Annonaceae of Borneo: a review of the climbing species

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ABSTRACT. The climbing species of the Annonaceae native to Borneo are reviewed. Eight genera of lianas are represented: *Artabotrys* (17 spp.), *Desmos* (4 spp.), *Fissistigma* (15 spp.), *Friesodielsia* (9 spp.), *Mitrella* (3 spp.), *Pyramidanthe* (1 sp.), *Sphaerocoryne* (1 sp.) and *Uvaria* (19 spp.). The species are described. Synonymy, typifications and keys for identification are included. No nomenclatural novelties are presented in this account.

Keywords. Brunei Darussalam, Indonesia, Malaysia, Malesia, lianas, systematics, taxonomy

Introduction

The Annonaceae are essentially a pantropical family and an important element in the flora of the lowland tropical forest. The family is well represented in Borneo, which is hardly surprising given that it is a large equatorial island with a warm and wet climate and was, until recently, covered in vast tracts of tropical rain forest. Most species of Annonaceae are free-standing trees, treelets or shrubs, but a substantial minority are woody climbers (lianas) or scandent shrubs. It is this element of the family as represented in Borneo that is the subject of the present paper.

The annonaceous climbers of Borneo merit attention for several reasons. Firstly, there has been relatively little work on them by taxonomists in recent decades. Secondly, they are particularly important in terms of representation amongst the liana flora. While the Annonaceae are pantropical, climbing species are almost confined to the Old World. Gentry (1991) reports only six species from two genera in the Neotropics, compared to a rich diversity in the Palaeotropics e.g. 41 species in West Africa (Jongkind & Hawthorne 2005), 49 species recognised here for Borneo. While published inventories of lianas in the forests of Borneo are rare and none is extensive, the data suggest that the Annonaceae are typically among the top three families in terms of representation by species or numbers of individuals (Putz & Chai 1987; Appanah et al. 1993; DeWalt et al. 2006), contesting top spot with the Leguminosae and Palmae.

The climbing Annonaceae of Borneo

The present revision is greatly facilitated by the strong tendency of life form to be shared across all members of a genus within the Annonaceae. Sinclair (1955) emphasised the

taxonomic value of knowing if a plant is a climber or not in the Annonaceae of the Malay Peninsula. Among the species in Borneo, the split of genera in to lianas or trees/treelets appears completely sound. The only possible doubt concerns *Desmos* and *Sphaerocoryne*. In cultivation, members of both genera will grow as shrubs if given no support. A number of *Sphaerocoryne* collections I have seen from Borneo are reportedly from trees, but this also happens for other genera of strict climbers such as *Uvaria*, so confusion between climber and mechanical host may be the explanation. Alternatively some species may be found as both climbers and free-standing plants in nature. In Borneo, the species of *Dasymaschalon* are treelets, but there is at least one climbing species in Thailand (Wang et al. 2009).

I recognise eight genera in the current revision. This is fewer than the 11 Sinclair (1955) recognised in his revision for the Malay Peninsula. This difference is explained by the reduction of genera into *Uvaria*. *Cyathostemma*, *Ellipeia* and others have been considered untenable after molecular phylogenies became available (Zhou et al. 2009). Notably, the only Asia-Pacific genus of climbing Annonaceae not recorded from Borneo is the poorly known New Guinea endemic *Schefferomitra*.

Molecular phylogenies make it clear that the climbing habit has arisen independently several times in the Annonaceae. Among the Bornean representatives, two lines are present. All the genera, except *Artabotrys*, are members of tribe *Uvariae* of subfamily Annonoideae (Chatrou et al. 2012), which consists mostly of lianas and represents a majority of the Old World climbing Annonaceae species. *Artabotrys* is a member of the same subfamily, but forms tribe Xylopieae with the non-climbing *Xylopia*. *Artabotrys* differs from the other Bornean climber genera in having specialised structures to assist climbing. Recurved hooks are formed from the inflorescence axes. These act as grapples, securing attachment to the supporting plants. Members of the other genera climb by means of twining and coiling stems, a response apparently elicited by the presence of a support, as growth appears relatively straight otherwise. Phyllotaxy also differs between the two climber clades; *Artabotrys* typically has spirally arranged leaves whereas the other genera show a distichous leaf arrangement (Johnson 2003).

Identification

Climbing Annonaceae material from Borneo is relatively easily identified as such. Even sterile material should be identifiable to family given the fairly clear characters of twig and leaf available.

Annonaceae (description applies to the climbing genera of Borneo)

Large woody climbers never truly herbaceous, unarmed except for *Artabotrys*. **Twigs** with fibrous bark, often striate or latticed, medullary rays broadening outwards generally obvious to the naked-eye as a star-shaped pattern in cross-section, pith

often septate. **Indumentum** hairs simple; stellate or caespitose in *Uvaria*. **Leaves** simple, entire, generally alternate and distichous, rarely spiral, membranous to coriaceous, often glaucous, pinnately nerved, with lateral veins looping within the lamina margin, though often obscurely, stipules absent. **Inflorescences** axillary or terminal, sometimes appearing leaf-opposed or supra-axillary through growth of the uppermost axillary vegetative shoot or the inflorescence axis being partly adnate to the vegetative shoot. **Flowers** bisexual, trimerous, rarely dimerous, solitary, paired or in few–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 without an obvious bud stage (not so in some *Uvaria* spp.). Sepals (2–)3(–4), hypogynous, valvate or imbricate, free to entirely connate. Petals mostly green, white or yellow, sometimes red or purple, hypogynous, usually 2 whorls of (2–)3(–4), valvate or imbricate, free or connate at the base, often apically coherent, usually alternating with the sepals. Stamens hypogynous, numerous, spirally arranged, closely packed on the torus, sometimes staminodes present, filaments absent or short, anthers linear, 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. Carpels several to many, free or slightly connate at the base, ovules 1–many, basal or lateral; styles free or united, mostly short and terete, stigma capitate, oblong or variously folded. **Fruits** several to many fleshy or somewhat woody indehiscent, sessile or stipitate monocarps, monocarps cylindrical (moniliform in *Desmos*), ellipsoidal, globose or irregular, with 1–many seeds in 1–2 rows, with seeds transverse or longitudinal to long axis of monocarp. **Seeds** sometimes with a circumferential groove, sometimes pitted, endosperm abundant, ruminate, hard, oily, often divided almost to the axis into a series of horizontal plates; embryo straight, minute.

Key to genera of climbing Annonaceae in Borneo

1a. Stellate hairs present ..... *Uvaria*
b. Stellate hairs absent 2

2a. Inflorescence axis hooked ..... *Artabotrys*
b. Inflorescence axis not hooked 3

3a. Petal whorls of similar shape and size with petals at least 2 cm long, monocarps moniliform ..... *Desmos*
b. Petals whorls of dissimilar shape and size, or if similar then less than 2 cm long, monocarps not moniliform 4

4a. Petal whorls of similar shape and size ..... *Sphaerocoryne*
b. Petal whorls dissimilar in shape and/or size 5

5a. Leaves with a pair of glands in the margin of the lamina base, one on each side of the petiole, apex of anther connective more or less flat .... *Friesodielsia*

b. Leaves without glands, apex of anther connective obtuse, apiculate 6

6a. Leaves with lateral nerves distinct, interlateral veins absent, tertiary venation scalariform, inflorescences generally branched and multi-flowered, though some species have 1- or 2-flowered inflorescences, calyx connate near the base only ..... *Fissistigma*

b. Leaves with lateral nerves indistinct, or if distinct with clear interlateral nerves, tertiary venation not scalariform, inflorescences usually 1- or 2-flowered, calyx mostly or entirely connate.....7

7a. Calyx united into a shallow circular or weakly three-pointed cup..... ..... *Pyramidanthe*

b. Calyx united into a distinctly three-pointed cup..... *Mitrella*

An index to the specimens identified in this study is given in the Apendix.

ARTABOTRYS R.Br.

(Greek, *artane, artao* = that by which something is hung up, *botrys* = cluster, bunch of grapes; the hooked inflorescences)

Bot. Reg. 5 (1820) t. 423. Sinclair, Gard. Bull. Singapore 14 (1955) 246. Nurainas, Floribunda 2(5) (2004) 117–127. Turner, Folia Malaysiana 10 (2009) 59. TYPE: *Artabotrys odoratissimus* R.Br., *nom. illegit.* (≡ *Annona hexapetala* L.f., ≡ *Artabotrys hexapetalus* (L.f.) Bhandari)

Ropalopetalum Griff., Not. Pl. Asiat. 4 (1854) 716. TYPE: *Ropalopetalum uniflorum* Griff.

Woody climbers. Twigs glabrous or hairy. Leaves chartaceous to coriaceous, midrib sometimes raised above, lamina often decurrent to petiole. Inflorescences extra-axillary, borne on thick woody peduncles that form reflexed, often laterally compressed, hooks that assist with climbing, fascicled or single-flowered. Flowers bisexual, white or yellow, often fragrant, sepals 3 valvate, free or united at the base, petals 6, valvate in two whorls, subequal, clawed with concave bases connivent, closely adpressed over reproductive organs, inner whorl often remaining attached by their bases when it falls, torus flat or concave, stamens many, truncate, apex dilated, carpels numerous, ovules 2, basal. Monocarps few to many, cylindrical or ellipsoidal, often sessile. Seeds 2, erect, collateral.

Distribution and diversity: 100 or more species in the Old World tropics from Africa to Australia. 17 species recorded from Borneo.

Notes. The persistent inflorescence hooks make *Artabotrys* a relatively easy genus to recognise.

Key to *Artabotrys* species

1a. Petal blades of both whorls less than 2 mm wide, monocarps per pedicel typically 3 or fewer (monocarps of *A. sarawakensis* are unknown but carpel number indicates this to be true) 2

b. Petals blades of one or both whorls at least 2 mm wide, more than three monocarps per pedicel 5

2a. Pedicel of flower longer than 16 mm ..... *A. sarawakensis*

b. Pedicel of flower up to 16 mm long 3

3a. Petals drying black with sparse pale hairs, monocarps more than 2 cm wide ..... *A. veldkampii*

b. Petals drying brown often with dense pale tomentum, monocarps drying less than 2 cm wide 4

4a. Pedicel longer than flower, outer petals with relatively little distinction between claw and blade when viewed abaxially, blade relatively flat, monocarps 10 mm or more in diameter, longitudinally ridged and beaked ..... *A. gracilis*

b. Pedicel shorter than flower, outer petals with clear distinction between claw and filiform blade, monocarps less than 10 mm in diameter, smooth with rounded apex ..... *A. suaveolens*

5a. Blades of inner petals 2 mm wide or less 6

b. Blades of inner petals more than 2 mm wide 8

6a. Flower pedicel less than 5 mm long, petals covered with red-brown hairs ..... *A. sumatranus*

b. Flower pedicels more than 5 mm long, petals densely covered with pale hairs 7

7a. Pedicel shorter than flower, monocarps with apex rounded ..... *A. roseus*

b. Pedicel longer than flower, monocarps with apex beaked ..... *A. costatus*

8a. Pedicel villose, monocarps flat-topped, generally angular 9
b. Pedicel glabrous or tomentose but not villose, monocarps ellipsoidal and beaked (flat-topped in *A. pandanicarpus*) 11

9a. Leaves typically coriaceous, sepals broader than long, monocarps glabrous ..... *A. lanuginosus*
b. Leaves typically chartaceous, sepals longer than broad, monocarps shortly tomentose, at least near base 10

10a. Outer petals lanceolate, more than 2 cm long, monocarps with angled sides extending over the whole length ..... *A. hirtipes*
b. Outer petals ovate, less than 2 cm long, monocarps with angled sides near the base only ..... *A. kinabaluensis*

11a. Blades of at least one petal whorl more than 10 mm wide 12
b. Blades of both petal whorls less than 10 mm wide 14

12a. Petal blades ovate, monocarps flat-topped and angled ..... *A. pandanicarpus*
b. Petal blades of at least one whorl lanceolate, monocarps ellipsoidal, markedly beaked, not angled 13

13a. Flower pedicel less than 10 mm long, monocarps to 2.5 cm long, 1 cm diameter, beak very hard and sharp ..... *A. polygynus*
b. Flower pedicel more than 20 mm long, monocarps to 4 cm long, 2 cm diameter, beak not hard and sharp ..... *A. macropodus*

14a. Foliage, flowers and fruits often with yellow powdery spots, monocarps fusiform ..... *A. atractocarpus*
b. Foliage, flowers and fruits not yellow spotted, monocarps sessile 15

15a. Petals densely red-brown tomentose, monocarps drying dull brown ..... *A. venustus*
b. Petals densely to sparsely pale or brown tomentose, monocarps drying shiny smooth brown 16

16a. Petals relatively thick and fleshy, little difference in shape of blades between whorls, monocarps longer than broad ..... *A. maingayi*
b. Petals relatively thin, blades of inner whorl narrower than outer whorl, monocarps broader than long ..... *A. ochropetalus*

1. ***Artabotrys atractocarpus*** I.M.Turner
(Greek, *atractos* = spindle-shaped, *karpos* = fruit)

Folia Malaysiana 10 (2009) 79. TYPE: Borneo, Sarawak, Miri Division, Sungai Tutoh, Melana Protection Forest, Bukit Pelamau, 20 April 1997, *R.M.A.P. Haegens & N. Klazenga 438* (holotype: L[×2] (barcode nos. L 0196939, L0196940); isotypes: K, SAR).

Large woody climber. Foliage, flowers and fruits in dry specimens often with yellow powdery spots and splashes (a feature of several Borneo Annonaceae species including *Polyalthia rumphii* (Blume ex Hensch.) Merr. and *Artabotrys gracilis*). Twigs drying brown, sometimes quite dark, smooth and shiny but tending to become longitudinally wrinkled or latticed, glabrous or with a few scattered erect short pale hairs, sometimes with small pale lenticels. Leaves chartaceous, drying brown or grey-brown above, brown beneath typically with the midrib and lateral nerves contrasting a darker brown, midrib more or less flesh above in dry leaves, prominent beneath, lateral nerves very slightly raised above, prominent beneath, glabrous except for scattered pale adpressed hairs along midrib and laterals below, often with abundant irregular minutely pimply pustules on lower lamina, lamina ovate to elliptic, more rarely obovate, 6–17 × 2.5–7 cm, base rounded, truncate or obtuse, ultimately narrowly decurrent to petiole with lamina edge continuing in to the raised edge of a groove along the top of the petiole, apex acuminate, acumen rather narrow and sharp, lateral veins 10–13 pairs, looping very distinctly within the margin, tertiary venation reticulate; petiole 4–7 mm long, 0.5–2 mm thick. Inflorescence hooks variably adpressed pale hairy, single-flowered. Flowering pedicel 8–22 mm long, c. 1 mm thick, widening distally, drying brown or blackish, shiny, longitudinally wrinkled, sometimes bumpy, sepals thick, triangular, c. 3 × 4 mm, apex acute, reflexing, base slightly connate, scattered pale hairs outside, glabrous within, petals green, coriaceous, with clear distinction between claw and blade, blade of outer petals lanceolate, c. 26 × 6–7 mm, more or less flat, though sometimes with a faintly raised central ridge adaxially, drying red-brown, dense short pale tomentum soon lost except near base of petal, often pustulated, inside of claw drying dark brown, shiny, glabrous, inner petals coherent at margins of claw, with linear blade c. 26 × 3 mm, incurving with tips crossing, flat or slightly grooved with transition to claw pentagonal in cross section, drying red-brown, often pustulate, short pale tomentose near base, stamens many, c. 2 mm long, connective flat-topped, minutely erect hairy, carpels c. 8, c. 1.5 mm long, glabrous. Fruiting pedicel 15 mm long, 2 mm thick, monocarps c. 6, fusiform, to 30 mm long including 10-mm beak, 13 mm across, drying black and shiny with a series of laterally flattened ridges or flanges running longitudinally from base to apex, the two most pronounced on opposite sides extending to form the laterally compressed beak of the fruit, between these there are several less-pronounced longitudinal ridges, some reduced to a series of raised warts, stipe to 15 mm long. Seeds 2.

Distribution. Endemic to Borneo. Collected from eastern Sarawak and East Kalimantan.

Ecology. Lowland forest.

Notes. When I published this as a new species, the diagnosis was based on the stipitate monocarps in comparison to the sessile monocarps of other Malesian *Artabotrys* species. I have subsequently seen *Nengah Wirawan 439* collected from Java that has stipitate monocarps and appears to be *A. sumatranus*. *Forbes 3242* from Sumatra also has stipitate monocarps. The monocarps from these specimens have a rounded apex and not the pronounced beak of *A. atractocarpus*.

Vegetatively the frequent yellow powdering leads to confusion with *Artabotrys gracilis* King but the flowers of *A. atractocarpus* are far larger.

