section of leaf (upper surface). **C.** Flower before anthesis. **D.** Flower at anthesis, only top of pedicel shown. **E.** Flower (interior view), inner petals excised just above base. **F.** Stamen. **G.** Carpel. **H.** Shoot with attached infructescences in different stages of development. **I.** Mature monocarp. (A–I from Peninsular Malaysia, A–G, *Griffith s.n.*; H & I, *Anon. For. Dept. FMS 50874*. Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).

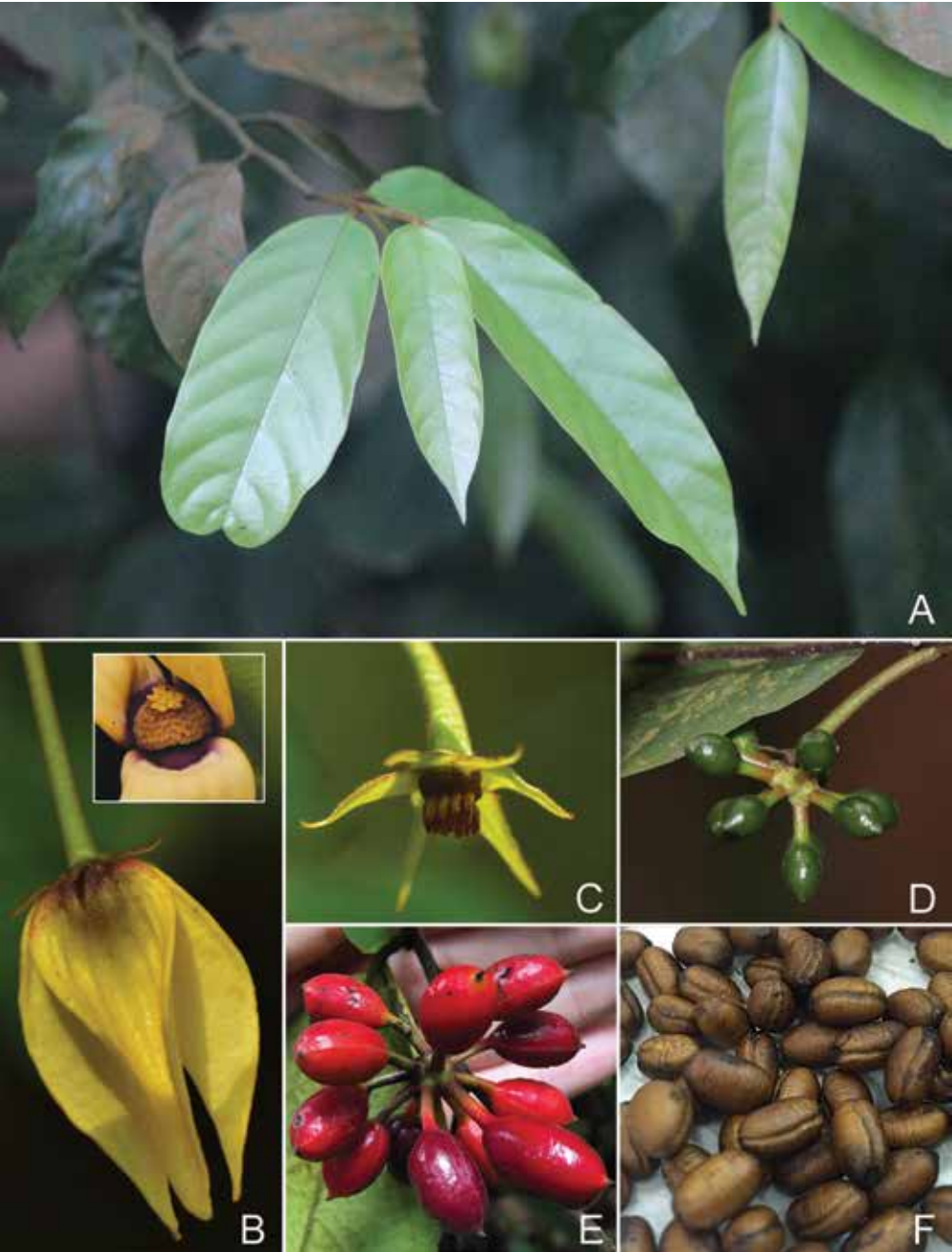


Figure 64. *Phaeanthus intermedius* (P.Parm.) I.M.Turner & Veldkamp. **A.** Leaves. **B.** Flower. Inset: Flower centre, showing stamens and stigmas. **C.** Developing fruit. **D.** Immature fruit. **E.** Mature fruit. **F.** Seeds. (A–F including inset from Singapore, A–F, MacRitchie; B inset, Mandai, Hassan Ibrahim & Lua SING2015-244. Photos: A–F, X.Y. Ng; B inset, P.K.F. Leong).

Bull. Singapore 55 (2003) 291; LaFrankie et al., Forest Trees Bukit Timah (2005) 60, 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 68, 103, 223.

Trees. **Twigs** drying pale grey or dark brown, longitudinally striate, young parts densely brown or more commonly red-brown hairy, hairs short, more or less erect. **Leaves:** lamina chartaceous, usually with a fringe of hairs along midrib above, scattered on lamina surface, beneath more generally hairy, but quite variable, from sparse to dense, drying dark brown to blackish, similar shade above and beneath, though sometimes with a silvery wash above, ovate, elliptic, ovate-lanceolate or obovate, $6\text{--}21 \times 1.5\text{--}7$ cm, base obtuse, apex acuminate, midrib slightly sunken above, prominent beneath, lateral veins more or less flush above, slightly raised beneath, 9–15 pairs, arching forward and looping within margin; petiole 6–12 mm long, 1–1.5 mm thick, densely hairy. **Inflorescences** subopposite leaves, several-flowered, though apparently only one developed flower at a time, on very short peduncle to 2 mm long. **Flowers** with pedicels to 10 cm long, more typically 2–4 cm, c. 1 mm thick, widening slightly distally, densely covered in brown or red-brown hairs; medial bract linear acute, to 4 mm long, near base of pedicel; sepals thin-textured, ovate-lanceolate, $6\text{--}7 \times 3$ mm, drying blackish, hairy on both surfaces; outer petals very like sepals, but slightly narrower at base, c. 2 mm; inner petals ovate, $13\text{--}25 \times 9\text{--}13$ mm, drying black, outside densely short hairy, inside more sparsely hairy, 3–5 veins radiating from base, raised ridges externally, grooved within; stamens many; carpels many. **Fruit** with pedicels 2(–10) cm long, c. 1.5 mm thick, sepals and sometimes outer petals persisting in fruit; monocarps to 20 or more, ellipsoidal, $13\text{--}14 \times 8\text{--}9$ mm, apex apiculate, surface minutely pimpled, stipe to 17 mm long, c. 1 mm wide, irregularly longitudinally grooved. **Seeds** 1 per monocarp.

Distribution. Peninsular Malaysia and Sumatra. In Singapore, known from Bukit Timah (*Gwee SING2010-022*, 5 Jan 2010, SING [SING0138185]), Nee Soon (*Yeo & Ang SING2012-223*, 19 May 2012, SING [SING0176374]), Mandai (*Hassan Ibrahim & Lua SING2015-244*, 2 Sep 2015, SING [SING0225264]) and Pulau Ubin (*Ali Ibrahim et al. SING2012-209*, 5 Jan 2012, SING [SING0174126]).

Ecology. Lowland forest understorey.

Conservation assessment. Globally, Data Deficient (DD) (IUCN Red List, 2026). In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

Taxonomy. The nomenclatural problems associated with the names *Phaeanthus nutans* and *P. ophthalmicus* were clarified by Turner & Veldkamp (Kew Bull. 66 (2011) 571), who discovered that the only legitimate name available for the Malayan plant was Parmentier's very misplaced *Magnolia intermedia*.

2. *Phaeanthus splendens* Miq.

(Latin, *splendens* = splendid, shining; referring to the shiny leaf surfaces)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 40; Mols & Kessler, Blumea 45 (2000) 223; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 138, fig. 30; Turner, Gard. Bull. Singapore 70 (2018) 629; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 148; Leeratiwong & Sathaporn in Johnson & Murray, Fl. Thailand 16(1) (2022) 234, fig. 48, pl. 28: E, F. **Type:** *Korthals s.n.*, [Indonesia], Borneo, Gunung Sakoembang (lectotype L [L0045058], designated by Mols & Kessler, Blumea 45 (2000) 223; isoelectotypes A [A00073473], B [B 10 0365044], L [L0045059], U [U0008087]). **Fig. 65.**

Phaeanthus crassipetalus Becc., Nuovo Giorn. Bot. Ital. 3 (1871) 191; Sinclair, Gard. Bull. Singapore 14(2) (1955) 376; Kochummen, Tree Fl. Malaya 1 (1972) 84; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 116. **Type:** *Beccari P.B. 2508*, [Malaysia], Borneo, Sarawak (holotype FI-B [FI007566] [Erb. Coll. Becc. no. 393]; isotypes A [A00073469, A00073470], B [B 10 0365043], BO, K [K000574612], M [M0240091], P [P00372671], S).

Phaeanthus lucidus Oliv., Hooker’s Icon. Pl. 16 [ser. 3, 6], fasc. 3 (1887) pl. 1561; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 122; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 96. **Synonym:** *Miliusa lucida* (Oliv.) Finet & Gagnep., Bull. Soc. Bot. France 53(Mém. 4(2)) (1906) 152. **Type:** *Curtis 839*, [Malaysia], Penang, Waterfall, May 1866 (lectotype K [K000574614], designated by Mols & Kessler, Blumea 45 (2000) 223; isoelectotypes K [K000574615], P [P00160892], SING [SING0049728]).

Trees. **Twigs** drying brown or grey-brown, latticed, sometimes with pale lenticels, youngest parts brown hairy, soon lost. **Leaves:** lamina chartaceous, scattering of hairs along midrib above and on veins beneath, glabrous at casual glance, drying brown, grey-brown, dark brown to blackish, ovate, elliptic or obovate, 7–20.5 × 3–7 cm, base obtuse, apex acuminate, midrib slightly sunken above, prominent beneath, lateral veins more or less flush above, slightly raised beneath, 9–13 pairs, looping just within margin, tertiary venation scalariform; petioles 4–9 mm long, 1–2 mm thick, with scattered hairs. **Inflorescences** subopposite leaves, peduncle very short. **Flowers** with pedicels 2–3.5 cm long, c. 1 mm wide, drying blackish but with a sparse to dense covering of short, brown, more or less adpressed hairs; medial bract acute, c. 1–1.5 × 0.5–0.75 mm, hairy outside; sepals tiny, broadly ovate, c. 1 × 1.5–2 mm, apiculate, hairy outside, glabrous within, tending to reflex at anthesis; outer petals similar to sepals, perhaps longer and narrower, c. 1.5 × 1–1.5 mm, hairy outside; inner petals relatively thick, apical portion shallowly triquetrous, at least in bud stage, ovate, c. 11 × 6 mm, drying dark brown or blackish, outside with scattered red-brown hairs, densest near margin, inside smooth and glabrous except for very short grey woolly tomentum in band near margin and apex; stamens many; carpels many. **Fruit** with pedicels c. 1.5 mm thick, drying brown, striate, sparsely red-brown hairy; monocarps to 12 or more, cylindrical 22–25 × 9–10 mm, drying black or dark brown, surface minutely warty, rather dull, apex apiculate, scattered red-brown hairs, stipe to 20 mm long, c. 1.5 mm wide, widening distally. **Seeds** 1 per monocarp.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, the only definite collection is a fairly recent one from Pulau Tekong (*Gwee et al. SING2008-233*, 17 Jun 2008, SING [SING0109174]), though there are some sterile specimens from Pulau Tekong that are probably also *Phaeanthus splendens*.



Figure 65. *Phaeanthus splendens* Miq. **A.** Habit. Inset: Trunk. **B.** Leaves and open flower. Inset: Flower bud. **C.** Immature fruit. Inset: A ripe fruit with a single monocarp. (A–C including insets from Thailand. Photos: C. Leeratiwong, reproduced with kind permission).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

24. POLYALTHIA Blume

(Greek, *poly-* = many, much, *althos* = a cure, something that heals; much used in traditional medicine)

Fl. Javae, fasc. 28–29 (1830) 68; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 62, p.p.; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 49, p.p.; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 62, p.p.; Ridley, Fl. Malay Penins. 1 (1922) 48, p.p.; Sinclair, Gard. Bull. Singapore 14(2) (1955) 279, p.p.; Backer & Bakhuizen van den Brink., Fl. Java (Spermatoph.) 1 (1964) 106, p.p.; Kochummen, Tree Fl. Malaya 1 (1972) 85, p.p.; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 114, p.p.; Turner, Phytotaxa 36 (2011) 68, p.p.; Xue et al., Taxon 61 (2012) 1021; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 141; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 238. **Synonym:** *Unona* L.f. sect. *Polyalthia* (Blume) Baill., Hist. Pl. 1(4) (1868) 213. **Type:** *Polyalthia subcordata* (Blume) Blume, lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 259.

Sphaerotheralamus Hook.f., Trans. Linn. Soc. London 23(1) (1860) 156. **Type:** *Sphaerotheralamus insignis* Hook.f. (= *Polyalthia insignis* (Hook.f.) Airy Shaw).

Haplostichanthus F.Muell., Vict. Naturalist 7 (1891) 180; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 116. **Type:** *Haplostichanthus johnsonii* F.Muell. (= *Polyalthia johnsonii* (F.Muell.) B.Xue & R.M.K.Saunders).

Papualthia Diels, Bot. Jahrb. Syst. 49(1) (1912) 138; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 120. **Type:** *Papualthia pilosa* Diels, lectotype designated by Fries in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 17a(2) (1959) 97 (= *Polyalthia longirostris* (Scheff.) B.Xue & R.M.K.Saunders).

Small evergreen treelets to trees. **Indumentum** comprising simple hairs. **Twigs** glabrous or tomentose, sometimes lenticellate. **Leaves** chartaceous to coriaceous, glabrous or hairy, not white or glaucous beneath; base acute, cuneate, obtuse, rounded or asymmetrically subcordate, cordate to auriculate; midrib furrowed or flush above, prominent beneath; venation brochidodromous, with the lateral veins looping well within (3–5 mm) the margin (though the intramarginal vein may be faint); intercostal venation more or less reticulate. **Inflorescences** ramiflorous or axillary fascicles arising from woody tubercles, 1- to several-flowered. **Flowers** bisexual; perianth whorls valvate; sepals 3, connate or free; petals 6 in two whorls of 3, free to slightly connate at base, not saccate, white, yellow, green, orange or red, not persistent in fruit; outer and inner petals of similar size and shape, blades more or less flat; inner petals smooth or wrinkled, not clawed, bases not tightly pressed over the reproductive structure; stamens many, apex of connective more or less flat; carpels more than 3, generally many more, ovules usually 2–6 in each carpel, lateral, uniseriate. **Fruit** with monocarps few to many, subglobose to ellipsoidal, 5–50 mm long, stipitate or sessile. **Seeds** 1–2 (rarely 3, 4 or 5) per monocarp, ellipsoidal, rarely more than 1 cm long, smooth, with a shallow circumferential groove, exarillate; endosperm spiniform, glass-like in texture.

Distribution. A genus of approximately 90 species from India to Australia. In Singapore, 2 native species.

Ecology. Lowland forest, but some species are found in montane habitats.

Taxonomy. It is now clear that *Polyalthia* was used as a place to put a heterogeneous mix of taxa with fairly unspecialised flowers. In the past decade or so, molecular analyses have led to the genus being reassessed as a false aggregation of disparate elements. In Singapore, many species previously placed in *Polyalthia* have now been moved into *Huberantha*, *Maasia* and *Monoon*, leaving just two species in *Polyalthia*. *Polyalthia* sensu stricto can be recognised by the brochidodromous leaf venation with more or less reticulate tertiary veins, asymmetric and ultimately slightly cordate leaf bases, one to several ovules per carpel, and seeds with glassy endosperm.

Notes. The type of *Polyalthia cinnamomea* Hook.f. & Thomson is a Wallich collection said to be from Singapore but as the species has never been collected again from Singapore, nor southern Johor, it is likely that Wallich confused a Penang collection for one from Singapore and hence the species is not included in this account. The same is true of *Unona cauliflora* Hook.f. & Thomson, a synonym of *Polyalthia cinnamomea*, which was based on a Lobb collection, noted as from Singapore. However, Lobb's localities are notoriously untrustworthy (Middleton & Turner, Fl. Singapore 1 (2019) 32). Similarly, *Polyalthia bullata* King, another distinctive species, was excluded from Singapore by Ridley (J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40), as the Cantley collection that the record was based on was probably wrongly localised.

Key to *Polyalthia* species

1. Flowers confined to leaf-bearing twigs; petals less than 2 mm wide; monocarps with stipes shorter than seed-bearing portion **1. *P. angustissima***
Some flowers arising from trunk and branches, petals at least 8 mm wide; monocarps with stipes longer than seed-bearing portion **2. *P. cauliflora***

1. *Polyalthia angustissima* Ridl.

(Latin, superlative of *angustus* = narrow; referring to the very narrow petals)

J. Straits Branch Roy. Asiat. Soc. 54 (1910) 11; Ridley, Fl. Malay Penins. 1 (1922) 53; Sinclair, Gard. Bull. Singapore 14(2) (1955) 286; Kochummen, Tree Fl. Malaya 1 (1972) 86; Keng, Gard. Bull. Singapore 27 (1974) 73; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 117; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 223; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 13; Turner, Gard. Bull. Singapore 70 (2018) 632; Ho et al.,

Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 148. **Type:** *Ridley 8050*, Singapore, Bukit Timah, February 1896 (lectotype SING [SING0048677], first step designated by Keng, Gard. Bull. Singapore 27 (1974) 73, second step designated by Bunchalee & Chantaranothai, Thai Forest Bull., Bot. 34 (2006) 3; isolectotype CAL [CAL0000220655]). **Fig. 66, 67.**

‘*Unona stenopetala* var.’: Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40.

Small trees. **Twigs** quite fine in leaf-bearing regions, c. 1–1.5 mm diam., drying dark charcoal grey, shallowly latticed, younger parts brown hairy. **Leaves:** lamina chartaceous, sometimes with a fringe of hairs on midrib above, scattered hairs on veins beneath, drying brown or grey above, brown or grey-brown beneath, elliptic to obovate-elliptic, 4–12.5 × 1.5–4.5 cm, base acute to obtuse, slightly asymmetric, apex with a broad acumen, midrib slightly sunken above, raised beneath, lateral veins immersed above, flush to very slightly raised beneath, 9–12 pairs; petiole 2–3 mm long, 1–1.5 mm diam. **Inflorescences** single-flowered, axillary, sometimes appearing terminal. **Flowers** with pedicels c. 4 mm long, 1 mm thick, densely brown hairy; sepals lanceolate-triangular with long sharp point, c. 7 × 2 mm, densely brown hairy outside, glabrous within; petals linear-lanceolate, to 6 cm long, blade c. 1.2 mm wide, outer c. 2 mm wide at base, inner slightly narrower, c. 1.5 mm, drying dark brown to blackish with scattered pale hairs. **Fruit** with pedicels to 2 mm thick; monocarps to 6 or more, rather irregularly ellipsoid in shape, drying brown, minutely pimpled, sparsely pale hairy, to 20 mm long, 9 mm wide, stipe to 3 mm long, 1 mm diam. **Seeds** 2–3 per monocarp.

Distribution. Peninsular Malaysia. In Singapore, known from Singapore Botanic Gardens’ Rain Forest (*Maxwell 82-168*, 15 May 1982, SING [SING0003257]), Bukit Timah (*Morawetz et al. 16-26285*, 26 Feb 1985, SING [SING0036737]), MacRitchie (*Chung & Li SING2014-383*, 25 Nov 2014, SING [SING0212070]) and Upper Seletar (*Chew et al. SING2010-600*, 17 Mar 2010, SING [SING0145661]).

Ecology. Lowland forest.

Conservation assessment. Globally, Data Deficient (DD) (IUCN Red List, 2026). In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

2. *Polyalthia cauliflora* Hook.f. & Thomson

(Latin, *caulis* = stem, *flos* = flower; bearing flowers on the stem)

Fl. Ind. 1 (1855) 138; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 44; Ridley, J. Straits Branch Roy. Asiat. Soc. 75 (1917) 6; Ridley, Fl. Malay Penins. 1 (1922) 51; Sinclair, Gard. Bull. Singapore 14(2) (1955) 292; Kochummen, Tree Fl. Malaya 1 (1972) 86; Keng, Gard. Bull. Singapore 27 (1974) 73; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 13, fig. 10.10; Turner, Gard. Bull. Singapore 45 (1993) 32; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10, as ‘*Polyalthia*’; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 117; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 71, 103, 223; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 9; Wong et al., Checkl. Pl. Sp. Nee

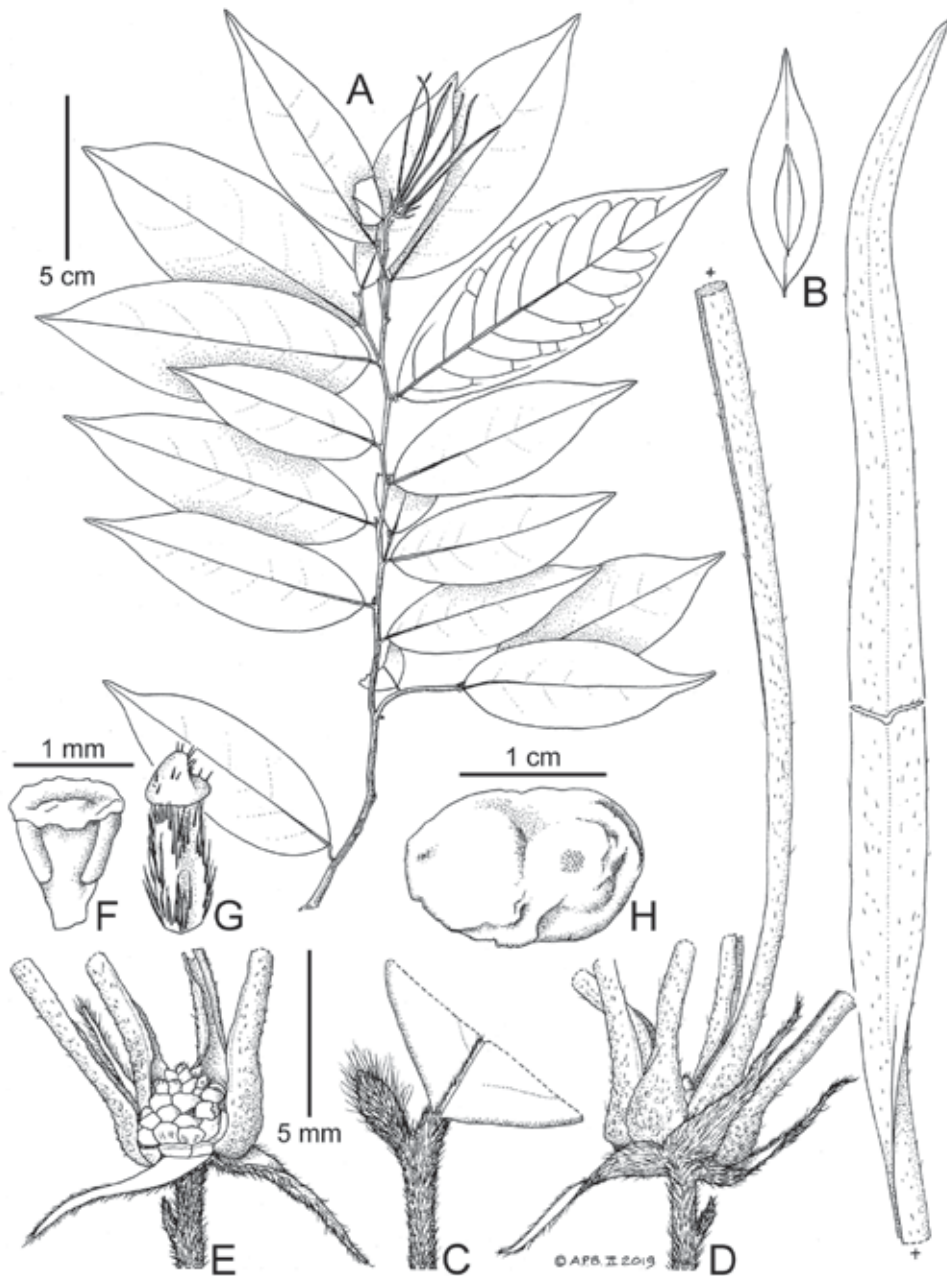


Figure 66. *Polyalthia angustissima* Ridl. **A.** Habit of flowering shoot. **B.** Range in leaf size on a single specimen (same scale as A). **C.** Shoot apex with attached section of leaf (upper surface). **D.** Flower with all of one petal shown (in 2 parts to same scale). **E.** Flower interior view with 2 adjacent petals removed. **F.** Stamen. **G.** Carpel. **H.** Monocarp (2-seeded). (A–H from Singapore, A–G, Mandai Road, *Sinclair SFN 40028*; H, Singapore Botanic Gardens' Rain Forest, *Ridley s.n.* Drawn by A. Brown, reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew).



Figure 67. *Polyalthia angustissima* Ridl. **A.** Habit. **B.** Trunk. **C.** Flower bud. **D.** Mature flower. **E.** Flower centre showing stigmas and anthers. **F.** Unripe fruit. Inset: More mature fruit. **G.** Seeds. (A–G including inset from Singapore, MacRitchie, Ng & Lim SING2018-224. Photos: X.Y. Ng).

Soon Swamp Forest (2013) 206, 286; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 145, pl. 6: D; Turner & Utteridge, Eur. J. Taxon. 183 (2016) 13; Turner, Gard. Bull. Singapore 70 (2018) 634; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 148; Bunchalee in Johnson & Murray, Fl. Thailand 16(1) (2022) 241, fig. 50, pl. 29: E. **Type:** *Wallich s.n.* [EIC 6476], Singapore, October 1822 (holotype K-W [K001123992]). **Fig. 68.**

Guatteria teysmannii Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 378. **Synonyms:** *Monoon teysmannii* (Miq.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19. – *Polyalthia teysmannii* (Miq.) King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 66; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40, as ‘*teysmanni*’. **Type:** *Teijsmann s.n.*, [Indonesia], Sumatra, Batu Radja (lectotype U [U0000373]), designated by Turner, Phytotaxa 36 (2011) 69).

Guatteria palembanica Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 379. **Synonyms:** *Monoon teysmannii* (Miq.) Miq. f. *parvifolium* Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19, as ‘*parvifolia*’. – *Polyalthia teysmannii* (Miq.) King var. *palembanica* (Miq.) Boerl., Icon. Bogor. 1, fasc. 2 (1899) 107. **Type:** *Teijsmann s.n.* [Herb. Bogor. no. 3597], [Indonesia], Sumatra, Palembang, Moeara Doewa (holotype U [U0000374]).

Unona pycnantha Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 60. **Synonym:** *Polyalthia pycnantha* (Hook.f. & Thomson) King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 67. **Type:** *Maingay 1491* [Kew Distribution 48], [Malaysia], Malacca [Melaka], 9 January 1865 or 1866 (lectotype K [K000691459]), designated by Turner, Nordic J. Bot. 28 (2010) 268).

Unona desmantha Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 61; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39. **Synonyms:** *Desmos desmanthus* (Hook.f. & Thomson) Saff., Bull. Torrey Bot. Club 39 (1912) 508, as ‘*desmantha*’. – *Polyalthia desmantha* (Hook.f. & Thomson) Ridl., J. Straits Branch Roy. Asiat. Soc. 75 (1917) 6; Ridley, Fl. Malay Penins. 1 (1922) 49. – *Polyalthia cauliflora* Hook.f. & Thomson var. *desmantha* (Hook.f. & Thomson) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 295; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 117. **Type:** *Maingay 1045* [Kew Distribution 48], [Malaysia], Malacca [Melaka], 1865–1866 (lectotype K [K000691431]), designated by Turner, Phytotaxa 36 (2011) 70).

Unona wrayi Hemsl., Hooker’s Icon. Pl. 16 [ser. 3, 6], fasc. 3 (1887) pl. 1553; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 47. **Synonyms:** *Desmos wrayi* (Hemsl.) Saff., Bull. Torrey Bot. Club 39 (1912) 507. – *Polyalthia wrayi* (Hemsl.) Ridl., J. Straits Branch Roy. Asiat. Soc. 75 (1917) 6; Ridley, Fl. Malay Penins. 1 (1922) 49. – *Polyalthia cauliflora* Hook.f. & Thomson var. *wrayi* (Hemsl.) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 296; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 117. **Type:** *Wray 560*, [Malaysia], Perak, Ulu Kenring, January 1884 (holotype K [K000691466]).

Polyalthia beccarii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 65; Ridley, Fl. Malay Penins. 1 (1922) 50. **Synonym:** *Polyalthia cauliflora* Hook.f. & Thomson var. *beccarii* (King) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 294; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 117. **Type:** *King’s Collector 4522*, [Malaysia], Perak, Gopeng, Kinta, July 1883 (lectotype K [K00069131]), designated by Turner, Folia Malaysiana 9(2) (2009) 93; isolectotypes CAL [CAL0000004407, CAL0000004408, CAL0000004412], DD, LE [LE00012477], U [U0045549]).