2. *Artabotrys costatus* King
(Latin, *costatus* = ribbed, the distinct lateral veins)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1892) 37. Ridley, Sarawak Mus. J. 1(3) (1913) 78. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born. (1942) 280. Sinclair, Gard. Bull. Singapore 14 (1955) 255. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 81. TYPE: Peninsular Malaysia, Perak, Ulu Bubong 500-800', *King's Collector* [H.H. Kunstler] *4291* (lectotype, designated by Turner (2009a), K (barcode no. K000381022); isolectotypes: BM, BO, CAL, K, SING[×2]).

Large woody climber. Twigs dark brown, smooth, some red-brown hairs on youngest parts. Leaves chartaceous, drying (pale) brown, midrib flush to slightly raised above, prominent below, secondary veins faintly raised above, but lamina often a little bullate giving impression of sunken veins above, sparse scattered hairs on lamina and along midrib in youngish leaves, leaves oblong elliptic, 9–26 × 3–9 cm, base obtuse, slightly decurrent, apex acuminate, lateral veins distinct, 11–13 pairs, petiole to 8 mm long, 2 mm thick. Inflorescence hooks recurved bearing many flowers. Pedicel to 3 cm long, very slender, c. 0.5 mm wide when dry, more or less glabrous, sepals broadly triangular 2 mm long, 3 mm across, petals yellow, densely covered with pale tomentum, outer petals clawed but with little distinction between claw and blade visible from outside, blade ovate oblong, 7 × 3 mm, inner petals clawed, blade concave, 6 × 2 mm, stamens many, carpels 3–8. Fruiting pedicel to 3 cm long, 3 mm thick, monocarps to 7 or more, ripening red, cylindrical, 3 × 1.5 cm, drying black, strongly wrinkled, sessile, often beaked. Seeds 1 or 2, 20 × 10 × 6 mm, pale brown, longitudinally grooved.

Distribution. Malay Peninsula, Borneo. Recorded from Brunei, Sabah and Sarawak.

Ecology. Lowland and montane forest to 1500 m.

3. *Artabotrys gracilis* King
(Latin, thin, slender)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1892) 35. Ridley, Sarawak Mus. J. 1(3) (1913) 77. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born. (1942) 280. Sinclair, Gard. Bull. Singapore 14 (1955) 258. Kessler & van Heusden, Rheedea 3 (1993) 54. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 12 as 'cf. *gracilis*'. TYPE: Peninsular Malaysia, Perak, *King's Collector* [H.H. Kunstler] *4987* (lectotype, designated by Nurainas (2004), BO; isolectotypes: BM, CAL, K, L, SING).

Woody climber to at least 25 m long. Twigs smooth, sometimes faintly latticed, drying brown, glabrous. Leaves chartaceous, drying brown, generally darker above, often with powdery splashes of white or yellow reminiscent of *Polyalthia rumphii*, ovate-elliptic, 5–15 × 2–6 cm, base obtuse, slightly decurrent, apex acuminate, almost caudate, midrib slightly sunken above, prominent below, lateral veins c. 8 pairs, arching forwards and looping within the margin. Petioles 4–7 mm long, 0.5–1 mm thick. Inflorescences hooks recurved and laterally compressed. Flowers pedicels 10–16 mm long, c. 0.5 mm thick, thickening distally, glabrous, sepals free, broadly ovate, 2 × 3 mm, petals pink when young, yellow when older, when dry densely covered in pale adpressed hairs, often with powdery white or yellow spots, outer whorl clawed, blade triangular, 5 × 1.5 mm, a broad-based triangle in cross section with the flat face inwards, claw broadly ovate, c. 2 × 3 mm, adpressed pale hairy externally, glabrous and concave within with a distinct raised upper rim, inner whorl clawed, blade terete, triquetrous or flattened, 2–3 mm long by 1 mm wide, claw c. 3 × 3 mm, glabrous except for a narrow central inverted triangle externally, glabrous within, stamens many, c. 1 mm long, apex truncate, carpels 3. Fruits pedicels 10–16 mm long, c. 1 mm thick, monocarps 1 or 2, ellipsoidal, 15–22 × 10–15 mm, glabrous, drying black or brown sometimes with many pale brown pustules, drying slightly ridged longitudinally, shortly beaked, stipe to c. 3 mm long. Seeds 1–2, 10 × 8 × 4 mm.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest to 800 m.

4. *Artabotrys hirtipes* Ridl.
(Latin, *hirti* = hairy, *pes* = foot, the hairy pedicel)

Bull. Misc. Inform. Kew (1912) 383. Sarawak Mus. J. 1 (1913) 77. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born.

(1942) 280. TYPE: Borneo, Sarawak, Rejang Kapit, *G.D. Haviland 2326* (lectotype designated by Turner (2009a), K (barcode no. K000691269)).

Artabotrys trichopetalus Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 176. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 71. Masamune, Enum. Phan. Born. (1942) 281. TYPE: Borneo, Sabah, Sandakan, September-December 1920, *M. Ramos 1465* (lectotype, designated by Turner (2009a), K (barcode no. K000691311); isolectotypes: A[×2], BM, L, US).

Artabotrys cinnamomeus Diels, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1931) 84. TYPE: Borneo, Sarawak, September 1865, *O. Beccari P.B. 531* (holotype: FI-B; isotype: B(fragment)).

Artabotrys sp. 1, Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 13.

Large woody climber. Twigs pale when older, latticed or longitudinally wrinkled, bark rather papery, brown tomentum on the youngest twigs. Leaves chartaceous to subcoriaceous, drying brown, generally darker above, glabrous above, scattered long adpressed hairs along midrib beneath, midrib flush above, prominent beneath, narrowly elliptic-obovate to oblanceolate, 10–32 × 3.5–6 cm, lateral veins c. 8 pairs, arching well forward, petiole drying black, 6–10 mm long, 2–3 mm thick. Inflorescence hooks recurved, bearing many flowers. Pedicel 12–15 mm long, densely rusty or pale brown villose, sepals triangular, c. 10 mm long, 5 mm across, apex acute, villose outside, glabrous inside, to 2.5 cm long, basal bract foliose to 3 cm long, medial bract to 2 cm long, petals relatively thin, densely covered with pale hairs, outer petals blade lanceolate, 25 mm long, 9 mm wide, inner petals similar length, slightly narrower c. 6 mm wide, stamens many, c. 2 mm long, carpels many, c. 1.5 mm long, densely pale hairy. Monocarps many in large groups to 6 cm diameter, pyriform, to 4 × 2.5 cm, drying brown, angled, flat-topped, central apiculus, covered with very short, pale tomentum. Seeds 2, 22 × 15 × 7 mm, pale brown, smooth.

Distribution. Endemic to Borneo. Collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forests.

Notes. Artabotrys hirtipes is close to two other species from Borneo, *A. lanuginosus* and *A. kinabaluensis*. Vegetatively *A. hirtipes* is closer to *A. kinabaluensis* which tends to have less coriaceous leaves and less hairy foliage than *A. lanuginosus*. The three species are most easily separated on the size and shape of the sepals and outer petals. *Artabotrys lanuginosus* has particularly broad sepals, which unlike the other two species are broader than long. In *A. hirtipes* the outer petals are lanceolate and longer than the more ovate outer petals of *A. kinabaluensis*. In fruit the species can also be distinguished. The monocarps of *A. lanuginosus* are glabrous whereas the other

two species are at least partially shortly pale tomentose. *Artabotrys hirtipes* and *A. lamiginosus* typically have angled sides running up the length of the sessile fruitlets. In *A. kinabaluensis* the base of the monocarp may have angled faces but the angles do not extend up the length of the fruitlet which remains more or less a flattened circle in cross section in the distal portions.

See notes under *A. pandanicarpus* for differences from that species.

5. *Artabotrys kinabaluensis* I.M.Turner
(of Mt Kinabalu)

Malayan Nat. J. 62: (2010) 360. TYPE: Borneo, Sabah, Mt Kinabalu, Tenompok, 7 March 1932, *J. Clemens & M.S. Clemens 28697* (holotype: BM (barcode no. BM000895993); isotypes: A, K, SING).

Artabotrys aff. *hirtipes*. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 81.

Large woody climber. Twigs drying pale brown to pale grey brown, latticed with raised pale lenticels, youngest twigs brown with adpressed long straight pale hairs, sometimes quite dense. Leaves chartaceous, drying brown, generally darker above, midrib sometimes a paler yellow-brown below, glabrous above, adpressed hairs along lamina below, sometimes scattered on lower lamina, midrib in dry leaves flush above, prominent beneath, lateral veins slightly raised above, raised below, lamina elliptic to obovate, 7–15.5 × 3–6 cm, apex shortly acuminate, base obtuse, lateral veins 9–11 pairs, arching forward and looping distinctly within the margin; petiole 4–6 mm long, 1–2 mm thick, often drying blackish with adpressed hairs. Inflorescence axes bearing several flowers. Flower pedicels 10–15 mm long, c. 1.5 mm thick, densely brown hairy, sepals ovate-lanceolate, c. 9 × 6 mm, densely covered with long and straight brown hairs, inside drying black, glabrous except near margins where hairs are finer and sparser than externally, outer petals broadly ovate 16 × 11 mm, densely covered in straight brown hairs except for near the base inside which is glabrous and surrounded by a raised rim, inner petals clawed, blade broadly ovate 11 × 10 mm, densely brown hairy, stamens many c. 2 mm long. Fruiting pedicel 12–15 mm long, c. 5 mm thick, monocarps to 15 or more, sessile to 4 × 3 cm, ellipsoidal, slightly compressed laterally, drying slight sunken between the seeds, apex often quite flat-topped and ultimately apiculate, base obtuse, sometimes slightly angled with flat faces, drying black or very dark brown, minutely warty, with scattered short brown hairs densest near the base, much denser when young. Seeds 2, c. 3 × 1 cm.

Distribution. Endemic to Borneo where it is only known from the Mount Kinabalu area of Sabah.

Ecology. Montane forest from 1500 to 2100 m.

Notes. See notes under *A. hirtipes* for distinction of *A. kinabaluensis* from *A. hirtipes* and *A. lanuginosus*.

6. *Artabotrys lanuginosus* Boerl.
(Latin, woolly, downy)

Cat. Pl. Phan. (1899) 23. Boerlage, Icon. Bogor. 1 (1899) 121, t. 52 (p. 159), as '*lanuginosa*'. Ridley, Sarawak Mus. J. 1(3) (1913) 78. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born. (1942) 280. TYPE: Borneo, Penigin, 1896-1897, *Jaheri 320* (lectotype, designated by Turner (2009a), BO (sheet no. BO-1339062)).

Artabotrys macranthus Holth., Blumea 5 (1942) 180. Kessler & van Heusden, Rheedea 3 (1993) 54, as '*macrantha*'. TYPE: Sulawesi, Sangi and Talaud Islands, Karakelang, Pasir Malap, E. of Lobo, 14 May 1926, *H.J. Lam 3003* (holotype: L (barcode no. L 0037895); isotypes: BO, L[×2], K).

Artabotrys sp. 2, Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 13.

Large woody climber. Twigs covered with dense red-brown tomentum, becoming glabrous with age when brown, latticed, often with raised, dark lenticels giving a rough feel. Leaves coriaceous to chartaceous, drying chestnut brown, sometimes slightly paler beneath, midrib slightly raised to slightly sunken above in dry leaves, prominent beneath, lateral veins flush to slightly sunken above, prominent beneath, lamina glabrous above, hairy below, hairs long (to 2 mm), more or less straight, red-brown becoming pale with age, scattered over lower lamina, denser and more clearly adpressed on midrib below, lamina elliptic or ovate-elliptic, 16–21 × 7–10 cm, apex shortly acuminate, base obtuse, lateral nerves 11-14 pairs, angled forward and arching, looping obscurely within margin, clearly visible from both surfaces, tertiary venation rather lax, only visible from below. Petiole drying brown, horizontally wrinkled, c. 3 × 7–10 mm, tomentose. Inflorescence hooks recured, bearing many flowers. Flowering pedicel to 15 mm long, 2 mm thick, densely covered with long pale hairs, sepals drying brown, broader than long, 6 × 10 mm, densely pale hairy outside, much more sparsely hairy within, petals green becoming yellow, petal whorls similar in shape, ovate, 25 × 15 mm, apex blunt; densely covered on both surfaces with pale brown hairs, outer petals glabrous near base inside which is surrounded by a raised rim, inner petals clawed with a thick, pointed rim over top of claw; stamens many, carpels many. Fruiting pedicel not seen, monocarps ellipsoidal, slightly laterally compressed, c. 3 × 2 × 1.5 cm, sessile or subsessile, apex rather flat-topped, with angles ridges extendin the length of the monocarp, drying dark brown with paler patches where in contact with neighbours, glabrous, surface minutely warty and somewhat shiny. Seeds 2.

Distribution. ?Sumatra, Borneo and Sulawesi. In Borneo known from a few scattered

collections from Brunei, Kalimantan and Sabah. *S 60776* from Limbang in Sarawak may also belong here.

Ecology. Lowland forest.

Notes. See notes under *A. hirtipes* for distinction of *A. lanuginosus* from *A. hirtipes* and *A. kinabaluensis*.

7. *Artabotrys macropodus* I.M.Turner
(Greek, *makro* = big, *podus* = footed, based: the large pedicel of the flower)

Folia Malaysiana 10 (2009) 77. TYPE: Borneo, Sabah, Ranau District, about 3 miles NW of Kampung Pinanantai, 9 May 1973, *G. Shea & Aban SAN 76878* (holotype: K (barcode no. K000581385); isotypes: L, SAN, SING).

Large woody climber. Twigs brown, often with tiny raised lenticels, youngest parts dark brown, shiny, more or less glabrous but for a few adpressed hairs around nodes. Leaves chartaceous to coriaceous, drying various shades of brown, main nerves more consistent dark brown above and below, contrasting with lamina when pale, midrib in dry leaf flush to slightly raised above, prominent below, lateral nerves slightly raised above, prominent below, leaves more or less glabrous except sometimes for some sparse pale long adpressed hairs along midrib below, lamina oblong-ovate or oblong-elliptic, more rarely oblong-obovate, 10–31 × 4–13 cm, base acute, obtuse or rounded, apex shortly acuminate, lateral nerves 8–14 pairs, looping distinctly within margin, tertiary venation reticulate, distinct from both surfaces in dry leaves. Petioles 7–12 mm long, 2–5 mm thick. Inflorescence hooked, single-flowered. Flower pedicel 2–3 cm long, 0.5–1.0 mm thick, pale adpressed hairs, sepals triangular 5–8 × 4–5 mm, apex acute, externally with long pale hairs, inside glabrous, outer petals thick, coriaceous, ovate with only slight constriction between claw and blade, 20–22 × 10–13 mm, densely adpressed pale hairy externally, particularly near the base, inside similarly tomentose except for the excavation at the base which is glabrous, inner petals cohering at their margins with gap between, blades thick, flat, ovate-lanceolate, 10–14 × 5–10 mm, densely pale hairy on both surfaces, stamens many, c. 2 mm long, connective apex convex, carpels many. Fruiting pedicel 2.5–3.5 cm long, 2–5 mm thick, monocarps 5–20 or more, ripening red, ellipsoidal c. 4 × 2 cm, drying brown, apparently markedly wrinkled if collected fully ripe, more or less glabrous except for a few short hairs near base, unripe fruit drying smooth with faint longitudinal lines, surface minutely warty under magnification, apex acuminate with a distinct beak, subsessile, stipe c. 3 mm long. Seeds 2, ellipsoidal with one flattened face, c. 26 × 14 × 8 mm, with a longitudinal groove.

Distribution. Endemic to Borneo. In Borneo collected from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. Among Bornean species *A. macropodus* is not easily confused. *Artabotrys costatus* King has similar long pedicels, but they are more slender and the petals are much narrower and the monocarps are less broad. *Artabotrys polygynus* has broad petals and numerous monocarps but the leaves dry a characteristic very dark brown, the petals are thicker but not so broad as *A. macropodus* and the monocarps are narrower and have a characteristic very hard, sharp point when dry.

8. *Artabotrys maingayi* Hook.f. & Thomson
(Alexander C. Maingay (1836–1869), English doctor and prison administrator in colonial service)

Fl. Brit. India 1 (1872) 55. Sinclair, Gard. Bull. Singapore 14 (1955) 259. Turner, Folia Malaysiana 10 (2009) 62. TYPE: Peninsular Malaysia, Malacca, 1867–1868, *A.C. Maingay 2617* [Kew distrib. no. 34] (holotype: K[×2] (barcode nos. K000381024, K000381029); isotypes: BM, CGE).

Artabotrys havilandii Ridl., Bull. Misc. Inform. Kew 1912 (1912) 382. Ridley, Sarawak Mus. J. 1(3) (1913) 77. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born. (1942) 280. Sinclair, Sarawak Mus. J. 5 (1951) 598. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 12. TYPE: Borneo, Sarawak, near Kuching, 9 September 1892, *G.D. Haviland 1629* (lectotype, designated by Turner (2009a), K (barcode no. K000691275); isolectotype: SAR).

Large woody climber. Twigs drying dark and smooth, more or less glabrous. Leaves chartaceous to thinly coriaceous, drying grey-brown, ovate-elliptic to oblong ovate, 7–13 × 3–5 cm, base obtuse to rounded, slightly decurrent, apex acuminate, midrib slightly raised above, prominent beneath. Inflorescence hooks recurved, drying black, glabrous. Pedicel 7–10 mm long, drying black, longitudinal wrinkled, some scattered pale hairs, sepals ovate, 4 × 4 mm, scattering of pale hairs outside, petals relatively thick and fleshy, densely covered with dense, pale adpressed hairs, outer petals ovate lanceolate, 20 × 6–7 mm, blade 15 × 6–7 mm, inner petals clawed, blades shaped like rabbits' ears, 15 × 4–5 mm, stamens many, carpels many. Fruiting pedicel c. 10 × 4 mm, monocarps 2–5, ellipsoidal to 4.5 × 3.5 cm, ripening orange-yellow, drying black, glabrous, thick-walled (to 4 mm), apex beaked, subsessile, stipe c. 3 mm long, 5 mm thick. Seeds 2, plano-convex, c. 2.5 × 1.5 × 1 cm.

Distribution. Malay Peninsula and Borneo. In Borneo from Brunei and Sarawak. Earlier reports of the species from Kalimantan (Turner 2009a), were based on misidentification of *A. veldkampii* specimens.

Ecology. Lowland forest.

Notes. Refer to *A. veldkampii* for notes on confusion of fruiting specimens with that species.

9. *Artabotrys ochropetalus* I.M.Turner
(Greek, *ochros* = pale yellow, *petalon* = petal)

Folia Malaysiana 10 (2009) 63. TYPE: Borneo, Sabah, Tawau Division, Lahad Datu District, Ulu Sungai Segama, Danum Valley Research Centre, 28 February 1985, *Argent et al. SAN 108284* (holotype: K (barcode no. K000581905); isotypes: K, KEP, L, SAN).

Artabotrys roseus auct. non Boerl., Merrill, Univ. Calif. Publ. Bot. 15 (1929) 71. Kessler & van Heusden, Rheedea 3 (1993) 55.

Large woody climber. Twigs drying black or brown, smooth, more or less glabrous, sometimes with sparse pale brown adpressed hairs on youngest parts. Leaves chartaceous, drying brown, generally darker below, midrib flush to slightly raised above, prominent beneath, lamina elliptic to elliptic lanceolate, 7–20 × 2.5–6.5 cm, base acute to obtuse, slightly decurrent, apex acuminate, lateral veins 10–13 pairs, looping clearly within margin; petiole 10 mm long, 2 mm thick. Inflorescence hooks recurved, multi-flowered. Pedicels 6–11 mm long, with pale adpressed hairs, sepals triangular, apex acute, 3 × 3 mm, with sparse pale hairs; petals yellow, drying brown with short pale pubescence, outer petals with slight constriction between claw and blade, blade lanceolate 21–30 × 4–5 mm, pale pubescent to glabrescent on both surfaces, claw c. 2 mm long, 3 mm wide, pubescent externally, excavated, glabrous within; inner petals with blade 3–5 mm wide with a central ridge adaxially, pale pubescent on both surfaces, claw c. 2 × 2 mm, slight ridge externally, pubescent externally, excavated, glabrous within, stamens many, c. 1.5 mm long, apex truncate, carpels c. 6, ovoid, glabrous but with long hairs among carpels. Fruiting pedicel c. 10 mm long, 6 mm thick, monocarps to 6, ripening yellow, ellipsoidal, wider than long, to 3 × 4.5 × 2.5 cm, longitudinal ridges, glabrous, drying brown, beaked. Seeds 2, 14 × 10 × 8 mm, smooth, brown, pale hilum.

Distribution. Endemic to Borneo where it has been collected from Brunei, Kalimantan, Sabah and Sarawak, but is particularly commonly collected in Sabah and East Kalimantan.

Ecology. Lowland forest.

Notes. The name *Artabotrys roseus* was widely misapplied to this species which is one of the more commonly collected taxa.

10. *Artabotrys pandanicarpus* I.M.Turner
(Greek, *carpos* = fruit, the fruits like those of *Pandanus*)

Folia Malaysiana 10 (2009) 83. TYPE: Borneo, Sarawak, near Kuching, 7 October 1892, *G. D. Haviland 1775* [Garai leg.] (holotype: K (barcode no. K000581386)).

Artabotrys blumei auct. non. Hook.f. & Thomson, Ridley, Sarawak Mus. J. 1(3) (1913) 78. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 266. Masamune, Enum. Phan. Born. (1942) 279.

Large woody climber. Twigs drying brown with youngest parts almost black, occasional pale hairs soon lost. Leaves thinly coriaceous, drying dark brown and shiny above, brown and dull beneath, midrib flush to slightly raised above, prominent beneath, lateral nerves flush to slightly raised above, raised beneath, leaf glabrous except for a few adpressed pale hairs on midrib below, lamina ovate or elliptic, 9–14.5 × 4–7 cm, base obtuse to rounded, ultimately slightly decurrent to petiole, apex acuminate, lateral veins, 10–12 pairs, looping within margin, tertiary venation areolate; petiole 6–7 mm long, 1–2 mm thick. Inflorescence hooks, recurved, laterally compressed, adpressed pale hairy when young, glabrous with age. Flowering pedicel unknown (no specimens with attached flowers available), sepals relatively thin, triangular, c. 6 × 5 mm, apex acute, base slightly connate, densely adpressed pale hairy externally, glabrous within, petals thick and coriaceous, clawed, outer petals with ovate blade, c. 18 × 13 mm, flat, apex blunt, densely covered with very short pale tomentum, claw c. 4 × 5 mm, excavated, glabrous within with raised rim around excavation, blade of inner petals ovate to almost sagittate, c. 14 × 12 mm, apex rounded, densely short pale tomentose on both surfaces, claw c. 5 × 3 mm, glabrous within (reproductive structures unknown). Monocarps many, at least 10, sessile, ellipsoidal, to 3.5 × 3 cm, angular with generally 4–5 longitudinal ridges, apex with a distinct 4–5-sided flat-bottomed depression, thick-walled (3–5 mm), drying dark brown, smooth, covered with dense pale, very short, tomentum. Seeds, 1, c. 2.5 × 1.5 × 1 cm.

Distribution. Endemic to Borneo, where it is known from two or three collections from Sarawak (type and a Haviland collection with the same number which may or may not be a true duplicate from Kuching, *S 28025* from Bintulu).

Ecology. Lowland forest.

Notes. The species of the *A. hirtipes* group (see notes under *A. hirtipes*) have sessile, angular, flat-topped monocarps similar to those of *A. pandanicarpus*. However the *A. hirtipes* group members have leaves with much more distinct secondary venation and floral parts covered with long hairs and relatively thin petals, whereas *A. pandanicarpus* has short to very short hairs on the flowers and thick fleshy petals.

11. *Artabotrys polygynus* Miq.
(Greek, *poly* = many, *gyne* = female; the many carpels)

Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 41. Ridley, Sarawak Mus. J. 1(3) (1913) 77. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born. (1942) 280 as 'polygonus'. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 12, as 'cf. polygynus'. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 82. TYPE: Borneo, Mt Pamatton, *P.W. Korthals s.n.* (lectotype, designated by Turner 2011, U (barcode no. U0000239)).

Artabotrys borneensis Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 175. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 71. Masamune, Enum. Phan. Born. (1942) 280. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 12. TYPE: Borneo, Sabah, Sandakan, September–December 1920, *M. Ramos 1366* (lectotype, designated by Turner (2009a), BM (barcode no. BM000898081); isolectotypes: A, B, BO, K, L, P, US).

Artabotrys hexagonolobus Priyanti, Floribunda 2(6) (2004) 161. TYPE: Borneo, Kalimantan, East Kalimantan, Berau, 9 October 1997, *P.J.A. Kessler et al. B867* (holotype: BO; isotypes: K, L, WAN).

Large woody climber. Twigs drying dark brown or black sometimes paler brown, often noticeably latticed, rusty adpressed tomentose on young parts, sometimes glabrescent. Leaves chartaceous, drying dark brown often greyish above, midrib flush to slightly raised above, prominent below, sometimes with pale, relatively long adpressed hairs along midrib and lamina beneath, otherwise glabrous, elliptic to obovate, base acute to obtuse, decurrent, apex apiculate to acuminate, 5–16 × 2–6 cm, lateral veins visible from both sides in dry leaves, 8–9 pairs, petiole 3–5 mm long. Inflorescence hooks recurved, single-flowered. Pedicel 7–8 mm long, dilating distally, covered with red-brown hairs, densely brown hairy, sepals triangular 5–8 mm long, 5–6 mm across, apex acute; petals yellowish, drying dark brown with pale adpressed hairs sparser on blades, outer petals thick fleshy, clawed, blade lanceolate 30 mm long, 12–15 mm wide, inner petals, blade ovate lanceolate, 20 mm long, 8–10 mm wide, stamens many, 2–3 mm long, carpels many. Monocarps 8 or more, irregularly cylindrical, spindle-shaped, sessile, apex sharply beaked, 2–2.5 cm long, 1 cm diameter, drying black or brown. Seeds 2, 15 × 7 × 4 mm, brown with longitudinal groove.

Distribution. Endemic to Borneo. In Borneo it has been recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland and hill forest to 1500 m.

12. *Artabotrys roseus* Boerl.
(Latin, rosy, pink)

Icon. Bogor. 1 (1899) 122, t. 53 (p. 161), as '*rosea*'. Ridley, Sarawak Mus. J. 1(3) (1913) 77. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 71. Masamune, Enum. Phan. Born. (1942) 280. Kessler & van Heusden, Rheedea 3 (1993) 55. TYPE: Borneo, Sarawak, near Kuching, 12 October 1894, *G.D. Haviland s.n.* (holotype: BO (sheet no. BO-1344062).

Artabotrys pleianthus Diels, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1931) 84. TYPE: Sarawak, September 1865, *O. Beccari P.B. 554* (holotype: FI-B; isotypes: B, K, M).

Large woody climber. Twigs drying brown, grey or blackish, latticed, often with raised lenticels giving a very rough feel, short brown tomentum on youngest parts. Leaves chartaceous to coriaceous, often drying grey-green or yellowy brown with yellowish venation, midrib distinctly raised above, prominent beneath, more or less glabrous, ovate elliptic to obovate, 2.5–12 × 1.2–4.5 cm, base obtuse to rounded, lamina slightly decurrent, apex apiculate to acuminate, lateral veins 9–10 pairs, clearly visible from both surfaces in dry leaves. Inflorescence hooks recurved, laterally compressed, sometimes with adpressed brown hairs, many-flowered. Pedicel 8–20 mm long, tomentose; sepals broadly ovate, 4 mm long by 3 mm wide, apex acute, slightly connate at base, outer petals triangular with little external distinction between blade and claw, 15 mm long, 4 mm wide, densely short pale or brown hairy on both surfaces except glabrous basal excavation inside; inner petals clawed, blade linear c. 1 mm wide, densely tomentose on both surfaces; stamens many, carpels c. 15. Fruiting pedicel to 2 cm long, drying 2 mm thick, monocarps to 8 or more, globose to ellipsoidal, to 3.5 × 2 cm, apex rounded not beaked, drying black or brown, smooth, glabrous, not sessile, stipe short but distinct, 2–6 mm long, 3–4 mm thick. Seeds 2, c. 19 × 13 × 8 mm.

Distribution. Endemic to Borneo. In Borneo collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest including heath forest.

Notes. Similar to *A. havilandii* but *A. roseus* can be distinguished by its thinner petals, linear inner petals and unconstricted outer ones.

13. *Artabotrys sarawakensis* I.M.Turner
(of Sarawak)

Folia Malaysiana 10 (2009) 70. TYPE: Borneo, Sarawak, Baram District, 26 October 1894, *C. Hose 302* (holotype: K (barcode no. K000581384); isotypes: BM, CGE).

Large woody climber. Twigs brown to dark brown, smooth or with faint longitudinal wrinkling or latticing. Leaves drying brown, often dark brown, rather shiny above, glabrous, midrib and lateral nerves raised on both surfaces in dry leaves, lamina elliptic to oblong elliptic, 6.5–11.5 × 2.5–4.5 cm, base acute to obtuse, decurrent, apex acuminate, venation distinct, particularly from above, lateral nerves 8–9 pairs, looping distinctly within margin. Inflorescences several flowered. Flower pedicel 17–23 mm long, c. 0.5 mm thick, drying black, longitudinally wrinkled, glabrous, sepals triangular 3 × 3 mm, petals yellow, clawed, densely covered in pale straw-coloured hairs on all surfaces including very short tomentum on interior excavations, blades of two whorls similar, triquetrous, sometimes grooved adaxially, 12–15 mm long, 1 mm across, stamens c. 20, c. 1 mm long, carpels c. 3, glabrous. Fruits unknown.

Distribution. Endemic to Borneo where it is known from Brunei and Sarawak.

Ecology. Lowland forest including heath forest.

Notes. Similar in flower form to *Artabotrys suaveolens* in having the blades of both petal whorls relatively narrow and not flat in cross section but the flowers are distinctly larger than *A. suaveolens* and the pedicels are much longer. The '*corniculatus*' form of *A. suaveolens* that occurs in Sabah (described by Merrill as *Artabotrys trigynus*) has larger flowers and longer pedicels than typical *A. suaveolens* but it also has large, thick sepals not found in *A. sarawakensis*. Also the petals of *A. sarawakensis* are more densely and regularly tomentose – in *A. suaveolens* the petal blades are typically glabrescent giving a brown appearance in dried material.

Artabotrys costatatus has flowers with long pedicels, but the outer petals have flat blades and the strongly ribbed leaves are unlike those of *A. sarawakensis*.

14. *Artabotrys suaveolens* (Blume) Blume
(Latin, fragrant, sweetly smelling)

Fl. Javae Anonaceae (1830) 62, t. 30. Ridley, Sarawak Mus. J. 1(3) (1913) 76, Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 173. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 67. Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 289. Masamune, Enum. Phan. Born. (1942) 280. Sinclair, Gard. Bull. Singapore 14 (1955) 256. Kessler & van Heusden, Rheedea 3 (1993) 55. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 12. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 82. *Unona suaveolens* Blume, Bijdr. (1825) 17. TYPE: Java, in sylvis montium Salak, Seribu etc

Unona corniculata Blanco, Fl. Filip. (1837) 469. — *Artabotrys corniculatus* (Blanco) Merr., Sp. Blancoanae (1918) 150 as '*corniculata*'. TYPE: Philippines, Luzon, Laguna Province, 15 March 1913, *M. Ramos Species Blancoanae No. 298* (neotype, designated by Turner (2009a), US; isoneotypes: BM, K, L).

Artabotrys parviflorus Miq., Fl. Ned. Ind., Eertse Bijv. (1861) 375. — *Artabotrys suaveolens* var. *parviflorus* (Miq.) Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 43. TYPE: Sumatra, Lampong Privince, near Kebang, *Anon. s.n.* [Herb. Bogor. no. 4317] (lectotype, designated by Turner (2011b), U (barcode no. U 0000238)).

Artabotrys rolfei S. Vidal, Rev. Pl. Vasc. Filip. (1886) 39. TYPE: Philippines, Luzon, Prov. Albay, 1841, *H. Cuming 1099* (lectotype, designated by Turner (2009a), K (barcode no. K000691330); isolectotypes: BM, CGE, MA, MEL).

Artabotrys monogynus Merr., Philipp. J. Sci., C. 14 (1919) 383. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 173. TYPE: Philippines, Luzon, Zambales Province, Mt Canaynayan, Castillejos, December 1916, *G. Edaño Bur. Sci. 26826* (lectotype, designated by Turner (2009a), K (barcode no. K000691328); isolectotypes: A, US).

Artabotrys trigynus Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 177. TYPE: Borneo, Sabah, Sandakan, September–December 1920, *M. Ramos 1178* (lectotype, designated by Turner (2009a), K; isolectotypes: A, BM, GH, L, P, US).