Small trees. **Twigs** drying pale grey to white, more rarely dark grey, young parts with brown or golden brown tomentum. **Leaves:** lamina chartaceous, from more or less glabrous to hairy on veins and lamina surface beneath and along midrib above, drying brown, dark brown or grey above, generally a silvery brown beneath, often with tiny red-brown spots visible

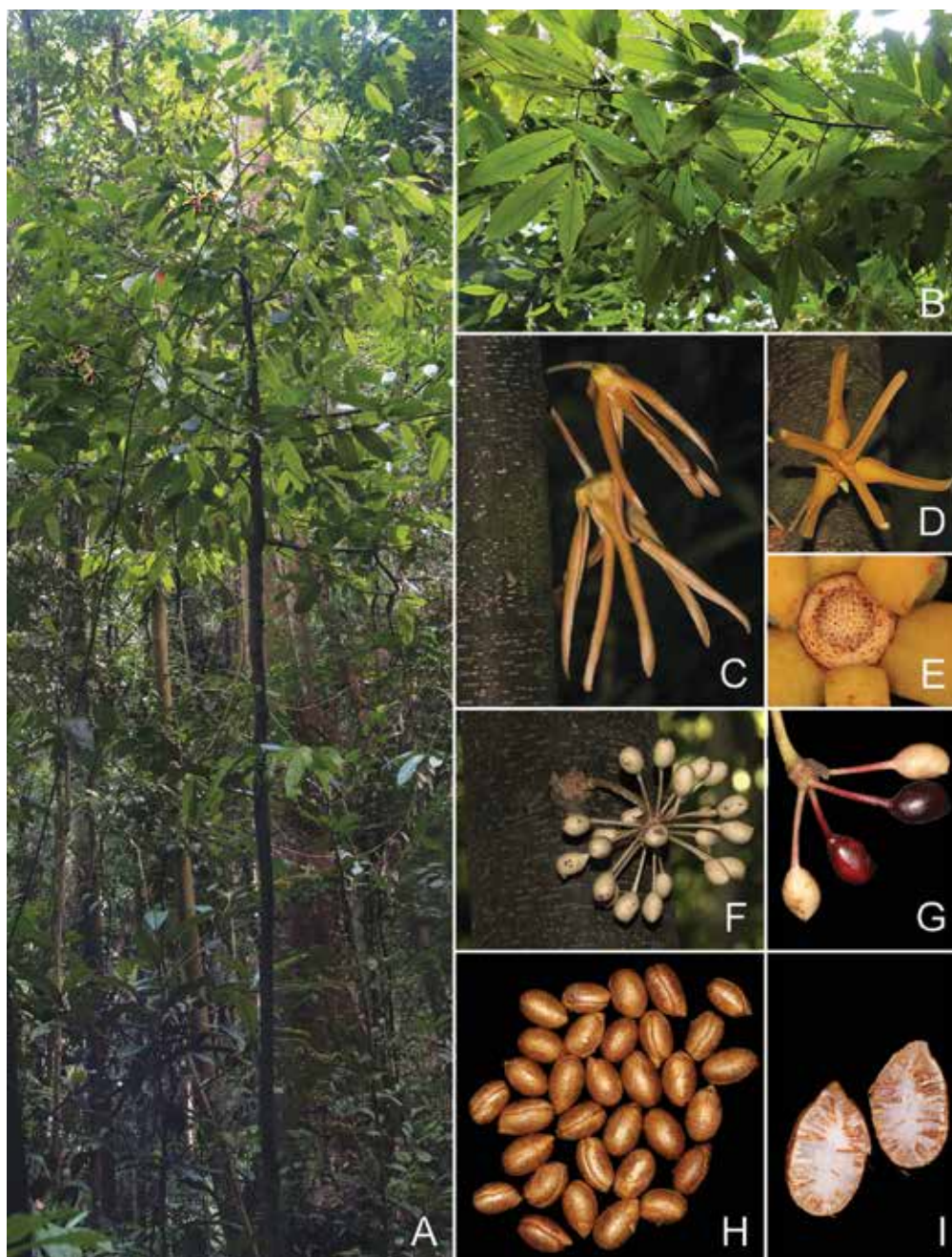


Figure 68. *Polyalthia cauliflora* Hook.f. & Thomson. **A.** Habit. **B.** Leaves. **C.** Flowers on trunk. **D.** Flower (front view). **E.** Flower centre showing stigmas and anthers. **F.** Unripe fruit. **G.** More mature fruit with four monocarps. **H.** Seeds. **I.** Sectioned seed showing ruminant endosperm. (A–I from Singapore, A & C–I, Bukit Timah, S.K. Ganesan & Ali Ibrahim SKG 452; B, MacRitchie, Leong *et al.* SING2018-006. Photos: A, Zaki Jamil; B, P.K.F. Leong; C–I, X.Y. Ng).

on the lamina surface under magnification, generally (narrowly) oblong-elliptic or oblong-obovate, $3\text{--}28.5 \times 1\text{--}9$ cm, base obtuse to rounded, more rarely acute, ultimately very slightly asymmetric, apex acuminate, midrib slightly sunken above, prominent beneath, lateral veins more or less flush above, raised beneath, 7–14 pairs, arching forward and looping well within the margin; petiole drying brown and wrinkled, often hairy. **Inflorescences** cauliflorous or behind and among leaves when axillary. **Flowers** with pedicels 13–30 mm long, 0.75–1 mm thick, widening distally, drying dark brown, sparsely hairy; medial bract absent; sepals broadly ovate, $4\text{--}5 \times 4$ mm, apex acute, drying dark brown with scattered red-brown hairs outside, glabrous within; petals of two whorls similar, linear-lanceolate to 5 cm long, 8–10 mm wide, outer petals slightly wider than inner, drying dark brown, pale hairy outside, more sparsely hairy within; stamens many; carpels many. **Fruit** with pedicels 2–5 mm thick, sepals often persisting; monocarps to 25 or more, globose or ellipsoidal, $8\text{--}10 \times 6\text{--}8$ mm, apiculate or not, drying dark brown to black, hairy to glabrescent, stipe to 25 mm long, c. 1 mm thick. **Seeds** 1–2 per monocarp, globose or hemispherical, c. 6 mm diam.

Distribution. Thailand to Sumatra and Borneo. In Singapore, there are historical collections from Tuas (*Ridley s.n.*, 1894, SING [SING0003267]) and Changi (*Ridley 5980*, 1894, SING [SING0003269]). More recent collections are from Bukit Timah (*Gwee SING2010-063*, 5 Jan 2010, SING [SING0138195]), MacRitchie (*Leong et al. MR 2014-089*, 17 Nov 2014, SING [SING0212461]) and Upper Seletar (*Chew et al. SING2010-599*, 17 Mar 2010, SING [SING0145660]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

25. POPOWIA Endl.

(Johann Siegmund Valentin Popowitsch, 1705–1774, professor of botany in Vienna)

Gen. Pl., fasc. 11 (1839) 831; Walpers, Repert. Bot. Syst. 1, fasc. 1 (1842) 74; Hooker & Thomson, Fl. Ind. 1 (1855) 104; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 68; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 89; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 74; Sinclair, Gard. Bull. Singapore 14(2) (1955) 466; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 108; Kochummen, Tree Fl. Malaya 1 (1972) 91; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 120; Turner, Phytotaxa 36 (2011) 83; Ganesan, Tree Fl. Sabah & Sarawak 8 (2014) 165; Turner, Gard. Bull. Singapore 70 (2018) 657; Johnson & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 259. **Type:** *Popowia pisocarpa* (Blume) Endl. ex Walp.

Evergreen shrubs or small trees with branches spiral on main trunk axis. **Indument** of simple hairs. **Leaves:** lamina chartaceous, often with a granular surface, base asymmetrical, obliquely subcordate, lateral veins arcuate, tertiary venation often scalariform; petioles ≤ 5 mm long. **Inflorescences** terminal, appearing leaf-opposed or sometimes just proximal to the node,

1–7-flowered, the pedicels arising sequentially from a short helical rhipidium. **Flowers** with pedicels short, bearing a minute persistent median bract; buds globose to ovoid; sepals shorter than the petals, free; petals valvate, ovate, the inner whorl slightly longer than the outer, cucullate and forming a tooth at the apex, sometimes connate at base, petals barely separating at anthesis; stamens c. 20, anthers not septate, anther connective apex truncate; carpels c. 6–7, ovaries oblong, stigmas clavate, subcapitate or wedge shaped, c. 0.5 mm long; torus flat, bristly pubescent. **Fruit** consisting of stalked globose indehiscent red to purple monocarps; monocarps short-stipitate with thin pericarp. **Seeds** 1–4 per monocarp, attached laterally, globose to ellipsoid, somewhat flattened, pitted, wrinkled or tuberculate, exarillate; endosperm ruminations spiniform.

Distribution. A genus of approximately 26 species, distributed from Southeast Asia to New Guinea. In Singapore, 3 native species.

Key to *Popowia* species

1. Leaves over 13 cm long, hairy on both surfaces **3. *P. tomentosa***
 Leaves usually less than 13 cm long, glabrous except for the midrib pubescent on the upper surface, glabrous or pubescent beneath 2
2. Leaves with reddish pubescence along the proximal half of midrib on the upper surface, pubescent on the lower surface, apex obtuse, acute or short-acuminate; flowers 2–3 per inflorescence, pedicels stout, reddish pubescent **1. *P. fusca***
 Leaves glabrous except for whitish hairs along the midrib on the lower surface, apex often long-acuminate; flowers usually only 1 per inflorescence, pedicels slender, greyish/whitish pubescent **2. *P. pisocarpa***

1. *Popowia fusca* King

(Latin, *fuscus* = dark, dusky; referring to the purplish brown tomentum on young twigs)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 94; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 76; Sinclair, Gard. Bull. Singapore 14(2) (1955) 471; Kochummen, Tree Fl. Malaya 1 (1972) 92; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14, fig. 10.11; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Wong et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 75; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 119; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; Lee et al., Gard. Bull. Singapore 55 (2003) 291; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 72, 104, 223; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Turner, Gard. Bull. Singapore 70 (2018) 659; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 67; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 149; Johnson & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 260. **Type:** *King's Collector 8602*, [Malaysia], Perak, near Ulu Kerling, March 1886 (lectotype CAL [CAL0000004462], designated by Kessler et al., Prov. Checkl. Asiat.-Austral. Annonac. (1995) 65; isoelectotypes K [K000691722, K000691723], SING [SING0294218]). **Fig. 69.**

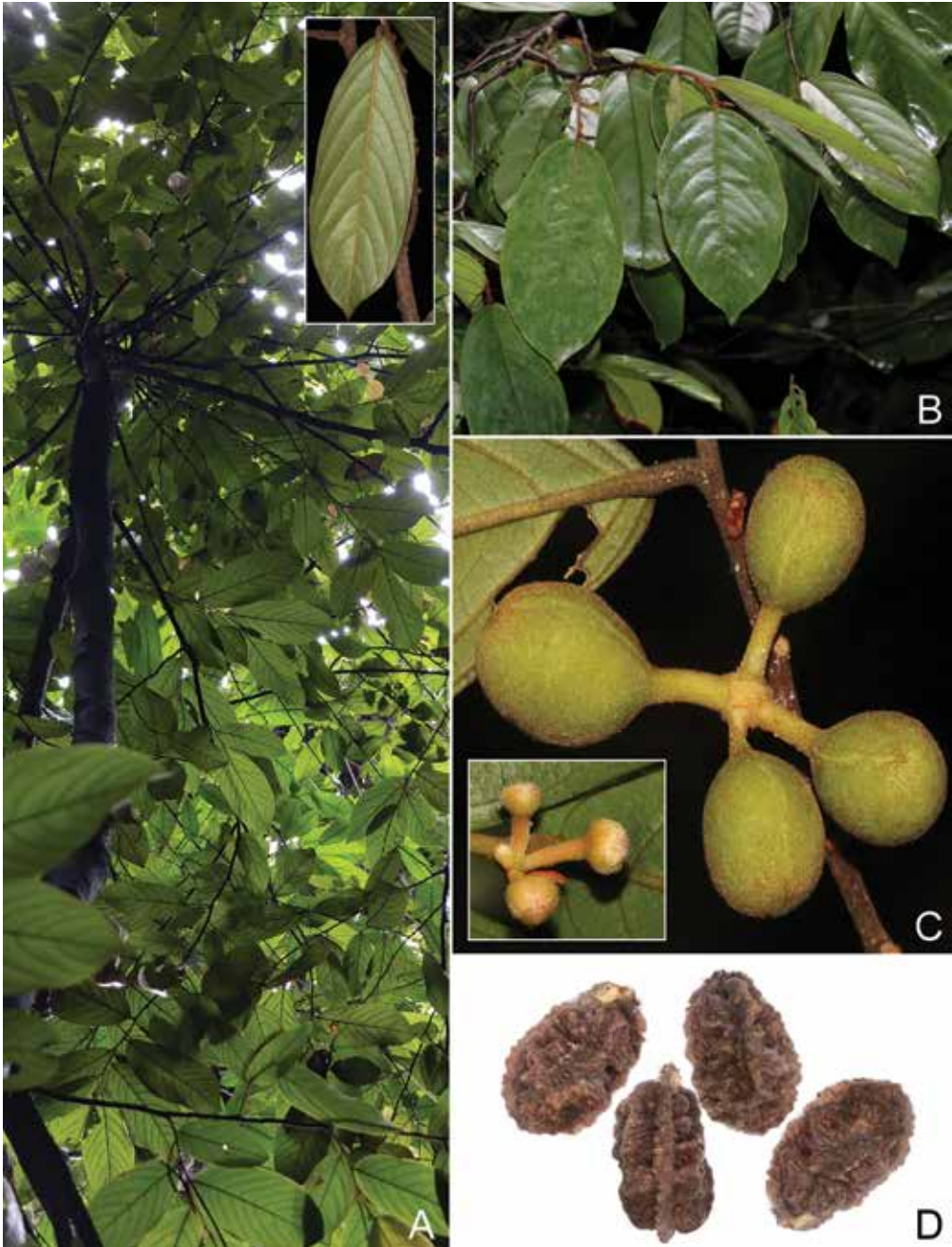


Figure 69. *Popowia fusca* King. **A.** Habit. Inset: Close-up of leaf lower surface. **B.** Leaves. **C.** A fruit with four monocarps. Inset: Flower buds. **D.** Seeds. (A–D including insets from Singapore, A, A inset, C & D, Bukit Timah; B, MacRitchie, Ng SING2016-202; C inset, MacRitchie. Photos: A, P.K.F. Leong; A inset, B, C, C inset & D, X.Y. Ng).

Small trees to 8 m tall. **Twigs** densely erect-rufous-pubescent, eventually glabrate. **Leaves:** lamina glabrous above except for the reddish pubescence along lower half of midrib, pubescent beneath, denser along midrib, elliptic to oblong-elliptic, $9.4\text{--}16.7 \times 4\text{--}6.4$ cm, base broadly cuneate to obliquely rounded, apex obtuse to acute or short-acuminate, the acumen 5–12 mm long, lateral veins 7–13 per side; petiole 3–5 mm long. **Inflorescences** leaf-opposed, 2–7-flowered, rhpidium c. 1.5 mm long. **Flowers** with pedicels 2–3.8 mm long, stout, reddish-pubescent, bearing a bract c. 1.2 mm long; buds globose; sepals broadly triangular, coriaceous, 1.5–2.5 mm long, acute to obtuse, pubescent on both surfaces; petals white; outer petals ovate, c. 2 mm long, broadly acute; inner petals broadly ovate, 2–3 mm long, obtuse, apex incurved; stamens wedge-shaped, 0.6–0.8 mm long; carpels 6–7, ovaries c. 0.8 mm long, pubescent, stigmas clavate, puberulent at apex; torus c. 1.3 mm diam. **Fruit** of up to 4 monocarps borne on pedicels to 6 mm long; monocarps green with white specks when unripe, globose- to ellipsoid-stipitate, pubescent, seed-containing portion $11\text{--}12 \times 8\text{--}11$ mm, smooth or slightly wrinkled, stipe $3\text{--}6 \times 1.3\text{--}1.8$ mm. **Seeds** 1 per monocarp, tuberculate.

Distribution. Peninsular Thailand and Peninsular Malaysia. In Singapore, known from Bukit Timah (*Ngadiman SFN 36364*, 9 Mar 1939, SING [SING0003310]; *Mhd Noor MN. 1295*, 4 Aug 1970, SING [SING0042264]; *Maxwell 81-98*, 21 May 1981, SING [SING0003306]; *Leong & Duistermaat SING2005-163*, 12 May 2005, SING [SING0061585]) and MacRitchie (*Sinclair SFN 37939*, 27 Jan 1949, SING [SING0003312]).

Ecology. In Singapore, lowland mixed dipterocarp forest. Elsewhere also in hill forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

2. *Popowia pisocarpa* (Blume) Endl. ex Walp.

(Greek, *pison* = pea, *carpos* = fruit; referring to the shape of the fruit)

Repert. Bot. Syst. 1, fasc. 1 (1842) 74; Sinclair, Gard. Bull. Singapore 14(2) (1955) 468; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 1 (1964) 108; Kochummen, Tree Fl. Malaya 1 (1972) 91; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Wong et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 75; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 119; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 165; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 72, 104, 223; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Ganesan, Tree Fl. Sabah & Sarawak 8 (2014) 168, fig. 34; Turner, Gard. Bull. Singapore 70 (2018) 661; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 149; Johnson & Chalermglin in Johnson & Murray, Fl. Thailand 16(1) (2022) 261, fig. 53, pl. 32: E, F. **Basionym:** *Guatteria pisocarpa* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 21. **Synonym:** *Bocagea pisocarpa* (Blume) Blume, Fl. Javae, fasc. 30–31 (1830) 90, t. 45. **Type:** *Blume s.n.* ['1247'], [Indonesia], Java, G. Parang (lectotype L [L0190172], designated by Ganesan in Turner, Phytotaxa 36 (2011) 84; isolectotype L [L0190174]). **Fig. 70, 71.**

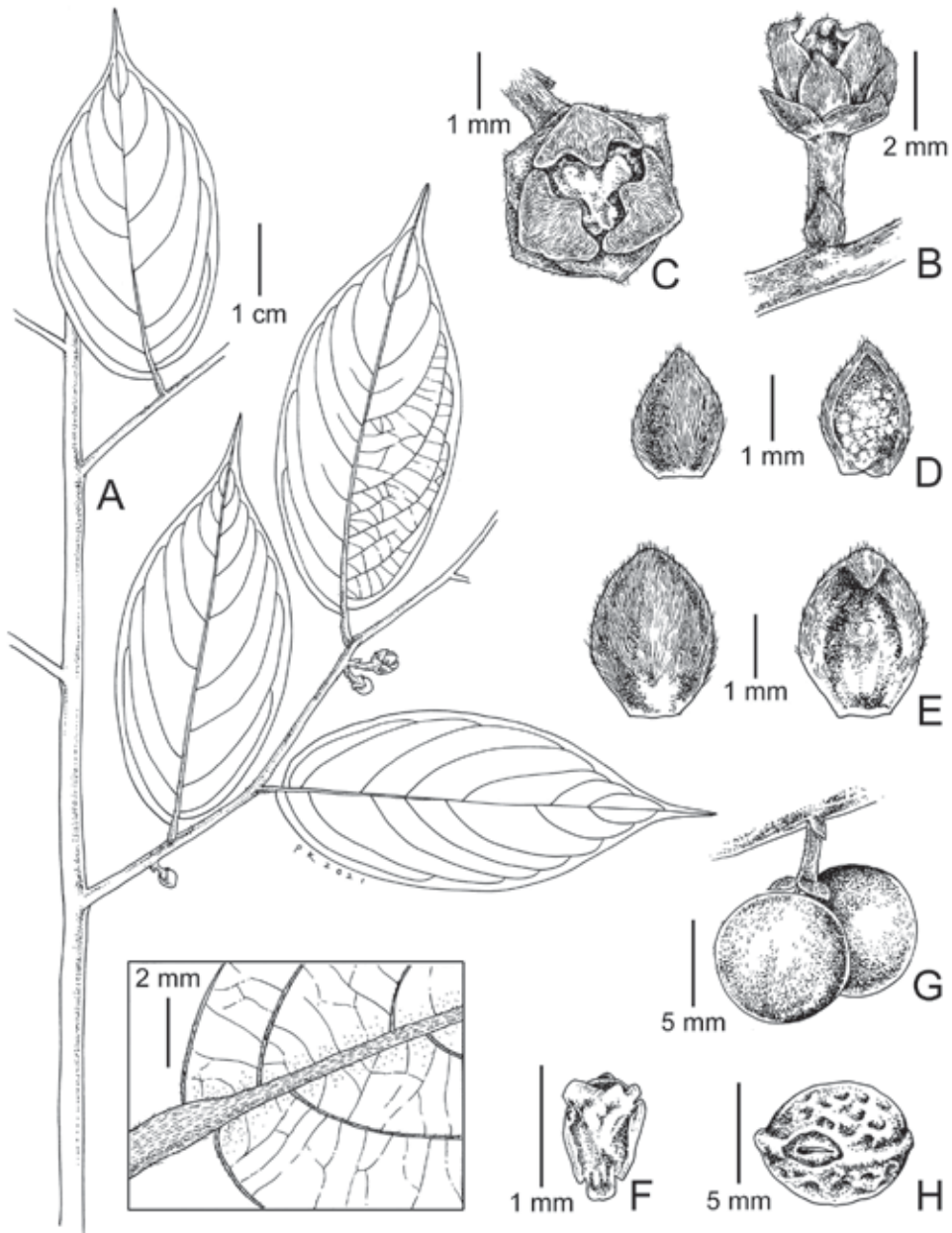


Figure 70. *Popowia pisocarpa* (Blume) Endl. ex Walp. **A.** Leafy twig with flowers. **B.** Flower (side view). **C.** Flower (front view). **D.** Outer petal: outer and inner surfaces. **E.** Inner petal: outer and inner surfaces. **F.** Stamen (inner surface). **G.** Monocarps. **H.** Seed. (A–H from Singapore, A–F, MacRitchie, Lua & Yee SING2014-149; G & H, Bukit Timah, Ridley 6482. Drawn by P.K. Cheng).



Figure 71. *Popowia pisocarpa* (Blume) Endl. ex Walp. **A.** Habit. Inset: Leaves upper surface. **B.** Leaves lower surface. **C.** Flowers. Inset: Flower (side view). **D.** Ripe fruit. Inset: An open monocarp showing yellow pulp. (A–D including insets from Singapore, MacRitchie. Photos: A, A inset, B, C, C inset & D inset, X.Y. Ng; D, J. Chen).

Popowia ramosissima Hook.f. & Thomson, Fl. Ind. 1 (1855) 105; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 68; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 92; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 75. **Type:** *Collector unknown s.n.* [EIC 7294], locality unknown (lectotype K-W [K001127124], designated by Turner, Phytotaxa 36 (2011) 84; isoelectotypes GZU [GZU000267226], K [K000691713, K000691714, K000691715, K000691716, K000691717], M [M0240069], NY [NY00026229], P [P00732362], PH [PH00013136]).

For further synonyms see Turner, Gard. Bull. Singapore 70 (2018) 661.

Treelets or trees to 10 m tall. **Twigs** brownish yellow-strigose, eventually glabrate. **Leaves:** lamina glabrous except for the strigose midrib above, strigose along midrib and lateral veins beneath, elliptic to obovate, $4.9\text{--}17.6 \times 2.1\text{--}6.6$ cm, base broadly cuneate to rounded, usually oblique, apex often long-acuminate, the acumen 9–23 mm long, lateral veins 7–9 per side; petiole 1.5–4 mm long. **Inflorescences** terminal or leaf-opposed, 2–3-flowered, rhipidium short. **Flowers** with pedicels 2–7 mm long, slender, greyish/whitish pubescent bearing a bract c. 1.5 mm long; buds globose; sepals triangular to ovate, coriaceous, 1.5–2.5 mm long, acute, pubescent on both surfaces; petals cream-coloured to light orange; outer petals ovate, c. 2 mm long, acute; inner petals ovate, 2–3 mm long, obtuse, apex incurved; stamens wedge-shaped, c. 1 mm long; carpels 5–6, ovaries c. 0.5 mm long, pubescent, stigmas wedged-shape to sub-capitate, glabrous; torus flat, c. 1.5 mm diam., bristly pubescent. **Fruit** of up to 6 monocarps borne on pedicels to 4.5 mm long; monocarps orange to red, globose, seed-containing portion $7\text{--}9 \times 7\text{--}8$ mm, smooth or slightly wrinkled, glabrate or with a few hairs, sessile, or stipe $0.5\text{--}0.8 \times 0.6\text{--}0.7$ mm. **Seeds** 1 per monocarp, broadly ellipsoid to globose, $7\text{--}8 \times$ c. 6 mm, dull pale brown, pitted.

Distribution. Peninsular Thailand, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Philippines and New Guinea. In Singapore, known from Bukit Timah (*Ridley* 6482, 1894, SING [SING0003318]; *Niissalo* SING2020-803, 1 Oct 2020, SING [SING0361243]) and the Central Catchment (*Tan et al.* 695, 4 May 1992 SING [SING0355214]; *Gwee et al.* SING2009-103, 3 Feb 2009 SING [SING0120444]; *Lua & Yee* SING2014-149, 17 Apr 2014, SING [SING0211893]).

Ecology. In Singapore, lowland forest. Elsewhere, also in forest on limestone and old secondary forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

3. *Popowia tomentosa* Maingay ex Hook.f. & Thomson

(Latin, *tomentum* = stuffing for cushions, wool, *-osus* = abundance;
referring to the indumentum on the stems and leaves)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 70; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 95; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 77; Sinclair, Gard. Bull. Singapore 14(2) (1955) 474; Kochummen, Tree Fl. Malaya 1 (1972) 92; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 119; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 62, 165; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 72, 104, 217; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 209, 287; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 663; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 149. **Type:** *Maingay 1585* [Kew Distribution 54], [Malaysia], Malacca [Melaka], 29 March 1867 (lectotype K [K000691720], designated by Turner, Gard. Bull. Singapore 70 (2018) 663). **Fig. 72.**

Distribution. Peninsular Malaysia and Singapore.

Notes. Two varieties are recognised, *Popowia tomentosa* var. *tomentosa* and *P. tomentosa* var. *crinita* J.Sinclair (Sinclair, Gard. Bull. Singapore 14(2) (1955) 475) of which only the type variety is in Singapore.

var. *tomentosa*

Small trees to 10 m tall. **Twigs** dark grey, densely brown-pubescent. **Leaves:** lamina hairy on both surfaces, sparsely tomentose above, densely tomentose beneath, especially conspicuous on the margins, midrib, and lateral veins beneath, obovate to elliptic, 13.4–16.3 × 6.4–7.2 cm, base subcordate, often obliquely so, apex acute to short-acuminate, acumen 4–11 mm long, lateral veins 7–14 per side; petioles 4 mm long. **Inflorescences** internodal, 2–4-flowered. **Flowers** with pedicels 2.5–4 mm long, brown-pubescent; buds globose; sepals broadly triangular, coriaceous, 1.5–2 mm long, obtuse, glabrous adaxially, densely brown-hairy abaxially; petals whitish/yellowish pubescent; outer petals ovate, c. 2.4 mm long; inner petals ovate, 2.6–3 mm long; stamens wedge-shaped, 0.8–1 mm long; carpels 3–6, ovaries 0.7–0.8 mm long, glabrous except for few hairs at apex, stigmas clavate; torus c. 1.5 mm high. **Fruit** of up to 3 monocarps borne on pedicels c. 5 mm long; monocarps bright red, turning dark purple, subglobose, 16–21 × 16 mm, shiny, somewhat rugose, glabrate, stipe 4–6 × 2.2–2.5 mm. **Seeds** 1–2 per monocarp, broadly or irregularly ellipsoid, 12–13.6 × 10.5–11.6 mm, dull greyish brown, pitted.

Distribution. Peninsular Malaysia. In Singapore, known from Mandai (*Sinclair SFN 39540*, 31 Mar 1953, SING [SING0003323]), Bukit Timah (*Lai LJ 376*, 1998, SING [SING0019876]) and Singapore Botanic Gardens' Rain Forest (*Tang & Sidek 1386*, 18 Apr 2000, SING [SING0219044]).



Figure 72. *Popowia tomentosa* Maingay ex Hook.f. & Thomson. Leafy habit with fruit. Inset: Close-up of flowers. (From Singapore, Singapore Botanic Gardens' Rain Forest; inset: MacRitchie. Photos: P. Athen; inset: W.F. Ang).

Ecology. In Singapore, lowland mixed dipterocarp forest. In Peninsular Malaysia, also in hill forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 467).

26. PYRAMIDANTHE Miq.

(Greek *pyramis* = pyramid, *anthos* = flower; referring to the pyramidal shape of the flower in bud)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 39; Boerlage, Icon. Bogor. 1, fasc. 2 (1899) 86, 130, t. 43: fig. D; Sinclair, Gard. Bull. Singapore 14(2) (1955) 362; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 121; Turner, Gard. Bull. Singapore 64 (2012) 432; Turner, Gard. Bull. Singapore 70 (2018) 679; Bangkomnate et al., Willdenowia 51 (2021) 383, p.p.; Johnson et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 276. **Synonyms:** *Unona* L.f. sect. *Pyramidanthe* (Miq.) Baill., Hist. Pl. 1(4) (1868) 213. – *Melodorum* Lour. sect. *Pyramidanthe* (Miq.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43(2) (1874) 56. **Type:** *Pyramidanthe rufa* Miq. (= *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr.).

Evergreen woody climbers with lateral branches wrapping around adjacent supports. **Twigs** with simple hairs, becoming glabrate. **Leaves** petiolate, subcoriaceous, base symmetrical, rounded, midrib impressed above, raised beneath, lateral veins brochidodromous, higher-order venation finely reticulate. **Inflorescences** axillary, 1–3-flowered. **Flowers** bisexual; sepals 3, valvate, connate to form a flat circular to triangular disc, much smaller than outer petals; petals 6, valvate in two whorls, free, fleshy, outer petals valvate, linear to lanceolate; inner petals much shorter than outer petals, forming a dome over the centre of the flower; stamens many, anthers aseptate, anther connective apex truncate, capitate or tongue-shaped; carpels 5–13, stigma depressed-capitate, multi-lobed, ovules c. 20 per ovary, biseriate. **Fruit** of few to many monocarps; monocarps indehiscent, base contracted into a short stipe. **Seeds** attached laterally in 2 rows, up to 18 per monocarp, smooth, flattened ellipsoid or ellipsoid-oblong, arillate; endosperm ruminations spiniform or flattened pegs.

Distribution. As morphologically and taxonomically delimited here, a genus of two species occurring in southern Thailand, Peninsular Malaysia, Singapore, Sumatra, and Borneo.

Taxonomy. *Pyramidanthe* differs from *Fissistigma* in axillary inflorescence position, the short inner petals forming a dome in the centre of the flower, and the lobate stigma. Molecular phylogenetic studies have placed it nearer to *Mitrella* than to *Fissistigma* (Thomas et al., *Perspect. Pl. Ecol. Evol. Syst.* 17 (2015) 1–16; Guo et al., *Sci. Rep.* 7 (2017) art. 7323). Recently, Bangkomnate et al. (*Willdenowia* 51 (2021) 383–394) proposed that *Mitrella* and *Pyramidanthe* be united under the latter generic name. In order to highlight biological differences between the two genera, however, we have chosen to keep them distinct for this flora treatment. Details are provided under the *Mitrella* account above.

Pyramidanthe prismatica (Hook.f. & Thomson) Merr.