Woody climber to 25 m long of more. Twigs smooth, drying brown, typically glabrous with a few scattered pale hairs on youngest parts, but some collections have dense brown tomentum on the twigs. Leaves chartaceous to coriaceous, drying light brown, sometimes greenish, ovate-elliptic, 6–12 × 2.5–5 cm, apex acuminate, base obtuse, slightly decurrent; midrib slightly raised above particularly near the base where the broad, flat-topped midrib is just proud of the lamina in the dry leaf, prominent beneath, generally glabrous, sometimes with adpressed hairs on lamina and along midrib below, lateral veins 9–12 pairs, looping well within the margin, easier to see from above. Petioles 3–5 mm long, less than 1 mm thick when dry. Inflorescence hooks recurved, laterally compressed, side branches to 20 mm long. Flowers sweet smelling, pedicels 5–8 mm, widening distally, glabrous or brown tomentose, basal bracts lanceolate to 4 mm long; sepals free, triangular 1–3 mm wide by 1–4 mm long, apex acute; petals pink or red turning pale creamy yellow, clawed, blades filiform (terete, triquetrous or channelled), 8–11 mm long, less than 1 mm wide, claw covered with short dense pale adpressed hairs, blade less densely tomentose, stamens many, truncate, c. 1 mm long; carpels c. 7. Fruits pedicels 5–8 mm long, monocarps 1 or 2, ellipsoidal, 12–15 × 7–9 mm, smooth, drying dark brown or black, unbeaked, sessile. Seeds 1–2, ellipsoidal, 10 × 6 × 5 mm, one face flattened if seeds paired, longitudinally grooved.

Distribution. Indochina to the Philippines. In Borneo widespread and apparently common as indicated by the many collections, particularly from Sabah.

Ecology. Lowland and montane forests up to 1220 m, including heath, peat swamp and limestone forests.

Notes. As is to be expected from a wide-ranging species, *A. suaveolens* shows some

variation in form. A few collections from Sabah were described as *A. trigynus*. They are much the same as *A. corniculatus* (Blanco) Merr. from the Philippines, which in turn may simply represent the upper end of the flower size range for *A. suaveolens*. I have reduced much of this variation to synonymy of *A. suaveolens*, but do recognise a set of distinctive collections from Borneo as *A. sarawakensis*. See this for notes on how it differs from *A. suaveolens*.

15. *Artabotrys sumatranus* Miq.
(of Sumatra)

Fl. Ned. Ind., Eertse Bijv. (1861) 375. Ridley, Sarawak Mus. J. 1(3) (1913) 77. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 267. Masamune, Enum. Phan. Born. (1942) 281. Kessler & van Heusden, Rheedea 3 (1993) 57. TYPE: Sumatra, Lampongs, near Tiga-nennin, s. dat., *J.E. Teijsmann s.n.* [Herb. Bogor. 4382] (holotype: U (barcode no. U 0000242)).

Large woody climbers. Twigs drying brown or dark brown with fine longitudinal wrinkles or latticing, sparse pale or brown hairs. Leaves chartaceous, drying rather pale brown or grey-brown, glabrous except for spare long adpressed hairs on midrib below, midrib more or less flush above, prominent beneath, lateral nerves very slightly raised on both surfaces, lamina elliptic to obovate, 7.5–9 × 2.5–3.5 cm, apex acuminate, base acute, lateral nerves 10–12 pairs, looping within margin; petiole 4–5 mm long, c. 1 mm thick. Inflorescence hooks bearing several short-branched axes densely packed with many flowers. Flower pedicel 2–4 mm long, c. 0.5 mm thick, drying dark brown with sparse red-brown hairs, sepals ovate, 3 × 2.5 mm, drying dark brown, minutely wrinkled and warty outside, inside smoother, petals yellow, drying brown, outer petals clawed, to 15 mm long, blade linear lanceolate, 11 × 2 mm, red-brown hairy on both surfaces, claw broadly ovate, 2.5–3 × 3.5 mm, red-brown hairy externally, internally with a slightly raised upper rim, more or less glabrous, verrucose, inner petals similar length to outer petals, blade linear, chanelled in upper portion, 11–12 mm long, c. 1 mm wide, red-brown hairy, claw c. 3 × 2 mm, hairy outside, glabrous, verrucose within, rather thick in upper portion, blade with peltate attachment to claw, stamens many, c. 1 mm long, apex acute, carpels 5–8, c. 1 mm long. Fruits unknown.

Distribution. Sumatra, Java and Borneo. In Borneo known with certainty only from Kalimantan with three unnumbered collections made by P.W. Korthals and *Kostermans 6820*.

Ecology. Lowland forest.

Notes. As noted under *A. atractocarpus*, it seems that *A. sumatranus* produces stipitate, but not fusiform, monocarps. I refrain from including these in the description as no fruiting specimens are known from Borneo. While the flowering specimens

from Borneo seem a good match to the type of *A. sumatranus* from (not surprisingly) Sumatra, I have not had access to enough specimens to confirm that the fruiting specimens are truly *A. sumatranus*.

16. *Artabotrys veldkampii* I.M.Turner
(J.F. Veldkamp (1941–), Dutch botanist)

Folia Malaysiana 10 (2009) 73. TYPE: Borneo, Central Kalimantan, Bukit Raya, Batu Badinging, KCT 47 km, 7 February 1983, *J.F. Veldkamp 8567* (holotype: L[×2] (barcode nos. L 0180936, L 0180937); isotype: US).

Large woody climber. Twigs drying brown to black, generally smooth with some shallow latticing, more or less glabrous except for a few pale hairs on young twigs near nodes. Leaves chartaceous to pergamentaceous, drying brown or grey-brown with midrib and laterals below a darker shade, midrib and laterals above slightly raised, midrib prominent below, laterals slightly raised, glabrous except for adpressed pale or brown hairs on midrib below, scattered on lateral nerves, lamina elliptic or oblong-elliptic, 9.5–17 × 3.5–6.5 cm, apex acuminate, base obtuse ultimately slightly decurrent, lateral nerves 11–13 pairs, looping distinctly within the margin, tertiary venation reticulate, distinct form both surfaces in dry leaves; petioles 10–12 mm long, 1.5–2 mm thick. Inflorescence hooks with adpressed pale or brown hairs, flowering repeatedly, distichously, from persistent, short straight side branches to 10 mm long. Flower pedicel 5–6 mm, 1 mm thick, widening distally, drying black, shiny, longitudinally wrinkled, with sparse brown hairs, sepals fleshy, ovate c. 2 × 2.5 mm, drying black, wrinkled outside with scattered hairs, inside smoother and glabrous, outer petals clawed, very narrowly ovate-lanceolate, blade 12–21 × 1–1.5 mm, broadly triquetrous, drying black with adpressed pale tomentum, densest towards base, claw c. 2 × 3 mm, excavation glabrous within, outside with adpressed pale tomentum, inner petals more distinctly filiform than outer, blade 13–25 × 1 mm, terete or quadrangular in cross section, drying black with adpressed pale tomentum, claw c. 3 × 2 mm, with two longitudinal ridges externally, dense very short pale tomentum outside, inside centrally glabrous with short pale tomentum marginally, stamens many c. 1 mm long, apex of connective flat-topped, carpels c. 5, c. 1 mm long, glabrous. Fruiting pedicel 8–10 mm long, to 5 mm thick, monocarps 1–2, globose but flattened apically and laterally compressed, to 3 cm from base to apex, to 3.5 cm at greatest width and 2.5 cm perpendicular to that, so wider then long, thick-walled, drying black, glabrous and relatively smooth to the naked eye, sometimes with slight longitudinal ridges, under magnification the surface appears black, shiny and wrinkled. Seeds 2, more or less hemispherical c. 17 mm diameter, 12 mm high, with circumferential groove, drying dull brown.

Distribution. Endemic to Borneo where it has been collected from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. Artabotrys veldkampii has filiform petals like *A. suaveolens* but they are longer and slightly wider. The fruits are, however, much larger than the pea-sized monocarps of *A. suaveolens*. Fruiting *A. veldkampii* is likely to be confused with *A. ochropetalus*, but the monocarps of *A. veldkampii* dry black, shiny and minutely wrinkled and truly sessile whereas *A. ochropetalus* fruits dry brown, not shiny, and smoother and generally not truly sessile. The fruits of *A. maingayi* are also very similar, drying black, but they are typically longer than wide and have a more pronounced apex and stalk than *A. veldkampii*. The slender petals of *A. veldkampii* readily distinguish it from *A. ochropetalus* and *A. maingayi*.

A group of specimens from Sabah may belong here (*SAN 41074*, *SAN 41075*, *SAN 147972*) – they have more distinct lateral veins than *A. veldkampii* generally does, and the petals are broader.

17. *Artabotrys venustus* King
(Latin, beautiful, graceful)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1892) 32. Sinclair, Gard. Bull. Singapore 14 (1955) 252. TYPE: Peninsular Malaysia, Perak, August 1884, *King's Collector* [H.H. Kunstler] *6499* (lectotype, designated by Nurainas (2004), BO; isotypes CAL, K, L, SING).

Large woody climber. Twigs dark, longitudinally wrinkled, drying pale yellow-brown when young. Leaves drying grey olivaceous, midrib slightly prominent above, glabrous, elliptic, 9–15.5 × 4–7 cm, base obtuse to acute, apex acuminate, lateral veins c. 10 pairs, petioles 5–7 mm long. Inflorescence hooks tightly coiled, few flowered. Pedicel 10–25 mm long, 1 mm thick, sepals reflexing at anthesis, triangular, 3–5 mm long, 2–3 mm wide, sparse adpressed red-brown hair, petals yellow, coriaceous, dense rusty tomentose, outer petals flat, with no constriction externally at claw, blade ovate c. 20 × 7 mm, inner similar length to outer, slightly narrower, stamens many, carpels c. 10. Monocarps ellipsoidal, 4.5 × 2–3.5 cm, drying brown, prominently and sharply beaked, more or less sessile. Seeds 2, c. 2.5 × 1.3 cm.

Distribution. Malay Peninsula, Sumatra, Borneo. In Borneo only known from a few collections from Sarawak.

Ecology. Lowland forest.

DESMOS Lour.

(Greek, *desmos* = a bond, halter or fetter;
the moniliform monocarps are reminiscent of a chain)

Fl. Cochinch. (1790) 352 as '*Desmis*'. Sinclair, Gard. Bull. Singapore 14 (1955) 261. Bân, Bot. Zhurn. 59 (1974) 1766. Turner, Folia malaysiana 10 (2009) 59. *Unona* [unranked] *Desmos* (Lour.) Dunal, Monogr. Anonac. (1817) 97, 110. *Unona* section *Desmos* (Lour.) DC., Syst. Nat. 1 (1817) 485, 493. LECTOTYPE: *Desmos cochinchinensis* Lour. (designated by Safford 1912).

Woody climbers or scandent shrubs. Twigs glabrous or hairy. Leaves chartaceous to coriaceous, often with paired glands in lamina margin on 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, petals valvate in two whorls of 3, subequal, stamens numerous, connective truncate, carpels numerous, ovules several, lateral. Fruits monocarps many, moniliform. Seeds few to many.

Distribution and diversity. 25–30 species from India and Sri Lanka to south China and the Philippines. Four species recorded from Borneo.

Notes. Specimens are quite readily identified as belonging to *Desmos*, particularly if it is considered in the narrow sense with *Dasymaschalon* as a separate genus. The flower form with relatively undifferentiated petal whorls of quite large, free, petals; and the moniliform monocarps, easily distinguish *Desmos* from other genera. Sterile specimens might be confused with *Friesodielsia*, as both have paired glands in the leaves, though these are less distinct in herbarium material in the *Desmos* species compared to most species of *Friesodielsia*.

Key to *Desmos* species

1a. Leaves with veins obscure, not glaucous 2
b. Leaves with veins distinct, often glaucous 3

2a. Pedicels more than 3 cm long, opposite leaves ..... *D. acutus*
b. Pedicels less than 2 cm long, in leaf axils ..... *D. dunalii*

3a. Leaves glabrous ..... *D. chinensis*
b. Leaves tomentose ..... *D. dumosus*

1. *Desmos acutus* (Teijsm. & Binn.) I.M.Turner
(Latin, acute, pointed)

Malayan Nat. J. 62 (2010) 368. — *Uvaria acuta* Teijsm. & Binn., Natuurk. Tijdschr.

Ned.-Indië 4: (1853) 398. — *Unona acuta* (Teijsm. & Binn.) Zoll., Linnaea 29 (1858) 320. — *Habzelia acuta* (Teijsm. & Binn.) Miq., Fl. Ned. Ind. 1 (1858) 37. TYPE: Java, *Anon. s.n.* (lectotype, designated by Turner (2010a), L (barcode no. L 0186510)).

Desmos teysmannii (Boerl.) Merr., Philipp. J. Sci., C. 10 (1915) 235. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 256. Masamune, Enum. Phan. Born. (1942) 282. Sinclair, Gard. Bull. Singapore 14 (1955) 264. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 14. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 83. — *Unona teysmannii* Boerl., Icon. Bogor. 1 (1899) 103. Ridley, Sarawak Mus. J. 1(3) (1913) 79. TYPE: Borneo, Sungai Landak, *J.E. Teijsmann s.n.* [Bogor distribution no. 185] (holotype: L (barcode no. L 0037925); isotypes: B, K, US).

Scandent shrub or large woody climber to 15 m long at least. Twigs slender, dark, lenticellate, minutely pubescent when young. Leaves membranous, glabrous except for some hairs on midrib beneath, sometimes glaucous beneath, drying pale brown above, ovate or oblong-elliptic to oblong-lanceolate, 5–13 × 2–6 cm, base rounded to acute, apex acute; midrib immersed above, prominent below, lateral veins 11–13 pairs, very fine and faint on both surfaces, tertiary venation reticulate. Petioles 5–7 mm long. Inflorescences opposite leaves, single-flowered. Flowers pendent, fragrant, pedicels long and slender, 3–6 cm, less than 0.5 mm thick; sepals triangular, 5–10 mm long, apex acute, reflexed at anthesis; petals greenish-yellow, thin, puberulous, lanceolate, 4–7 cm long, 10–18 mm wide at widest, apex obtuse; stamens many; carpels many. Fruits pedicels 3–6 cm long, monocarps moniliform, to 20 or more, to 5 cm long, stipe 1–2 cm long. Seeds 2–6, globose or ellopsoidal, c. 7 × 6 mm, drying pale brown, smooth.

Distribution. Malay Peninsula, Java, ?Bali and Borneo. In Borneo from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. Fruiting material can be confused with that of *Sphaerocoryne affinis*, but the persistent calyx and decurrent veins of the latter identify it as *Sphaerocoryne*.

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

Fl. Cochinch. (1790) 352. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 255. Masamune, Enum. Phan. Born. (1942) 282. Sinclair, Gard. Bull. Singapore 14 (1955) 266. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 83. — *Unona chinensis* (Lour.) DC., Syst. Nat. 1 (1817) 495. TYPE: China, Canton, s. dat., *Loureiro s.n.* (lectotype, designated by Ban (1974a), BM).

Uvaria monilifera Gaertn., Fruct. Sem. Pl. 2 (1790) 156, t. 114. TYPE: Gaertner's plate (Gaertner 1790: t. 114) (lectotype designated by Turner (2011b)). Java, East Java, Besuki, Nusa Barung Island, between Teluk Tjambak and Teluk Kandangan, 8°30'S, 113°20'E, 11 May 1957, *M. Jacobs 4729* (epitype, designated by Turner (2011b), K; isoepitypes: A, BO, L, LAE, NY, PNH, SING).

Unona discolor Vahl, Symb. Bot. 2 (1791) 63, t. 36. Ridley, Sarawak Mus. J. 1(3) (1913) 79. TYPE: East Indies, *J.G. König s.n.* (holotype: C).

[*Uvaria undulata* Roxb., Hort. Bengal. (1814) 43, *nom. nud.*]

Unona lessertiana Dunal, Monogr. Anonac. (1817) 107, t. 26. TYPE: Uvaria uncata Vahl in herb. Delessert.

Unona biglandulosa Blume, Bijdr. (1825) 16. TYPE: Java, Tjikao, s. dat., *J.C.A. van Hasselt s.n.* [Herb. Blume no. 1206] (lectotype, designated by Turner (2011b), L (barcode no. L 0186343)).

Unona discolor var. *bracteata* Blume, Fl. Javae Anonaceae (1830) 37, t. 15. TYPE: Java, in Provincia Krawang.

Unona undulata Wall., Pl. As. Rar. 3 (1832) 42, t. 265, *non Unona undulata* (P. Beauv.) Dunal (1817). — *Uvaria undulata* Walp., Repert. Bot. Syst. 1 (1842) 77. TYPE: India, cultivated in Hort. Bot. Calc., *Anon. s.n.* [EIC 6423B] (lectotype, designated by Turner (2011b), K-W; isolectotypes: CAL, K).