(Greek, *prismatikos* = prismatic; perhaps referring to the triquetrous outer petals)

J. Straits Branch Roy. Asiat. Soc., Special No. [Bibliogr. Enum. Born. Pl.] (1921) 262; Sinclair, *Gard. Bull. Singapore* 14(2) (1955) 362; Keng, *Gard. Bull. Singapore* 27 (1974) 74; Corner, *Gard. Bull. Singapore, Suppl.* 1 (1978) 72; Keng, *Concise Fl. Singapore*, vol. 1, *Gymn. Dicot.* (1990) 14; van Setten & Maas, *Taxon* 39 (1990) 686; Turner, *Gard. Bull. Singapore* 45 (1993) 33; Turner et al., *Gard. Bull. Singapore* 46(2) (1995 [‘1994’]) 10; Turner, *Gard. Bull. Singapore* 47 (1997 [‘1995’]) 120; Turner et al., *Gard. Bull. Singapore* 48 (1998 [‘1996’]) 141; Chew et al., *Gard. Bull. Singapore* 49(2) (1999 [‘1997’]) 171; Chong et al., *Checkl. Vasc. Pl. Fl. Singapore* (2009) 74, 104, 217; Turner & Chua, *Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res.* (2011) 10; Wong et al., *Checkl. Pl. Sp. Nee Soon Swamp Forest* (2013) 213, 287; Turner, *Gard. Bull. Singapore* 70 (2018) 679; Ho et al., *Gard. Bull. Singapore* 71(Suppl. 1) (2019) 68; Lindsay et al., *Gard. Bull. Singapore* 74(Suppl. 1) (2022) 149; Johnson et al. in Johnson & Murray, *Fl. Thailand* 16(1) (2022) 277, fig. 59, pl. 34: E, F. **Basionym:** *Melodorum prismaticum* Hook.f. & Thomson, *Fl. Ind.* 1 (1855) 121; Miquel, *Fl. Ned. Ind.* 1(2), fasc. 1 (1858) 36; Hooker & Thomson in Hooker, *Fl. Brit. India* 1, fasc. 1 (1872) 81; King, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 61(1) (1892) 109; Ridley, *J. Straits Branch Roy. Asiat. Soc.* 33 (1900) 41; Ridley, *Fl. Malay Penins.* 1 (1922) 87. **Synonym:** *Fissistigma prismaticum* (Hook.f. & Thomson) Merr., *Philipp. J. Sci.* 15(2) (1919) 135. **Type:** *Wallich s.n.* [EIC 6455], [Malaysia], Penang, August 1822 (lectotype K-W [K001123944], designated by Turner, *Phytotaxa* 36 (2011) 87; isoclectotype BM). **Fig. 73, 74.**

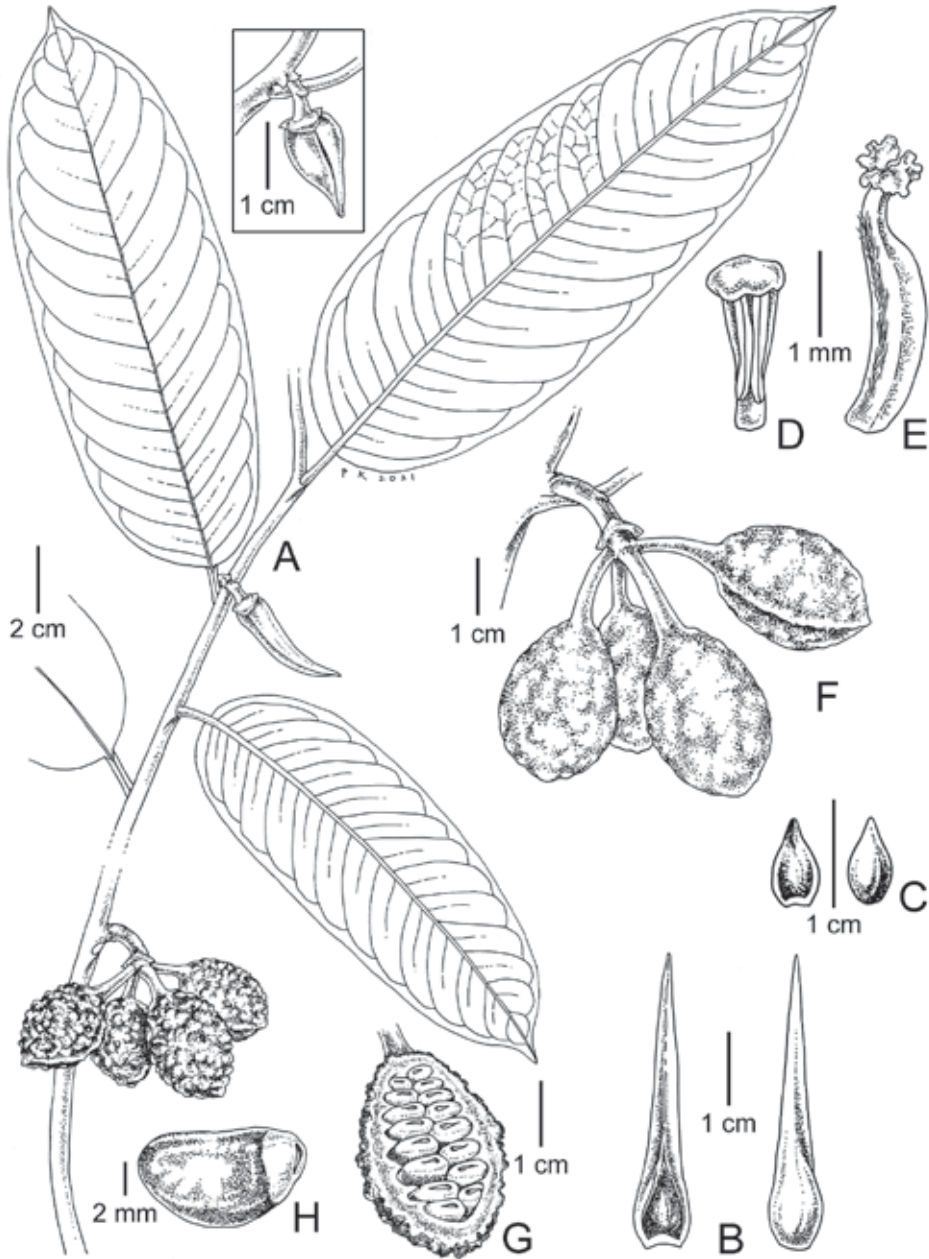


Figure 73. *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr. **A.** Habit. Inset: Flower bud. **B.** Outer petals. **C.** Inner petals. **D.** Stamen. **E.** Carpel. **F.** Fruit. **G.** Monocarp section, showing the micropylar end of seeds. **H.** Seed. (A & D–F from Singapore, A (top twig), Rifle Range Road, *Lua et al. SING2017-476*; A (bottom twig), Bukit Timah, *Goodenough s.n.*; A inset, Kranji, *Ridley 6344*; B & C from Peninsular Malaysia, *Curtis 1046*; D & E, Jurong, *Corner SFN 26152*; F, Rifle Range Road, *Lua et al. SING2017-476*; G & H from Peninsular Malaysia, *Anonymous s.n.* Drawn by P.K. Cheng).

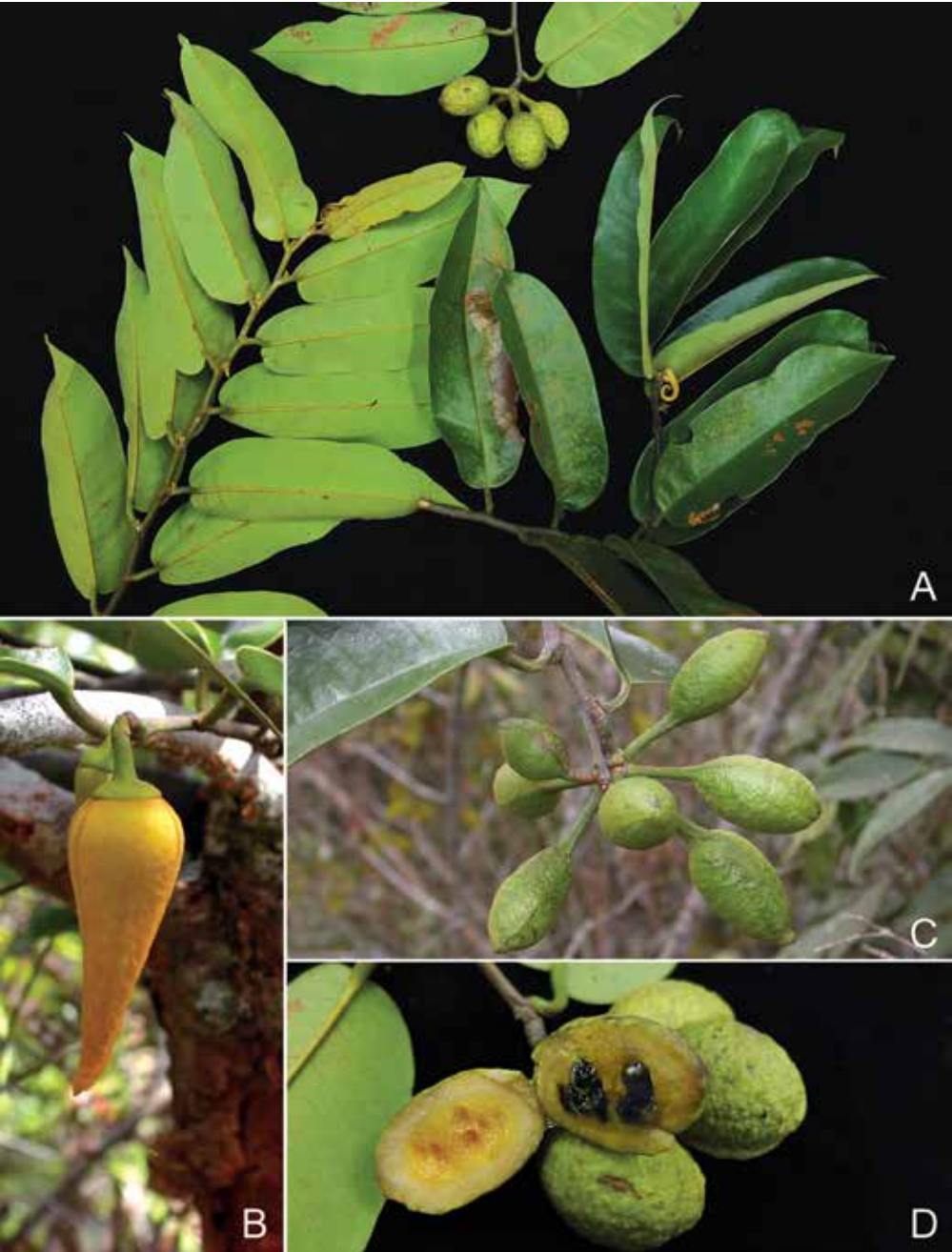


Figure 74. *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr. **A.** Habit. **B.** Flower. **C.** Fruit. **D.** Cut monocarp showing pericarp and seeds. (A & D from Singapore; A & D, Rifle Range Road, *Lua et al. SING2017-476*; B & C from Thailand). Photos: A & D, P.K.F. Leong; B & C, J. Wai, reproduced with kind permission).

Oxymitra bassiifolia Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indië 25 (1863) 419, as '*bassiaefolia*'. **Type:** *Teijsmann s.n.* [Herb. Bogor. no. 17645], [Indonesia], Bangka, near Planyas (lectotype BO [sheet no. BO-1408032], designated by Turner, Phytotaxa 36 (2011) 87; isoelectotype BO [sheet no. BO-1408033]; possible isoelectotypes U [U0149023, U0149018]).

Pyramidanthe rufa Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 2 (1865) 39. **Type:** *Korthals s.n.*, [Indonesia], Borneo australis [Kalimantan], Martapoera [Martapura] (lectotype L [L.1775037], designated by Bangkomnate et al., Willdenowia 51 (2021) 389).

Melodorum maingayi Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 80. **Synonym:** *Fissistigma maingayi* (Hook.f. & Thomson) Merr., Philipp. J. Sci. 15(2) (1919) 133. **Type:** *Maingay s.n.* [Kew Distribution 108], [Malaysia], Penang (holotype K [K000574660]).

Melodorum cylindricum Maingay ex Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 80. **Synonyms:** *Fissistigma cylindricum* (Maingay ex Hook.f. & Thomson) Merr., Philipp. J. Sci. 15(2) (1919) 131. – *Pyramidanthe cylindrica* (Maingay ex Hook.f. & Thomson) Bangk. & Chaowasku, Willdenowia 51 (2021) 387. **Type:** *Maingay 1507* [Kew Distribution 78], [Malaysia], Malacca [Melaka], 1865 or 1866 (lectotype K [K000574661], designated here; isoelectotype CAL [CAL0000004741]).

Pyramidanthe rufa Miq. var. *parvifolia* Boerl., Icon. Bogor. 1, fasc. 2 (1899) 131, t. 44. **Synonym:** *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr. var. *parvifolia* (Boerl.) Merr., J. Straits Branch Roy. Asiat. Soc., Special No. [Bibliogr. Enum. Born. Pl.] (1921) 263. **Type:** *Haviland 421* [Malaysia], Borneo, Sarawak, near Kuching, 1892 (lectotype BO [sheet no. BO-134059], designated by Turner, Phytotaxa 36 (2011) 88).

Melodorum rigidum Ridl., Bull. Misc. Inform. Kew 1912 (1912) 386. **Synonym:** *Fissistigma rigidum* (Ridl.) Merr., Philipp. J. Sci. 15(2) (1919) 135. **Type:** *Garai for Haviland 421* [d.k.m.a.], [Malaysia], Borneo, Sarawak, near Kuching (lectotype K [K000574656], designated by Turner, Gard. Bull. Singapore 64 (2012) 237).

Woody climbers to 20 m. **Twigs** dark brown to blackish brown, brown to reddish brown velvety-puberulent, eventually glabrate. **Leaves:** lamina subcoriaceous, glabrous above except the occasionally sparsely erect-pubescent midrib, sparsely but finely erect-pubescent beneath, drying brown to purplish brown or olivaceous above and paler beneath, oblong, oblong-oblancheolate or elliptic, 9.2–22.7 × 3.8–9.6 cm, base rounded, apex acute or acuminate, acumen 3–19 mm long, midrib impressed above, raised beneath, lateral veins (11–)13–16 per side, brochidodromous, flush above, flush or slightly raised beneath, higher-order veins forming a fine visible meshwork on both surfaces, sometimes indistinct; petiole 8–25 mm long, 1–3 mm diam., nearly terete, slightly winged, grooved adaxially, red-brown puberulent, eventually glabrate. **Inflorescences** 1(–3)-flowered. **Flowers** with pedicels 5.5–10 mm long, rusty-pubescent, with two small bracts, one attached below the midpoint and the other just beneath the calyx; sepals connate at base to form a nearly flat triangular calyx 7–8 mm diam., sepals crescent-shaped, 1.5–3.5 × 4–6 mm, rusty-pubescent outside, glabrous inside, apex acute or obtuse; petals yellow to yellow-orange; outer petals linear to lanceolate, (14.5–)30–45(–65) mm long, 6–9 mm wide at base, 2.8–4.5 mm wide at midpoint, inner surface keeled except for the concave base, yellowish to grey puberulent inside except the glabrous base, reddish brown pubescent outside, apex acute or rounded; inner petals ovate, 7–9 mm long, 3–5 mm wide, drying darker than outer petals, glabrous inside and outside, apex acuminate; stamens 1.5–2.5 mm long, anther connective apex truncate to tongue-shaped; carpels 5–11,

c. 3.5 mm long, stigmas glabrous. **Fruit** with 3–7 monocarps borne on pedicels 12–15 × 3–5 mm; monocarps light to dark green, ellipsoid, sparsely brown-pubescent, 28–45 × 16–25 mm, drying dark brown to black, smooth to strongly bumpy, sometimes with a longitudinal crest on one side, pericarp 2.5–4 mm thick, yellow and fleshy when ripe, stipe (5–)9–23 × 2–5 mm, apex rounded to obtuse, sometimes narrowed into a short beak. **Seeds** 16–18 in two rows per monocarp, flattened ellipsoid, 6–13 × 4–7 × 2–3.9 mm, smooth, dark brown and shiny except for dull pale brown to whitish ring surrounding the micropyle.

Distribution. Southern Thailand, Peninsular Malaysia, Sumatra, Bangka and Borneo. In Singapore, known from Bukit Timah (*Goodenough s.n.*, 10 Mar 1890, SING [SING0003324]), Chan Chu Kang, Jurong (*Corner SFN 26152*, 18 Dec 1932, NY, SING [SING0003328]), Kranji, Mandai (*Lai LJ 75*, 1996, SING [SING0008201, SING0008202]), Nee Soon (*Ahmad SA 1453*, 8 Mar 1977, SING [SING0003326, SING0003327]), Rifle Range Road (*Lua et al. SING2017-476*, 2 Oct 2017, SING [SING0267845, SING0267846]) and Upper Peirce.

Ecology. In Singapore, in lowland forest including swamp forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. In Peninsular Malaysia there is variation in the length of the outer petals and in surface texture of the monocarps. The plants with shorter lanceolate outer petals seem to have smooth monocarps, while those with longer linear outer petals have weakly to strongly bumpy monocarps. In Singapore, the former morphology is seen in *Corner SFN 26152* and *Ridley 6344* (SING [SING0003330]) and the latter in *Ridley 5078* (SING [SING0003331]) and *Shah & Shukor MS 2365* (SING [SING0003325]). The variation likely represents more than one species but material to separate the taxa is lacking.

27. TRIVALVARIA (Miq.) Miq.

(Latin, *tri-* = three, *valva* = valve; referring to the concave inner petals of the type species *Trivalvaria macrophylla*)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19; Sinclair, Gard. Bull. Singapore 14(2) (1955) 195; Kochummen, Tree Fl. Malaya 1 (1972) 94; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 120; van Heusden, Nordic J. Bot. 17 (1997) 169; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 182; Yang et al., PhytoKeys 94 (2018) 3; Turner, Gard. Bull. Singapore 70 (2018) 687; Johnson et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 286. **Basionym:** *Guatteria* Ruiz & Pav. sect. *Trivalvaria* Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 381. **Synonyms:** *Unona* L.f. sect. *Trivalvaria* (Miq.) Baill., Hist. Pl. 1(4) (1868) 213. – *Polyalthia* Blume sect. *Trivalvaria* (Miq.) Prantl in Engler & Prantl, Nat. Pflanzenfam. 3(Abt. 2, Lief. 16) (1888) 33. **Type:** *Guatteria brevipedata* Miq. (= *Trivalvaria macrophylla* (Blume) Miq.).

Shrubs or small trees, stem with spiral branches. **Indument** of simple hairs. **Leaves** chartaceous to subcoriaceous, often bright yellow-green when dried, venation evident, base cuneate to rounded, symmetrical, lateral veins arcuate, forming closed loops inside the margin or not,

connected by fine scalariform tertiary veins, between which is a fine raised reticulum of smaller veins visible on the lower leaf surface; petiole usually less than 10 mm long. **Inflorescences** supra-axillary, internodal or leaf-opposed, 1–4-flowered. **Flowers** staminate or bisexual on the same plant; buds globose to ovoid; pedicels very short, with 1–2 small bracts; sepals imbricate, smaller than the petals; petals coriaceous to slightly fleshy; outer petals often slightly smaller than the inner petals, spreading at anthesis; inner petals connivent at apices or free, erect or spreading at anthesis; stamens numerous, clavate, wedge-shaped or oblong, anther connective apex truncate to slightly dome-shaped; carpels 6–30, ovaries oblong, pubescent, stigmas capitate to clavate, glabrous or pubescent; ovule 1, basal; torus cushion-shaped to columnar. **Fruit** consisting of stipitate monocarps, the stipe shorter than the seed-containing portion in most species, pericarp thin, adhering to seed coat. **Seeds** basal, erect, ellipsoid, smooth, exarillate; endosperm ruminations flattened, peglike or lamellate.

Distribution. A genus of approximately 10 species, distributed from Northeast India to Hainan and south to Sumatra and Java. In Singapore, 1 native species.

Trivalvaria macrophylla (Blume) Miq.

(Greek, *macros* = large, *phyllon* = leaf; with large leaves)

Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 19; Sinclair, Gard. Bull. Singapore 14(2) (1955) 196; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 121; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 88, 104, 199; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 251, 287; Turner, Tree Fl. Sabah & Sarawak 8 (2014) 184, fig. 39; Turner, Gard. Bull. Singapore 70 (2018) 689; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 150; Johnson et al. in Johnson & Murray, Fl. Thailand 16(1) (2022) 288, fig. 62, pl. 35: G, H. **Basionym:** *Guatteria macrophylla* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 19. **Synonym:** *Polyalthia macrophylla* (Blume) Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 66, nom. illeg. non (Blume) Blume (1830). **Type:** *Blume 1026*, [Indonesia], Java (lectotype L [L0038204], designated by van Heusden, Nordic J. Bot. 17 (1997) 175; isoelectotypes L [L0038205], P [P00268432]). **Fig. 75, 76.**

Guatteria bragma Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 20. **Synonym:** *Guatteria macrophylla* Blume var. *bragma* (Blume) Blume, Fl. Javae, fasc. 30–31 (1830) 97. **Type:** *Blume 1713*, [Indonesia], Java (lectotype L [L0038206], designated by van Heusden, Nordic J. Bot. 17 (1997) 175; isoelectotype K [K000691924]).

Guatteria macrophylla Blume var. *glabrata* Blume, Fl. Javae, fasc. 30–31 (1830) 97. **Type:** *van Hasselt s.n.*, [Indonesia], Java (lectotype L [L0038207], designated by van Heusden, Nordic J. Bot. 17 (1997) 175).

Guatteria brevipetala Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 381. **Type:** *Collector unknown s.n.* [HB 497], [Indonesia], Sumatra, Poeloe [Pulau] Pisang, Padang (lectotype U [U0000421], designated by van Heusden, Nordic J. Bot. 17 (1997) 175).

Trivalvaria macrophylla (Blume) Miq. var. *lanceolata* Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 20. **Type:** *Collector unknown s.n.*, [Indonesia], Java, Santiang (lectotype L [L0038028], designated by van Heusden, Nordic J. Bot. 17 (1997) 175).

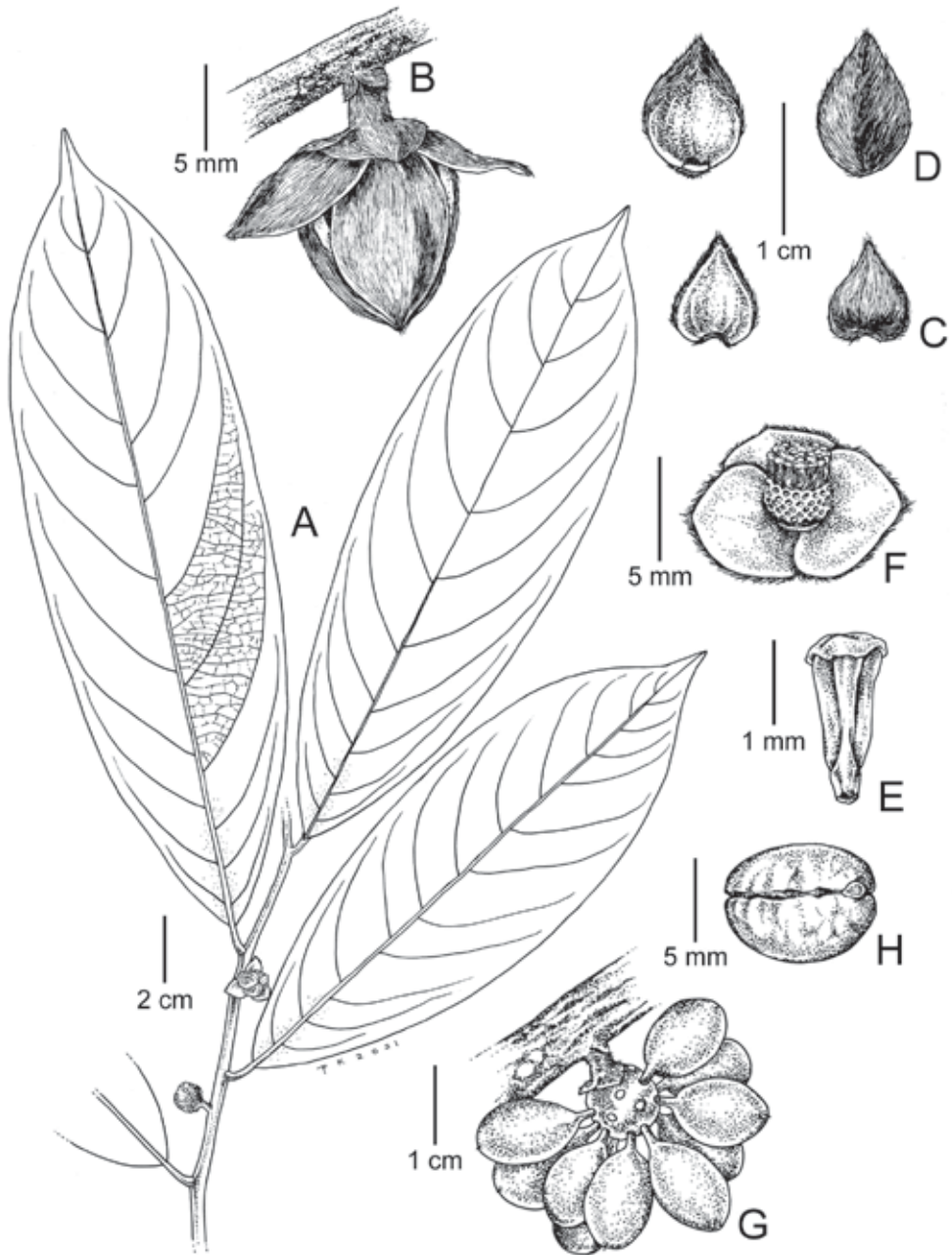


Figure 75. *Trivalvaria macrophylla* (Blume) Miq. var. *macrophylla*. **A.** Habit. **B.** Mature flower. **C.** Outer petals. **D.** Inner petals. **E.** Stamen. **F.** Flower with petals and stamens detached, showing sepals, torus and carpels. **G.** Fruit. **H.** Seed. (A & C–H from Peninsular Malaysia, B from Thailand; A, *Burkill & Haniff SFN 17062*; B, *Leeratiwong 20-1521*; C–E, *Kiah SFN 35393*; F, *LaFrankie 2478*; G, *Chan FRI 6724*; H, *Chan FRI 6766*. Drawn by P.K. Cheng).

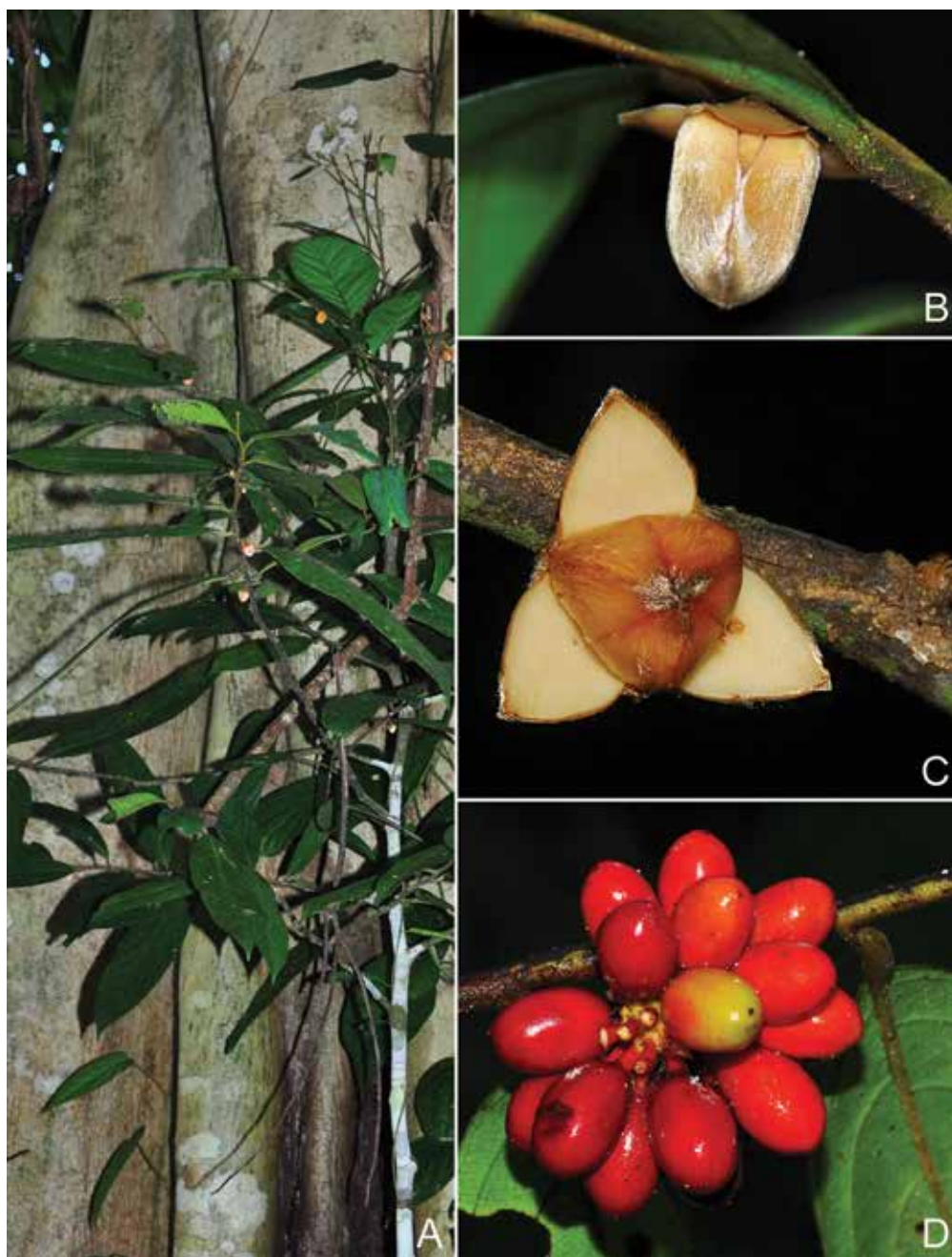


Figure 76. *Trivalvaria macrophylla* (Blume) Miq. var. *macrophylla*. **A.** Habit. **B.** Flower (side view). **C.** Flower (front view). **D.** Fruit. (A–D from Thailand. Photos: C. Leeratiwong, reproduced with kind permission).

Trivalvaria stymanii Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1869 ['1870']) 8, as '*stymanni*'. **Type:** *Stijman s.n.*, [Indonesia], Sumatra, West Sumatra, Prov. Badong'sche Bovenlanden, Paju-combo (lectotype BO [sheet no. BO-1352627], designated by van Heusden, Nordic J. Bot. 17 (1997) 175; isolectotypes BO, L [L0038209, L0038210]).

Popowia nervifolia Maingay ex Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 69. **Type:** *Maingay 3011* [Kew Distribution 53], [Malaysia], Malacca [Melaka] (holotype K [K000580907]).

Distribution. Continental Southeast Asia and western Malesia.

Notes. Two varieties are recognised, *Trivalvaria macrophylla* var. *macrophylla* and *Trivalvaria macrophylla* var. *sumatrana* Heusden, the former of which is widespread and the latter is only in Sumatra.

var. *macrophylla*

Shrubs or treelets to 3 m tall. **Twigs** with short erect brown pubescence. **Leaves:** lamina chartaceous to subcoriaceous, dull and glabrous above, sparsely pubescent at least along midrib beneath, narrowly elliptic to elliptic, elliptic-oblongate or obovate, 18.1–24.2 × 4.2–10 cm, base cuneate, apex acuminate to cuspidate, the acumen 4–21 mm long, lateral veins 10–14 per side, arcuate; petiole 6–13 mm long. **Inflorescences** internodal, 1–2-flowered. **Flowers** bisexual; buds globose; pedicels c. 4 mm long, bearing 1–2 clasping bracts; sepals semicircular to broadly triangular, coriaceous, 3–4.5 mm long, broadly acute to rounded, silky-pubescent abaxially; petals brown, coriaceous; outer petals broadly ovate, 5–7.5 × 5–6.3 mm, obtuse to nearly rounded, densely sericeous on outside; inner petals broadly ovate, 6.9–11 × 7–9 mm, rounded or obtuse, margins thicker; stamens c. 100, clavate, 1.8–2 mm long, anther connective apex truncate, glabrous; carpels 25–30, 1.5–1.7 mm long, densely pubescent; torus cushion-shaped, 3–4 mm diam., 1.1–2.5 mm high. **Fruit** of up to 20 monocarps borne on pedicels c. 3.5 mm long; monocarps ellipsoid, 12–13 × 7–9 mm, thinly adpressed-pubescent to glabrate, pericarp c. 0.1 mm thick, apex rounded to an apiculum c. 0.5 mm long, stipe 2–4 mm long, c. 1.3 mm thick. **Seeds** ellipsoid, c. 12.1 × 6 mm, light brown, dull, smooth.

Distribution. Peninsular Thailand, Peninsular Malaysia, Sumatra, Java and Borneo. In Singapore, known from a single collection made by Ridley somewhere in Singapore (*Ridley s.n.*, 188?, SING [SING0003332]).

Ecology. Lowland forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Nationally Extinct (NEx) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Note. Although Wong et al. (Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 251, 287) included the species in a checklist for Nee Soon Freshwater Swamp Forest, the single collection known for Singapore is unlocalised and no specimen evidence for it has been found for Nee Soon.

28. UVARIA L.

(Latin, *uva* = a grape, a cluster of grapes; alluding to the fruit composed of clustered monocarps)

Sp. Pl. 1 (1753) 536; Linnaeus, Gen. Pl., ed. 5 (1754) 140; Blume, Fl. Javae, fasc. 21–22 (1830) 11; Hooker & Thomson, Fl. Ind. 1 (1855) 95; Bentham & Hooker, Gen. Pl. 1(1) (1862) 23; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 11; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 14; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 38; Ridley, Fl. Malay Penins. 1 (1922) 28; Sinclair, Gard. Bull. Singapore 14(2) (1955) 206; Fries in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 17a(2) (1959) 45; Huber in Dassanayake & Fosberg (ed.), Rev. Handb. Fl. Ceylon 5 (1985) 61; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 111; Zhou et al., Syst. Biodivers. 7 (2009) 255; Zhou et al., Bot. J. Linn. Soc. 163 (2010) 39; Li & Gilbert, Fl. China 19 (2011) 674; Turner, Gard. Bull. Singapore 64 (2012) 437; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 322; Turner, Gard. Bull. Singapore 70 (2018) 690; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 292. **Synonyms:** *Narum* Adans., Fam. Pl. 2 (1763) 365, nom. illeg. superfl. – *Uva* Burm. ex Kuntze, Revis. Gen. Pl. 1 (1891) 7, nom. illeg. superfl. **Type:** *Uvaria zeylanica* L., lectotype designated by Hutchinson, Bull. Misc. Inform. Kew 1923 (1923) 256.

Melodorum Lour., Fl. Cochinch. 1 (1790) 329, 351. **Type:** *Melodorum fruticosum* Lour. (= *Uvaria siamensis* (Scheff.) L.L.Zhou et al.), lectotype designated by Safford, Bull. Torrey Bot. Club 39 (1912) 503.