Uvaria cordifolia Roxb., [Hort. Bengal. (1814) 43, *nom. nud.*] Fl. Ind. 2 (1832) 662. TYPE: India, Eastern India, *W. Roxburgh 3663* (lectotype, designated by Turner (2011b), BM).

Unona amherstiana A.DC., Mem. Soc. Phys. Genèv. 5 (1832) 204. TYPE: Burma, Amherst, 14 July 1827, *N. Wallich s.n.* [EIC 6424] (lectotype, designated by Turner (2011a), K-W; isolectotype: BM).

[*Unona roxburghiana* Wall., Numer. List (1832) no. 6423, *nom. nud.*]

Unona discolor var. *latifolia* Hook.f. & Thomson, Fl. Ind. (1855) 133. TYPE: Peninsular Malaysia, Malacca, s. dat., *W. Griffith s.n.* (lectotype, designated by Turner (2011b), K).

Unona discolor var. *laevigata* Hook.f. & Thomson, Fl. Ind. (1855) 133. — *Desmos chinensis* var. *laevigatus* (Hook.f. & Thomson) Debika Mitra, Bull. Bot. Survey India 35 (1997) 117, as '*laevigata*'. TYPE: India, cultivated in Hort. Bot. Calc., *Anon. s.n.* [EIC 6423B] (lectotype, designated by Mitra (1997), CAL; isolectotypes: CGE, K, K-W).

Unona discolor var. *pubiflora* Hook.f. & Thomson, Fl. Ind. (1855) 133. TYPE: India.

Unona discolor var. *pubescens* Hook.f. & Thomson, Fl. Ind. (1855) 133. Type: India, Sikkim, *s. dat.*, *Anon.* [J.D. Hooker] *143* (lectotype, designated by Turner (2011b). K (barcode no. K000739190)).

Unona discolor var. *parviflora* Miq., Fl. Ned. Ind., Eerste Bijv. 3 (1861) 376. TYPE: Sumatra, Ins. Pulu Pisang prope Padang, Teijsmann.

Unona discolor var. *angustipetala* Boerl., Cat. Pl. Phan. (1899) 17. TYPE: Java, cult. in Hort. Bot. Bogor sub XI.A.33a, *Anon. s.n.* [Bogor. distrib. no. 168) (lectotype, designated Turner (2011b), L (barcode no. L 0186415); isolectotype: K).

Unona discolor var. *brevifolia* Teijsm. & Binn. ex Boerl., Cat. Pl. Phan. (1899) 17. — *Desmos chinensis* var. *brevifolius* (Teijsm. & Binn. ex Boerl.) Bân. Bot. Zhurn. 59 (1974) 1773. TYPE: Java, cult. in Hort. Bogor., *Anon. s.n.* (Bogor. distrib. no. 170 B) (lectotype, designated by Ban (1974a), US).

Unona discolor var. *macropetala* Teijsm. & Binn. ex Boerl., Cat. Pl. Phan. (1899) 16. — *Desmos chinensis* var. *macropetalus* (Teijsm. & Binn. ex Boerl.) Bân. Bot. Zhurn. 59 (1974) 1774. TYPE: Java, cult. in Hort. Bogor., *Anon. s.n.* [Bogor. distrib. no. 174 A] (lectotype, designated by Ban (1974a), US).

Unona discolor var. *neglecta* Boerl., Cat. Pl. Phan. (1899) 17. TYPE: Java, cultivated in Hort. Bot. Bogor. sub XI.A.17, *Anon. s.n.* [Bogor. distrib. no. 168] (lectotype, designated by Turner (2011b). L (barcode no. L 0181967)).

Unona discolor var. *siamensis* Scheff. ex Boerl., Cat. Pl. Phan. (1899) 17. TYPE: Java, cultivated in Hort. Bot. Bogor. sub XI.A.40a, *Anon. s.n.* [Bogor. distrib. no. 182] (lectotype, designated by Turner (2011b), L (barcode no. (L 0181979)).

Artabotrys esquirolii Lév., Fl. Kouy-Tcheou (1914-1915) 29. TYPE: China, Kouy-Tcheou [Gui Zhou], 17 April 1910, *J.H. Esquirol 2039* (lectotype, designated by Turner (2011b). E (barcode no. E00181425)).

Desmos cochinchinensis auct. non Lour.: Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 158.

Scandent shrub or large climber to 40 m long. Twigs slender, striate, dark, slightly pubescent at the tips. Leaves thinly chartaceous, glabrous, glaucous beneath, oblong, 6–13 × 3–6 cm, base rounded, sometimes emarginate, apex acute to acuminate; midrib immersed above, prominent below, sparsely hairy below, lateral veins 8–10 pairs, feint above, prominent below. 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. Fruits pedicel to 6 cm long, c. 20 moniliform monocarps, 3–4 cm long, glabrous or minutely pubescent, terminal section apiculate, stipes 10–14 mm long. Seeds 2–6, globose or ellipsoidal, c. 6–7 × 5 mm, drying light brown, smooth.

Distribution. Widespread from India to the Philippines. In Borneo, widespread, commonly collected in Sabah, occasional from Sarawak and Kalimantan.

Ecology. Lowland forests. May be cultivated in gardens for its fragrant blooms.

Notes. 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. The specimens from the wild in Borneo appear relatively uniform and fall well within the range of morphological variation of *D. chinensis*.

3. *Desmos dumosus* (Roxb.) Saff.
(Latin, bushy)

Bull. Torrey Bot. Club 39 (1912) 506. Sinclair, Sarawak Mus. J. 5 (1951) 599. Sinclair, Gard. Bull. Singapore 14 (1955) 268. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 14. — *Unona dumosa* Roxb., Fl. Ind. 2 (1832) 670. TYPE: Roxburgh Icon. 2294 (lectotype, designated by Turner (2011b), K). India, cult. in Hort. Bot. Calc., s. dat. *Anon. s.n.* [EIC 6429B] (epitype, designated by Turner (2011b), K-W [×2]; isoepitypes: BM, CGE, K).

Unona subbiglandulosa Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 11. Ridley, Sarawak Mus. J. 1(3) (1913) 78. — *Desmos subbiglandulosus* (Miq.) Merr., Philipp. J. Sci., C. 10 (1915) 235. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 256. Masamune, Enum. Phan. Born. (1942) 282. TYPE: Borneo, Martapoera, *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L0182002)).

Oxymitra monilifera Merr., Univ. Calif. Publ. Bot. 15 (1929) 73. Masamune, Enum. Phan. Born. (1942) 292. — *Dasymaschalon moniliferum* (Merr.) P.T. Li, Acta Phytotax. Sin. 14(1) (1976) 104. TYPE: Borneo, Sabah, near Tawao, October 1922–March 1923, *A.D.E. Elmer 20525* (lectotype, designated by Turner (2011b), MO (barcode no. MO-176168); isolectotypes: A, BISH, BM, BO, C, CM, DS, K, L, M, MICH, MO, NY, P, PH, S, SING, U).

Scandent shrub. Twigs relatively stout, tomentose when young, striate with numerous lenticels. Leaves 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 below,

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 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. Fruits pedicels 2–4 cm long, monocarps 30 or more, moniliform, 2–4 cm long, stipes 1–1.5 cm long, minutely pubescent, terminal segment usually beaked. Seeds 2–5, globose or ellipsoidal, c. 6–7 × 5–6 mm, drying light brown, smooth.

Distribution. Widespread from India to Borneo. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

4. *Desmos dunalii* (Wall. ex Hook.f. & Thomson) Saff.
(M.F. Dunal (1789–1856) French botanist who published a monograph of the Annonaceae in 1817)

Bull. Torrey Bot. Club 39 (1912) 506. Sinclair, Gard. Bull. Singapore 14 (1955) 263. — *Unona dunalii* Wall. ex Hook.f. & Thomson, Fl. Ind. 1 (1855) 131. TYPE: Peninsular Malaysia, Penang, *G. Porter s.n.* [EIC 6425] (lectotype, designated by Turner (2011b), K (barcode no. K000691358); isotypes: CAL, CGE, GZU, K, K-W).

Liana to 30 m long. Twigs slender, glabrous with pale lenticels. Leaves subcoriaceous, glabrous except for some hairs on midrib beneath, sometimes glaucous beneath, drying pale brown above, oblong-elliptic to oblong-oblanceolate, 6–13 × 3–6 cm, base rounded to acute, apex acute; midrib flush to slightly sunken above, prominent below, 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, pedicel 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. Fruits pedicel to 15 mm long, monocarps moniliform, numerous, glabrous, 13–35 mm long. Seeds 1–5, globose or ellipsoidal, c. 8 × 5 mm, drying brown, smooth.

Distribution. Malay Peninsula and Borneo. In Borneo collected from Brunei, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. Care must be taken not to include fruiting *Sphaerocoryne affinis* with this or *D. acutus*, though *Sphaerocoryne* does not have moniliform monocarps.

FISSISTIGMA Griff.

(Latin, *fissum* = to split, divide, separate, *stigma* = stigma)

Notul. Pl. Asiat. (Posthum. Pap.) 4 (1854) 706. Sinclair, Gard. Bull. Singapore 14 (1955) 349. Irawan, Floribunda 2(7) (2005) 173. Turner, Nord. J. Bot. 27 (2009) 362–369. TYPE: *Fissistigma scandens* Griff.

Woody climbers typically tomentose with simple hairs. Leaves with scalariform tertiary venation. Inflorescences leaf-opposed, or axillary, sometimes appearing terminal, fascicles of few to many fowers. Flowers bisexual, buds conical, sepals 3, valvate, more or less connate at base, petals valvate, coriaceous, two whorls of 3, inner slightly smaller, coriaceous, triquetrous, concave at base, stamens many, connectives with slightly prolonged apex, obtuse or apiculate, carpels many, pubescent, ovules 2 or more, biseriate. Fruits cylindrical, ellipsoidal or globose, thick-walled, stipitate. Seeds several in two rows, smooth and shiny.

Distribution and diversity: Some 60 species or so. India and Sri Lanka, Indochina, China and through Malesia to Australia. 15 species recorded from Borneo.

Notes. Merrill (1919) included *Mitrella* and *Pyramidanthe* in *Fissistigma*. Based on molecular analyses, Bygrave (2000) supported this generic reduction. However other authors (Sinclair 1955; Ban 1974b; Kessler 1993; Jessup 2000; Irawan 2005) have maintained *Fissistigma* in the narrower sense. I follow the latter position because *Fissistigma* is quite readily distinguished from *Mitrella* and *Pyramidanthe* on morphological grounds, at least as far as Borneo material is concerned, and there has been no recent peer-reviewed publication supporting unification.

Key to *Fissistigma* species

1a. Midrib of dry leaf with a raised longitudinal ridge on upper surface, monocarps drying rugulose ..... *F. rugosum*

b. Midrib of leaf without a raised longitudinal ridge, monocarps drying relatively smooth (*F. latifolium* with irregular ridges, *F. longipetalum* verruculose) 2

2a. Leaves more than 13 cm wide, petiole 6 mm thick or more, pedicel of flower at least 2.5 cm long, 3 mm thick ..... *F. crassicaule*

b. Leaves less than 13 cm wide, petiole generally 3 mm or less in diameter (up to 5 mm in *F. kingii*), pedicel of flower generally 2 mm or less in diameter, if thicker then pedicel less than 2.5 cm long 3

3a. Lower lamina glabrous (to naked eye or touch) 4
b. Lower lamina hairy.....7

4a. Leaves with 18 or more pairs of lateral veins ..... *F. elmeri*
b. Leaves with 12 or fewer pairs of lateral veins.....5

5a. Leaf with midrib above glabrous, flowers drying dark brown externally, medial bract absent or very close (3 mm or less) to the base of the pedicel, monocarps more or less glabrous, drying dark brown ..... *F. bygravei*
b. Leaves with fringe of hairs on midrib above, flowers drying pale or golden brown externally, medial bract more than 3 mm from the base of the pedicel, monocarps covered in short dense tomentum drying pale to mid-br own..... 6

6a. Hairs on midrib above more or less erect, outer petals more than 2 cm long, monocarps verruculose, covered with dense short brown curly hairs ..... *F. longipetalum*
b. Hairs on midrib above prostrate or decumbent, outer petals less than 2 cm long, monocarps smooth, covered with straight adpressed golden brown hairs ..... *F. fulgens*

7a. Leaf lower lamina when viewed under a lens (× 10) with more or less straight hairs, erect or decumbent 8
b. Leaf lower lamina when viewed under a lens (× 10) with curled hairs 11

8a. Leaves typically drying silvery grey above, medial bract and sepals 5 mm or more long ..... *F. manubriatum*
b. Leaves typically not drying silvery grey above, medial bract and sepals to 4 mm long 9

9a. Hairs on lower lamina more or less erect, flowers in few-flowered panicles ..... *F. paniculatum*
b. Hairs on lower lamina decumbent to adpressed, flowers solitary in leaf axils 10

10a. Flower pedicel very slender (c. 0.5 mm thick when dry), monocarps to 1.5 cm diameter, stipes to 4.5 cm long ..... *F. kinabaluense*
b. Pedicel c. 1 mm thick when dry, monocarps c. 2.5 cm diameter, stipes to 2.5 cm long ..... *F. carrii*

11a. Tertiary venation clearly visible under magnification (× 10) 12
b. Tertiary venation not clearly visible under magnification or obscured by dense tomentum 14

12a. Many orders of venation on lower lamina clearly visible under magnification (× 10) and distinctly raised beneath, monocarps globose, stipes typically longer than seed-bearing portion of monocarps 13

b. Tertiary venation on lower lamina clearly visible under magnification but higher orders of venation obscure, monocarps ellipsoidal, stipes shorter than seed-bearing portion of monocarps ..... *F. brevistipitatum*

13a. Leaves drying brown above with lateral veins sunken, inner petals more or less glabrous, monocarps drying with irregular ridges or wrinkles ..... *F. latifolium*

b. Leaves drying grey-green above with lateral veins flush, inner petals covered with a short grey tomentum externally and in upper portion of the inner surface, monocarps drying more or less smooth ..... *F. kingie*

14a. Tertiary venation of lower lamina obscured by dense brown tomentum, medial bract 4 mm or more long ..... *F. multivenium*

b. Tertiary venation of lower lamina scarcely visible under magnification, not obscured by tomentum, medial bract absent or to 1 mm long .... *F. montanum*

1. *Fissistigma brevistipitatum* I.M.Turner
(Latin, *brevi* = short, *stipitatus* = provided with a stalk; the short stipes to the monocarps)

Nordic J. Bot. 27 (2009) 363. TYPE: Borneo, Sabah, Interior Division, Nabawan District, Sungai Millian, 7 November 1986, *Sumbing Jiunpin SAN 118571* (holotype: K (barcode no. K000580891); isotypes: A, L, SAN).

Fissistigma sp. 4: Beaman et al., Pl. Mt. Kinabalu 4 (2001) 86.

Large woody climber. Twigs generally drying black with abundant raised pale lenticels, sometimes brown and striate, young parts densely red-brown tomentose. Leaves chartaceous to subcoriaceous, expanding leaves very densely red-brown hairy below and on nerves above, pale hairs on lamina above, mature leaves drying pale brown or grey-brown above with lateral nerves distinctly paler, brown below with midrib and nerves a darker shade, ultimately glabrous above except for hairs on midrib which can be restricted to a few near the petiole attachment, below with red-brown curly hairs, dense on nerves, abundant on lamina, lamina oblong elliptic to oblong obovate, 4–8.5 × 1.5–4 cm, base obtuse to rounded, apex obtuse to rounded, lateral veins 7–11 pairs, arching forward, looping obscurely, tertiary venation visible from below. Petiole 7– 11 mm long, 1–2 mm thick. Inflorescence terminal or leaf-opposed, few-flowered panicle. Pedicel to 15 mm long, 2 mm thick, densely red-brown hairy, medial bract acute, to 2 mm long, densely hairy outside, sepals triangular, c. 3 × 3 mm, outer petals 15 × 5 mm, dense red-brown hairs externally, inside covered with very short pale brown wool, inner petals ovate lanceolate c. 11 × 4 mm, dense very short brown hairs

outside, inside also in upper portion, excavation glabrous, verrucose, stamens many, carpels numerous, densely red-brown hairy. Fruiting pedicel 12–15 mm long, 2–4 mm thick, monocarps to 5 or more, ellipsoidal, 3–3.5 × 2.5 cm, apex broadly nippled, drying densely, very shortly red-brown woolly, stipe, shorter than seed-bearing portion of the monocarp, 1–1.5 cm long, 4 mm thick. Seeds c. 12 in 2 rows, smooth, brown, c. 13 × 9 × 4 mm.

Distribution. Endemic to Borneo where it has been collected quite widely in Sabah and once from Sarawak.