Marentheria Noronha ex Thouars, Gen. Nov. Madagasc. (1806) 18. **Type:** *Unona marentheria* DC. (= *Uvaria marentheria* (DC.) Baill.), lectotype designated here.

Cyathostemma Griff., Not. Pl. Asiat. 4 (1854) 707; Griffith, Icon. Pl. Asiat. 4 (1854) pl. 650; Utteridge, Blumea 45 (2000) 377. **Type:** *Cyathostemma viridiflorum* Griff. (= *Uvaria griffithii* L.L.Zhou et al.).

Ellipeia Hook.f. & Thomson, Fl. Ind. 1 (1855) 104. **Type:** *Ellipeia cuneifolia* Hook.f. & Thomson. (= *Uvaria cuneifolia* (Hook.f. & Thomson) L.L.Zhou et al.).

Anomianthus Zoll., Linnaea 29(3) (1858) 324. **Type:** *Anomianthus heterocarpus* (Blume) Zoll. (= *Uvaria dulcis* Dunal).

Tetrapetalum Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 1. **Type:** *Tetrapetalum volubile* Miq. (= *Uvaria excelsa* (Hook.f. & Thomson) King).

Rauwenhoffia Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 [‘1885’]) 21. **Type:** *Rauwenhoffia siamensis* Scheff. (= *Uvaria siamensis* (Scheff.) L.L.Zhou et al.).

Uvariella Ridl., Fl. Malay Penins. 1 (1922) 22, 35. **Type:** *Uvariella leptopoda* (King) Ridl. (= *Uvaria leptopoda* (King) J.Sinclair).

Ellipeiopsis R.E.Fr., Verstreute Beob. Fam. Annon. (1953) 41; Fries, Ark. Bot., ser. 2, 3 (1955) 41. **Type:** *Ellipeiopsis ferruginea* (Buch.-Ham. ex Hook.f. & Thomson) R.E.Fr. (= *Uvaria ferruginea* Buch.-Ham. ex Hook.f. & Thomson).

Dasoclema J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 273. **Type:** *Dasoclema siamense* (Craib) J.Sinclair. (= *Uvaria dasoclema* L.L.Zhou et al.).

Balonga Le Thomas, Adansonia, sér. 2, 8 (1968) 106. **Type:** *Balonga buchholzii* (Engl. & Diels) Le Thomas (= *Uvaria buchholzii* Engl. & Diels).

Woody climbers or scrambling shrubs. **Indumentum** of stellate hairs or both stellate and simple hairs present. **Leaves:** lamina with midrib slightly sunken or flush above, lateral veins generally distinct, tertiary venation reticulate or reticulate-scalariform. **Inflorescences:** flowers solitary, in a single monochasial cyme (a rhipidium) or in complex inflorescences with racemose primary branching and multiple cymose partial inflorescences (rhipidia); terminal, leaf-opposed, internodal, supra-axillary, sometimes cauliflorous. **Flowers** bisexual, with bracts at the base and along the pedicel; sepals 3 or rarely 2, free or connate at the base to about the middle; petals 6 in two whorls of 3, or rarely 4, free or sometimes connate at the very base; outer and inner petals larger than sepals, outer and inner whorl similar in length or rarely inner petals much shorter, sometimes clawed, spreading or reflexed at maturity, or suberect and cup-shaped pollination chamber formed by the overlapping petals; stamens many, outer sometimes staminodal, connective apex truncate or rounded and frequently extended-flattened (tongue-shaped); style not differentiated from ovary, stigma elongated or short, bilobed-U-shaped in cross-section, stigma lobe margins straight or strongly involute, glabrous or hairy at base; ovules 2 to many, or solitary. **Fruit** apocarpous; monocarps indehiscent, ellipsoid, globose or cylindrical, stipitate. **Seeds** 1 to many per monocarp, smooth, brown, arillate; endosperm ruminations lamellate.

Distribution. A genus of about 210 species distributed across the Old World tropics and subtropics, from Africa and Madagascar to India and China, and through continental Southeast Asia, Malesia, Australia and some Pacific islands. In Singapore, 13 native species.

Key to *Uvaria* species

- 1. Leaves and young stems with erect hairs 2–3 mm long **8. *U. hirsuta***
Leaves and young stems glabrous, glabrescent or with an indumentum of adpressed to erect hairs < 2 mm long 2
- 2. Young stems and abaxial leaf lamina with a multi-layered indumentum including stalked stellate hairs that easily rub off and get entangled resulting in a lumpy indumentum appearance **1. *U. blumei***
Young stems and abaxial leaf lamina indumentum variously developed but without conspicuous lumps of entangled hairs 3
- 3. Stamens 6–8 mm long 4
Stamens 0.8–3 mm long 5
- 4. Sepals 15–30 × 10–25 mm; petals 19–45 × 8–22 mm; bract associated with the flowers large (to 32 mm long); outermost stamens with well-developed pollen sacs; mature monocarps > 40 mm long **6. *U. grandiflora***
Sepals 4–6 × 6–10 mm; petals 12–20 × 7–17 mm; bracts to 7 mm long; outermost stamens with reduced pollen sac length or staminodal; mature monocarps to 33 mm long
..... **10. *U. littoralis***

5. Inner petals much shorter than outer petals **3. *U. cuneifolia***
Outer and inner petals subequal in length 6
6. Inner petals distinctly narrowed and sometimes thickened at base (inner petals clawed) ...
..... 7
Inner petals with broad base or slightly narrowed but not distinctly clawed 10
7. Petals 15–25 mm long **13. *U. pauciovulata***
Petals < 8 mm long 8
8. Leaf lamina moderately to densely hairy beneath on both the midrib and lamina;
monocarps densely hairy **5. *U. excelsa***
Leaf lamina very sparsely hairy or glabrous on the lamina and very sparsely hairy along
the midrib; monocarps glabrous or sparsely hairy 9
9. Leaf base rounded to cuneate; flowers in short-pedunculate, leaf-opposed or internodal
cymes; ovary with ring of hairs below the stigma, otherwise glabrous **2. *U. clementis***
Leaf base usually shortly cordate, sometimes subcordate to rounded; flowers in long-
pedunculate complex inflorescences composed of multiple cymes, frequently cauliflorous;
ovary surface densely hairy or with longitudinal lines of hairs **7. *U. griffithii***
10. Flower pedicels 18–32 mm long; stamens c. 3 mm long **4. *U. curtisii***
Flower pedicels to 10 mm long; stamens 0.8–2 mm long 11
11. Stamens 0.8–1 mm long with truncate apex; sepals 2–3 × 2.5–3.5 mm; petals 3–6 × 3–5
mm; monocarp stipes slender and short, to 21 mm long and 1 mm thick; petioles 1.5–4
mm long, leaf base cuneate to rounded, leaf lamina relatively narrow (1.7–4.5 cm)
..... **12. *U. micrantha***
Stamens > 1 mm long and with elongated, tongue-shaped apex; sepals 3–6 × 4–10 mm;
petals 7–12 × 5–9 mm; monocarp stipes robust and long, to 82 mm long and 3 mm thick;
petioles frequently > 4 mm long, leaf base shortly cordate or sometimes rounded, leaf
lamina frequently more than 4.5 cm wide 12
12. Indumentum on young stem and adaxial leaf surface of stellate hairs with predominantly
semi-erect to erect branches; monocarp surface wrinkled to finely tuberculate; petals 7–9
× 5–7 mm, adaxially sparsely to moderately hairy distally and (sub-)glabrous towards the
base **9. *U. leptopoda***
Indumentum on young stem and abaxial leaf surface of stellate hairs with predominantly
horizontally adpressed branches; monocarps tuberculate; petals 10–12 × 6–9 mm,
adaxially densely hairy **11. *U. lobbiana***

1. *Uvaria blumei* (Boerl.) I.M.Turner

(Carl Ludwig von Blume, 1796–1862, German-Dutch botanist and author of seminal works on the Malesian flora)

Gard. Bull. Singapore 70 (2018) 692; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 150. **Basionym:** *Uvaria javana* Dunal var. *blumei* Boerl., Cat. Pl. Phan. 1 (1899) 13. **Type:** [Published illustration] *Uvaria javana* in Blume, Fl. Javae, fasc. 21–22 (1830) t. 3, lectotype designated by Turner, Gard. Bull. Singapore 70 (2018) 692. **Fig. 77.**

Uvaria dulcis auct. non Dunal: Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 38; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 2256.

Uvaria javana auct. non Dunal: Sinclair, Gard. Bull. Singapore 14(2) (1955) 216; Turner, Gard. Bull. Singapore 64 (2012) 425.

Large woody climbers. **Twigs** brownish, striate-latticed, the youngest parts densely hairy with a floccose indumentum, older twigs sparsely hairy to glabrescent. **Leaves:** lamina sparsely to densely hairy between the veins and densely hairy on the midrib above, densely to moderately densely hairy between the veins and densely hairy on the midrib beneath, elliptic, broadly elliptic, oblong-elliptic, obovate or broadly obovate, 8–24.5 × 4–11.5 cm, base cordate or rounded, apex obtuse or acute, often shortly acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 7–11 per side; petiole 4–8 mm long, densely hairy. **Inflorescences** 1–2-flowered, supra-axillary or leaf-opposed. **Flowers** with pedicels 6–12 mm long, densely hairy; bracts ovate or elliptic, basal bract to 6 mm long, medial bract to 3 mm long; sepals connate in bud exposing petal apex, basally connate at maturity, lobes broadly ovate, 3–5 × 3–5 mm, densely to sparsely hairy adaxially, densely hairy abaxially; petals greenish-yellowish, turning yellow and eventually yellowish orange to pinkish, spreading at anthesis, elliptic to elliptic-oblong, subequal in shape and size in the outer and inner whorl, 10–22 × 4–10 mm, densely hairy; stamens 2–2.5 mm long, connective apex slightly extended or extended-flattened, minutely papillose, thecae glabrous; carpels many, ovaries densely hairy, stigma bilobed, U-shaped, with strongly involute margins, glabrous. **Fruit** with pedicels to 15 mm long, densely hairy; monocarps numerous (to 30 or more), ellipsoidal, straight or slightly curved, usually not constricted between the seeds or sometimes with a single constriction, 19–38 × 11–22 mm, apex rounded, not or indistinctly apiculate, surface irregularly tuberculate, densely hairy, stipitate, stipes to 30 mm long and 3 mm thick. **Seeds** several to numerous (to 12) per monocarp, 10–15 × 7–12 mm, flattened hemi-ellipsoidal, testa smooth, glabrous, drying brown.

Distribution. Peninsular Malaysia, Java and Borneo. In Singapore, known from MacRitchie (*Yee et al. SING2014-124*, 5 May 2014, SING [SING0212370]), Upper Seletar (*Thomas 3430*, 8 Mar 2020, SING [SING0386222, SING0386233]) and Bukit Timah (*Ali Ibrahim SING2018-953*, 15 Nov 2018, SING [SING0286293]).

Ecology. In Singapore, in primary and secondary lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

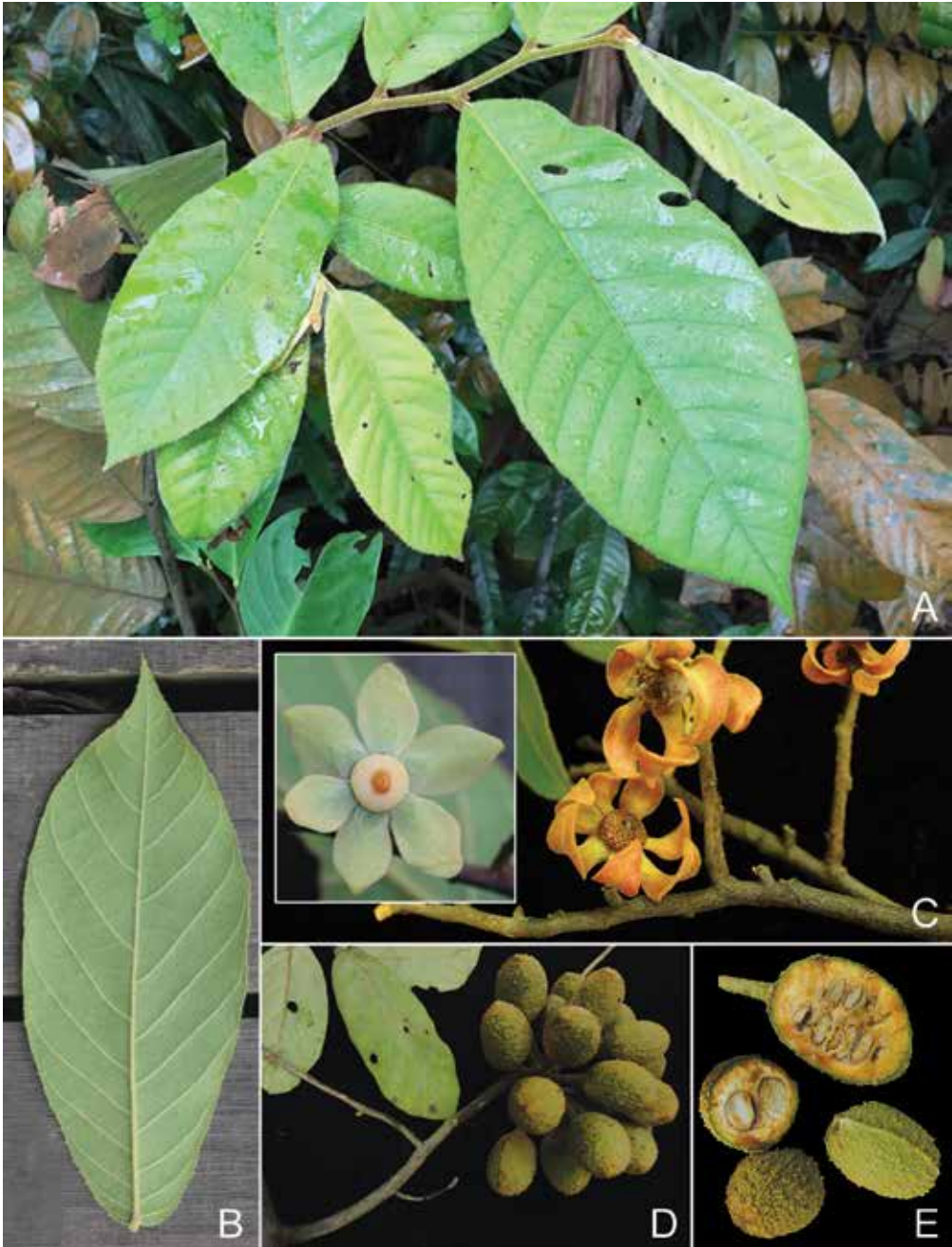


Figure 77. *Uvaria blumei* (Boerl.) I.M.Turner. **A.** Habit. **B.** Leaf (lower surface). **C.** Flowers at the end of anthesis. Inset: Younger flower showing receptive stigma. **D.** Fruit with irregularly tuberculate monocarps. **E.** Monocarps, cross-section (middle left) and longitudinal section (top). (A–E including inset from Singapore, A, B & C inset, MacRitchie; C, MacRitchie, *Yee et al. SING2014-124*; D & E, MacRitchie, *Boo SING2011-360*. Photos: A, B & C inset, X.Y. Ng; C, P.K.F. Leong; D & E, S. Lee).

2. *Uvaria clementis* (Merr.) Attan. et al.

(Mary Strong Clemens, 1873–1968, and Joseph Clemens, 1862–1936, plant collectors in Malasia)

Novon 21 (2011) 166; Turner, Gard. Bull. Singapore 64 (2012) 443; Turner, Gard. Bull. Singapore 70 (2018) 694; Leeratiwong et al., Thai Forest Bull., Bot. 49 (2021) 241; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 150; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 296; Thomas et al., Nat. Singapore 16(e2023001) (2023) 4. **Basionym:** *Artabotrys clementis* Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 174. **Type:** *Ramos* 1667, [Malaysia], North Borneo [Sabah], Sandakan and vicinity, September–December 1920 (lectotype K [K000786696], designated by Attanayake et al., Novon 21 (2011) 167; isoelectotype A [A00039703]). **Fig. 78.**

Uvaria parviflora Hook.f. & Thomson, Fl. Ind. 1 (1855) 103, nom. illeg. non A.Rich. (1831), nec (Michx.) Torr. & A.Gray (1838). **Synonyms:** *Uva parviflora* Kuntze, Revis. Gen. Pl. 1 (1891) 8. – *Cyathostemma hookeri* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 10, nom. illeg. superfl.; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 38; Ridley, Fl. Malay Penins. 1 (1922) 28; Sinclair, Gard. Bull. Singapore 14(2) (1955) 223; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 110; Utteridge, Blumea 45 (2000) 386; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 30, 103, 190. – *Uvaria kingii* L.L.Zhou et al., Syst. Biodivers. 7 (2009) 255, nom. illeg. superfl. **Type:** *Phillips s.n.*, [Malaysia], Prince of Wales Island [Penang] (lectotype K [K000615957], designated by Attanayake et al., Novon 21 (2011) 167).

Orophea dodecandra auct. non Miq.: Ridley, Fl. Malay Penins. 1 (1922) 72.

Large woody climbers. **Twigs** dark brownish, striate-latticed, the youngest parts sparsely hairy, older twigs glabrescent. **Leaves:** lamina glabrous above, glabrous except for a very sparse indumentum along the midrib beneath, elliptic to obovate, 6.5–21 × 3–7 cm, base rounded or cuneate, apex acute and often shortly acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 9–12 per side; petiole 4–10 mm long, very sparsely hairy to glabrescent. **Inflorescences** 1–3-flowered, leaf-opposed or internodal. **Flowers** with pedicels 7–11 mm long, hairy; with a basal and a medial bract, bracts ovate, to 2 mm long; sepals valvate in bud, free at maturity, broadly ovate, 2–3 × 3–5 mm, glabrous or sometimes sparsely hairy towards the margins adaxially, sparsely hairy abaxially; petals yellow, elliptic to ovate, erect at anthesis forming a pollination chamber, subequal in size in the outer and inner whorl, but petals of the outer whorl with a broad base and of the inner with a conspicuously narrowed base (clawed), 4–5 × 3–4 mm, with vertical furrows when dried, abaxially hairy, adaxially papillate; stamens 1–2 mm long, connective apex slightly extended, truncate, frequently incurved or cleft and minutely bilobed, papillose, thecae glabrous; carpels many, ovaries basally glabrous but densely hairy in the distal part below the stigma, stigma U-shaped, glabrous. **Fruit** with pedicels to 15 mm long, lenticellate, glabrous; monocarps several to numerous (4 to 20 or more), ellipsoidal to cylindrical, not constricted between the seeds, 21–45 × 15–26 mm, apex rounded, not or indistinctly apiculate, surface finely granular, glabrous, stipitate, stipes to 49 mm long and 3 mm thick. **Seeds** up to 8 per monocarp, 10–19 × 8–11 mm, hemi-ellipsoidal-flattened, testa smooth, glabrous, drying brown.

Distribution. Thailand, Peninsular Malaysia, Sumatra and Borneo. In Singapore, known only from a few recent and historical collections from Singapore Botanic Gardens’ Rain Forest (*Lau*

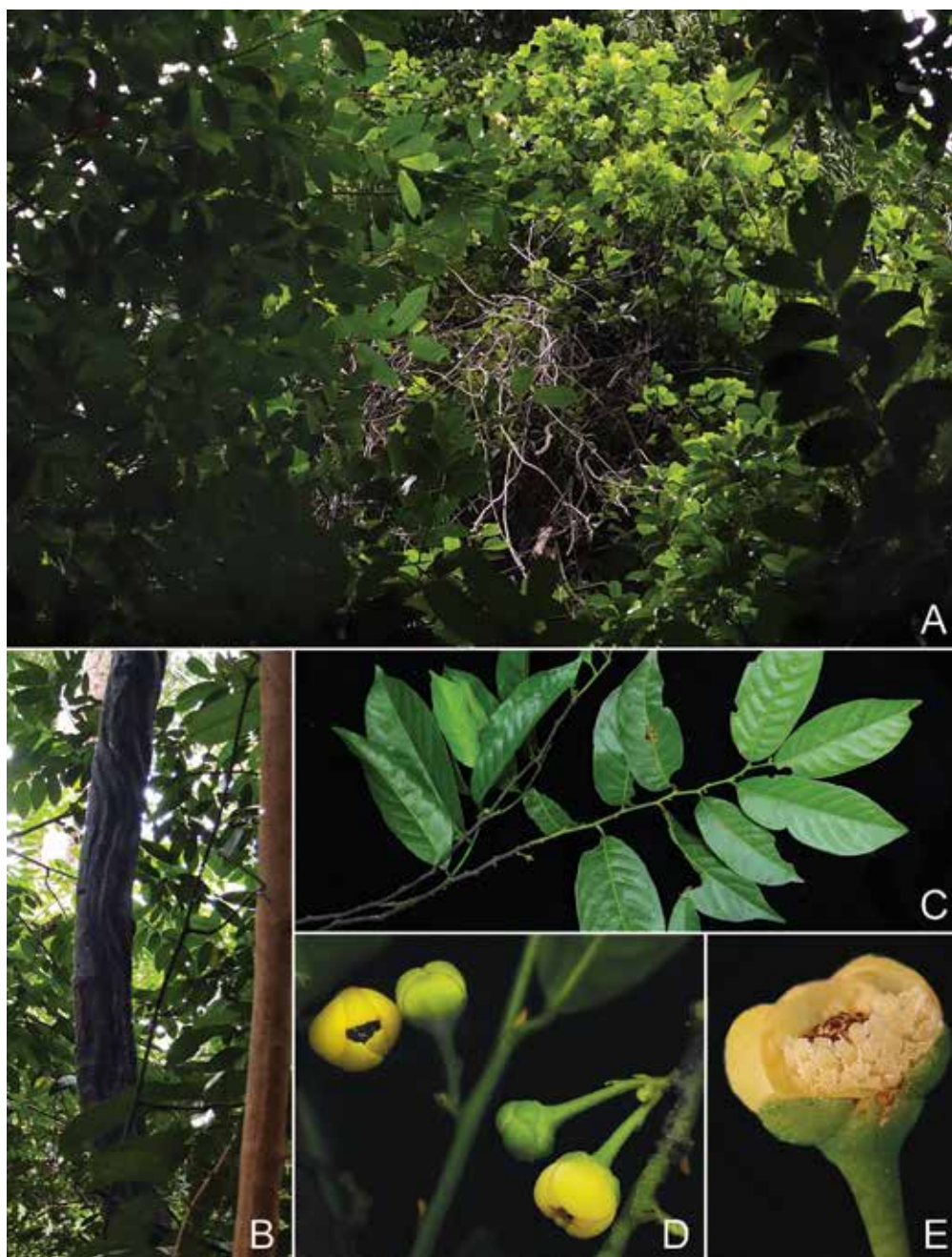


Figure 78. *Uvaria clementis* (Merr.) Attan. et al. **A.** Habit. **B.** Dark coloured stem. **C.** Leaves. **D.** Inflorescences. **E.** Flower, petals removed to show stamens. (A–D from Singapore, Singapore Botanic Gardens, *Lau SING2020-165*. Photos: P.K.F. Leong).

SING2020-165, 21 Feb 2020, SING [SING031094]) and a recent collection from MacRitchie (*Thomas 3470*, 21 Mar 2021, SING [SING0387070, SING0387071]).

Ecology. In Singapore, in primary and mature secondary lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. As there is no fruiting material known from Singapore, the fruit description is based on material from Peninsular Malaysia.

3. *Uvaria cuneifolia* (Hook.f. & Thomson) L.L.Zhou et al.

(Latin, *cuneatus* = wedge-shaped, *folius* = leaf; referring to the shape of the leaves)

Syst. Biodivers. 7 (2009) 255; Turner, Gard. Bull. Singapore 64 (2012) 450; Turner, Gard. Bull. Singapore 70 (2018) 696; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68, 125; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 150. **Basionym:** *Ellipeia cuneifolia* Hook.f. & Thomson, Fl. Ind. 1 (1855) 104; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 35; Sinclair, Gard. Bull. Singapore 14(2) (1955) 230; Keng, Gard. Bull. Singapore 27 (1974) 71; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 111; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 38, 103, 205; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 98, 284. **Type:** *Griffith s.n.*, [Malaysia], near Malacca [Melaka] (lectotype K [K000382203], designated by Turner, Phytotaxa 36 (2011) 98).

Uvaria laha Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 369. **Synonym:** *Ellipeia laha* (Miq.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 10. **Type:** *Teijsmann s.n.* [Herb. Bogor. no. 3811], [Indonesia], Sumatra, West Sumatra, Palembang near Tubuan, Ogau-ulu (lectotype U [U0000268], designated here; isolectotype BO [sheet no. BO-1349058]).

Ellipeia gilva Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 9. **Synonym:** *Uvaria gilva* (Miq.) L.L.Zhou et al., Syst. Biodivers. 7 (2009) 255. **Type:** *de Vriese s.n.*, [Indonesia], Borneo (lectotype L [L0484299], designated by Turner, Phytotaxa 36 (2011) 98).

Large woody climbers. **Twigs** brownish, striate-latticed, initially densely hairy, glabrescent with age. **Leaves:** lamina with sparse indumentum to glabrescent between the veins and dense indumentum on the midrib above, very densely hairy to very sparsely hairy beneath, obovate, oblong to elliptic, 8–25 × 2.5–8 cm, base subcordate to rounded, apex acuminate, midrib sunken adaxially, prominent abaxially, lateral veins 13–18 per side; petiole 4–6 mm long, densely to sparsely hairy. **Inflorescences** terminal, elongate and composed of one to multiple 2–5-flowered cymes with slightly elongated internodes. **Flowers** with pedicels 7–14 mm long, densely hairy; basal bract ovate, to 8 mm long, medial bract broadly ovate with clasping base, to 5 mm long; sepals valvate in bud, free at maturity, ovate, 4–5 × 4–6 mm, glabrous or sometimes sparsely hairy towards the margins adaxially, densely hairy adaxially and abaxially;

petals creamy yellow, the outer spreading and the inner connivent at anthesis, elliptic to ovate, unequal in size in the outer and inner whorl, the inner much shorter than the outer, both outer and inner petals densely hairy adaxially and abaxially; outer petals ovate, $16\text{--}17 \times 11\text{--}12$ mm; inner petals obovate with narrowed base (clawed), $4\text{--}7 \times 4\text{--}5$ mm; stamens numerous, 1.5–2 mm long, connective slightly extended-flattened, apically frequently with concave depression when dried, not papillose, thecae glabrous; carpels numerous, ovaries hairy or sometimes with longitudinal lines of hairs, stigma shallowly bilobed, glabrous. **Fruit** with pedicels to 20 mm long, densely to sparsely hairy; monocarps several to numerous (to 20 or more), ellipsoidal, without constrictions, $12\text{--}15 \times 6\text{--}12$ mm, apex rounded, apiculus laterally positioned, densely hairy, stipitate, stipes to 25 mm long and 1.5 mm thick. **Seeds** 1 per monocarp, $10\text{--}14 \times 7\text{--}9$ mm, ellipsoidal, testa smooth, glabrous, drying brown.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, known only from historical collections from MacRitchie (*Nur* 5082, Feb 1893, SING [SING0003144]) and Singapore Botanic Gardens' Rain Forest (*Ridley* 4919 fide Sinclair, Gard. Bull. Singapore 14(2) (1955) 231; specimen not located).

Ecology. Tropical lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al., Singapore Red Data Book, ed. 3 (2024) 468) but as it appears there has been no verified material collected in Singapore in over 100 years, assessed here as Nationally Extinct (NEx).

Notes. As there is very limited material of this species from Singapore, the description is partly based on material from Peninsular Malaysia.

4. *Uvaria curtisii* King

(Charles Curtis, 1853–1928, English botanist and first Superintendent of Penang Botanic Gardens)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 19; Sinclair, Gard. Bull. Singapore 14(2) (1955) 206; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 121; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 89, 104, 199; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 257, 287; Chong et al., Gard. Bull. Singapore 70(Suppl. 1) (2018) 58; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 330; Turner, Gard. Bull. Singapore 70 (2018) 696; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 150; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 298. **Type:** *Curtis* 1415, [Malaysia], Penang, Government Hill, May 1892 (lectotype K [K000380127, designated by Turner, Gard. Bull. Singapore 70 (2018) 696).

Large woody climbers. **Twigs** brownish, striate-latticed, densely hairy, glabrescent with age. **Leaves:** lamina sparsely hairy with 1- to multi-branched hairs above except for the densely hairy midrib, sparsely to moderately densely hairy with multi-branched hairs beneath, midrib

sparsely to densely hairy, obovate, narrowly obovate to elliptic, 18–25 × 6–8 cm, base rounded to subcordate, apex acute or shortly acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 10–13 per side; petiole 6–8 mm long, densely hairy. **Inflorescences** 2-flowered cymes, leaf-opposed. **Flowers** with pedicels 18–32 mm long, densely hairy; basal bract narrowly ovate, to 8 mm long, medial bract ovate, to 5 mm long; sepals calyptrate in bud, basally connate at maturity, lobes ovate, c. 9 × 8 mm, densely hairy adaxially and abaxially; petals white or greenish yellow, spreading at maturity, elliptic to ovate, subequal in shape and size in the outer and inner whorl, 13–16 × 5–7 mm, densely hairy adaxially and abaxially, inner surface showing indentations from the stamens; stamens numerous, c. 3 mm long, connective apex truncate to shortly tongue-shaped, minutely papillose, glabrous; carpels many, ovaries densely hairy, stigma U-shaped with strongly involute margins, glabrous. **Fruit** with pedicels to 36 mm long, densely hairy, monocarps numerous (to 30 or more), cylindrical, straight or slightly curved, sometimes with a longitudinal ridge, not constricted between the seeds, 59–65 × 21–25 mm, apex rounded, indistinctly apiculate, yellow and fleshy at maturity, densely hairy, stipitate, stipes to 40 mm long and 3 mm thick. **Seeds** numerous (12–16) per monocarp, flattened ellipsoidal, testa smooth, glabrous, drying blackish brown.

Distribution. Thailand and Peninsular Malaysia. In Singapore, material from Bukit Timah (*Sinclair SFN 38652*, May 1953, SING [SING0012188]), Upper Peirce (*Gwee SING2009-461*, 17 Nov 2009, SING [SING0138017]) and Pulau Ubin (*Gwee et al. GAT386*, 7 Oct 2003, SING [SING0047733]) has been identified as *Uvaria curtisii*, but some uncertainty remains regarding the identifications (see notes).

Ecology. In Singapore, specimens identified as *Uvaria curtisii* have been collected in primary and secondary lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. All material identified as *Uvaria curtisii* from Singapore is sterile and the flower and fruit descriptions are based on material from Peninsular Malaysia and Thailand, as well as the description by Meade & Parnell (Austral. Syst. Bot. 31 (2018) 330). Additional flowering and fruiting material is required to confirm the identity of the Singapore material and the presence of this species in Singapore.

Meade & Parnell (Austral. Syst. Bot. 31 (2018) 330), published a lectotypification for *Uvaria curtisii* on 6 December 2018 but the specimen they chose was collected after the protologue was published and is not original material. Although Turner (Gard. Bull. Singapore 70 (2018) 696) was published later, on 14 December 2018, the specimen he designated as lectotype is accepted here as it is original material.

5. *Uvaria excelsa* (Hook.f. & Thomson) King

(Latin, *excelsus* = lofty, high; presumably referring to the large size of this climber)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 22; Turner, Gard. Bull. Singapore 64 (2012) 446; Turner, Gard. Bull. Singapore 70 (2018) 698; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 151. **Basionym:** *Mitrephora excelsa* Hook.f. & Thomson, Fl. Ind. 1 (1855) 114. **Synonyms:** *Uvaria excelsa* Wall., Numer. List no. 6477 (1832), nom. nud. – *Kinginda excelsa* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 7. – *Cyathostemma excelsum* (Hook.f. & Thomson) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 226; Turner, Gard. Bull. Singapore 45 (1993) 29; Utteridge, Blumea 45 (2000) 384. **Type:** *Porter s.n.* [EIC 6477], [Malaysia], Penang (lectotype K [K000691369], first step designated by Sinclair, Gard. Bull. Singapore 14(2) (1955) 227, second step designated by Utteridge, Blumea 45 (2000) 384; isoelectotypes BR [BR0000013471712], K [K000691370], K-W [K001123993], WU [WU0025755]).