Ecology. Lowland and hill forest to 1200 m.

2. *Fissistigma bygravei* I.M.Turner,

(Paul C. Bygrave (1970–), British Annonaceae taxonomist and nurseryman)

Nordic J. Bot. 27 (2009) 366. TYPE: Borneo, Sabah, West Coast Division, Penampang District, 5th mile path from Kpg. Babgon to Ulu Terian, 15 October 1969, *P.F. Cockburn SAN 65500* (holotype: K (barcode no. K000580483); isotypes: L, SAN, SAR, SING).

Large woody climber. Twigs pale brown, striate, youngest parts brown, sometimes with very short dark brown hairs. Leaves chartaceous, drying dark grey brown above, dark or pale purply brown below, midrib and laterals flush above in dry leaves, midrib prominent below, laterals very slightly raised below, leaves glabrous above, below glabrous to the naked eye but very short adpressed golden brown hairs visible under magnification, leaves elliptic, ovate or oblong obovate, 3.5–15 × 1.5–7 cm, base obtuse to rounded, apex very slightly notched, blunt or shortly acuminate, lateral veins, 9–14 pairs, arching forward and looping obscurely, tertiary venation visible from both surfaces in dry leaves. Petiole 4–12 × 1–2 mm. Inflorescences terminal or leaf-opposed, many-flowered panicle. Pedicel 7–17 mm long, c. 1 mm thick, with red-brown or dark brown short adpressed hairs, medial bract sometimes absent, otherwise within 3 mm of base of pedical, sepals ovate, c. 1 × 2 mm, somewhat reflexed, drying black with short adpressed brown hairs, outer petals coriaceous, ovate lanceolate, 12–17 × 4 mm, drying blackish or dark brown with short adpressed brown or red-brown hairs outside, inside and on edges with short pale woolly hairs, inner petals ovate lanceolate 8 × 3 mm, base concave, short woolly pale brown externally and on upper portion internally, concavity glabrous, stamens many, c. 1 mm long, carpels many. Fruiting pedicel 16–18 mm long, 3 mm thick, monocarps to 12 or more, ellipsoidal, to 2 cm long, apex with a broad short beak, glabrous, drying black or dark brown, stipe c. 10 mm long, 3 mm thick. Seeds several.

Distribution. Endemic to Borneo where it has been collected from Kalimantan, Sabah and Sarawak.

Ecology. Lowland rain forest to 680 m.

Notes. Among Bornean species, *F. bygravei* is most similar to *F. longipetalum*. *Fissistigma bygravei* differs from *F. longipetalum* in having leaves glabrous above, medial bract absent or very close (3 mm or less) to the base of the flower pedicel, outer petals drying dark brown and monocarps drying dark brown, smooth and more or less glabrous.

3. *Fissistigma carrii* I.M.Turner
(Cedric Erroll Carr (1892–1936), New Zealand-born rubber planter and orchidologist)

Nordic J. Bot. 27 (2009) 367. TYPE: Borneo, Sabah, Mt Kinabalu, path to Ranau, c. 4800 ft, 15 Apr 1933, *C.E. Carr SFN 27006* (holotype: SING (barcode no. SING 0108643)).

Fissistigma sp. 2: Beaman et al., Pl. Mt. Kinabalu 4 (2001) 85.

Large woody climber. Twigs drying dark grey with shallow longitidinal wrinkles, youngest parts covered with decumbent golden brown hairs. Leaves chartaceous to subcoriaceous, drying pale to dark brown above, brown to pale brown beneath, midrib immersed to slightly sunken above, prominent beneath, lateral veins immersed above raised beneath, glabrous above except for hairs on midrib, below sparsely to densely tomentose, with more or less straight, decumbent pale brown hairs lying parallel to lateral nerves, lower lamina surface realtively smooth, not granular or wrinkled, elliptic, ovate to ovate-lanceolate, 3.5–10 × 1.5–3 cm, base obtuse to rounded, apex obtuse, acute or acuminate, lateral nerves 12–20 pairs, distinct from both surfaces in dry leaves, tertiary venation sometimes distinct from below. Petiole 6–13 mm long, 1–2 mm thick. Inflorescences axillary, single-flowered. Flower pedicel 6–9 mm long, 1 mm thick, densely golden brown hairy, sepals triangular, c. 2 × 2 mm, brown hairy outside, more or less glabrous within, outer petals ovate-lanceolate c. 11 × 4, outside brown hairy, inside with very short curly brown hairs near margins otherwise more or less glabrous, drying black, minutely papillate, inner petals ovate-lanceolate, c. 9 × 3 mm, drying black, glabrous except for scattering of short brown hairs coinciding with the gaps between the outer petals, drying verrucose inside, stamens many, carpel many, hairy. Fruiting pedicel 7–15 × 3–4 mm, monocarps to 16 or more, globose, c. 2.5 cm diameter, drying dark brown, smooth, sparsely covered with adpressed golden brown hairs, densest near apex, apex rounded sometimes with very short, broad apiculus, stipe 1–2.5 cm long, c. 2 mm thick. Seeds 10–12, flat oblong but with one side more curved, c. 16 × 9 × 3 mm, dark brown, smooth and shiny.

Distribution. Endemic to Borneo. Only known from around Mt Kinabalu in Sabah.

Ecology. Montane forest at 1200–1800 m.

Notes. *Fissistigma carrii* is similar to *F. kinabaluense*, which, as its name suggests, was also described from Mt Kinabalu. *Fissistigma carrii* differs in not having the long slender flower pedicels of *F. kinabaluense*, or the clear central ridge and radiating nerves visible on the outer petals. The monocarps of *F. carrii* are larger (2.5 vs 1.5 cm diameter) than those of *F. kinabaluense*.

4. *Fissistigma crassicaule* I.M.Turner
(Latin, *crassus* = thick, *caulis* = stem)

Nordic J. Bot. 27 (2009) 365. TYPE: Borneo, Sarawak, Kuching Division, Kuching District, Stampin, 5 miles south of Kuching, 6 January 1966, *J.A.R. Anderson & P. Chai S 22770* (holotype: K[×2] (barcode nos. K000580484, K000580485); isotypes: L, SAR).

Large woody climber. Twigs densely red-brown hairy, at least when young. Leaves chartaceous to coriaceous, drying dark brown to dark grey-brown above, brown or greeny brown below, glabrous above except for dense fringe on midrib and some laterals, below densely golden brown or pale brown hairy on nerves, sparser on lamina, lamina surface smooth, oblong-elliptic, 22–32 × 13–16 cm, base obtuse, truncate to very slightly cordate, apex rounded to slightly notched, lateral veins 16–17 pairs. Petiole to 3 cm long, 6 mm thick. Inflorescence terminal, many-flowered panicle. Pedicel 2.5–3 cm long, c. 3 mm thick, densely brown hairy, medial bract ovate c. 4 × 3 mm, brown hairy outside, sepals ovate, 5 × 4 mm, brown hairy outside, outer petals ovate lanceolate, 15 × 8–10 mm, densely brown hairy outside, inside glabrous, drying dark brown, except for edges and narrow margin where pale brown adpressed woolly, inner petals ovate acuminate, c. 12 × 8 mm, apex acute, almost glabrous except for pale hairs near apex externally, drying dark brown, pimply outside, verrucose inside, stamens many, red, drying pale, carpels numerous, hairy. Fruiting pedicel c. 4.5 cm long, 6 mm thick, densely brown hairy, monocarps to 20 or more, globose, c. 1.5 cm diameter, densely golden brown hairy, hairs long, straight, more or less erect, stipe to 2 cm long, 3 mm thick.

Distribution. Endemic to Borneo. Known from two collections (type, *Beaman 11834*) from disturbed lowland kerangas (heath) forest in western Sarawak.

Notes. In its general robustness *Fissistigma crassicaule* is only approached among the Bornean species by *F. rugosum*. However *F. rugosum* is readily distinguished by a characteristic raised longitudinal ridge along the top side of the midrib in dry leaves, its almost glabrous foliage, relatively indistinct tertiary venation and monocarps drying rugose. Otherwise leaves more than 13 cm wide, petioles 6 mm or more thick and flower pedicel 25 mm long and 3 mm thick or more distinguish *F. crassicaule* from all the other species native to Borneo. *Fissistigma crassicaule* is essentially a giant version of *Fissistigma latifolium* (Dunal) Merr. (at least as far as

Borneo material referred to *F. latifolium* is concerned), and the type of *F. crassicaule* has been previously determined as *F. latifolium*. However *F. crassicaule* lacks the ridges on the dry monocarps characteristic of *F. latifolium* and the surface of the lower lamina is smooth in *F. crassicaule* lacking the granular or cobwebbed appearance of *F. latifolium*. One can speculate whether *F. crassicaule* represents a local species derived from *F. latifolium* in the heath forest of Sarawak.

5. *Fissistigma elmeri* Merr.
(A.D.E. Elmer, 1870–1942, American plant collector and botanist)

Univ. Calif. Publ. Bot. 15 (1929) 72. Masamune, Enum. Phan. Born. (1942) 284. TYPE: Borneo, Sabah, Tawao, October 1922-March 1923, *A.D.E. Elmer 20881* (lectotype, designated by Turner (2011b), UC (sheet no. 289981); isolectotypes: B[×2], BISH, BM[×2], BO, C, CM, DS, GH, K, L, M, MICH, MO, NY, P[×2], PH, S, SING, US[×2]).

Large woody climber. Twigs drying black or dark chestnut brown with shallow latticing, redder when young, striate, very youngest parts with pale hairs, soon lost. Leaves chartaceous to subcoriaceous, drying pale grey brown to dark brown above, or a mixture of shades, quite shiny, more uniform mid-brown below with darker midrib and laterals, midrib slightly sunken above in dry leaves, prominent beneath, laterals flush above, prominent beneath, short hairs on midrib above, but to the naked eye appearing more or less glabrous, sparse very short adpressed hairs on lamina and nerves beneath, oblong oblanceolate or oblong elliptic, 9–19 × 3.5–9 cm, base broadly cuneate with a round or truncate termination, apex emarginate, obtuse, apiculate or acuminate, acumen rather sharply pointed, lateral veins 18–22 pairs, angled forward, more or less parallel, looping obscurely, short but distinct intersecondary veins present, tertiary venation scalariform, ultimate reticulations areolate giving a characteristic matt appearance to lamina below. Petiole 8–14 mm long, 2 mm thick. Inflorescence terminal or axillary. Pedicels 10–20 mm long, 1 mm thick, drying red-brown, slightly wrinkled, with pale hairs, medial bract ovate, c. 2 × 1 mm, base truncate, sepals coriaceous, triangular, c. 2–3 × 2–3 mm, slightly connate at the base, densely pale brown hairy outside, glabrous inside; outer petals thick, coriaceous, ovate lanceolate, 12–35 × 4–6 mm, outside with central longitudinal ridge, covered in adpressed pale brown hairs, inside very short adpressed pale hairs, sparse on papillate portion near base; inner petals ovate lanceolate, 8–10 × 3 mm, base deeply concave, externally with central ridge, covered with dense, very short adpressed pale hairs, inside sparsely hairy in upper portion, more or less glabrous basally, stamens many, 1–1.5 mm long, connective apex pointed, curved inwards, carpels pale hairy, stigmas drying black with long pale hairs. Fruiting material scarce, monocarps globose, c. 2 cm diameter, stipitate, densely red-brown adpressed tomentose.

Distribution. Endemic to Borneo, where it has been collected quite widely from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest to 600 m.

6. *Fissistigma fulgens* (Hook.f. & Thomson) Merr.
(Latin, shiny, bright-coloured)

Philipp. J. Sci., C. 15 (1919) 131. Sinclair, Gard. Bull. Singapore 14 (1955) 353. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 15. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 84. Irawan, Floribunda 2(7) (2005) 178. — *Melodorum fulgens* Hook.f. & Thomson, Fl. Ind. (1855) 120. Ridley, Sarawak Mus. J. 1(3) (1913) 90. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 261. Masamune, Enum. Phan. Born. (1942) 287. TYPE: Peninsular Malaysia, Malacca, s. dat., *W. Griffith s.n.* (lectotype, designated by Turner (2011b), K (barcode no. K000574633)).

[*Uvaria fulgens* Wall., Numer. List (1832) no. 6482, *nom. nud.*]

[*Myristica finlaysoniana* Wall., Numer. List (1832) no. 6793), *nom. nud.*]

Magnolia ferruginea P. Parm., Bull. Sci. France Belg. 27 (1896) 203, 263; *non M. ferruginea* Hort. ex W. Wats. (1889). TYPE: India (?wrongly localised), *s.dat.*, *T.S. Ralph s.n.* (holotype: P (barcode no. P01964102)).

Melodorum parviflorum var. *angustifolium* Boerl., Icon. Bogor. 1 (1899) 134. Ridley, Sarawak Mus. J. 1(3) (1913) 90. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. TYPE: Borneo, Sarawak, near Kuching, 17 October 1894, *G.D. Haviland & C. Hose 416L* (holotype: BO (sheet no. BO-1349056); isotype: CGE).

Large woody climber. Twigs drying dark brown or dark grey, young parts with dense red-brown to pale brown adpressed hairs giving a rough feel to finger running proximally down twig. Leaves chartaceous, drying dark brown to almost black above, often with patches or wash of a paler grey-brown, rich brown below with veins and midrib a slightly redder hue, midrib slightly sunken above in dry leaves, prominent beneath, laterals flush above, prominent beneath, tiny golden or red-brown tightly adpressed hairs on lamina and nerves below, hairs on lamina running more or less parallel to the lateral nerves, scarcely visible to naked eye except as a reflective metallic sheen, above pale hairs on nerves, lamina ovate lanceolate, 4.5–18 × 1–5 cm, base obtuse to rounded, apex acute to acuminate, lateral veins 7–11 pairs, arching forward, looping obscurely, tertiary venation obscure to the naked eye; petiole 6–11 mm long, 1–2 mm thick. Inflorescence terminal or axillary. Pedicels 7–9 mm long, c. 1 mm thick, widening distally, densely adpressed straw brown or golden brown hairy, medial bract ovate, 3 × 2 mm, apex acute, sepals triangular, c. 3 × 3 mm, densely hairy outside, glabrous inside except for scattered hairs near the apex; outer petals coriaceous, ovate lanceolate, 10 × 5–6 mm, apex acute, externally densely covered in adpressed straw brown hairs, similar inside except for a glabrous papillate portion near the base; inner

petals ovate lanceolate, 7–8 × 4–5 mm, base deeply concave, drying dark brown except for scattering of adpressed pale hairs near the apex externally, stamens many, 1–2 mm long, connective apex acute, curved inwards, carpels many. Fruiting pedicel c. 15 mm long, 4 mm thick, monocarps to 15 or more, ellipsoidal, c. 2.5 × 2 cm, densely golden brown adpressed hairy, apex rounded, drying relatively smooth, stipe to 20 × 3 mm. Seeds many, drying dark brown, smooth, shiny, 11–14 × 8–9 × 4 mm.

Distribution. Malay Peninsula, Sumatra, Borneo and the Philippines. In Borneo widespread with most collections from Sabah, but also Brunei, Kalimantan and Sarawak.

Ecology. Lowland forest.

7. *Fissistigma kinabaluense* (Stapf) Merr.
(of Mt Kinabalu)

Philipp. J. Sci., C. 15 (1919) 132. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 84. Irawan, Floribunda 2(7) (2005) 180. — *Melodorum kinabaluense* Stapf, Trans. Linn. Soc. Ser. II 4 (1894) 130. Ridley, Sarawak Mus. J. 1(3) (1913) 90. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 261. Masamune, Enum. Phan. Born. (1942) 287. TYPE: Borneo, Sabah, Mt Kinabalu, Penokok alt. 3000 ft, *G.D. Haviland 1310* [e.h.e.] (holotype: K (barcode no. K000574681); isotypes: SAR[×2], SING).

Large woody climber. Twigs drying dark grey or dark brown, striate or latticed, when young with a covering of erect pale hairs, densest on youngest parts. Leaves chartaceous, drying dark brown or grey brown above, or a mixture of shades, more uniform brown below with redder brown midrib and laterals, midrib and lateral more or less flush above, prominent beneath, lower lamina covered with decumbent pale hairs angled in direction of the laterals, giving a slightly rough feel when rubbed in the opposite direction, lamina ovate, ovate lanceolate or ovate oblong, 5–12 × 2–5 cm, base rounded or obtuse, apex obtuse to acuminate, lateral veins 12–15 pairs, angled forward, more or less parallel, looping obscurely, tertiary venation scalariform; petiole 6–8 mm long, 1–2 mm thick. Inflorescence axillary. Pedicels 2–4 cm long, c. 0.5 mm thick, densely pale brown hairy, medial bract c. 2 mm long, sepals triangular, c. 4 × 2 mm, apex acute, hairy outside, glabrous inside, outer petals ovate, 13–14 × 3–11 mm, outside with central longitudinal ridge and radiating nerves, covered in semi-adpressed pale hairs, inside covered with very short pale woolly tomentum; inner petals ovate, c. 8 × 5 mm, externally with central ridge, covered with pale tomentum on both surfaces, stamens many, c. 1 mm long, carpels. Fruiting pedicel 2–3.5 cm × 2 mm, monocarps to 20 or more, irregularly globose, c. 1.5 cm diameter, apex minutely apiculate, drying blackish, scurfy grey, stipe to 4.5 cm long, 1 mm thick. Seeds several, dark brown shiny, c. 10 × 8–9 × 4–5 mm.