Tetrapetalum volubile Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 1. **Type:** *de Vriese s.n.* Borneo, 1857 (lectotype L [L0037889, L0037900, L0037901 – a single specimen over 3 sheets], designated by Utteridge, Blumea 45 (2000) 384; isoelectotype U [U0008328]).

Uvaria confertiflora Merr., Univ. Calif. Publ. Bot. 15 (1929) 61. **Type:** *Elmer 21081*, [Malaysia], British North Borneo [Sabah], Tawao [Tawau], October 1922–March 1923 (lectotype L [L0037902], designated by Utteridge, Blumea 45 (2000) 384; isoelectotypes A [A00039272], BISH [BISH1000699], BM [BM000554036, BM000554037], BO, BR [BR0000005216765], C [C10005701], CAL [CAL0000004223], CAS [CAS0005336], CM [CM0612], DS, HBG [HBG0514577], K [K000380305], M [M0265463], MICH [MICH1115457], MO [MO176164], NY [NY00059212], P [P00411199], PH [PH00028647], S [S07-10813], SING [SING0081608], U [U0014328], UC [UC289959], Z [Z000000868, Z000000869]).

Large woody climbers. **Twigs** blackish, striate-latticed, the youngest parts sparsely hairy, older twigs glabrescent. **Leaves:** lamina glabrous above or midrib hairy or sometimes both midrib hairy and lamina sparsely hairy, moderately to densely hairy beneath on both the midrib and lamina, obovate to narrowly obovate, $6.5\text{--}23.5 \times 2.5\text{--}12$ cm, base cordate to subcordate, apex acute-acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 8–12 per side; petiole 5–12 mm long, densely hairy when young, older densely hairy to glabrescent. **Inflorescences** 2- to many-flowered, usually both supra-axillary and internodal present. **Flowers** with pedicels 2–5 mm long, densely hairy; with a basal and a medial bract, bracts ovate, to 11 mm long; sepals 2–3, valvate in bud, connate at base at maturity, broadly ovate to semi-orbicular, $4\text{--}5 \times 5\text{--}6$ mm, glabrous to sparsely hairy adaxially, densely hairy abaxially; petals 4 or 6, green-yellow or sometimes red, erect at anthesis forming a pollination chamber, elliptic to broadly ovate, subequal in size in the outer and inner whorl, both outer and inner petals clawed but outer with a broader base and the inner with a narrower base, $3\text{--}6 \times 4\text{--}6$ mm, with some vertical furrows at the base when dried, abaxially densely hairy, adaxially distally moderately densely hairy, basally sparsely hairy; stamens 1.5–2 mm long, connective apex slightly elongated and straight to obliquely tongue-shaped, truncate to rounded, papillose, thecae glabrous; carpels many, ovaries densely hairy or densely hairy abaxially and glabrous adaxially, stigma bilobed, U-shaped, glabrous. **Fruit** with pedicels to 6 mm long, densely hairy; monocarps several to numerous (to 20 or more), ellipsoidal, not constricted between the seeds, $14\text{--}25 \times 12\text{--}22$ mm, apex rounded, not or indistinctly apiculate, surface tuberculate, densely hairy, stipitate, stipes to 32 mm long and 3 mm thick. **Seeds** up to 12 per monocarp, $11\text{--}16 \times 7\text{--}11$ mm, flattened ellipsoidal, testa smooth, glabrous, drying brown.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, known only from one very old collection without date and any collector information but the label indicating ‘Flora of Singapore’ (SING [SING0073857]).

Ecology. Lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Nationally Extinct (NEx) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. Only very limited material is known from Singapore and the species description is primarily based on material from Peninsular Malaysia.

6. *Uvaria grandiflora* Roxb. ex Hornem.

(Latin, *grandis* = large, *flos* = flower; with large flowers)

Suppl. Hort. Bot. Hafn. (1819) 141; Sinclair, Gard. Bull. Singapore 14(2) (1955) 202; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14, fig. 10.12; Turner, Gard. Bull. Singapore 45 (1993) 33; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; Lee et al., Gard. Bull. Singapore 55 (2003) 292; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 89, 104, 224; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Li & Gilbert, Fl. China 19 (2011) 675; Turner, Gard. Bull. Singapore 64 (2012) 448; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 257, 287; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 328; Turner, Gard. Bull. Singapore 70 (2018) 700; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 151; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 303, pl. 36: E, F. **Type:** *Collector unknown s.n.*, India, cultivated in the Calcutta Botanic Garden, April 1818 (lectotype C [C10005704], designated by Turner, Phytotaxa 36 (2011) 99). **Fig. 79.**

Unona grandiflora Lesch. ex DC., Prodr. 1 (1824) 90. **Synonym:** *Uva grandiflora* (Lesch. ex DC.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Leschenault s.n.*, India, Bengal, 1821 (lectotype G-DC [G00201447], designated here).

Uvaria purpurea Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 11; Blume, Fl. Javae, fasc. 21–22 (1830) 13; Hooker & Thomson, Fl. Ind. 1 (1855) 95; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 47; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 17; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 21; Ridley, Fl. Malay Penins. 1 (1922) 31. **Type:** *Blume s.n.*, [Indonesia], Java (neotype NY [NY00059989], designated by Meade & Parnell, Austral. Syst. Bot. 31 (2018) 328).

Guatteria macrantha C.Presl, Reliq. Haenk. 2, fasc. 2 (1835) 78. **Type:** *Haenke s.n.*, Mexico [more likely the Philippines] (holotype PR [sheet no. 192591]).

Uvaria platypetala Champ. ex Benth., Hooker’s J. Bot. Kew Gard. Misc. 3 (1851) 257. **Type:** *Champion* 38, [China], Hong Kong, East Point, low jungle near the Buddhist Temple, East Point, 1850 (lectotype K [K000380694], designated by Meade & Parnell, Austral. Syst. Bot. 31 (2018) 328).

Uvaria rhodantha Hance ex Walp., Ann. Bot. Syst. 2, fasc. 1 (1851) 19. **Type:** *Hance* 933, [China], Hong Kong, April 1852 (neotype BM [BM000527943], designated by Turner, Phytotaxa 36 (2011) 99).

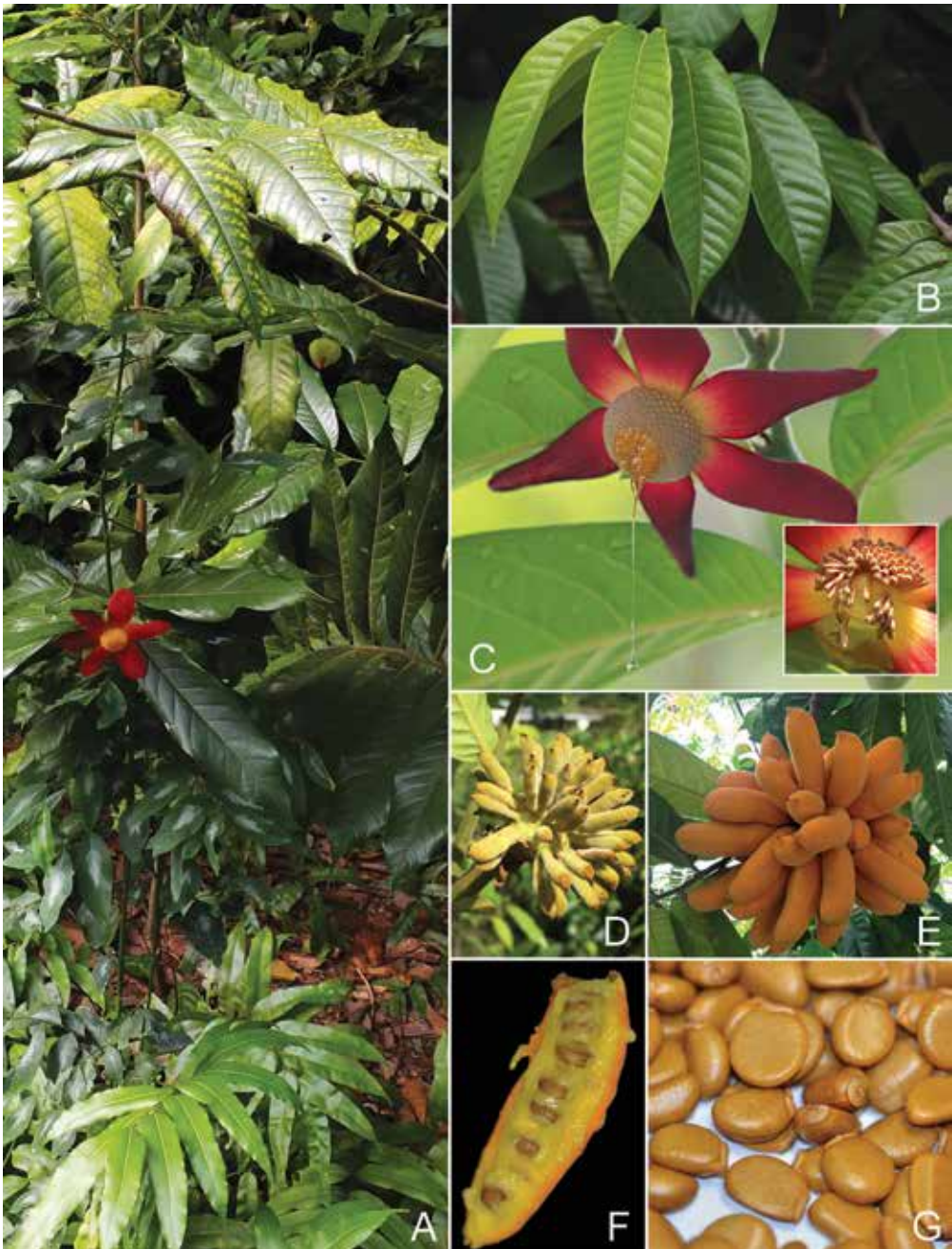


Figure 79. *Uvaria grandiflora* Roxb. ex Hornem. **A.** Habit. **B.** Leaves. **C.** Flower with receptive stigma oozing stigmatic exudate. Inset: Flower centre, showing anthers falling off. **D.** Developing fruit. **E.** Fruit. **F.** Monocarp, longitudinal section showing pulp and seeds. **G.** Seeds. (A–G from Singapore, A, Singapore Botanic Gardens, *Leong & Tan SING2017-838*; B–E, Singapore Botanic Gardens. Photos: A, P.K.F. Leong; B, Zaki Jamil; C–E, X.Y. Ng).

Uvaria flava Teijsm. & Binn., *Natuurk. Tijdschr. Ned.-Indië* 25 (1863) 419. **Synonyms:** *Uvaria purpurea* Blume var. *flava* (Teijsm. & Binn.) Scheff., *Natuurk. Tijdschr. Ned.-Indië* 31 (1869 ['1870']) 4. – *Uvaria grandiflora* Roxb. ex Hornem. var. *flava* (Teijsm. & Binn.) J.Sinclair, *Gard. Bull. Singapore* 14(1) (1953) 44; Meade in Johnson & Murray, *Fl. Thailand* 16(1) (2022) 304. **Type:** *Collector unknown s.n.*, [Indonesia], originally from Bangka, cult. in Hort. Bot. Bogor. sub XVI-E-6 (lectotype L [L1770656], designated by Meade & Parnell, *Austral. Syst. Bot.* 31 (2018) 329).

Uvaria purpurea Blume var. *angustifolia* Miq., *Ann. Mus. Bot. Lugduno-Batavi* 2, fasc. 1 (1865) 6. **Type:** *de Vriese*, [Indonesia], Halmahera (not traced).

Uvaria purpurea Blume var. *alba* Scheff., *Natuurk. Tijdschr. Ned.-Indië* 31 (1869 ['1870']) 4. **Type:** *Diepenhorst s.n.*, [Indonesia], Sumatra, Priaman (lectotype U [U1074870], designated by Meade & Parnell, *Austral. Syst. Bot.* 31 (2018) 329).

Uvaria purpurea Blume var. *glabrescens* Becc. ex Scheff., *Ann. Jard. Bot. Buitenzorg* 2 (1881 ['1885']) 1. **Type:** *Beccari s.n.* [Indonesia], Aru Islands, Giabu-lengan, May 1873 (lectotype FI-B [FI007544] [Erb. Coll. Becc. no. 155], designated by Turner, *Gard. Bull. Singapore* 70 (2018) 701; isoelectotypes FI-B [Erb. Coll. Becc. no. 155A, 155B]).

Uvaria neoguineensis Engl., *Bot. Jahrb. Syst.* 7(5) (1886) 454, as '*neo-guineensis*'. **Synonyms:** *Uvaria purpurea* Blume var. *neoguineensis* (Engl.) Diels, *Bot. Jahrb. Syst.* 49(1) (1912) 123. **Type:** *Naumann N.G. 46*, [Indonesia, Papua], Segar Bay, 17 June 1875 (lectotype B [B 10 0365078], designated by Diels, *Bot. Jahrb. Syst.* 49(1) (1912) 123).

Uvaria purpurea Blume var. *tuberculata* King, *J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 61(1) (1892) 18. **Type:** *King's Collector 4786*, [Malaysia], Perak, Larut, August 1883 (lectotype K [K000380129], designated by Turner, *Phytotaxa* 36 (2011) 100; isoelectotypes CAL [CAL0000004218, CAL0000004219], G).

Uvaria rubra C.B.Rob., *Bull. Torrey Bot. Club* 35 (1908) 68. **Type:** *Williams 3042*, Philippines, Mindanao, Prov. Davao, Santa Cruz, 29 June 1905 (holotype NY [NY00059991]; isotypes NY [NY00059990, NY00059992]).

For several additional potential synonyms see Turner, *Gard. Bull. Singapore* 70 (2018) 701.

Large woody climbers. **Twigs** green to brownish, striate-latticed, moderately to densely hairy, glabrescent with age. **Leaves:** lamina sparsely hairy with 1- to multi-branched hairs when young, older leaves usually glabrescent above except for the densely hairy midrib, sparsely to moderately densely hairy with multi-branched hairs beneath, midrib and lateral veins usually densely hairy, rarely sparsely hairy, obovate to elliptic, 13–31 × 5–11.7 cm, base cordate to rounded, apex acuminate, midrib flush to slightly sunken adaxially, prominent abaxially, lateral veins 11–19 per side; petiole 5–10 mm long, usually densely hairy, rarely sparsely hairy. **Inflorescences** single-flowered or flowers in short, 2–3-flowered cymes, leaf-opposed, sub-opposed or cauliflorous. **Flowers** with pedicels 10–32 mm long, densely hairy; with a basal and a medial bract, bracts ovate to elliptic, to 32 mm long; sepals calyprate in bud, basally connate at maturity, lobes ovate, 15–30 × 10–25 mm, sparsely to densely hairy adaxially, densely hairy abaxially, greenish; petals deep red to purple, frequently cream-coloured at the base, spreading at maturity, elliptic to ovate, subequal in shape and size in the outer and inner whorl, 19–45 × 8–22 mm, densely hairy abaxially, moderately to densely hairy adaxially; stamens 6–8 mm

long, connective apex tongue-shaped, minutely papillose, glabrous; carpels many, ovaries densely hairy, stigma bilobed, U-shaped, with strongly involute margins, glabrous. **Fruit** with pedicels to 32 mm long, densely hairy; monocarps numerous (to 20 or more), cylindrical or curved-cylindrical, frequently slightly constricted between the seeds, $44\text{--}58 \times 10\text{--}18$ mm, apex rounded or apiculate, orange and fleshy at maturity, densely hairy, stipitate, stipes to c. 32 mm long and 4 mm thick. **Seeds** numerous (16–30) per monocarp, $7\text{--}10 \times 5$ mm, hemi-ellipsoid to ovoid, testa smooth, glabrous, drying brown.

Distribution. India, China, Myanmar, Thailand, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Sulawesi, Philippines and New Guinea. In Singapore, there are historical collections from Jurong (*Ridley s.n.*, 10 Apr 1892, SING [SING0003348]), Bukit Panjang (*Ridley s.n.*, 1906, SING [SING0003349]) and other places. More recent collections are from MacRitchie (*Leong et al. SING2014-098*, 16 Dec 2014, SING [SING0213737]), Singapore Botanic Gardens' Rain Forest (*Kessler PK3115*, 28 Jun 2001, SING [SING0035937]) and Bukit Timah (*Niissalo et al. SING2020-206*, 4 Mar 2020, SING [SING0341473]).

Ecology. In Singapore, in primary and secondary lowland rain forest including severely disturbed forest vegetation at forest margins.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Uses. In Singapore, and elsewhere in tropical Asia, this species is occasionally planted as an ornamental.

Vernacular names. *Akar larak*, *pisang akar*, *red hot poker*, 山椒子, 山椒, 大花紫玉盘 (NParks' Flora & Fauna Web, 2026).

Notes. Meade & Parnell (Austral. Syst. Bot. 31 (2018) 329), published on 6 December 2018, designated a lectotype for *Uvaria flava* Teijsm. & Binn., here treated as a synonym of *Uvaria grandiflora* Roxb. ex Hornem. Turner (Gard. Bull. Singapore 70 (2018) 701), published on 14 December 2018, designated a different specimen as a neotype. The designation by Meade & Parnell has priority. It is difficult to verify whether their selected lectotype unequivocally represents original material, but even if it is established that it is not, and in the absence of any other verifiable original material, this would be correctable by a change of the type status to neotype.

7. *Uvaria griffithii* L.L.Zhou et al.

(William Griffith, 1810–1845, English botanist known for his work in India and Malaya)

Syst. Biodivers. 7 (2009) 255; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Turner, Gard. Bull. Singapore 64 (2012) 449; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 342; Turner, Gard. Bull. Singapore 70 (2018) 702; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68;

Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 151. **Synonym:** *Cyathostemma viridiflorum* Griff., Not. Pl. Asiat. 4 (1854) 707; Griffith, Icon. Pl. Asiat. 4 (1854) pl. 650; Ridley, Fl. Malay Penins. 1 (1922) 27; Sinclair, Gard. Bull. Singapore 14(2) (1955) 221; Keng, Gard. Bull. Singapore 27 (1974) 71; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 12; Turner, Gard. Bull. Singapore 45 (1993) 29; Turner et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 10; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 110; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 140; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 170; Utteridge, Blumea 45 (2000) 390; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 30, 103, 220; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 71, 283; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 304, pl. 37: A, B. **Type:** *Griffith s.n.* [Kew Distribution 432], [Malaysia], Malacca [Melaka] (lectotype K [K000582099], designated by Utteridge, Blumea 45 (2000) 390). **Fig. 80.**

Cyathostemma scortechinii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 9; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 38. **Synonym:** *Cyathostemma viridiflorum* Griff. var. *scortechinii* (King) Ridl., Fl. Malay Penins. 1 (1922) 27. **Type:** *King's Collector 5857*, [Malaysia], Perak, Gopeng (lectotype K [K000380130], designated by Utteridge, Blumea 45 (2000) 390; isolectotypes A [A00348398], BM [BM000020753], CAL, SING [SING0073566]).

Large woody climbers. **Twigs** brownish (when young), dark brownish-blackish (at maturity), striate-latticed, the youngest parts moderately densely to sparsely hairy, older twigs glabrescent. **Leaves:** lamina adaxially glabrous or with sparse indumentum along the midrib, abaxially with sparse indumentum on midrib and very sparse indumentum on the lamina to glabrescent, obovate to elliptic, 10–28 × 4–8.6 cm, base usually shortly cordate or sometimes subcordate to rounded, apex acute-acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 9–15 per side; petiole 5–13 mm long, sparsely hairy to glabrescent. **Inflorescences** elongated and composed of multiple cymes, each few- to many-flowered, but only 1–2 flowers open at any time, cauliflorous or internodal. **Flowers** with pedicels 6–9 mm long, densely hairy; with a basal and a medial bract, bracts ovate to broadly ovate, to 6 mm long; sepals valvate in bud, free or shortly connate at base at maturity, broadly ovate to semi-orbicular, 2.5–3.5 × 3–5 mm, densely hairy adaxially and abaxially; petals greenish to green-yellow, erect at anthesis forming a pollination chamber, elliptic to ovate, inner narrower than outer, petals of both whorls with thickened claw, 5–7 × 4–5 mm, abaxially and adaxially sparsely to moderately densely hairy; stamens many, c. 2–2.5 mm long, connective apex slightly elongated and straight to obliquely tongue-shaped, truncate to rounded, papillose, thecae glabrous; carpels many, ovaries densely hairy or with longitudinal lines of hairs, stigma bilobed, U-shaped, glabrous except for the hairy abaxial base. **Fruit** with pedicels to 14 mm long, moderately densely hairy; monocarps several to numerous (to 20 or more), ellipsoidal to cylindrical, with shallow constrictions between the seeds (when dried), 22–38 × 13–20 mm, apex rounded, apiculate, surface finely granulate, sparsely hairy, stipitate, stipes to 31 mm long and 4 mm thick. **Seeds** up to 10 per monocarp, c. 15 × 7 mm, flattened ellipsoidal, testa smooth, glabrous, drying brown.

Distribution. Andaman & Nicobar Islands, Thailand, Peninsular Malaysia, Sumatra and Borneo. In Singapore, there are historical collections from Bidadari (*Ridley s.n.*, 1898, SING [SING0042217]), Jurong and other places. More recent collections are from Pulau Ubin (*Gwee et al. GAT302*, 8 Apr 2003, SING [SING0043940]), MacRitchie (*Samsuri et al. NES375*, 6 Apr 2004, SING [SING0053901]), Nee Soon (*Lua SING2010-734*, 31 Mar 2010,



Figure 80. *Uvaria griffithii* L.L.Zhou et al. **A.** Habit. Inset: Climbing stem. **B.** Flower in pistillate stage (front view). **C.** Inflorescence. **D.** Flower bud (front view). **E.** Flower, staminate stage. (A–E including inset from Singapore, A, A inset, D & E, MacRitchie, Ng & Lim SING2020-348; B & C, MacRitchie. Photos: A, D & E, X.Y. Ng; A inset & B, J. Chen; C, P.K.F. Leong).

SING [SING0146616]), Bukit Timah (*Niissalo & Choo SING2019-938*, 24 Sep 2019, SING [SING2019-938]) and Upper Peirce (*Thomas 3471*, 27 Mar 2021, SING [SING0387072, SING0387073]).

Ecology. In Singapore, in primary and secondary lowland rain forest including severely disturbed vegetation at forest margins.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

8. *Uvaria hirsuta* Jack

(Latin, *hirsutus* = rough, hairy; referring to the indumentum on the stems and leaves)

Malayan Misc. 1(5) (1820) 46; Hooker & Thomson, Fl. Ind. 1 (1855) 99; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 24; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 18; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 22, pl. 14; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 31; Sinclair, Gard. Bull. Singapore 14(2) (1955) 203; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 121; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; Lee et al., Gard. Bull. Singapore 55 (2003) 292; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 89, 104, 224; Turner, Gard. Bull. Singapore 64 (2012) 450; Turner, Gard. Bull. Singapore 70 (2018) 703; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68, 126; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 151. **Synonyms:** *Uvaria blumeana* Steud., Nomencl. Bot., ed. 2, 2, fasc. 12–13 (1841) 737, nom. illeg. superfl. – *Uva hirsuta* (Jack) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Wallich s.n.* [EIC 6458B], [Malaysia], Penang, 1822 (neotype K-W [K000442828], designated by Turner, Phytotaxa 36 (2011) 100; possible isoneotypes BM [BM000528061], K [K000739195]). **Fig. 81.**

Uvaria velutina Roxb. ex Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 13, nom. illeg. non DC. (1817). **Synonym:** *Uvaria hirsuta* Blume, Fl. Javae, fasc. 21–22 (1830) 22, t. 5, nom. illeg. non Jack (1820), nec Vell. (1829). **Type:** *Blume s.n.*, [Indonesia], Java, [West Java], Kuripan (lectotype L [L0332999], designated here).

Uvaria trichomalla Blume, Fl. Javae, fasc. 23–24 (1830) 42, t. 18. **Type:** *Kuhl & van Hasselt 1837*, [Indonesia], Java, [West Java], Tjikao (lectotype L [L0049372], designated here).

Guatteria pilosa G.Don, Gen. Hist. 1 (1831) 100. **Synonym:** *Uvaria pilosa* (G.Don) Roxb., Fl. Ind. 2 (1832) 665. **Type:** *Roxburgh s.n.* [EIC Herb. 6458A], locality unknown (lectotype K-W [K000442826], designated by Veldkamp, Gard. Bull. Singapore 62(2) (2011) 304).

Uvaria hirsuta Jack var. *bancana* Scheff., Natuurk. Tijdschr. Ned.-Indië 32 (1872 [‘1873’]) 387. **Type:** *Teijsmann*, [Indonesia], Sumatra, Bangka, prope Toboali (not traced).

Large woody climbers. **Twigs** pale brownish, striate-latticed, sparsely to densely hairy with erect, ferruginous hairs to c. 3 mm long, older twigs glabrescent. **Leaves:** adaxial lamina sparsely hairy with simple and multi-branched hairs to glabrescent between the veins above,



Figure 81. *Uvaria hirsuta* Jack. **A.** Habit. **B.** Flower bud. **C.** Flower in pistillate stage. Inset: Back of flower showing calyx. **D.** Flower in staminate stage. **E.** Flower with stamens falling off. (A–E including inset from Singapore, MacRitchie, Ng SING2013-369. Photos: X.Y. Ng).

midrib and lateral veins densely to sparsely hairy above, lamina sparsely hairy to glabrescent and midrib sparsely hairy beneath, elliptic, oblong-elliptic or obovate, 5–24 × 3–9 cm, base cordate to rounded, apex shortly to long acuminate, midrib slightly sunken to flush adaxially, prominent abaxially, lateral veins 9–16 per side; petiole 3–8 mm long, sparsely to densely hairy. **Inflorescences** single-flowered, supra-axillary. **Flowers** with pedicels 15–30 mm long, sparsely to densely hairy; with a basal and a medial bract, bracts ovate to oblong, to 12 mm long; sepals calyptrate in bud, basally connate at maturity, lobes ovate, 8–10 × 7–10 mm, sparsely hairy adaxially, densely hairy adaxially, greenish; petals dark red, spreading to reflexed at anthesis, ovate to elliptic, subequal in shape and size in the outer and inner whorl, 10–16 × 5–8 mm, densely hairy abaxially, moderately to densely hairy adaxially; stamens 3–5 mm long, connective apex slightly extended, minutely papillose, thecae glabrous to sparsely hairy; carpels many, ovaries densely hairy, stigma bilobed, U-shaped, with strongly involute margins, glabrous. **Fruit** with pedicels to 30 mm long, sparsely hairy; monocarps several to numerous (8 to 18 or more), cylindrical or ellipsoidal, not or slightly constricted between the seeds, 20–52 × 10–15 mm, apex rounded, indistinctly apiculate, orange and fleshy at maturity, densely hairy, stipitate, stipes to 35 mm long and 2.5 mm thick. **Seeds** several to numerous (to 16) per monocarp, 6–11 × 4–7 mm, hemi-ellipsoid to ovoid, testa smooth, glabrous, drying brown.

Distribution. Peninsular Malaysia, Sumatra, Java and Borneo. In Singapore, known from MacRitchie (Ng *SING2013-369*, 30 Dec 2013, SING [SING0213750]), Mandai (Gwee *SING2010-170*, 26 Jan 2010, SING [SING0144733]), Bukit Timah (Gwee *SING2010-079*, 5 Jan 2010, SING [SING0144071]) and Pulau Ubin (Ali Ibrahim *et al. AII62*, 15 Nov 1993, SING [SING0003359]). There are also historical collections from several other localities including Bedok (Ridley *s.n.*, 25 May 1892, SING [SING0003353]), Changi and Singapore Botanic Gardens' Rain Forest.

Ecology. In Singapore, in primary and secondary lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Vulnerable (VU/D) by Middleton *et al.* (in Davison *et al.* (ed.), *Singapore Red Data Book*, ed. 3 (2024) 468).

Vernacular name. *Daun cermai* (NParks' Flora & Fauna Web, 2026).

9. *Uvaria leptopoda* (King) J.Sinclair

(Greek, *leptos* = thin, slender, *-poda* = foot; referring to the slender pedicel)

Gard. Bull. Singapore 14(2) (1955) 212; Keng, Gard. Bull. Singapore 27 (1974) 74; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, *Concise Fl. Singapore*, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 121; Turner *et al.*, Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew *et al.*, Gard. Bull. Singapore 49(2) (1999 ['1997']) 171, as '*leptopoda*'; Chong *et al.*, *Checkl. Vasc. Pl. Fl. Singapore* (2009) 89, 104, 213; Turner & Chua, *Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res.* (2011) 10; Turner, Gard. Bull. Singapore 70 (2018) 706;

Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 152. **Basionym:** *Ellipeia leptopoda* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 25. **Synonym:** *Uvariella leptopoda* (King) Ridl., Fl. Malay Penins. 1 (1922) 35. **Type:** Ridley 4708, Singapore, Bukit Mandai, 1892 (lectotype CAL [CAL0000004222], first step designated by Keng, Gard. Bull. Singapore 27 (1974) 74, second step designated here; isolectotype SING [SING0012191]). **Fig. 82, 83.**

Uvaria ridleyi auct. non King: Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 32.

Large woody climbers. **Twigs** dark brownish, striate-latticed, densely to moderately densely hairy, glabrescent with age. **Leaves:** lamina densely hairy on the midrib and sparsely hairy to glabrescent between the veins above, abaxial midrib densely to sparsely hairy, abaxial lamina densely tomentose to sparsely hairy, obovate to elliptic, $8-17 \times 3.2-8.3$ cm, base shortly cordate to rounded, apex acute and acuminate, midrib flush to slightly sunken adaxially, prominent abaxially, lateral veins 9–15 per side; petiole 4–8 mm long, densely hairy, transverse rings absent or sometimes present. **Inflorescences** 1–3-flowered cymes, internodal or leaf-opposed. **Flowers** with pedicels 5–6 mm long, densely hairy; bracts broadly ovate, to 5 mm long; sepals connate in early bud (petals exposed), connate at the base to middle at maturity, lobes broadly ovate to semicircular, $3-5 \times 5-8$ mm, densely hairy adaxially except for glabrous base, densely hairy abaxially; petals dark red-purple, spreading at anthesis, ovate, broadly ovate or elliptic, subequal in shape and size in the outer and inner whorl, $7-9 \times 5-7$ mm, densely hairy abaxially, adaxially sparsely to moderately densely hairy distally and usually (sub-)glabrous towards the base; stamens numerous, 2–2.5 mm long, connective apex extended tongue-shaped, papillose, glabrous, outer staminodal; carpels many, ovaries densely hairy, stigma U-shaped, with strongly involute margins and longitudinal slit, glabrous. **Fruit** with pedicels to 10 mm long, densely hairy; monocarps numerous (to 40 or more), ovoid, ellipsoidal, not constricted between the seeds, $13-22 \times 14-16$ mm, apex rounded, apicule absent or indistinct in mature monocarps, distinct in young monocarps, surface smooth to wrinkled-tuberculate, densely hairy, stipitate, stipes to 82 mm long and 3 mm thick. **Seeds** few to several (3–10) per monocarp, $10-15 \times 7-9$ mm, flattened hemi-ellipsoidal, testa smooth, glabrous, drying dark brown.

Distribution. Peninsular Malaysia. In Singapore, there are historical collections from Mandai (Ridley 5822, 1893, SING [SING0048663]), Bukit Kalang (Burkill SFN 7834, 2 Aug 1922, SING [SING0012192]), Jurong (Corner SFN 26153, 18 Dec 1932, SING [SING0012193]) and Pasir Panjang (Sinclair SFN 39431, 27 Nov 1951, SING [SING0012190]). Recent collections have been made only in Nee Soon (Ng et al. SING2018-685, 8 Jul 2018, SING [SING0273954]).

Ecology. In Singapore, now only found in freshwater swamp forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. As there is very limited material of this species known from Singapore, the description is also based on material from Peninsular Malaysia.