Distribution. Endemic to Borneo, where is restricted to Sabah; mostly, but not solely, to Mt Kinabalu.

Ecology. Hill and montane forest to 900 m.

Notes. See notes under *F. carrii* for distinction from that species.

8. *Fissistigma kingii* (Boerl.) Burkill
(Sir George King (1840–1909), British botanist, Superintendent of Royal Botanic Garden, Calcutta, and first director of the Botanical Survey of India)

Bull. Misc. Inform. 1935 (1935) 317. Masamune, Enum. Phan. Born. (1942) 284. Sinclair, Gard. Bull. Singapore 14 (1955) 358. Kessler & van Heusden, Rheedea 3 (1993) 63. Irawan, Floribunda 2(7) (2005) 180. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 84. — *Melodorum kingii* Boerl., Icon. Bogor. 1 (1899) 134. TYPE: Peninsular Malaysia, Perak, *King's Collector* [H.H. Kunstler] *4070* (lectotype, designated by Irawan (2005), BO (sheet no. BO-1372487); isotypes: CAL, K).

Melodorum parviflorum auct. non Scheff., King, J. As. Soc. Bengal 51 (1892) 107.

Melodorum rubiginosum auct. non (A. DC.) Hook.f. & Thomson. Ridley, Sarawak Mus. J. 1 (1913) 91, *p.p.* Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262, *p.p.* Masamune, Enum. Phan. Born. (1942) 288, *p.p.*

Melodorum fagifolium Ridl., Bull. Misc. Inform. 1912 (1912) 386. Ridley, Sarawak Mus. J. 1(3) (1913) 91. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 261. Masamune, Enum. Phan. Born. (1942) 287. — *Fissistigma fagifolium* (Ridl.) Merr., Philipp. J. Sci., C. 15 (1919) 131. — *Fissistigma kingii* (Boerl.) Burkill var. *fagifolium* (Ridl.) Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 238. Masamune, Enum. Phan. Born. (1942) 284. TYPE: Borneo, Sarawak, Entagut River, December 1894, *C. Hose 397* (lectotype, designated by Turner (2011b), K (barcode no. K000574676); isolectotypes: A, B, BM, CGE, K, L, P).

Fissistigma kingii var. *grandiflorum* Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 287. Masamune, Enum. Phan. Born. (1942) 284. TYPE: Borneo, Sarawak, near Kuching, 13 November 1894, *G.D. Haviland & C. Hose 3336K* (holotype: K (barcode no. K000574680); isotypes: SAR, SING).

Fissistigma kingii var. *multinerve* Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 287. Masamune, Enum. Phan. Born. (1942) 284. TYPE: Borneo, Sarawak, Fourth Division, Mt Dulit (Ulu Tinjar) near Long Kapa, 10 August 1932, *P.W. Richards 1192* (lectotype, designated by Turner (2011b), K (barcode no. K000574679); isolectotypes: K, SING).

Large woody climber. Twigs drying brown, dark to pale, sometimes with pale lenticels, latticed or striate, youngest parts with short crisped chocolate-brown hairs, almost velutinous. Leaves chartaceous to coriaceous, typically drying pale grey-green or grey-brown above, light brown below with darker midrib and veins, midrib and laterals more or less flush or very slightly sunken above, prominent beneath, upper lamina with short brown curled hairs in youngest leaves, soon lost except along midrib, lower lamina with curled chocolate-brown hairs, generally dense on the veins, sometimes longer straighter hairs present, lower lamina with pale granular appearance under tomentum, lamina ovate lanceolate to oblong obovate, 6–30 × 2–14.5 cm, base truncate, rounded or broadly obtuse, apex obtuse, rounded, slightly acuminate or slightly emarginate, lateral veins 7–23 pairs, looping obscurely, tertiary venation visible from below; petiole 10–20 mm long, 2–6 mm thick. Inflorescence axillary or terminal. Pedicels 5–20 mm long, 1–3 mm thick, densely brown woolly, medial bract c. 2 × 1 mm long, apex acute, sepals slightly connate at the base, triangular, 2 × 2–3 mm, apex obtuse, brown woolly outside, outer petals coriaceous, ovate lanceolate, 10–22(–40) × 3–6 mm, outside with brown woolly tomentum, inside with very short pale grey woolly tomentum on upper parts, lower glabrous and papillate; inner petals ovate lanceolate, 8–19 × 3–5 mm, base excavate, externally with pale grey short woolly tomentum, inside woolly also in upper portion, lower part glabrous and papillate, stamens many, c. 1 mm long, carpels many. Fruiting pedicel 12–30 mm × 2–4 mm, monocarps to 20 or more, globose, 2–2.5 cm diameter, apex rounded or minutely apiculate, drying dark brown, dense brown woolly tomentum, stipe to 3.5 cm long, 2 mm thick. Seeds several, dark brown shiny, 12–14 × 9–11 × 4–5 mm.

Distribution. Malay Peninsula and Borneo. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest at 300–900 m.

Notes. This is a variable species and there has been formal recognition of a number of entities at varietal rank. However the varieties appear to represent fairly arbitrary divisions of the variation, particularly in terms of number of lateral vein pairs and flower size. I therefore reduced the varieties to synonymy.

9. *Fissistigma latifolium* (Dunal) Merr.
(Latin, *lati-* = broad, wide; *folius* = leaved)

Philipp. J. Sci., C. 15 (1919) 132. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 72. Sinclair, Gard. Bull. Singapore 14 (1955) 359. Kessler & van Heusden, Rheedea 3 (1993) 64. Irawan, Floribunda 2(7) (2005) 181. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 85. *Unona latifolia* Dunal, Monogr. Anonac. (1817) 115. — *Uvaria latifolia* (Dunal) Blume, Fl. Jav. Anon. (1828) 37, t. 15. — *Melodorum latifolium* (Dunal) Hook.f. & Thomson, Fl. Ind. (1855) 177. Ridley, Sarawak Mus. J. 1(3) (1913) 90. Merrill, J.

Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 285. TYPE: Based entirely on Cananga sylvestris III latifolia, Rumphius, Herb. Amb. 2 (1741) 198.

Uvaria longifolia Blume, Bijdr. (1825) 13, *non Uvaria longifolia* Sonn. (1782). TYPE: Java, *Anon. s.n.* (lectotype, designated by Turner (2011b), L (ex Herb. Blume et Herb. Groningen) (barcode no. L 0186878)).

Annona rufa C. Presl, Rel. Haenk. 2 (1830) 75. — *Melodorum rufum* (C. Presl) Merr., Philipp. J. Sci., C. 3 (1908) 223. — *Fissistigma rufum* (C. Presl) Merr., Philipp. J. Sci., C. 15 (1919) 132. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 174. TYPE: Philippines, Luzon, *T.P.X. Haenke s.n.* (holotype: PR[×2] (sheet no. 360883); isotype: HAL).

Melodorum molissimum Miq., Fl. Ned. Ind., Eerste Bijv. 3 (1861) 374. TYPE: Sumatra, Lampongs, *J.E. Teijsmann s.n.* [Herb. Bogor. 4252] (holotype: U; isotype: BO).

Melodorum borneense Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 36. Ridley, Sarawak Mus. J. 1(3) (1913) 88. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 261. Masamune, Enum. Phan. Born. (1942) 287. — *Fissistigma borneense* (Miq.) Merr., Philipp. J. Sci., C. 15 (1919) 131. Kessler & van Heusden, Rheedea 3 (1993) 63. Irawan, Floribunda 2(7) (2005) 176. TYPE: Borneo, *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L0186730)).

Melodorum clementis Merr., Philipp. J. Sci., C. 3 (1908) 136. TYPE: Philippines, Lake Lamao, Camp Keithley, July 1907, *M.S. Clemens s.n.* (lectotype, designated by Turner (2011b), US (barcode no. 00098807); isolectotypes: B, M).

Large woody climber. Twigs relatively smooth, persistently hairy with dense red-brown tomentum on young twigs, generally paler with age. Leaves chartaceous to coriaceous, drying dark brown to grey brown above, brown below with main veins a rather redder shade, midrib flush above, laterals very slightly sunken above in dry leaves, midrib prominent, rather broad and flat, beneath, laterals raised beneath, glabrous above, below densely red-brown hairy on the main veins, lamina and minor veins with long fine, not completely straight, hairs, lamina surface granular, papillate or cob-webbed, lamina ovate oblong to elliptic oblong, 8–28 × 3–10 cm, base slightly cordate, truncate, rounded or broadly obtuse, apex notched, broadly obtuse, or very shortly acuminate. Inflorescence axillary or terminal, few- to many-flowered panicles. Pedicel 1–2.5 cm long, 1–2 mm thick, dense short red-brown hairy, medial bract ovate, 2–5 × 1–3 mm, hairy outside, sepals triangular 2.5–4 × 3–4 mm, hairy outside, outer petals coriaceous, ovate lanceolate, 9–15 × 5–7 mm, densely red-brown hairy outside, inside densely short brown woolly on edges and near margins, centrally and basally generally, glabrous, black or dark brown, slightly papillate or verrucose, inner petals much thinner than outer petals, ovate lanceolate, 7–8 × 3 mm, more or less glabrous except for scattering of brown woolly hairs near apex externally, drying black or dark

brown, papillate outside, smoother within, stamens many, drying white, apex acute, carpels many. Fruiting pedicel c. 2 cm long, 3 mm thick, monocarps to 20 or more, globose, to 2.5 cm diameter, with irregular raised blunt-topped, ridges, surface densely brown hairy, stipe to 4 cm long, 2 mm thick. Seeds several, semi-circular or ellipsoid in outline with one or two flat or convex faces, c. 12 × 8–10 × 4 mm, drying dark brown, smooth.

Distribution. Widespread from Indo-China to the Moluccas. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland and hill forest to 1500 m, including peat swamps.

Notes. The name *Fissistigma latifolium* is entirely based on Rumphius's Cananga sylvestris III latifolia. There is no original material or illustration available and I have not seen any specimen of *Fissistigma latifolium* collected from Ambon that would be a potential neotype. I have seen a specimen from nearby Ceram that is fairly close to *F. latifolium*.

Two collections from Sabah (*SAN 35802*, *SAN 59263*) are more like the Philippines form of *F. latifolium* than the typical Borneo form. A couple of specimens from Mount Kinabalu (*Clemens & Clemens 40781*, *SAN 86075*) seem to be a narrow-leaved form of *F. latifolium*, but there are no fruiting specimens available to confirm this placement.

10. *Fissistigma longipetalum* (Ridl.) Merr.
(Latin, *longi* = long, *petala* = petal)

Philipp. J. Sci., C. 15 (1919) 133. Irawan, Floribunda 2(7) (2005) 187. — *Melodorum longipetalum* Ridl., Bull. Misc. Inform. 1912 (1912) 387. Ridley, Sarawak Mus. J. 1(3) (1913) 92. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 287. TYPE: Borneo, Sarawak, Kuching, 11 January 1893, *G.D. Haviland 2102* [Ngaiang leg.] (holotype: K (barcode no. K000574672); isotypes: BM, SAR, SING).

Large woody climber. Twigs drying black or dark brown, longitudinally wrinkled, young parts covered with golden brown woolly tomentum. Leaves glaucous below, thinly chartaceous, drying pale grey brown to dark brown above, or a mixture of shades, pale or mid-brown below, midrib and laterals flush to slightly sunken above in dry leaves, prominent beneath, fringe of erect pale hairs on midrib above, adpressed golden brown hairs on lamina and nerves beneath, lamina ovate to ovate lanceolate, 4–8 × 1.5–3 cm, base obtuse to rounded, apex acute to acuminate, more rarely obtuse, lateral veins 9–12 pairs, arching forward, more or less parallel, looping obscurely, tertiary venation scarcely visible to the naked eye; petiole 6–10 mm long, 1 mm thick. Inflorescence axillary. Pedicels 7–20 mm long, 1 mm thick, golden brown woolly,

sepals triangular, c. 3.5 × 2 mm, red-brown or golden brown hairy outside, glabrous inside; outer petals coriaceous, ovate lanceolate, 25–30 × 4 mm, outside with slight central longitudinal ridge, covered in adpressed golden brown hairs, inside very short pale curly hairs, sparse on papillate portion near base; inner petals ovate lanceolate, c. 12 × 4 mm, base deeply concave, externally covered with dense, very short brown curly hairs, inside more or less glabrous, stamens many, carpels many. Fruiting pedicel 12 × 3 mm, with short brown hairs, monocarps to 5, globose or ellipsoidal, to 2.5 × 2 cm, apex rounded to broad short beak, drying brown with irregular bumps and wrinkles, densely covered with short brown hairs, stipe 10–20 mm long, c. 4 mm thick. Seeds c. 5, lunar c. 12–13 × 8 × 5 mm, drying brown, shiny.

Distribution. Endemic to Borneo where it is known from Kalimantan and Sarawak.

Ecology. Lowland forest to 600 m.

11. *Fissistigma manubriatum* (Hook.f. & Thomson) Merr.
(Latin, *manubriatum* = handle, heft)

Philipp. J. Sci., C. 15 (1919) 134. Sinclair, Gard. Bull. Singapore 14 (1955) 355. Kessler & van Heusden, Rheedea 3 (1993) 60. Irawan, Floribunda 2(7) (2005) 184. — *Melodorum manubriatum* Hook.f. & Thomson, Fl. Ind. (1855) 118. Ridley, Sarawak Mus. J. 1(3) (1913) 88. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 287. TYPE: Peninsular Malaysia, Penang, s. dat., *G. Porter s.n.* [EIC 6456A] (lectotype, designated by Turner (2011b), K (barcode no. K000574630); isolectotypes: BM, K-W).

[*Uvaria manubriata* Wall., Numer. List (1832) no. 6456, *nom. nud.*].

Melodorum korthalsii Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 37. Ridley, Sarawak Mus. J. 1(3) (1913) 88. — *Fissistigma korthalsii* (Miq.) Merr., Philipp. J. Sci., C. 15 (1919) 132. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 261. Masamune, Enum. Phan. Born. (1942) 287. TYPE: Borneo, Martapoera, s. dat., *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L 0182131)).

Melodorum bancanum Scheff., Natuurk. Tijdschr. Ned.-Indie 31 (1869) 343. TYPE: Type: Bangka, prope Muntok et Blienjoe detexit Teysmann.

Large woody climber. Twigs drying black or dark brown with shallow longitudinal fissures, brown or red-brown woolly tomentum, dense on young parts, generally persistent. Leaves chartaceous to subcoriaceous, drying silvery grey or dark grey-brown, shiny, above, golden brown beneath, midrib and lateral more or less flush above, prominent beneath, lower lamina and nervature covered with dense, long fine tomentum giving a furry feel with hairs generally running towards margin parallel to

the lateral nerves, sometimes relatively sparse, but always present, above glabrous except for fringe of red-brown or pale hairs along midrib, lamina lanceolate to narrowly oblong obovate, 5–20 × 1.5–6.5 cm, base rounded to obtuse, apex acute or more rarely acuminate, lateral veins 9–14 pairs, tertiary venation obscure below, visible from above; petiole 8–10 mm long, 1–2 mm thick. Inflorescence axillary or terminal. Pedicels 10–15 mm long, 2 mm thick, densely golden brown woolly hairy, medial bract clasping, ovate, c. 6 × 5 mm, densely hairy outside, glabrous, black, inside; sepals triangular or ovate, 6–8 × 5–7 mm, apex broadly acute, densely hairy outside, glabrous inside, outer petals coriaceous, ovate lanceolate, 15–20 × 6–9 mm, apex blunt, outside woolly hairy, inside with very short pale woolly tomentum on upper portions otherwise glabrous and dark brown; inner petals ovate lanceolate, c. 12 × 5 mm, apex acute, base concave, externally with short greyish wool, brown pimply inside, stamens many, carpels. Fruiting pedicel 10–15 mm × 4–5 mm, monocarps to 20 or more, globose to ovoid, c. 2 × 2.5 cm diameter, densely woolly brown hairy, apex rounded to broadly nippled, stipe 1–5.5 cm long, 2–3 mm thick. Seeds c. 10–12, brown shiny, c. 11 × 7 × 3 mm.