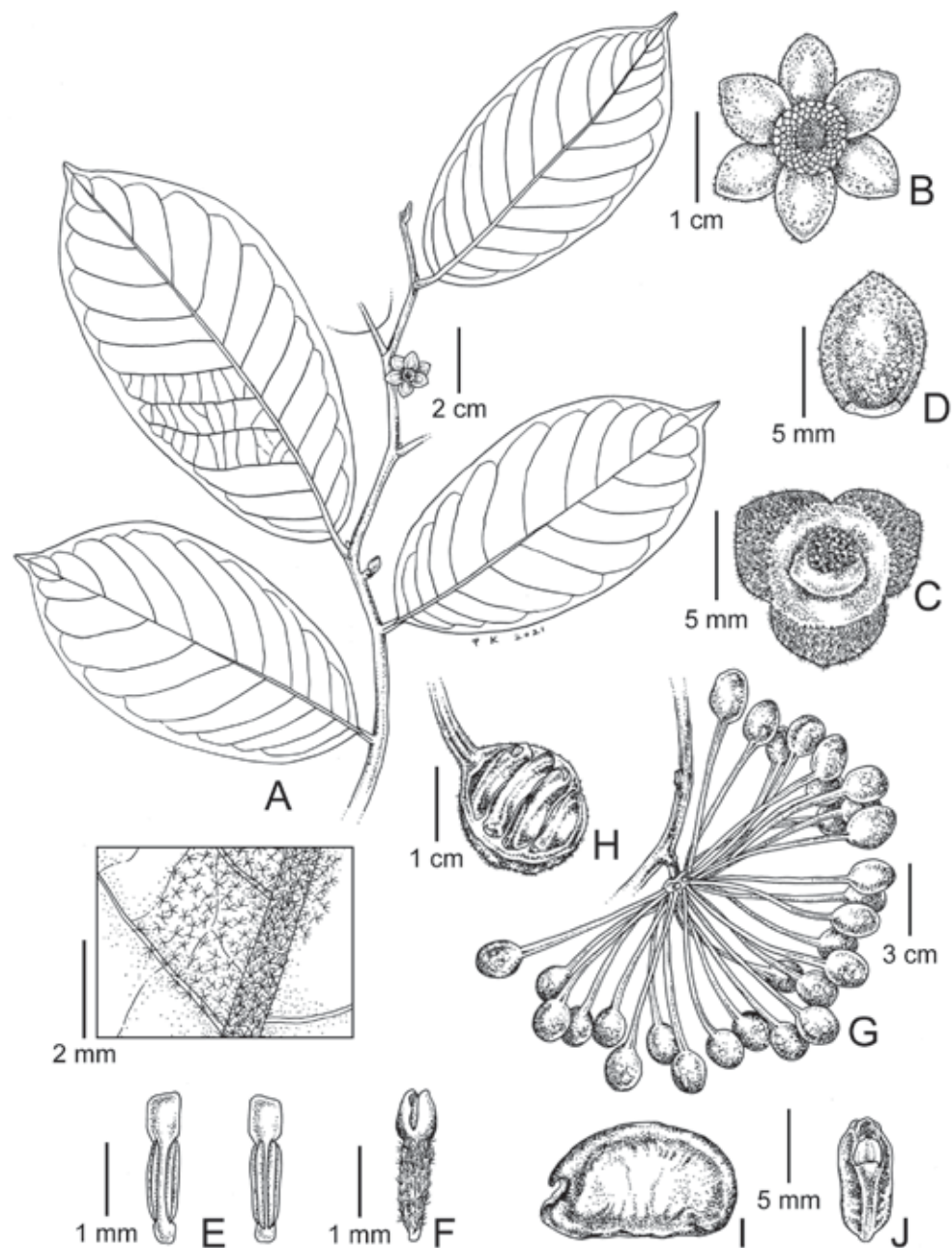


Figure 82. *Uvaria leptopoda* (King) J.Sinclair. **A.** Flowering branch. **A inset:** Lower leaf surface. **B.** Flower (front view). **C.** Flower, front view showing calyx and torus. **D.** Petal, adaxial side. **E.** stamens, adaxial (left) and abaxial (right). **F.** Ovary. **G.** Fruit. **H.** Monocarp, longitudinal section showing seeds. **I.** Seed (side view). **J.** Seed, micropylar region. (A–F from Peninsular Malaysia, Johore, *Corner 28580*; G & H from Singapore, Bukit Kalang, *Burkill 7834*. Drawn by P.K. Cheng).

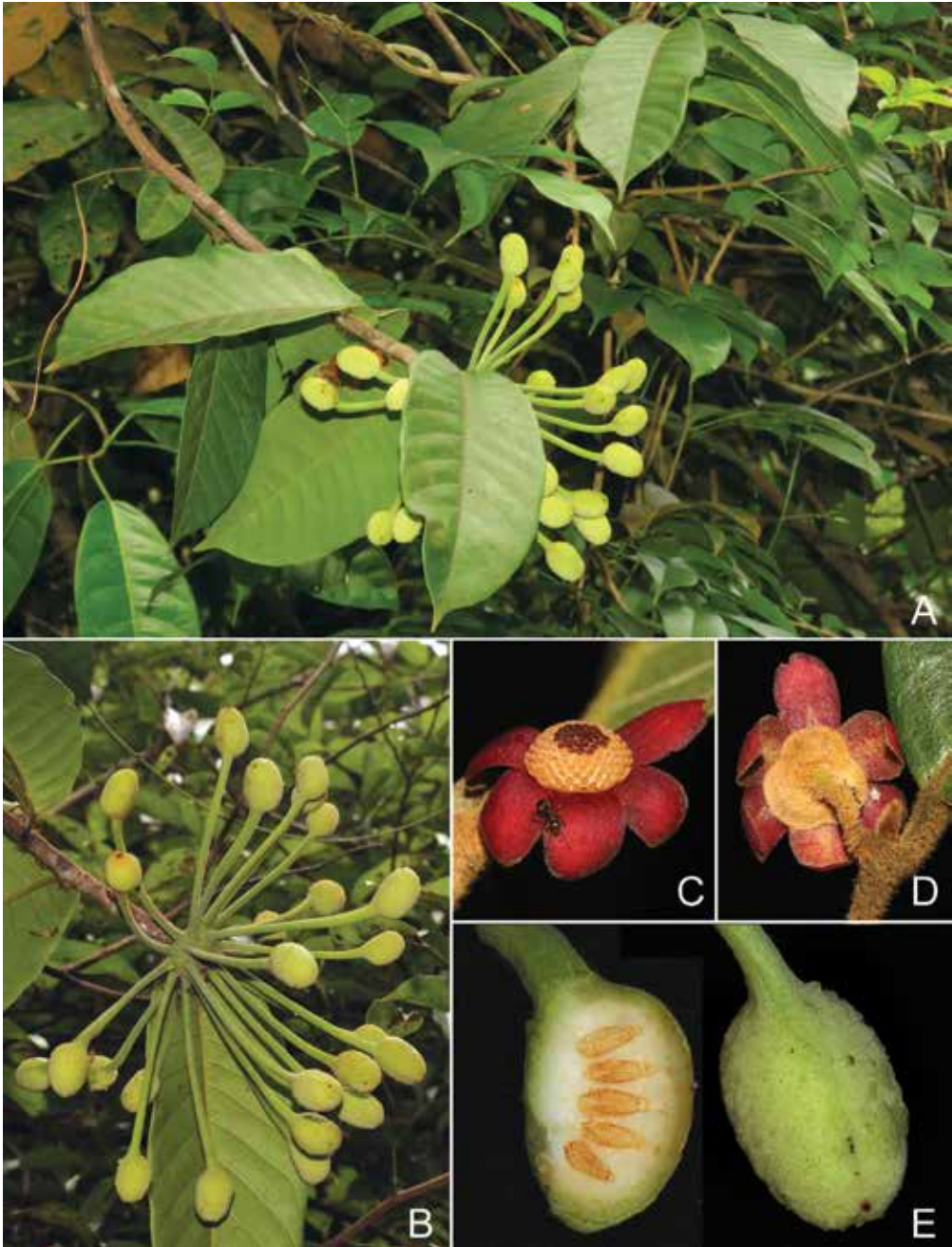


Figure 83. *Uvaria leptopoda* (King) J.Sinclair. **A.** Habit. **B.** Immature fruit. **C.** Flower (side view). **D.** Flower, pedicel and calyx. **E.** Longitudinal section of monocarp showing seeds. (A–E from Singapore, A, B & E, Nee Soon, *Ng et al. SING2018-685*; C & D, Nee Soon, *Ng & Lim SING2021-505*. Photos: A, R.C.J. Lim; B–E, X.Y. Ng).

10. *Uvaria littoralis* (Blume) Blume

(Latin, *littoralis* = of the seashore)

Fl. Javae, fasc. 21–22 (1830) 26, t. 7; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Turner, Gard. Bull. Singapore 64 (2012) 425; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 337; Turner, Gard. Bull. Singapore 70 (2018) 706; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 152; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 307, pl. 37: C, D. **Basionym:** *Unona littoralis* Blume, Bijdr. Fl. Ned. Ind., pt 1 (1825) 16. **Synonym:** *Uvaria gamopetala* Zoll., Linnaea 29(3) (1858) 305, 310, nom. illeg. superfl. **Type:** *Collector unknown s.n.* [Blume leg.], [Indonesia], Java (lectotype U [U1074978], designated by Meade & Parnell, Austral. Syst. Bot. 31 (2018) 337). **Fig. 84.**

Guatteria cordata Dunal, Monogr. Anonac. (1817) 129, t. 30. **Synonyms:** *Uva cordata* (Dunal) Kuntze, Revis. Gen. Pl. 1 (1891) 8. – *Uvaria cordata* (Dunal) Wall., Numer. List no. 6486 (1832), nom. illeg. non Schumach. & Thonn. (1827); Alston, Handb. Fl. Ceylon 6(Suppl.) (1931) 4; Sinclair, Gard. Bull. Singapore 14(2) (1955) 207; Huber in Dassanayake & Fosberg (ed.), Rev. Handb. Fl. Ceylon 5 (1985) 14; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 33; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; Lee et al., Gard. Bull. Singapore 55 (2003) 291; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 89, 104, 231; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 257, 287. **Type:** [Published illustration] *Guatteria cordata* in Dunal, Monogr. Anonac. (1817) t. 30, lectotype designated by Turner, Nordic J. Bot. 33 (2015) 291. **Epitype:** *Porter s.n.* [EIC 6486A], [Malaysia], Penang (epitype K-W [K001124009], designated by Meade & Parnell, Austral. Syst. Bot. 31 (2018) 337).

Uvaria ovalifolia Blume, Fl. Javae, fasc. 21–22 (1830) 27, t. 8, t. 14: A. **Type:** [Published illustration] *Uvaria ovalifolia* in Blume, Fl. Javae, fasc. 21–22 (1830) t. 8, lectotype designated by Turner, Nordic J. Bot. 33 (2015) 291.

Uvaria macrophylla Roxb. [Hort. Bengal. (1814) 43, nom. nud.] ex Wall., Pl. Asiat. Rar. 2, fasc. 5 (1830) t. 122; Wallich, Pl. Asiat. Rar. 2, fasc. 6 (1831) 22; Roxburgh, Fl. Ind. 2 (1832) 663; Hooker & Thomson, Fl. Ind. 1 (1855) 97; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 49; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 30; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 2215; Li & Gilbert, Fl. China 19 (2011) 676. **Type:** *Wallich s.n.* [EIC 6487A], India, cult. in Calcutta Botanic Garden (lectotype K-W [K000442833], designated by Turner, Phytotaxa 36 (2011) 102; isolectotype BM).

Uvaria rufescens A.DC., Mém. Soc. Phys. Genève 5 (1832) 202; de Candolle, Mém. Anon. (1832) 26. **Type:** *Wallich 130* [EIC 6487B], Burma [Myanmar], Prome [Pyay], 1826 (lectotype K-W [K000442832], designated by Turner, Phytotaxa 32 (2011) 48).

Uvaria sorzogonensis C.Presl, Reliq. Haenk. 2, fasc. 2 (1835) 76. **Type:** *Haenke s.n.*, Philippines, Luzon, Sorzogon (holotype PR [sheet nos. 212920A and 212920B – a single specimen over 2 sheets]).

Unona camphorata Blanco, Fl. Filip. (1837) 468. **Type:** *Merrill: Species Blancoanae 1057*, Philippines, [Alabat Island, December 1916] (neotype K [K000779806], designated by Turner, Phytotaxa 36 (2011) 102; isoneotypes BM [BM001121310], L [L0190939], P [P00248448], US [US00688554]).

Uvaria badiiflora Hance in Walpers, Ann. Bot. Syst. 2, fasc. 1 (1851) 19. **Type:** *Hance 932*, [China], Hong Kong, May 1854 (neotype BM [BM000527942], designated by Turner, Gard. Bull. Singapore 70 (2018) 707).

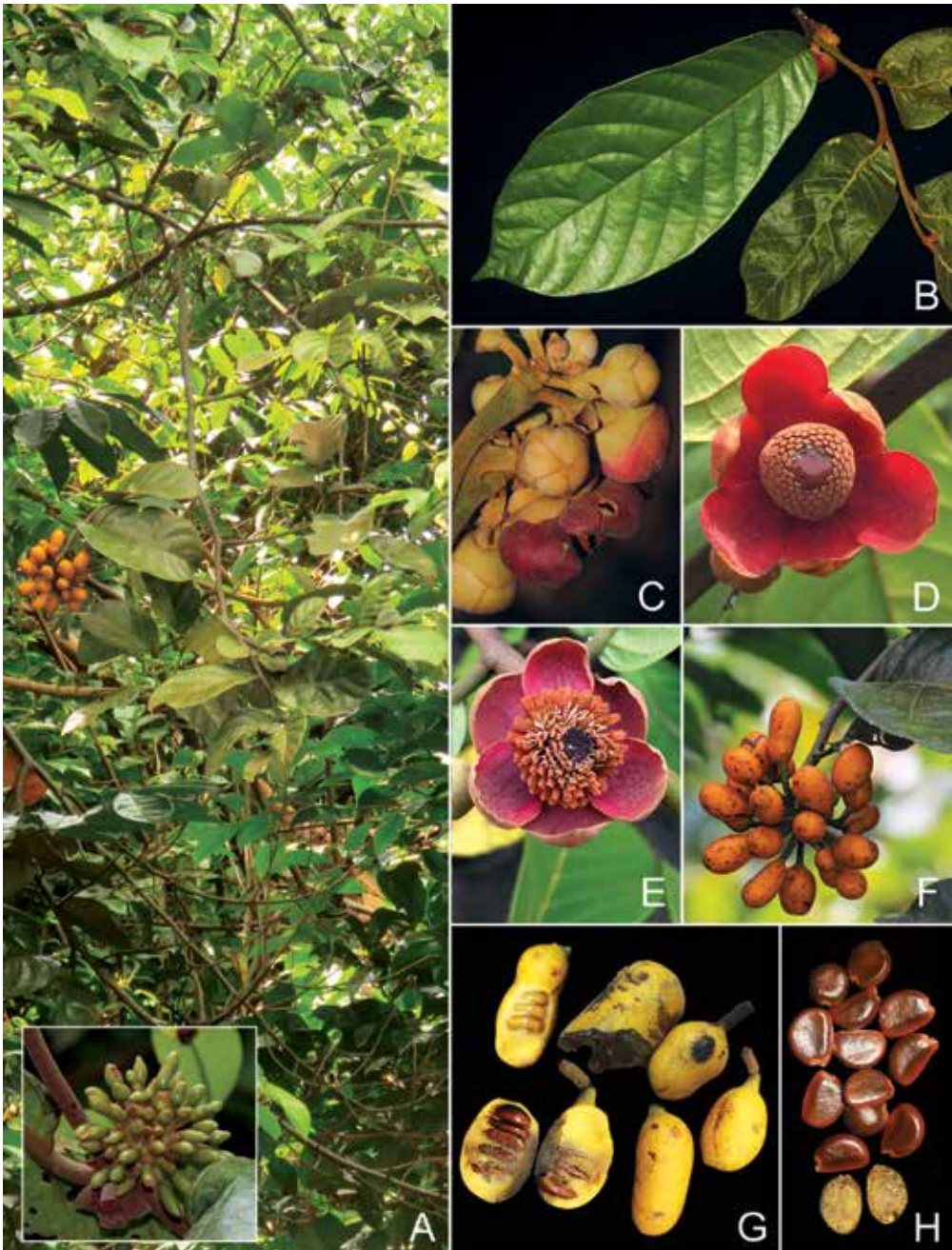


Figure 84. *Uvaria littoralis* (Blume) Blume. **A.** Habit. Inset: Young fruit. **B.** Leaves. **C.** Flower buds. **D.** Flower in pistillate stage. **E.** Flower in staminate stage. **F.** Fruit. **G.** Monocarps, some opened showing the seeds. **H.** Seeds, a sectioned seed showing the ruminant endosperm. (A–H including inset from Singapore, A, A inset, B & D–H, Nee Soon, *Lim et al. SING2013-336*; C, MacRitchie. Photos: A, R.C.J. Lim; A inset, B & D–H, X.Y. Ng; C, J. Chen).

Uvaria microcarpa Champ. ex Benth., Hooker's J. Bot. Kew Gard. Misc. 3 (1851) 256. **Synonyms:** *Uva microcarpa* (Champ. ex Benth.) Kuntze, Revis. Gen. Pl 1 (1891) 8. – *Uvaria macrophylla* Roxb. ex Wall. var. *microcarpa* (Champ. ex Benth.) Finet & Gagnep., Bull. Soc. Bot. France 53(Mém. 4(2)) (1906) 67. **Type:** *Champion* 39, [China], Hong Kong (holotype K [K000691191]).

Uvaria macrophylla Roxb. ex Wall. var. *glabrior* Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 368. **Type:** *Collector unknown* [Teijsmann] *s.n.* [Herb. Bogor no. 3304, [Indonesia], Banka [Bangka], Sekoe Boeboe (lectotype U [U0048988], designated by Turner, Gard. Bull. Singapore 70 (2018) 707).

Uvaria acrantha Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 368. **Synonym:** *Uvaria ovalifolia* Blume var. *acrantha* (Miq.) Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 7. **Type:** *Collector unknown* [Teijsmann] *s.n.* [Herb. Bogor. no. 4323], [Indonesia], Sumatra, Lampongs, Kebang, Larah Batoe (lectotype U [U0000430], designated by Turner, Gard. Bull. Singapore 70 (2018) 707).

Uvaria synsepala Miq., J. Bot. Néerl. 1 (1861) 128. **Synonym:** *Uva synsepala* (Miq.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Krone s.n.*, China, China aust. (lectotype U [U0048973], designated by Turner, Gard. Bull. Singapore 70 (2018) 707).

Magnolia fasciculata P.Parm., Bull. Sci. France Belgique 27(2) (1896) 204, 265, 324, 333, pl. 10: fig. 26. **Type:** *Ralph s.n.*, India [probably an error] (lectotype P [P00260050], designated by Turner, Adansonia 34 (2011) 241).

Uvaria dolichoclada Hayata, Icon. Pl. Formosan. 3 (1913) 10. **Type:** *Konishi* 55, China, Hainan, June 1908 (lectotype TI [sheet no. TI-02594], designated by Turner, Gard. Bull. Singapore 70 (2018) 707).

Uvaria obovatifolia Hayata, Icon. Pl. Formosan. 3 (1913) 11. **Type:** *Katsumuda s.n.*, China, Hainan, 1909 (lectotype TI [sheet no. TI-02595], designated by Turner, Gard. Bull. Singapore 70 (2018) 707).

Uvaria macclurei Diels, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1931) 73. **Type:** *McClure C.C.C.* 9697, China, Hainan, Yik Tsok Mau, 18 May 1922 (lectotype E [E00050326], designated by Turner, Gard. Bull. Singapore 70 (2018) 707; isolectotypes A [A00039699], BM [BM000528083], C [C10005706], NY [NY00059218], P [P00142625].

For several additional potential synonyms see Turner, Gard. Bull. Singapore 70 (2018) 706–707.

Large woody climbers. **Twigs** dark brownish, striate, moderately densely hairy with short brownish hairs, glabrescent with age. **Leaves:** lamina hairy on midrib and basal lateral veins and sparsely hairy to glabrous between the veins above, abaxial midrib densely to sparsely hairy, abaxial lamina moderately densely to sparsely hairy or sometimes glabrescent, obovate to elliptic, 8–28 × 4.5–17.6 cm, base cordate to rounded, apex obtuse to acute, usually acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 9–16 per side; petiole 4–13 mm long, sparsely to densely hairy, sometimes with transverse rings. **Inflorescences** 3–5-flowered cymes, leaf-opposed or supra-axillary. **Flowers** with pedicels 3–16 mm long, densely hairy; with a basal and a medial bract, bracts broadly ovate, to 7 mm long; sepals connate in early bud, connate to about the middle at maturity, lobes broadly ovate to triangular; sepals 4–6 × 6–10 mm, densely hairy adaxially and abaxially, pale greenish; petals red to brownish red, elliptic, broadly ovate, ovate or obovate, subequal in shape and size in the outer and inner whorl, 12–20 × 7–17 mm, densely hairy abaxially and adaxially; stamens numerous, 6–8 mm long, connective apex extended, minutely papillose, glabrous, outermost

stamens with reduced pollen sac length or staminodal; carpels many, ovaries densely hairy, stigma bilobed, U-shaped, with strongly involute margins, hairy at base, otherwise glabrous. **Fruit** with pedicels to 20 mm long, densely hairy; monocarps numerous (to 20 or more), globose, ellipsoidal or cylindrical, frequently slightly constricted between the seeds, 10–33 × 10–15 mm, apex rounded or sometimes apiculate, orange, yellow to dark reddish and fleshy at maturity, very sparsely hairy to glabrous, stipitate, stipes to 23 mm long and 3 mm thick. **Seeds** few to numerous (3–14) per monocarp, 7–10 × 5–10 mm, hemi-ellipsoidal, testa smooth, glabrous, drying light brown.

Distribution. India, Sri Lanka, Bangladesh, China, Myanmar, Thailand, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Sulawesi and the Moluccas. In Singapore, there are historical collections from Tampines (*Goodenough s.n.*, 17 Jun 1890, SING [SING0003337]), Singapore Botanic Gardens' Rain Forest (*Ridley 9221*, 1891, SING [SING0000089]), Chan Chu Kang, Changi, and Jurong. More recent collections are from Nee Soon (*Ng SING2013-326*, 19 Oct 2013, SING [SING0203066]), MacRitchie (*Leong et al. MR2014-081*, 12 Nov 2014, SING [SING0213488]) and Bukit Timah (*Ho et al. BTSVP02-10C*, 19 May 2015, SING [SING0395798]).

Ecology. In Singapore, in primary and secondary lowland rain forest including severely disturbed vegetation at forest margins.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Least Concern (LC) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

11. *Uvaria lobbiana* Hook.f. & Thomson

(Thomas Lobb, 1817–1894, English plant collector in Southeast Asia)

Fl. Ind. 1 (1855) 100; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 24; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 15; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 30; Sinclair, Gard. Bull. Singapore 14(2) (1955) 208; Keng, Gard. Bull. Singapore 27 (1974) 74; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 34; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 121; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 89, 104, 199; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 257, 288; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 708; Chong et al., Gard. Bull. Singapore 70(Suppl. 1) (2018) 58; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 340; Turner, Gard. Bull. Singapore 70 (2018) 708; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68, 126; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 152; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 308, pl. 37: E. **Synonym:** *Uva lobbiana* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 7. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka], 1845 (lectotype K [K000380689], designated by Turner, Phytotaxa 36 (2011) 102).

Uvaria subrepanda Wall. [Numer. List no. 6483 (1832), nom. nud.] ex Hook.f. & Thomson, Fl. Ind. 1 (1855) 101; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 25; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 23, as '*sub-repanda*'; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 39; Ridley, Fl. Malay Penins. 1 (1922) 34, as '*sub-repanda*'. **Synonym:** *Uva subrepanda* (Wall. ex Hook.f. & Thomson) Kuntze, Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Wallich s.n.* [EIC 6483], Singapore,

1822 (lectotype K-W [K00044825], designated by Turner, Phytotaxa 36 (2011) 103; islectotype CAL [CAL0000064650]).

Uvaria ptychocalyx Miq., Ann. Mus. Bot. Lugduno-Batavi 2, fasc. 1 (1865) 4. **Synonym:** *Uva ptychocalyx* (Miq.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Korthals s.n.*, [Indonesia], Borneo, [Kalimantan], Poeloe [Pulau] Lampei (lectotype L [L0195619], designated by Turner, Phytotaxa 36 (2011) 103).

Large woody climbers. **Twigs** dark brownish to greyish-brownish, striate-latticed, sparsely to moderately densely hairy with adpressed, brownish hairs, glabrescent with age. **Leaves:** lamina sparsely to densely hairy on the midrib and sparsely hairy to glabrescent between the veins above, abaxial midrib sparsely hairy, abaxial lamina sparsely hairy to glabrescent, obovate to elliptic, 8–21 × 4–8 cm, base shortly cordate to rounded, apex acute or obtuse, frequently shortly acuminate, midrib slightly sunken adaxially, prominent abaxially, lateral veins 8–15 per side; petiole 4–7 mm long, sparsely to moderately densely hairy, with transverse rings. **Inflorescences** 1–2(–4)-flowered cymes, internodal or leaf-opposed. **Flowers** with pedicels 4–10 mm long, densely hairy; basal and medial bracts broadly ovate, to 9 mm long; sepals connate in early bud (petals exposed), connate at the base to about the middle at maturity, broadly ovate, 4–6 × 4–10 mm, lobe margins distinctly undulate, densely hairy abaxially and moderately to densely hairy adaxially; petals yellow turning reddish yellow to red, spreading at anthesis, ovate, broadly ovate, elliptic or obovate, subequal in shape and size in the outer and inner whorl, 10–12 × 6–9 mm, surface verruculose, densely hairy abaxially and adaxially; stamens numerous, 1.5–2 mm long, connective apex extended, minutely papillose, glabrous, outermost staminodal; carpels many, ovaries densely hairy, stigma bilobed, U-shaped, with strongly involute margins, glabrous. **Fruit** with pedicels to 20 mm long, densely hairy; monocarps numerous (to 40 or more), ovoid, ellipsoidal or globose, not constricted between the seeds, 15–21 × 12–19 mm, apex rounded, apicule absent or indistinct, surface prominently tuberculate, densely to sparsely hairy, stipitate, stipes to 64 mm long and 3 mm thick. **Seeds** few to several (2–9) per monocarp, 11–12 × 8–10 mm, flattened hemi-ellipsoidal, testa smooth, glabrous, drying dark brown.

Distribution. Andaman Islands, Myanmar, Thailand, Peninsular Malaysia, Sumatra and Borneo. In Singapore, known only from a few historical collections, without locality (e.g., *Wallich s.n.* [EIC 6483], 1822, K-W [K00044825]) and Singapore Botanic Gardens' Rain Forest (*Ridley 9211*, 1898, SING [SING0000425]). It has also been reported in recent surveys of Bukit Timah Nature Reserve, Nee Soon Freshwater Swamp Forest and Windsor Forest but these reports are based on sterile material and additional fertile specimens are required to corroborate the identifications.

Ecology. In Singapore, in lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468). However, it is assessed here as Data Deficient (DD) due to the lack of recent fertile material to corroborate the identification.

Notes. As there is very limited material known from Singapore, the description is also based on material from Peninsular Malaysia.

12. *Uvaria micrantha* (A.DC.) Hook.f. & Thomson

(Greek, *micros* = small, *anthos* = flower; referring to the small flowers)

Fl. Ind. 1 (1855) 103; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 21; King, Ann. Roy. Bot. Gard. Calcutta 4 (1893) 26, pl. 18; Ridley, Fl. Malay Penins. 1 (1922) 33; Turner, Gard. Bull. Singapore 64 (2012) 455; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 346; Lim et al., Gard. Bull. Singapore 70 (2018) 77; Turner, Gard. Bull. Singapore 70 (2018) 709; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 153; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 309, pl. 37: F. **Basionym:** *Guatteria micrantha* A.DC., Mém. Soc. Phys. Genève 5 (1832) 218; de Candolle, Mém. Anon. (1832) 42. **Synonyms:** *Uva micrantha* (A.DC.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. – *Cyathostemma micranthum* (A.DC.) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 225; Utteridge, Blumea 45 (2000) 388; Jessup in Wilson, Fl. Australia 2 (2007) 32. **Type:** *Gomez 15* [Wallich 1287, EIC 6449], Burma [Myanmar], Martaban, Amherst, 17 June 1827 (lectotype G [G00237292], designated by Kessler et al., Prov. Checkl. Asiat.-Austral. Annonac. (1995) 29; isolectotypes BM, K-W [K001123938]). **Fig. 85.**

Polyalthia fruticans A.DC., Mém. Soc. Phys. Genève 5 (1832) 216; de Candolle, Mém. Anon. (1832) 40. **Type:** *Gomez 49* [Wallich 1288, EIC 6430], Burma [Myanmar], Tavoy, 7 August 1827 (lectotype K-W [K001123876], designated by Turner, Phytotaxa 32 (2011) 47; isolectotype G [G00237293]).

Anaxagorea sumatrana Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 382. **Synonyms:** *Uvaria sumatrana* (Miq.) Kurz, Rep. Veg. Andaman Isl. App. B (1868) 1; Kurz, Rep. Veg. Andaman Isl., App. A (1870) [29]. – *Uva sumatrana* (Miq.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. – *Cyathostemma sumatranum* (Miq.) Boerl., Icon. Bogor. 1, fasc. 2 & 3 (1899) 126, [171], t. 58, as ‘*sumatrana*’. **Type:** *Teijsmann s.n.* [Herb. Bogor. no. 4383], [Indonesia], Sumatra, Lampongs, near Tegineneng (lectotype U [U0000249], designated by Maas & Westra, Bot. Jahrb. Syst. 105(2) (1985) 195; possible isolectotypes B [B 10 0272836], GH, K [K003529068, K003529074], KFTA [KFTA0001514]).

Uvaria lanceolata Scheff., Ann. Jard. Bot. Buitenzorg 2 (1881 [‘1885’]) 3, nom. illeg. non Sw. (1788). **Type:** *Beccari s.n.*, [Indonesia], Celebes [Sulawesi], Garontalo, November 1873 (holotype FI-B [FI007545] [Erb. Coll. Becc. no. 111 and 111A]).

Popowia nitida King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 92. **Type:** *King s.n.*, [India], Andaman Islands, South Andaman, Hobdaypur, 4 July 1891 (lectotype K [K000739196], designated by Utteridge, Blumea 45 (2000) 388; isolectotype K [K000739197]).

Large woody climbers or scrambling shrubs. **Twigs** dark brownish-blackish, striate-latticed, the youngest parts moderately to densely hairy, older twigs sparsely hairy to glabrescent. **Leaves:** lamina adaxially glabrous except for the moderately to densely hairy midrib, abaxially sparsely adpressed hairy on the midrib and lamina or lamina glabrescent, elliptic, elliptic-oblong to narrowly obovate, 5–13 × 1.7–4.5 cm, base cuneate to rounded, apex acute to acuminate, midrib flush to slightly sunken adaxially, prominent abaxially, lateral veins 8–15 per side; petiole 1.5–4 mm long, moderately densely hairy to glabrescent. **Inflorescences** 2–3-flowered, but usually only one flower open, leaf-opposed or internodal. **Flowers** with pedicels 2–6 mm long, densely hairy; with a basal and a medial bract, bracts ovate to broadly ovate, to 3 mm long; sepals valvate in bud, free at maturity, broadly ovate, 2–3 × 2.5–3.5 mm, densely to moderately densely hairy abaxially, sparsely hairy to glabrous adaxially; petals greenish, yellowish, pink-orange, to maroon, spreading at anthesis, subequal in the two whorls, the outer ovate with broad base, the inner elliptic with slightly constricted base, but not distinctly clawed, 3–6 × 3–5 mm, abaxially and adaxially densely hairy; stamens many, 0.8–1



Figure 85. *Uvaria micrantha* (A.DC.) Hook.f. & Thomson. **A.** Habit, fruiting. **B.** Flowering, leafy branch. **C.** Flower in pistillate stage. **D.** Fruit with three monocarps. (A–D from Thailand. Photos: C. Leeratiwong, reproduced with kind permission).

mm long, connective apex truncate, papillose, thecae glabrous; carpels many, ovaries hairy or with longitudinal lines of hairs and a ring of hairs at the stigma base, stigma bilobed, U-shaped, with strongly involute margins, glabrous except for the hairy base. **Fruit** with pedicels to 8 mm long, sparsely to moderately densely hairy; monocarps several to numerous (to 25 or more), ellipsoidal to globose, without or with very weakly developed constrictions between the seeds (when dried), 8–20 × 8–10 mm, apex rounded, not apiculate or with laterally developed apicule, surface finely granulate, glabrous, stipitate, stipes to 21 mm long and 1 mm thick. **Seeds** 1–4 per monocarp, 5–9 × 4–6 mm, flattened ellipsoidal, testa smooth, glabrous, drying brown.

Distribution. Andaman & Nicobar Islands, Myanmar, Thailand, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Lesser Sunda Isles, Sulawesi, Philippines, New Guinea and Australia. In Singapore, known only from two collections from Pulau Ubin (*Gwee et al. GAT196*, 28 Jan 2003, SING [SING0043106]; *Gwee et al. GAT370*, 7 Oct 2003, SING [SING0047715]).

Ecology. In Singapore, at the margin of coastal rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

13. *Uvaria pauciovulata* Hook.f. & Thomson

(Latin, *paucus* = few, *ovulatus* = ovulate; having few ovules)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 51; Sinclair, Gard. Bull. Singapore 14(2) (1955) 217, as '*pauciovulata*'; Keng, Gard. Bull. Singapore 27 (1974) 74, as '*pauciovulata*'; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 34, as '*pauciovulata*'; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 121, as '*pauciovulata*'; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171, as '*pauciovulata*'; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 89, 104, 213, as '*pauciovulata*'; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 257, 288; Meade & Parnell, Austral. Syst. Bot. 31 (2018) 350; Turner, Gard. Bull. Singapore 70 (2018) 712; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 153; Meade in Johnson & Murray, Fl. Thailand 16(1) (2022) 310. **Synonym:** *Uva pauciovulata* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Maingay 1023A* [Kew Distribution 104], [Malaysia], Malacca [Melaka], 14 June 1865–1866 (lectotype K [K000380686], designated by Turner, Gard. Bull. Singapore 70 (2018) 712).

Scandent shrubs or large woody climbers. **Twigs** brownish, striate-latticed, densely hairy when young, sparsely hairy to glabrescent with age. **Leaves:** lamina glabrous between the veins and sparsely hairy to glabrescent on the midrib above, sparsely hairy on the midrib and sparsely hairy to glabrescent on the lamina beneath, elliptic, oblong to obovate, 8.2–18 × 3.5–8.3 cm, base shortly cordate, apex acute and usually shortly acuminate, midrib sunken adaxially, prominent abaxially, lateral veins 10–14 per side; petiole 4–9(–12) mm long, sparsely to densely hairy. **Inflorescences** elongated and composed of multiple (1–)2–3-flowered cymes with short internodes. **Flowers** with pedicels 7–10 mm long, densely hairy; basal and medial bract broadly ovate, to 8 mm long; sepals connate in bud, basally connate at maturity, lobes

broadly ovate, 6–8 × 6–8 mm, densely hairy adaxially and abaxially; petals yellow, cream or white, semi-erect at anthesis, subequal in size in the outer and inner whorl, the outer petals broadly obovate to elliptic, 15–25 × 11–22 mm, the inner obovate, 15–25 × 11–16 mm, base narrowed and abruptly and strongly curved in both outer and inner petals, both outer and inner petals densely to moderately densely hairy adaxially and abaxially; stamens numerous, 1.5–1.8 mm long, connective not or slightly extended, truncate, not papillose, thecae glabrous; carpels numerous, ovaries densely hairy, stigma bilobed, U-shaped, glabrous. **Fruit** with pedicels to 14 mm long, densely to sparsely hairy; monocarps numerous (to 25 or more), globose to broadly ellipsoidal, without constrictions, 9–11 × 11–12 mm, apex rounded, apiculate, densely hairy, stipitate, stipes to 20 mm long and 1 mm thick. **Seeds** 1–2 per monocarp, 9–11 × 7–9 mm, ellipsoidal, testa smooth, glabrous, drying brown.

Distribution. Thailand and Peninsular Malaysia. In Singapore, known only from two relatively recent sterile collections from Mandai (*Lai LJ74*, 1996, SING [SING0019874]) and Bukit Timah (*Ho et al. BTJFP 26-38C*, 10 May 2016, SING [SING0395753]) but there are historical collections (with flowers) from Bukit Timah (*Ngadiman BF36432*, 1939, SING [SING0012197]) and Sungai Morai (*Sinclair 40179*, 19 Dec 1953, SING [SING0012199]).

Ecology. Lowland rain forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. As there is no fruiting material of this species known from Singapore, the description is also based on material from Peninsular Malaysia.

29. XYLOPIA L.

(Greek, *xylos* = wood, *picon* = bitter; alluding to a property of the type species)

Syst. Nat., ed. 10, 2 (1759) 1241, 1250, 1378, nom. cons.; Hooker & Thomson, Fl. Ind. 1 (1855) 124; Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 82; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 112; Ridley, Fl. Malay Penins. 1 (1922) 89; Sinclair, Gard. Bull. Singapore 14(2) (1955) 335; Kochummen, Tree Fl. Malaya 1 (1972) 94; Kessler in Kubitzki et al. (ed.), Fam. Gen. Vasc. Pl. 2 (1993) 117; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 186; Johnson & Murray, Gard. Bull. Singapore 67 (2015) 361; Turner, Gard. Bull. Singapore 70 (2018) 720; Johnson & Murray, Fl. Thailand 16(1) (2022) 324. **Synonym:** *Xylopicrum* P.Browne, Civ. Nat. Hist. Jamaica (1756) 250. **Type:** *Xylopia muricata* L., typ. cons.

Unona L.f., Suppl. Pl. (1782 [‘1781’]) 270. **Synonym:** *Habzelia* A.DC., Mém. Soc. Phys. Genève 5 (1832) 185, 207, nom. illeg. superfl.; de Candolle, Mém. Anon. (1832) 9, 31. **Type:** *Unona discreta* (L.) L.f. (= *Xylopia discreta* (L.) Sprague & Hutch.).

Coelocline A.DC., Mém. Soc. Phys. Genève 5 (1832) 187, 208; de Candolle, Mém. Anon. (1832) 11, 32. **Type:** *Coelocline acutiflora* (Dunal) A.DC. (= *Xylopia acutiflora* (Dunal) A.Rich.), lectotype designated by Swart, Index Nominum Genericorum Card 10/09462 (1959).

Parartabotrys Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 374. **Type:** *Parartabotrys sumatranus* Miq. (= *Xylopia malayana* Hook.f. & Thomson).

Medium to large trees with spiral primary branching, stilt roots present in some species. **Indument** of simple hairs or plants glabrous. **Leaves** petiolate, chartaceous to subcoriaceous, base symmetrical, cuneate, rounded or subcordate, midrib slightly raised to slightly impressed above, raised beneath, lateral veins brochidodromous, indistinct or slightly raised above, indistinct to raised beneath, higher-order venation reticulate, slightly raised or indistinct above, raised to indistinct beneath. **Inflorescences** axillary or from axils of fallen leaves, 1–8(–30)-flowered. **Flowers** bisexual; sepals 3, valvate, minutely connate to connate for about half length, much smaller than the petals; petals in two whorls of 3, valvate, free, linear to ovate, the inner whorl slightly shorter, narrower, and with a concave base; stamens numerous, outermost and innermost usually staminodal, anthers septate, anther connective apex tongue-shaped, truncate or dome-shaped, bases of the filaments connate, forming either an inconspicuous ring or a hollow cone around the ovaries; carpels one to many, stigmas filiform to club-shaped, ovules up to 13 per ovary, uniseriate or biseriate. **Fruit** apocarpous, of one to many monocarps; monocarps abaxially dehiscent, oblongoid, obovoid or narrowly cylindrical, occasionally ellipsoid or globose, pubescent or glabrate, smooth, verrucose or wrinkled, pericarp slightly thickened, leathery when dried, base contracted into a short stipe to nearly sessile. **Seeds** attached laterally in 1–2 rows, up to 13 per monocarp, smooth or wrinkled, ellipsoid, oblongoid, or rarely globose, with a pale bluish, purplish or greyish white sarcotesta (not visible when dried), aril a fleshy or corky ring around the micropyle or absent, endosperm ruminations lamelliform to spiniform.

Distribution. A pantropical genus of nearly 200 species. In Singapore, 7 native species.

Taxonomy. Asian species of *Xylopia* are classified in two sections, both represented in Singapore. *Xylopia ferruginea* (Hook.f. & Thomson) Baill., *X. fusca* Maingay ex Hook.f. & Thomson and *X. oxyantha* (Hook.f. & Thomson) Hook.f. & Thomson belong to the exclusively Asian *Xylopia* sect. *Rugosperma* D.M.Johnson & N.A.Murray, characterised by wrinkled seeds lacking an aril, and by stamen bases that form an inconspicuous ring around the ovaries. The Singaporean species of this section all have stilt roots. The remaining species in Singapore belong to the widespread Palaeotropical *Xylopia* sect. *Stenoxylopia* Engl. & Diels. These species have smooth seeds, sometimes arillate, and a hollow cone surrounding the ovaries. Stilt roots are not known from this section, with the exception of *Xylopia sessiliflora* (Kochummen & T.C.Whitmore) D.M.Johnson & N.A.Murray from Peninsular Malaysia.

Notes. The fruits of *Xylopia* species are green, red or orange when mature, but dehisce longitudinally to reveal a bright scarlet to pink endocarp against which the seeds are readily visible to dispersers. In other parts of the distribution, species of *Xylopia* may be shrubs, occasionally sprawling or scandent, and also small trees.

There is a record of *Xylopia elliptica* Maingay ex Hook.f. & Thomson from Singapore (Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 2275). *Xylopia elliptica*, while a good

species, had become confused with other species over the past century. Neither Ridley nor Sinclair reported it for Singapore, no material has been seen, including of a specimen that may suggest that the name was misapplied, and so Burkill's record is excluded here.

Key to *Xylopia* species

1. Sepals recurved at the apex; monocarps narrowly cylindrical, weakly torulose to moniliform; flower pedicels 6–19 mm long 2
 Sepals erect or slightly spreading at the apex; monocarps ellipsoid to oblongoid to obovoid, occasionally globose, not torulose or moniliform; flower pedicels 1–10 mm long 3
2. Twigs and lower surfaces of leaves sparsely to densely dark rusty-pubescent; petioles 3–7 mm long **3. *X. ferruginea***
 Twigs and lower surfaces of leaves sparsely yellowish white-pubescent to glabrate; petioles 10–14 mm long **7. *X. oxyantha***
3. Leaf blades glabrous beneath 4
 Leaf blades uniformly pubescent beneath 5
4. Sepals drying black, sparsely white-pubescent to glabrate; inflorescences 1–8(–30)-flowered **2. *X. dicarpa***
 Sepals drying brown, densely rusty- or brown-pubescent; inflorescences 1–4-flowered ...
 **6. *X. malayana***
5. Leaf blade widest above the midpoint, cuneate and decurrent at the base, apex obtuse, emarginate, retuse, or rarely short-acuminate **4. *X. fusca***
 Leaf blade widest at or below the midpoint, cuneate to rounded but not decurrent at base, apex acute or acuminate 6
6. Twigs finely pubescent to glabrate; leaf blades 2–7.5 cm long; petals 7–10 mm long
 **1. *X. caudata***
 Twigs rusty-tomentose; leaf blades 8.5–13 cm long; petals 30 mm long or longer
 **5. *X. magna***

1. *Xylopia caudata* Hook.f. & Thomson

(Latin, *cauda* = tail; referring to the long leaf acumen)

Fl. Ind. 1 (1855) 125; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 38; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 117; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 93; Sinclair, Gard. Bull. Singapore 14(2) (1955) 339; Keng, Gard. Bull. Singapore 27 (1974) 74; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 34; Wong et al., Gard. Bull. Singapore 46(2) (1995)

['1994']) 77; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 122; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 166; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 91, 104, 224; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 188; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 721; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 153. **Synonym:** *Xylopicrum caudatum* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka], 1845 (lectotype K [K000574707], designated by Turner, Phytotaxa 36 (2011) 108; isolectotypes BM, BR, CAL [CAL0000004587]; probable isolectotype K [K000574706]).

Xylopia tooropiana Scheff., Natuurk. Tijdschr. Ned.-Indië 32 (1872 ['1873']) 392. **Type:** *Teijsmann 17802*, [Indonesia], Bangka prope Soengai Liat (lectotype BO [BO-1362330], designated here; isolectotypes A (fragment), BO [BO-1362329]; possible isolectotypes KFTA [KFTA0001573], L [L0195898, L0195899], MEL [MEL2383090]).

Trees to 30 m tall, lacking stilt roots. **Twigs** brown or reddish brown to light grey-brown, finely pubescent to glabrate. **Leaves:** lamina chartaceous, glabrous except for pubescent midrib above, with long sparse silver adpressed hairs beneath, drying brown to greyish brown above, light brown beneath, lanceolate to elliptic, $2\text{--}7.5 \times 1.25\text{--}2.1$ cm, base obliquely cuneate, apex acuminate with an obtuse tip, sometimes minutely mucronate, the acumen 5–15 mm long, lateral veins about 10 per side; petiole 2–3 mm long. **Inflorescences** 1–3-flowered, pubescent, peduncles absent. **Flowers** with pedicels c. 1 mm long; bracts 1–3, c. 0.7 mm long; sepals connate for a quarter to a third of their length, broadly ovate, c. 2.5 mm long, obtuse to acute at apex, pubescent outside; petals white, cream or yellow; outer petals linear, slightly widened just above the base, 8–10 mm long, 2 mm wide just above base, 1.5 mm wide at midpoint, with sparse crinkled hairs inside and longer silvery hairs outside, apex obtuse; inner petals linear with a slight widening just above the base, c. 7 mm long, c. 1.2 mm wide just above base, c. 1 mm wide at midpoint, with sparse crinkled hairs inside and longer silvery hairs outside, apex obtuse; stamens 0.6–0.9 mm long, anther connective apex truncate to slightly dome-shaped, stamen bases forming a hollow cone surrounding the ovaries; carpels 2–3, c. 2 mm long, stigmas connivent, club-shaped. **Fruit** of 1–2(–3) monocarps borne on sparsely pubescent pedicels 2–3 mm long, 1–1.5 mm thick; monocarps red, obliquely ellipsoid, $8\text{--}12 \times 7\text{--}9$ mm, sparsely pubescent to pubescent, drying brown, slightly lumpy and wrinkled, sometimes with a slight keel extending from the apex, stipe 2–2.5 mm long, apex slightly beaked. **Seeds** 1–2 per monocarp, ellipsoid, $7\text{--}9 \times 6\text{--}6.1 \times$ c. 5.3 mm, smooth, sarcotesta whitish blue, drying brown to black, aril inconspicuous, white, a flat fleshy ring surrounding the micropyle.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, known from Jurong (*Corner SFN 26030*, 13 Nov 1932, BK, BO, SING [SING0003362]), Chestnut (*Gwee et al. SING2009-307*, 10 Mar 2009, SING [SING0120542]) and Bukit Timah (*Ngadiman SFN 34662*, 12 Jan 1938, SING [SING0003364]; *Corner SFN 39576*, 21 Apr 1953, SING [SING0003360]).

Ecology. Lowland non-inundated forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. Branches may form from most leaf axils on young twigs; in addition, two branches may form from a single axil. This lends a weblike appearance to the young growth and leads to a highly branched tree architecture.

Sinclair (Sarawak Mus. J. 52 (1951) 608) recognised two varieties, *Xylopia caudata* var. *caudata* and *X. caudata* var. *reticulata* J.Sinclair, the latter known only from Borneo. *Xylopia caudata* var. *reticulata* is a synonym of *Xylopia lanceola* Ridl. from Borneo.

2. *Xylopia dicarpa* Hook.f. & Thomson

(Greek, *di-* = two, *carpos* = fruit; referring to the two monocarps per fruit of the type specimen)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 85; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 114, p.p.; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, J. Straits Branch Roy. Asiat. Soc. 35 (1901) 84; Ridley, Fl. Malay Penins. 1 (1922) 91; Turner, Gard. Bull. Singapore 70 (2018) 723; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 153. **Synonym:** *Xylopicrum dicarpum* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Maingay 2691* [Kew Distribution 84], Singapore, September 1867 (lectotype K [K000574717], designated by Turner, Phytotaxa 36 (2011) 110).

Xylopia malayana auct. non Hook.f. & Thomson: Sinclair, Gard. Bull. Singapore 14(2) (1955) 340, p.p.

Trees to 20 m tall, lacking stilt roots. **Twigs** black to grey or orange-brown, glabrous. **Leaves:** lamina chartaceous to subcoriaceous, glabrous on both surfaces, drying brown, lanceolate-elliptic or oblanceolate, 8.2–13.9 × 3–5.2 cm, base cuneate to nearly rounded, occasionally short-decurrent, apex acuminate, acumen 2–18 mm long, lateral veins 9–14 per side; petiole 4.5–7 mm long. **Inflorescences** 1–8(–30)-flowered, pubescent to glabrate, peduncles c. 4 mm long. **Flowers** with pedicels 1.5–4.5 mm long; bracts 1–2, near base of pedicel, 1.2–2.5 mm long; sepals connate for about half their length, ovate, 2–3 mm long, drying black, acute at apex, sparsely white-adpressed pubescent to glabrate outside; petals white to yellow; outer petals linear, 7–22 mm long, 2.5–3 mm wide at base, 1.6–2.1 mm wide at midpoint, pubescent on both surfaces, apex obtuse to acute; inner petals linear, 9–19 mm long or longer, 1–2.1 mm wide at base, 0.6–1.1 mm wide at midpoint, pubescent on both surfaces, apex acute; stamens c. 1.5 mm long, anther connective apex truncate to dome-shaped, stamen bases forming a hollow cone surrounding the ovaries; carpels 2–3, c. 3.7 mm long, stigmas connivent, club-shaped. **Fruit** of 1–2 monocarps borne on glabrous pedicels 10–11.5 mm long, c. 2.5 mm thick; monocarps obovoid to oblongoid, 19–34 × 10–15 mm, glabrate, drying black, strongly wrinkled, stipe 2.8–6.5 mm long, apex obtuse, somewhat narrowed into a broad oblique beak c. 2 mm long. **Seeds** c. 5 per monocarp, in two rows, oblongoid, c. 9 × 7 mm, smooth, sarcotesta greyish white, presence or absence of aril not determined.

Distribution. Peninsular Malaysia and Simeulue Island. In Singapore, known from Bukit Timah (*Ridley 9838*, 1898, A, K [K003313856], SING [SING0003401]; *Ngadiman SFN 37003*, 27 Jul 1939, BKF, SING [SING0003405]; *Thomas et al. 3422*, 25 Feb 2020, SING [SING0386239]), Mandai (*Kiah SFN 37147*, 26 Jul 1940, A, BM, K [K003313857], KEP, SING [SING0003400]) and Jurong (*Corner 26098*, 15 Oct 1932, A, BO, K [K003313858], SING [SING0003408]).

Ecology. Non-inundated and swampy lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. Both *Xylopia dicarpa* and *X. malayana* occur in Bukit Timah Nature Reserve. *Xylopia dicarpa* has a more glabrous inflorescence, with a slightly shorter calyx and sparse whitish hairs. The tips of the sepals are erect to slightly incurved, so that the calyx is nearly urceolate. The sepals of *Xylopia malayana* are slightly longer, with the tips diverging, even in bud. The fruit and seed descriptions of *Xylopia dicarpa* are based primarily on material from Peninsular Malaysia; the only fruiting collection observed from Singapore was spirit material of *Ngadiman SFN 37003*, which includes a single monocarp. Collections with flowers are from July–October and February, a different phenology from that of *Xylopia malayana*.

3. *Xylopia ferruginea* (Hook.f. & Thomson) Baill.

(Latin, *ferrugineus* = reddish brown, rusty; referring to the indumentum)

Hist. Pl. 1(4) (1868) 225; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 93; Sinclair, Gard. Bull. Singapore 14(2) (1955) 343; Kochummen, Tree Fl. Malaya 1 (1972) 95; Keng, Gard. Bull. Singapore 27 (1974) 75; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14, fig. 10.13; Turner, Gard. Bull. Singapore 45 (1993) 34; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 77; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 122; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 91, 104, 231; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 263, 288; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 193, fig. 42; Turner, Gard. Bull. Singapore 70 (2018) 724; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 153; Johnson & Murray, Fl. Thailand 16(1) (2022) 325, pl. 39: D, E. **Basionym:** *Habzelia ferruginea* Hook.f. & Thomson, Fl. Ind. 1 (1855) 123. **Synonym:** *Melodorum ferrugineum* (Hook.f. & Thomson) Finet & Gagnep., Bull. Soc. Bot. France 53(Mém. 4(2)) (1906) 138. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka] (lectotype K [K000574700], designated by Turner, Phytotaxa 36 (2011) 109; islectotype BR). **Fig. 86.**

Artabotrys malayanus Griff., Not. Pl. Asiat. 4 (1854) 713, as ‘*malayanae*’. **Synonym:** *Xylopicrum malayanum* (Griff.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Verupha s.n.* [Kew Distribution 385], [Malaysia], Malacca [Melaka], Aloor Gagah (lectotype K [K000574698], designated by Turner, Phytotaxa 36 (2011) 109).

Xylopia altissima Boerl., Icon. Bogor. 1, fasc. 3 (1899) [203], t. 73. **Type:** [Published illustration] *Xylopia altissima* in Boerlage, Icon. Bogor. 1, fasc. 3 (1899) t. 73, lectotype designated here.

Trees to 35 m tall, with stilt roots forming up to 3 m from the base of the trunk. **Twigs** reddish brown to dark grey, persistently dark rusty-pubescent but eventually glabrate. **Leaves:** lamina subcoriaceous to chartaceous, glabrous above, dark rusty-pubescent beneath, often slightly discoloured, sometimes glaucous beneath, oblong, oblong-oblongate, oblong-elliptic or

elliptic, $9.2\text{--}20.7 \times 2.3\text{--}6.6$ cm, base broadly cuneate, subcordate, truncate or rounded, often obliquely so, apex acute or short-acuminate, the acumen 1.5–15 mm long, lateral veins 11–17 per side; petiole 3–7 mm long. **Inflorescences** 1–6-flowered, dark rusty-pubescent, peduncles 2–7.5 mm long. **Flowers** with pedicels 6–19 mm long; bract 1, just proximal to pedicel midpoint, 2.5–5.5 mm long; sepals connate for about a quarter their length, narrowly triangular, 3–5.5 mm long, acuminate to caudate, often recurved at apex, dark rusty-pubescent outside; petals greenish yellow, pale yellow or occasionally orange, with a dark purple blotch on the inside of the inner petal base; outer petals linear, 31–60 mm long, 3–4.5 mm wide at base, 2–2.2 mm wide at midpoint, densely pubescent inside, sericeous outside, apex obtuse; inner petals linear, 27–34 mm long, 1.2–2.4 mm wide at base, c. 0.7 mm wide at midpoint, densely pubescent on both surfaces, apex acute; stamens 1.8–3 mm long, anther connective apex tongue-shaped, stamen bases forming an inconspicuous ring around ovaries; carpels 18–20, c. 4 mm long, stigmas loosely connivent, filiform. **Fruit** of up to 22 monocarps borne on glabrate pedicels 10–23 mm long, 1.6–9 mm thick; monocarps red, narrowly cylindrical, torulose, $62\text{--}115 \times 4\text{--}6$ mm, glabrate, longitudinally wrinkled, stipe 7–14 mm long, apex rostrate, the beak 0.8–8 mm long. **Seeds** up to 13 per monocarp, commonly 7–11, in a single row, oblong to ellipsoid, $5.2\text{--}7 \times 3\text{--}4.6$ mm, wrinkled, sarcotesta light bluish to grey, drying brown, aril absent.

Distribution. Southern Thailand, Peninsular Malaysia, Sumatra and Borneo. In Singapore, known from Singapore Botanic Gardens' Rain Forest (*Corner SFN 34537*, 18 Nov 1937, A, K [K003313936], L, MICH [$\times 2$], SING [SING0003365]), Bukit Timah (*Ngadiman SFN 34604*, 30 Nov 1937, A, K [K003313964], SING [SING0003369]), MacRitchie (*Sinclair 39478*, 6 Feb 1953, K [K003313953], L, SING [SING0003368]) and Nee Soon (*Gwee et al. SING2010-494*, 3 Mar 2010, SING [SING01445835]).

Ecology. Primary and secondary lowland forest, sometimes along rivers or in swampy areas. Saplings are frequently observed in secondary and primary rain forest habitats in Singapore, but there are only occasional observations of mature, flowering or fruiting individuals.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Endangered (EN/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Vernacular names. *Antoi jangkang*, *jangkang bukit*, *stilted antoi* (NParks' Flora & Fauna Web, 2026).

Notes. The bright orange-brown bark, which may be rough or smooth, is distinctive. The trunk base sometimes has buttresses in addition to the stilt roots. The young twigs form a zigzag pattern and are frequently marked with decurrent ridges from the petiole bases.

The GH sheet of Kew Distribution 385 [GH00062419] is a specimen of *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr. with flowers and young fruit in a packet. It is, consequently, not an isoelectotype of *Artabotrys malayana* Griff.

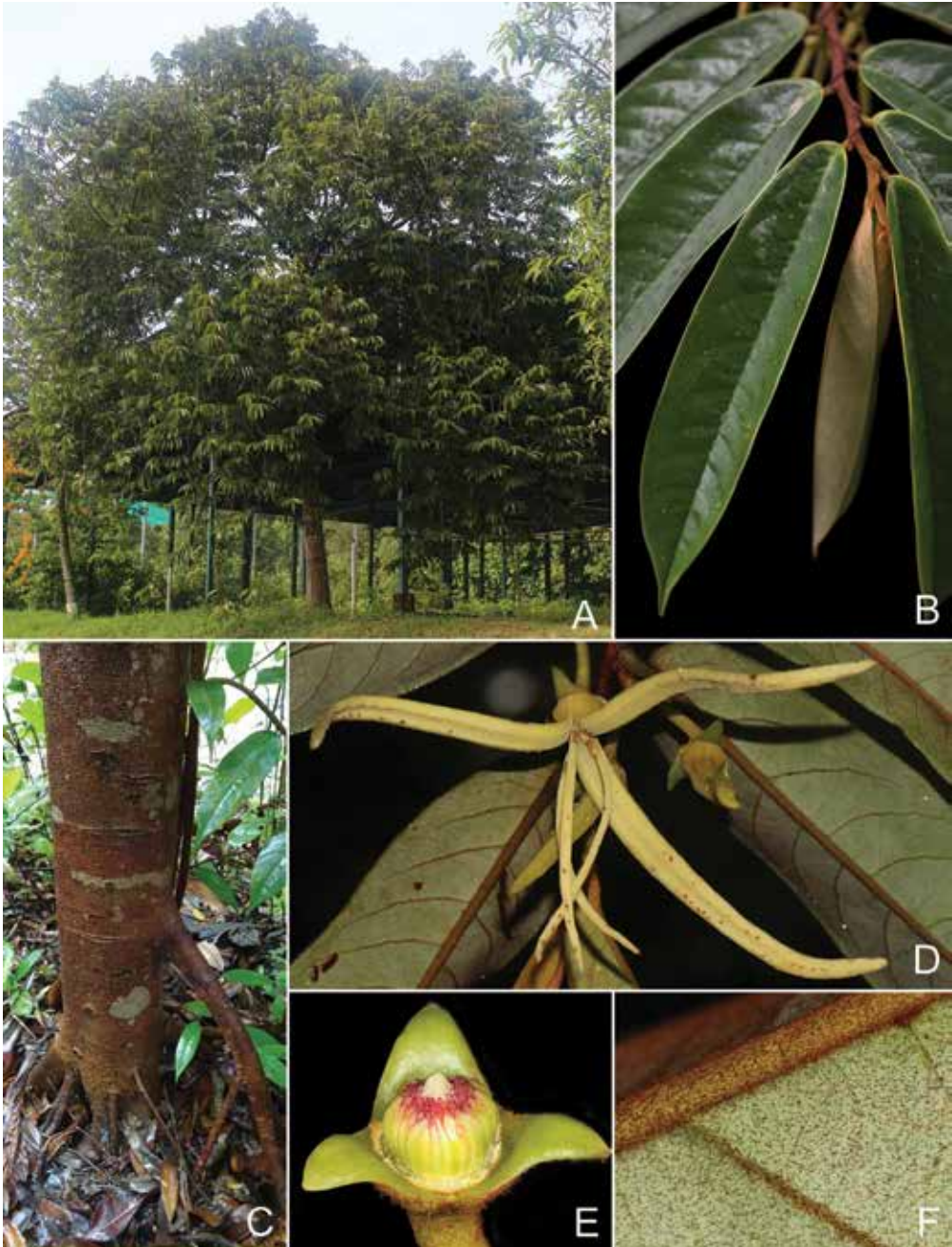


Figure 86. *Xylopia ferruginea* (Hook.f. & Thomson) Baill. **A.** Habit. **B.** Leaves. **C.** Trunk base showing stilt roots. **D.** Flower (front view). **E.** Flower with petals removed, showing stamens and stigmas. **F.** Indumentum on lower leaf surface. (A–F from Singapore; A, B, E & F, Pasir Panjang Nursery; C, specific location unknown; D, Nee Soon, *Lim W.H. et al. SING2019-1399*. Photos: A, E & F, X.Y. Ng; B, Zaki Jamil; C, W.F. Ang; D, J. Chen).

4. *Xylopia fusca* Maingay ex Hook.f. & Thomson

(Latin, *fuscus* = dark, dusky; perhaps referring to the leaf colour)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 83; Ridley, Fl. Malay Penins. 1 (1922) 92; Sinclair, Gard. Bull. Singapore 14(2) (1955) 337; Kochummen, Tree Fl. Malaya 1 (1972) 96; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Wong et al., Gard. Bull. Singapore 46(2) (1995 ['1994']) 77; Turner, Gard. Bull. Singapore 47 (1997 ['1995']) 122; Turner et al., Gard. Bull. Singapore 48 (1998 ['1996']) 141; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 171; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 91, 104, 213; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 263, 288; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 195; Turner, Gard. Bull. Singapore 70 (2018) 724; Wong & Ganesan, Fl. Singapore 1 (2019) 44; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 154; Johnson & Murray, Fl. Thailand 16(1) (2022) 326, fig. 68: H, K. **Synonym:** *Xylopicrum fuscum* (Maingay ex Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Maingay 1583* [Kew Distribution 86], [Malaysia], Malacca [Melaka], 22 April 1867 (lectotype K [K000574708], designated by Turner, Phytotaxa 36 (2011) 109; isolectotype K [K000574710]).

Xylopia obtusifolia Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 83, nom. illeg. non (A.DC.) A.Rich. (1841). **Synonym:** *Xylopicrum obtusifolium* Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Griffith s.n.* [Kew Distribution 386], [Malaysia], Malacca [Melaka] (lectotype K [K000574711], designated by Kessler et al., Prov. Checkl. Asiat.-Austral. Annonac. (1995) 88; isolectotypes CAL [CAL0000004584], P [P01984651]).

Xylopia havilandii Ridl., Bull. Misc. Inform. Kew 1912 (1912) 388. **Type:** *Haviland 2334*, [Malaysia], Sarawak, Kuching, 17 May 1893 (lectotype K [K000574765], designated by Turner, Gard. Bull. Singapore 64 (2012) 244; isolectotypes L [L.1775393], SAR, SING [SING0049719]).

Trees to 35 m tall, with well-developed stilt roots. **Twigs** dark grey, reddish-gold-adpressed-pubescent soon glabrate, striate. **Leaves:** lamina subcoriaceous to coriaceous, glabrous and verrucose above, sericeous gold or silver beneath, discolorous, greenish grey above, brown beneath, not glaucous, elliptic, obovate, oblanceolate or oblong-elliptic, 4–10.5 × 1.8–5 cm, base attenuate-cuneate, gradually decurrent nearly to the petiole base, apex obtuse to rounded, occasionally emarginate or retuse, rarely short-acuminate, lateral veins 9–15 per side; petiole 3–8 mm long. **Inflorescences** 1–4-flowered, sericeous, becoming glabrate, peduncles 4–6 mm long. **Flowers** with pedicels 5–10 mm long; bract 1, at or just proximal to pedicel midpoint, 1.5–2.5 mm long; sepals connate for half to two-thirds their length, broadly elliptic to triangular, 2.5–4 mm long, acute to apiculate at apex, pubescent outside; petals cream to yellow; outer petals ligulate, 16–26 mm long, c. 2.5 mm wide at base, 2.5–3 mm wide at midpoint, weakly keeled toward apex inside, flat outside, silver-puberulent but glabrous at base inside, silver-gold sericeous outside, apex acute to obtuse; inner petals linear, 22–23 mm long, c. 1.5 mm wide at base, 1.2–1.3 mm wide at midpoint, keeled on both faces, densely silver-puberulent with a patch of longer hairs about 1 mm long about 2 mm above the glabrous base inside, densely silver-puberulent but glabrous at base outside, apex acute; stamens 2.2–3.1 mm long, anther connective apex flattened, tongue-shaped, stamen bases forming an inconspicuous ring around ovaries; carpels 3–5, 2.5–4 mm long, stigmas spreading, not connivent, filiform. **Fruit** of up to 4 monocarps borne on pubescent to glabrate pedicels 9–19 mm long, 3.2–5.5 mm thick; monocarps orange, flattened ellipsoid-oblongoid, 13–38 × 12–33 mm, adpressed rusty-pubescent to glabrate, stipe 2.5–7 mm long, apex obtuse or with a beak c. 1 mm long. **Seeds**

up to 4 per monocarp, in a single row, irregularly ellipsoid, $10\text{--}12 \times 6\text{--}7 \times 4\text{--}5$ mm, wrinkled, sarcotesta bluish, drying dark brown to black, aril absent.

Distribution. Southern Thailand, Peninsular Malaysia, Sumatra and Borneo. In Singapore, known from Jurong (*Corner SFN 26096*, 15 Oct 1932, K [K003313891], SING [SING0003377]), Nee Soon (*Chong et al. NSSF2-Q319aT36*, 21 Jan 2014, SINU [SING0354993]), Sungai Murai (*Corner SFN 34531*, 14 Nov 1937, A, K [K003313892], MICH, SING [SING0003375]), Upper Seletar (*Lua & Hassan Ibrahim SING2012-064*, 7 Mar 2012, SING [SING0173818]) and Bukit Mandai (*Sinclair 40010*, 29 Aug 1953, K [K003313896], L, SING [SING0003380]).

Ecology. In Singapore, in freshwater swamp forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. Corner gave *Xylopia fusca* a supporting role in the elaboration of his Durian Theory, describing its seeds with fleshy coverings suspended from a dehiscent fruit as indicative of an animal dispersal syndrome of early angiosperms (Corner, Ann. Bot. (Oxford), n.s., 13 (1949) 403). In addition, he drew attention to the ecological importance of the species in the freshwater swamp forests above the tidal zone in Singapore and the Sedili region of Johor, Malaysia (Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 173), citing its frequent co-dominance with *Palaquium xanthochyllum* (de Vriese) Pierre ex Burck in these habitats. A handy identification aid, visible even in fallen leaves, are the transverse wrinkles present on the petioles.

5. *Xylopia magna* Maingay ex Hook.f. & Thomson

(Latin, *magnus* = large; possibly referring to the long petals)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 84; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 120; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 93; Sinclair, Gard. Bull. Singapore 14(2) (1955) 338; Kochummen, Tree Fl. Malaya 1 (1972) 97; Keng, Gard. Bull. Singapore 27 (1974) 75; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 34; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 77; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 122; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 171; LaFrankie et al., Forest Trees Bukit Timah (2005) 166; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 91, 104, 213; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Turner, Gard. Bull. Singapore 70 (2018) 725; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 154. **Synonym:** *Xylopicrum magnum* (Maingay ex Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Maingay 3288*, [Malaysia], Malacca [Melaka], 1867–1868 (lectotype K [K00574703], designated by Turner, Gard. Bull. Singapore 70 (2018) 725).

Trees to 40 m tall, lacking stilt roots. **Twigs** brown, reddish brown-tomentose. **Leaves:** lamina subcoriaceous to chartaceous, glabrous except for the pubescent midrib above, more densely pubescent on the midrib beneath, drying grey above, orange-brown beneath, broadly lanceolate

to elliptic-oblong, 8.5–13 × 3.4–4.2 cm, base rounded, truncate or subcordate, apex acute to attenuate to acuminate, the acumen c. 10 mm long, lateral veins about 8–13 per side; petiole 4–6 mm long. **Inflorescences** single-flowered, orange-brown tomentose, peduncles absent. **Flowers** with pedicels 3.5–10 mm long; bracts 2, attached proximal to pedicel midpoint, 2.3–2.5 mm long; sepals connate for about half their length, broadly triangular, 3.4–4.5 mm long, short-acuminate at apex, pubescent outside; petals yellow to white; outer petals linear, widening into a very shallowly concave base, 75–93 mm long, 3–4 mm wide just above base, 1–2 mm wide at midpoint, flat on both faces, pubescent on both surfaces except at the base, apex acute; inner petals threadlike, with a slightly wider slightly flattened or deeply concave base, c. 58 mm long, 1 mm wide just above base, c. 0.7 mm wide at midpoint, keeled on both inner and outer faces, pubescent on both surfaces except at the base, apex acute; stamens 2–2.5 mm long, anther connective apex dome-shaped, stamen bases forming a hollow cone surrounding the ovaries; carpels 10–23, c. 4.5 mm long, stigmas connivent, filiform. **Fruit** of up to 9 monocarps borne on pubescent to glabrate pedicels c. 12 mm long, 2.5 mm thick; monocarps green, oblongoid to globose, 21–32 × 12–17 mm, irregularly pubescent, wrinkled, stipe 6–7 mm long, apex rounded. **Seeds** c. 6 per monocarp, in two rows, globose to ellipsoid, c. 9 × 7–8 × 5–7 mm, smooth, sarcotesta purple, drying brown to black, aril inconspicuous, a flat fleshy ring surrounding the micropyle.

Distribution. Peninsular Malaysia and Borneo. In Singapore, known from Bukit Timah (*Sinclair SFN 39690*, 24 Jun 1953, BK, BO, K [K003313921], L [L.4468323], SING [SING0003383]; *Hardial 345*, 13 Jun 1965, K [K003313924], SING [SING0003385]; *Jumali JK 1005*, 27 Nov 1972, SING [SING0003392]) and Seletar (*Sinclair SFN 40258*, 23 Apr 1954, K [K003313922], L [L.4468335], SING [SING0003384]).

Ecology. Lowland dipterocarp forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. *Xylopia magna* has the longest petals of any Asian *Xylopia* species. The base of the trunk may have stiff slightly-kneed buttresses to 2 m.

6. *Xylopia malayana* Hook.f. & Thomson (of Malaya)

Fl. Ind. 1 (1855) 125; Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 85; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 115; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 91; Sinclair, Gard. Bull. Singapore 14(2) (1955) 340, p.p.; Kochummen, Tree Fl. Malaya 1 (1972) 67; Keng, Gard. Bull. Singapore 27 (1974) 75; Corner, Gard. Bull. Singapore, Suppl. 1 (1978) 72; Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. (1990) 14; Turner, Gard. Bull. Singapore 45 (1993) 34; Turner et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 10; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 77; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 122; Turner et al., Gard. Bull. Singapore 48 (1998 [‘1996’]) 141; Chew et al., Gard. Bull.

Singapore 49(2) (1999 [‘1997’]) 171; Lee et al., Gard. Bull. Singapore 55 (2003) 292; LaFrankie et al., Forest Trees Bukit Timah (2005) 63, 166; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 91, 104, 231; Turner & Chua, Checkl. Vasc. Pl. Sp. Bukit Timah Nat. Res. (2011) 10; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 263, 288; Turner et al., Tree Fl. Sabah & Sarawak 8 (2014) 196; Neo et al., Nat. Singapore 7 (2014) 100; Turner, Gard. Bull. Singapore 70 (2018) 726; Ho et al., Gard. Bull. Singapore 71(Suppl. 1) (2019) 68; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 154. **Type:** *Griffith s.n.*, [Malaysia], Malacca [Melaka], [1845] (lectotype K [K000574721], designated by Turner, Phytotaxa 36 (2011) 110; isoelectotype CAL [CAL0000004583]). **Fig. 87, 88.**

Parartabotrys sumatranus Miq., Fl. Ned. Ind., Eerste Bijv., fasc. 3 (1861) 374. **Synonym:** *Xylopicrum sumatranum* (Miq.) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Teijsmann s.n.*, [Indonesia], Sumatra, Palembang circa Gunung Megang prope Muara-enim (possible type material L [L0196111, L0196112]).

Xylopa pustulata Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 85. **Synonym:** *Xylopicrum pustulatum* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Maingay 1320* [Kew Distribution 82/2], [Malaysia], Malacca [Melaka], 1865–1866 (lectotype K [K000574716], designated by Turner, Phytotaxa 36 (2011) 110).

Xylopa maingayi Hook.f. & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 85. **Synonym:** *Xylopicrum maingayi* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8. **Type:** *Maingay 2963* [Kew Distribution 81], [Malaysia], Malacca [Melaka], 12 February 1867 or 1868 (lectotype K [K000574719], designated here; isoelectotype BM [BM000511033]).

Trees to 20 m tall, lacking stilt roots. **Twigs** brown, reddish brown or brownish black, sparsely pubescent to glabrous. **Leaves:** lamina chartaceous to subcoriaceous, glabrous on both surfaces, drying brown and often shiny above, light brown beneath, elliptic, elliptic-ovate, lanceolate or oblong, 6.1–13.3 × 2.8–5.2 cm, base broadly cuneate, apex acuminate, acumen 5–14 mm long, lateral veins 8–14 per side; petioles 4–8 mm long. **Inflorescences** 1–4-flowered, rusty-pubescent, peduncles 1–2.5 mm long. **Flowers** with pedicels 2.5–4 mm long; bracts 1–2, attached near pedicel base, 1.4–2.3 mm long; sepals connate for about half their length, ovate to broadly ovate, 2.7–4 mm long, drying brown, obtuse at apex, rusty-pubescent outside; petals cream-coloured with a maroon patch on the inside of the inner petal base; outer petals linear, 13.5–20 mm long, 2.3–3 mm wide at base, 1.1–1.9 mm wide at midpoint, pubescent on both surfaces, apex obtuse; inner petals linear, 13–18 mm long, 1.2–1.6 mm wide at base, 0.6–0.7 mm wide at midpoint, pubescent on both surfaces, apex obtuse; stamens 1.5–1.8 mm long, anther connective apex truncate, stamen bases forming a hollow cone surrounding the ovaries; carpels 4–6, 3.2–3.7 mm long, stigmas connivent, club-shaped. **Fruit** of 3–4(–12) monocarps borne on pedicels 5–7 mm long, 2.6–2.8 mm thick; monocarps dull reddish green to greenish brown, oblongoid, 28–34 × 10–14 mm, sparsely rusty-pubescent to glabrate, rugose, stipe 2.5–6 × 1.5–4 mm, apex obtuse, somewhat narrowed into a broad oblique beak. **Seeds** c. 4 per monocarp, in two rows, ellipsoid, c. 8 × 6 × 4.2 mm, smooth, sarcotesta greyish white, greyish blue or pale lilac, drying brown, aril inconspicuous, a flat fleshy ring surrounding the micropyle.

Distribution. Peninsular Malaysia, Sumatra and Borneo. In Singapore, known from Bukit Timah (*Ngadiman SFN 36125*, 18 Aug 1939, A, K [K003313876], KEP, SING [SING0003413]), MacRitchie (*Sinclair SFN 40672*, 14 Jul 1955, BM, K [K003313849], L, SING [SING0003391]; *Leong et al. MR2014-023*, 3 Jun 2014, SING [SING0211885]), Upper

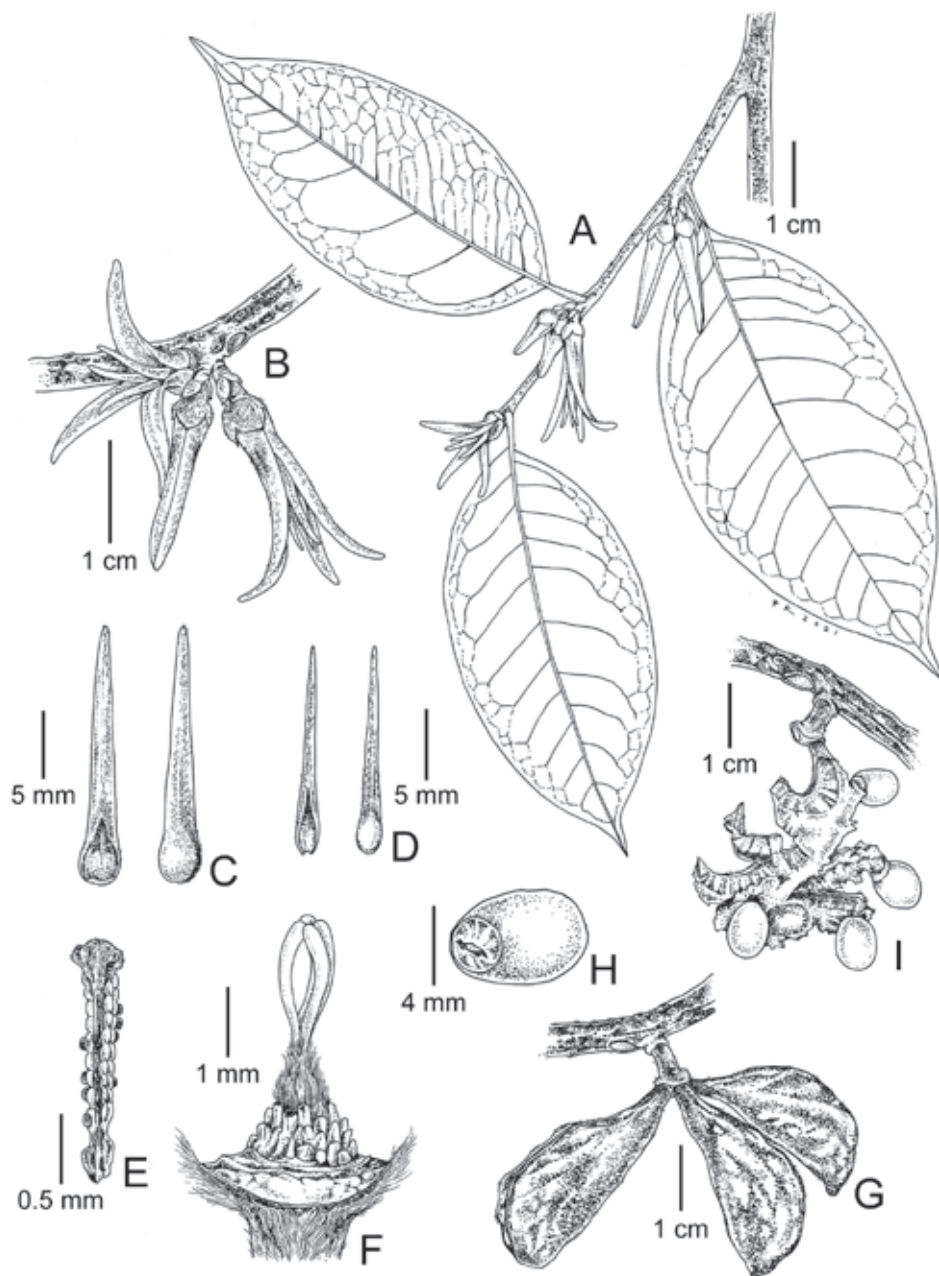


Figure 87. *Xylopia malayana* Hook.f. & Thomson. **A.** Habit. **B.** Inflorescence. **C.** Outer petals. **D.** Inner petals. **E.** Stamen. **F.** Flower with sepals, petals and stamens detached, showing the carpels and united stamen bases. **G.** Fruit before dehiscence. **H.** Seed. **I.** Dehisced monocarp. (A–H from Singapore, A, Nee Soon, Liew *et al.* SING2005-32; B, Upper Seletar, Lee *et al.* SING2008-69; C–F, Bukit Timah, Maxwell 81-73; G & H, MacRitchie, Chen & Thomas JH84; I, Bukit Timah, Khoo KMS 97. Drawn by P.K. Cheng).

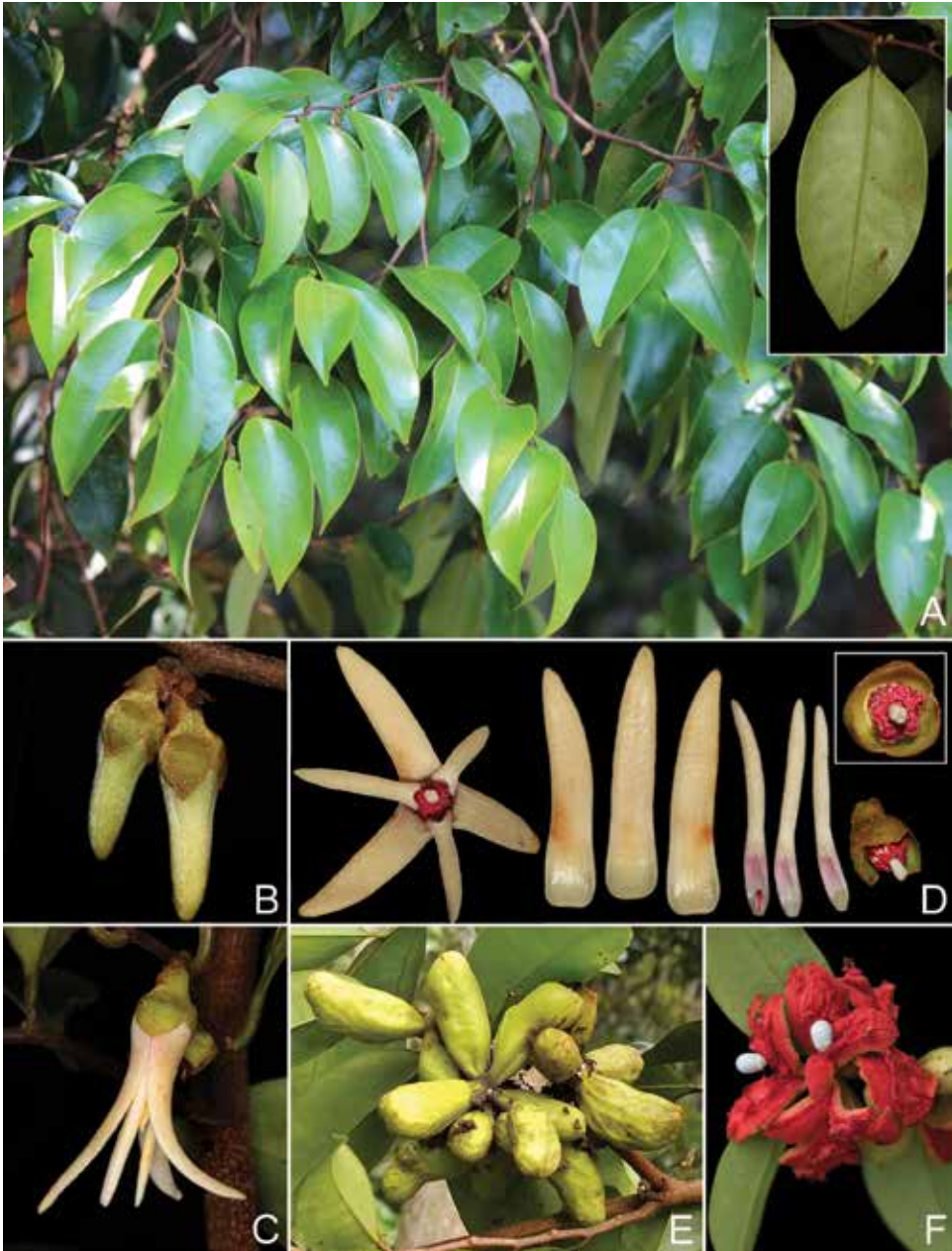


Figure 88. *Xylopia malayana* Hook.f. & Thomson. **A.** Habit. Inset: Lower leaf surface. **B.** Flower buds. **C.** Flower (side view). **D.** Left: Flower with inner petals pulled apart to reveal the stamens and carpels; Right: Dissected flower. Inset: Close-up of stigmas and stamens (front view). **E.** Immature fruit. **F.** Dehiscent monocarp showing red pericarp and seeds with greyish white sarcotesta. (A–F including insets from Singapore; A & B, MacRitchie; A inset & C, Pasir Panjang Nursery, *SING2018-807*; D & D inset, Chestnut; E, Bukit Kalang, *Leong et al. MR2014-023*; F, Pasir Panjang Nursery. Photos: A–D including insets, X.Y. Ng; E, P.K.F. Leong; F, Zaki Jamil).

Seletar (*Lee et al. SING2008-69*, 13 Mar 2008, K [K003313877], KEP, SING [SING0105456]), Jurong (*Ridley 3861*, 1892, BM) and several other localities.

Ecology. Lowland and swamp forest.

Conservation assessment. Globally, Least Concern (LC) (IUCN Red List, 2026). In Singapore, assessed as Vulnerable (VU/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. Keng & Heaslett (Gard. Bull. Singapore 26(2) (1973) 223–225) gave a detailed description of the fruit dehiscence process of this species. *Xylopia malayana* in Singapore flowers from February to April and in August, differing from its similar congener *X. dicarpa* in that regard.

7. *Xylopia oxyantha* (Hook.f. & Thomson) Hook.f. & Thomson

(Greek, *oxys* = sharp, *anthos* = flower; referring to the long and acute flower buds)

in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 83; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 114; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 41; Ridley, Fl. Malay Penins. 1 (1922) 90; Turner, Gard. Bull. Singapore 70 (2018) 727; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 154. **Basionym:** *Habzelia oxyantha* Hook.f. & Thomson, Fl. Ind. 1 (1855) 124; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 37. **Synonyms:** *Uvaria oxyantha* Wall., Numer. List no. 6478 (1832), nom. nud. – *Xylopicrum oxyanthum* (Hook.f. & Thomson) Kuntze, Revis. Gen. Pl. 1 (1891) 8, as ‘*oxyacanthum*’. – *Xylopia ferruginea* (Hook.f. & Thomson) Baill. var. *oxyantha* (Hook.f. & Thomson) J.Sinclair, Gard. Bull. Singapore 14(2) (1955) 345; Kochummen, Tree Fl. Malaya 1 (1972) 96; Turner, Gard. Bull. Singapore 45 (1993) 34; Wong et al., Gard. Bull. Singapore 46(2) (1995 [‘1994’]) 77; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 122. **Type:** *Wallich s.n.* [EIC 6478], Singapore, 1822 (holotype K-W [K001123994]; isotypes BR [fragment], CAL, K [K000574722]).

Xylopia glauca Boerl., Cat. Pl. Phan. 1 (1899) 24; Boerlage, Icon. Bogor. 1, fasc. 3 (1899) [205], t. 74. **Type:** *Collector unknown s.n.*, [Indonesia], cult. in Hort. Bot. Bogor. sub IV.H.45, ex insula Bangka (lectotype U [U0245797], designated by Turner, Gard. Bull. Singapore 70 (2018) 727; probable isoelectotypes A, K [K000574766, K001089938, K001089939], L [L0196050, L0196051, L0196052], NY, US).

Trees to 12 m tall, with stilt roots present toward base of trunk. **Twigs** initially brown, glabrous to pubescent, eventually light grey and glabrate. **Leaves:** lamina subcoriaceous or chartaceous, glabrous above, sparsely pubescent hairs densest along the midrib, or glabrate beneath, occasionally somewhat shiny above, elliptic to elliptic-oblong, 14.3–16.2 × 5.5–8.2 cm, base rounded to broadly cuneate and short-decurrent, apex acuminate, the acumen 5–10 mm long, lateral veins 11–16 per side; petiole 10–14 mm long. **Inflorescences** 3–4-flowered, whitish grey-pubescent, peduncles 2–8 mm long. **Flowers** with pedicels 9–15 mm long; bract 1, just proximal to pedicel midpoint, c. 1 mm long; sepals basally connate, crescent-shaped to broadly triangular, 2.5–5 mm long, acute and often recurved at apex, greyish white-pubescent; petals yellow; outer petals linear, 24–36 mm long, 3.3–4 mm wide at base, 2.1–2.2 mm wide at

midpoint, densely pubescent on both surfaces, apex acute; inner petals linear, similar in length but only 1.2–1.4 mm wide at base, 0.8–0.9 mm wide at midpoint, densely pubescent on both surfaces, apex acute; stamens 2–2.5 mm long, anther connective apex flattened, tongue-shaped, stamen bases forming an inconspicuous ring around ovaries; carpels c. 15, 1.6–3.5 mm long, stigmas loosely connivent, club-shaped to narrowly oblong. **Fruit** of up to 16 monocarps borne on glabrate pedicels c. 31 mm long, 3.5–4 mm thick; monocarps red, narrowly cylindrical, torulose, 81–112 × 5–6 mm, sparsely pubescent to glabrate, longitudinally wrinkled, stipe 6–12, apex rostrate, beak 1.5–4 mm long. **Seeds** 5–11 per monocarp, in a single row, ellipsoid, c. 7–8 × 4–4.5 × c. 3.6 mm, wrinkled, sarcotesta white, drying dark brown, aril absent.

Distribution. Peninsular Malaysia and Sumatra. In Singapore, known from Sungei Morai (Ridley 4558, 22 Jun 1892, BM, SING [SING0003372]), Kranji (*Mat s.n.*, 1894, SING [SING0003373]), Nee Soon (*Samsuri et al. NES111*, 15 Jul 2003, SING [SING0045821]), Thomson Road (*Togashi 6212411*, 24 Jan 1962, A, AAU, K) and an unknown locality (*Wallich s.n.* [EIC 6478], 1822, BR, K [K000574722], K-W [K001123994]).

Ecology. Tropical lowland forest.

Conservation assessment. Globally, not assessed. In Singapore, assessed as Critically Endangered (CR/D) by Middleton et al. (in Davison et al. (ed.), Singapore Red Data Book, ed. 3 (2024) 468).

Notes. In the past *Xylopia oxyantha* has been regarded as a variety of *Xylopia ferruginea* but is treated here as a distinct species with differences in both vegetative and reproductive features. The two species overlap in distribution, but *Xylopia oxyantha* has a narrower range limited to southern Peninsular Malaysia, Singapore, and nearby Bangka (Indonesia). Singapore provides a good location to assess the ecological differences between the two taxa.

Excluded taxa

Anaxagorea javanica Blume var. **dipetala** Corner: Maas & Westra, Bot. Jahrb. Syst. 105(2) (1985) 184; Turner, Gard. Bull. Singapore 45 (1993) 28. – See notes under *Anaxagorea javanica* Blume var. *javanica*.

Fissistigma latifolium (Dunal) Merr.: Burkill, Dict. Econ. Prod. Malay Penins. 1 (1935) 1021; Chew et al., Gard. Bull. Singapore 49(2) (1999 [‘1997’]) 170; Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 121, 285. – See notes under *Fissistigma*.

Goniothalamus giganteus Hook.f. & Thomson: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 73; Ridley, Fl. Malay Penins. 1 (1922) 65. – See notes under *Goniothalamus*.

Goniothalamus tortilipetalus M.R.Hend.: LaFrankie et al., Forest Trees Bukit Timah (2005) 162; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 46, 103, 228. – See notes under *Goniothalamus*.

Guatteria nitida A.DC.: Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 46. – See notes under *Monoon*.

Meiogyne monosperma (Hook.f. & Thomson) Heusden: LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 59, 103, 229. – See notes under *Meiogyne*.

Melodorum aberrans (Maingay ex Hook.f. & Thomson) J.Sinclair: Sinclair, Gard. Bull. Singapore 14 (1955) 369; Turner et al., J. Singapore Natl Acad. Sci. 18 & 19 (1990) 62; Turner, Gard. Bull. Singapore 45 (1993) 31; Turner, Gard. Bull. Singapore 47 (1997 [‘1995’]) 115; Lee et al., Gard. Bull. Singapore 55 (2003) 291. – This name is here considered a synonym of *Sphaerocoryne affinis* (Teijsm. & Binn.) Ridl. The record of the species for Singapore is based on one old specimen with no locality other than ‘Singapore’. In the absence of further confirmation, the record is considered doubtful and excluded from the account.

Miliusa roxburghiana Hook.f. & Thomson: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 123. – See notes under *Miliusa*.

Mitrephora maingayi Hook.f. & Thomson: LaFrankie et al., Forest Trees Bukit Timah (2005) 164; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 61, 103, 229; Turner, Gard. Bull. Singapore 70 (2018) 583; Soh et al., 1001 Gard. Pl. Singapore (Trees etc.) (2020) 210, 310; Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1) (2022) 146. – This species was listed as casual by Lindsay et al. (Gard. Bull. Singapore 74(Suppl. 1) (2022) 146). The only specimen in SING from Singapore, *Ho et al. SING2016-087* [SING0230863], is annotated as being from a tree ‘probably planted’ from near the summit of Bukit Timah. The species is listed in LaFrankie et al. (Forest Trees Bukit Timah (2005) 164), but no vouchers are cited. In the absence of wild-collected herbarium specimens, the taxon is excluded from the present account.

Mitrephora teysmannii Scheff.: Weerasooriya & Saunders, Taxon 51 (2002) 191; Chen et al., 1001 Gard. Pl. Singapore, ed. 3, [2015] 695, 807. – This older name was used for the same taxon as *Mitrephora maingayi* Hook.f. & Thomson above but *Mitrephora maingayi* has been conserved over it. The same exclusion applies.

Polyalthia bullata King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 64; Ridley, J. Straits Branch Roy. Asiat. Soc. 3340 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 55; Sinclair, Gard. Bull. Singapore 14(2) (1955) 300; Turner et al., J. Singapore Natl Acad. Sci. 18 & 19 (1990) 62; Turner, Gard. Bull. Singapore 45 (1993) 32. – See notes under *Polyalthia*.

Polyalthia cinnamomea Hook.f. & Thomson, Fl. Ind. 1 (1855) 138; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 44; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 66; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 40; Ridley, Fl. Malay Penins. 1 (1922) 51; Turner, Gard. Bull. Singapore 70 (2018) 636. – See notes under *Polyalthia*.

Polyalthia hypogaea King: Wong et al., Checkl. Pl. Sp. Nee Soon Swamp Forest (2013) 207, 287. – See notes under *Monoon*.

Polyalthia nitida (A.DC.) Hook.f. & Thomson: Hooker & Thomson in Hooker, Fl. Brit. India 1, fasc. 1 (1872) 64; Ridley, Fl. Malay Penins. 1 (1922) 61. – See notes under *Monoon*.

Stelechocarpus burahol (Blume) Hook.f. & Thomson: Hooker & Thomson, Fl. Ind. 1 (1855) 94; Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 22; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 5; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 38; Ridley, Fl. Malay Penins. 1 (1922) 24. – Early records of this species in Singapore are based on collections by Lobb although the collection locality in Singapore for these specimens is likely incorrect (see Middleton & Turner, Fl. Singapore 1 (2019) 32 for problems with Lobb specimens). The species is cultivated in Singapore but no specimens of wild or relictual trees from Singapore are known.

Unona cauliflora Hook.f. & Thomson, Fl. Ind. 1 (1855) 137, nom. illeg. hom. non Blanco (1845); Miquel, Fl. Ned. Ind. 1(2), fasc. 1 (1858) 43. – See notes under *Polyalthia*.

Unona desmos Dunal, nom. illeg. superfl.: King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(1) (1892) 44. – See notes under *Desmos*.

Xylopia elliptica Maingay ex Hook.f. & Thomson: Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935) 2275. – See notes under *Xylopia*.