Distribution. Malay Peninsula, ?Sumatra and Borneo. In Borneo widespread, occurring in Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

12. *Fissistigma montanum* I.M.Turner
(Latin, pertaining to mountains, montane)

Nordic J. Bot. 27 (2009) 364. TYPE: Borneo, Brunei, Pagon Ridge, 5000 ft, April 1958, *P.S. Ashton BRUN 2343* (holotype: K (barcode no. K000580482); isotypes: BRUN, L).

Fissistigma sp. 1: Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 15.

Fissistigma sp. 1: Beaman et al., Pl. Mt. Kinabalu 4 (2001) 85.

Large woody climber. Twigs drying dark, black, grey or brown, often with abundant, pale rather irregular lenticels, youngest parts with dense curly brown tomentum, becoming paler with age. Leaves chartaceous to coriaceous, drying dark brown, brown or grey brown above, brown or reddish brown below, midrib flush to slightly sunken above, prominent beneath, laterals immersed above, raised beneath, leaves glabrous above except for fringe of pale or brown hairs along midrib, below brown hairy, often dense, hairs very curly, lower lamina surface relatively smooth, not granular or papillose, lamina elliptic, ovate or obovate, 4–11 × 2–4.5 cm, base truncate, rounded, obtuse or acute, apex notched to very shortly acuminate, lateral veins 10–20 pairs, arching forward and looping obscurely, tertiary venation obscure from both surfaces in dry

leaves, petiole 8–14 mm long, 1–2 mm thick. Inflorescence terminal or leaf-opposed, 1- to few-flowered panicle. Pedicel 1–2.5 cm long, c. 1 mm thick, covered with dense brown curly hairs, medial bract tiny, sometimes absent, sepals broadly triangular, 2–4 × 3–4 mm, outer petals coriaceous but relatively thin, ovate, 15 × 7, externally densely short red-brown hairy, inside with very short pale brown hairs on edges and upper and marginal areas, otherwise glabrous, minutely papillate, drying brown, inner petals, 13 × 5 mm, dense pale brown hairy outside, inside relatively glabrous, drying dark brown or black, stamens many, carpels many, brown hairy. Fruiting pedicel 1–2 cm long, c. 4 mm thick, monocarps to 25 or more, globose, to 2 cm in diameter, covered with dense, very short, red-brown woolly tomentum, stipe to 2 cm long, 3 mm thick. Seeds several.

Distribution. Endemic to Borneo. Recorded from Sarawak, Sabah and Brunei.

Ecology. Hill and montane forest at 1000–2600 m.

13. *Fissistigma multivenium* (Diels) I.M.Turner
(Latin, *multi* = many, *vena* = vein)

Nordic J. Bot. 27 (2009) 363. — *Melodorum multivenium* Diels, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1931) 85. TYPE: Borneo, Sarawak, Bellaga, *O. Beccari PB 3789* (holotype: FI-B; isotypes: B(fragment), K).

Fissistigma kingii var. *tomentosum* Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 288. Masamune, Enum. Phan. Born. (1942) 284, Sinclair, Sarawak Mus. J. 5 (1951) 600. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 85. TYPE: Borneo, Sarawak, Bellaga, *O. Beccari P.B. 3789* (holotype: K (barcode no. K000574683); isotype: FI-B).

Large woody climber. Twigs drying black with shallow longitudinal wrinkles or latticing, with brown woolly tomentum, dense on young parts, generally persistent. Leaves chartaceous to subcoriaceous, drying grey brown, dark brown or grey-green above, brown beneath, midrib slightly sunken above in dry leaves, prominent beneath, lateral nerves more or less flush above, prominent beneath, glabrous above except for some very short brown or pale hairs along midrib, lamina below with brown woolly hairy, usually dense enough to give a soft feel, lamina oblong obovate, 10.5–20 × 4.5–8 cm, base obtuse, truncate, rounded or slightly cordate, apex apiculate or acuminate, lateral veins 21–23 pairs, angles forward almost parallel and straight, looping obscurely, tertiary venation, despite tomentum, usually visible from below, faint above; petiole 15–17 mm long, 3 mm thick. Inflorescence axillary or terminal. Pedicels 13–36 mm long, densely brown woolly hairy, medial bract ovate, 4–6 × 3–4 mm, apex obtuse, densely hairy outside, glabrous, inside: sepals slightly connate at base, broadly ovate, 3–5 × 5–7 mm, apex obtuse, densely hairy outside, glabrous within, outer petals coriaceous, ovate lanceolate, 12–15 × 5–8 mm, apex blunt, outside woolly hairy, inside with very short pale grey woolly tomentum near margins,

otherwise glabrous and black, papillate near the base; inner petals ovate lanceolate, 10–13 × 2–6 mm, base excavate, externally with short greyish woolly patches, brown verrucose inside, stamens many, carpels many. Fruiting pedicel 2–3 cm × 2–3 mm, monocarps to 15 or more, globose, often rather irregular, c. 1 × 1.5 cm diameter, apex rounded or apiculate, stipe 2–4 cm long, 1–2 mm thick. Seeds 1–several, brown smooth, shiny, 8–11 × 7–8 × 3 mm.

Distribution. Endemic to Borneo, occurring in Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

14. *Fissistigma paniculatum* (Ridl.) Merr.
(Latin, bearing panicles)

Philipp. J. Sci., C. 15 (1919) 134. — *Melodorum paniculatum* Ridl., Bull. Misc. Inform. 1912 (1912) 386. Ridley, Sarawak Mus. J. 1(3) (1913) 90. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 287. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 15. TYPE: Borneo, Sarawak, Kuching, *G.D. Haviland 1845* (holotype: K (barcode no. K000574667); isotype: K).

Large woody climber. Twigs drying dull dark grey, shallow longitudinal wrinkles, youngest parts densely red-brown hairy. Leaves chartaceous to subcoriaceous, drying dark brown or grey brown above, brown to light brown below with midrib and laterals darker, midrib flush to very slightly sunken above in dry leaves, prominent beneath, laterals flush above, prominent beneath; lower lamina with long red-brown hairs under which lamina surface pale and granular or minutely wrinkled, young leaves hairy above but soon lost except for pale or brown hairs on midrib, lamina elliptic or oblong elliptic, 2.5–13 × 2–5.5 cm, base broadly obtuse to rounded, apex rounded, obtuse, apiculate or acuminate, lateral veins 8–15 pairs, arching forward, looping obscurely, tertiary venation scalariform, clearer from below in dry leaves, petiole 6–12 mm long, c. 2 mm thick. Inflorescences axillary or terminal. Pedicel 1–3 cm long, c. 1 mm thick when dry, densely red-brown hairy, medial bract triangular to ovate, 2–3 × 1.5–2 mm. apex acute, red woolly outside, glabrous within, sepals triangular or ovate, 2–3 × 2.5–3 mm, apex acute, hairy outside, glabrous within, outer petals coriaceous, ovate, 7–10 × 4–6 mm, red-brown hairy outside, inside with short pale brown or whitish hairs densest on edges and near margins, more or less glabrous and drying black or dark brown in central portion, rather variable in surface texture, sometimes papillate or rugulose, inner petals excavate, ovate or ovate lanceolate, 6–7 × 2–4 mm, very short pale hairs on upper part inside and out, otherwise glabrous, drying black or dark brown, inside rather bumpy, stamens many, c. 1 mm long, carpels many hairy. Fruiting pedicel to 2 cm × 3 mm, monocarps c. 6, globose or ellipsoidal, 2 × 1.5–2 cm, apex rounded, drying wrinkled, red-brown woolly hairy, stipe to 5.5 cm long by 2 mm thick.

Distribution. Endemic to Borneo where it has been recorded from Brunei, Kalimantan, Sabah, Sarawak.

Ecology. Lowland and hill forest to 900 m including heath and peatswamp forest.

15. *Fissistigma rugosum* J.Sinclair
(Latin, wrinkled or folded)

Sarawak Mus. J. 5 (1951) 600. TYPE: Borneo, Sarawak, Kuching, s. dat., *G.D. Haviland s.n.* (holotype: SAR).

Cyathocalyx borneensis Boerl., Icon. Bogor. (1899) t. 56. Ridley, Sarawak Mus. J. 1 (1913) 76. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 266. Masamune, Enum. Phan. Born. (1942) 281. TYPE: Borneo, Sebalouw, *J.E. Teijsmann s.n.* [Herb. Bogor. no. 10838] (holotype: BO (BO-1346836); isotypes: K, L).

Fissistigma sp., Merrill, Univ. Calif. Publ. Bot. 15 (1929) 72.

Melodorum rubiginosum auct. non (A. DC.) Hook.f. & Thomson, Ridley, Sarawak Mus. J. 1 (1913) 91, p.p. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262, *p.p.* Masamune, Enum. Phan. Born. (1942) 288, *p.p.*

Large woody climber. Twigs drying somewhat irregular in cross section, smooth, brown or blackish, young parts with dense short erect brown tomentum, relatively persistent. Leaves chartaceous or coriaceous, drying dark brown, medium brown or pale grey-brown above, brown, grey-brown or pale grey-brown below with midrib and laterals generally a darker shade, midrib above with a prominent central ridge even if midrib is slightly channelled in dry leaf, laterals also very slightly raised above in dry leaves, midrib and laterals prominent beneath, lamina glabrous above except for scattered pale hairs in young leaves, below lamina with dense, very short adpressed tomentum with a sparser cover of longer pale brown hairs which are denser on the nerves, lamina ovate to oblong ovate, 13.5–37 × 7–20 cm, base rounded to truncate, apex broadly obtuse to shortly acuminate, lateral veins 15–28 pairs, arching forward, more or less parallel, looping relatively more distinctly than other *Fissistigma* species in Borneo, tertiary venation subscalariform, distinct from both surfaces in dry leaves, petiole 15–25 × 2–5 mm. Inflorescences axillary or terminal. Pedicel 7–20 mm long, 2 mm thick, densely brown adpressed hairy, medial bract tiny, broadly triangular c. 1 × 1.5 mm, hairy outside, sepals broadly triangular, c. 1.5 × 2 mm, hairy outside, glabrous within, outer petals c. 8 × 4 mm, covered with adpressed brown hairs externally, short woolly hairs cover upper portion internally, inner petals c. 5 × 2.5 mm, concave, dense very short adpressed hairs outside, glabrous within, stamens 1–1.5 mm long, carpels many. Fruiting pedicel 20–22 mm long, c. 3 mm thick, monocarps ripening bright yellow, to 4 or more, globose, c. 2.5 cm diameter, drying brown, rugose, covered with

very dense, very short brown hairs, apex rounded to broadly bluntly apiculate, stipe to 12 mm long, 5 mm thick. Seeds several, drying dark brown, shiny, smooth, c. 15 × 9 × 4–5 mm.

Distribution. Endemic to Borneo where it is known from Brunei, Kalimantan, Sarawak.

Ecology. Lowland forest to 400 m.

FRIESODIELSIA Steen.

(K.R.E. Fries (1876–1966), Swedish botanist;
F.L.E. Diels (1874–1945), German botanist; both Annonaceae specialists)

Bull. Jard. Bot. Buitenzorg, sér. 3. 17 (1948) 458. van Steenis, Blumea 12 (1964) 353. *Polyalthia* section *Oxymitra* Blume, Fl. Javae Anonac. (1830) 71. *Oxymitra* (Blume) Hook.f. & Thomson, Fl. Ind. (1855) 145, *non Oxymitra* Bisch. ex Lindenb. (1829). Sinclair, Gard. Bull. Singapore 14 (1955) 447. TYPE: *Polyalthia cuneiformis* (Blume) Blume (≡ *Guatteria cuneiformis* Blume, ≡ *Oxymitra cuneiformis* (Blume) Hook.f. & Thomson, ≡ *Friesodielsia cuneiformis* (Blume) Steen.).

Woody climbers. Leaves often glaucous beneath, with paired glands in the edge of the lamina near the insertion of the petiole, tertiary venation scalariform. Inflorescences leaf-opposed or supra-axillary, single-flowered. Flowers bisexual, buds conical, sepals 3, valvate, more or less connate at base, petals valvate, two whorls of 3, inner much shorter than outer, outer petals spreading at maturity, inner petals cohering about reproductive structures, stamens many, connectives with truncate prolonged apex, carpels many, ovules 1–5, lateral. Fruits cylindrical, ellipsoidal or globose, thin-walled, nipple-tipped, stipitate. Seeds 1–few, in cross-section quartered by the longitudinal walls of the endosperm.

Distribution and diversity: Some 50–60 species. Tropical Africa and Asia, though the African species may belong in a separate genus. Nine species recorded from Sabah and Sarawak.

Key to *Friesodielsia* species

1a. Leaves typically more than 20 cm long, base of lamina obtuse slightly decurrent to petiole, petiole 15 mm or more long, outer petals thin and flat, monocarps more than 3 cm long ..... *F. formosa*

b. Leaves generally smaller than 20 cm long, lamina base often rounded or auriculate, petiole less than 15 mm long, outer petals thick and generally triangular or rhomboidal in cross section, monocarps less than 3 cm long 2

2a. Leaves with tightly adpressed hairs beneath, often giving a golden sheen to the lamina ..... *F. biglandulosa*

b. Leaves hairy or not beneath, but not with a golden sheen 3

3a. Sepals with ridges radiating externally from base 4

b. Sepals without visible ridges externally 5

4a. Leaves chartaceous, drying dark brown above, glaucous beneath, monocarps subsessile, stipe to 3 mm long ..... *F. affinis*

b. Leaves coriaceous, drying mid-brown above, beneath hairy brown overlying glaucous lamina, monocarps stipitate, stipe more than 3 mm long ..... *F. excisa*

5a. Leaves not exceeding 8.5 × 3.5 cm ..... *F. ovalifolia*

b. Leaves typically bigger than 8.5 × 3.5 cm 6

6a. Leaves glaucous beneath, though this may be obscured by brown pubescence 7

b. Leaves not glaucous beneath ..... *F. acuminata*

7a. Lamina hairy beneath, or if glabrous then under ×15 or greater magnification has a granular appearance 8

b. Lamina glabrous beneath and under magnification relatively smooth and not granular ..... *F. glauca*

8a. Leaves typically more than 6 cm wide, flower pedicel to 15 mm long, monocarps drying dark brown with rusty pubescence ..... *F. grandifolia*

b. Leaves not exceeding 6 cm wide, flower pedicel 20 mm or more long, monocarps drying warm brown with rusty pubescence ..... *F. borneensis*

1. *Friesodielsia affinis* (Hook.f. & Thomson) D.Das
(Latin, neighbouring, akin to)

Bull. Bot. Survey India 5 (1963) 93. — *Oxymitra affinis* Hook.f. & Thomson, Fl. Brit. India 1 (1872) 70. Sinclair, Gard. Bull. Singapore 14 (1955) 450. TYPE: Peninsular Malaysia, Malacca, 12 April 1867, *A.C. Maingay 1851* [Kew distribution no. 59] (lectotype, designated by Turner (2009), K (barcode no. K000691787)).

Fissistigma magnisepalum Irawan, Floribunda 2(7) (2005) 184, as '*magnisepala*'. TYPE: Borneo, East Kalimantan, Long Iram Subdistrict, Maruwai, Block Lampunut, 19 March 1999, *P. Kessler 2621* (holotype: BO[×2] (sheet nos BO-1318961, BO-1318960), isotypes: K, L, WAN).

Large woody climber. Twigs drying black, latticed, youngest parts densely red-brown or dark brown hairy. Leaves chartaceous, glaucous beneath, drying dark brown above, grey-brown beneath with red-brown midrib and laterals, expanding leaves densely hairy, soon lost above except for fringe on midrib and main nerves, below hairy on lamina, giving a furry feel, and densely hairy on midrib and laterals, hairs generally slightly curled or kinked, lamina oblong elliptic to oblong obovate, 5–19(–26) × 2.5–8.5(–10) cm, base rounded to slightly cordate, apex broadly truncate apiculate to acuminate, midrib and lateral nerves slightly sunken above in dry leaves, prominent beneath, lateral nerves 7–11 pairs, tertiary venation scalariform, distinct from below, less clear from above. Petiole 5–6 mm long, 2–3 mm thick. Inflorescences single-flowered, extra-axillary. Flowers, pedicel 5–8 mm long, 1 mm thick, densely red-brown hairy, medial bract ovate to 8 mm long, 5 mm wide, base sometimes cordate (n.b. bracts and sepals may enlarge after anthesis), sepals free, ovate, c. 6 × 6 mm, base truncate, apex obtuse to rounded, red-brown hairs inside and out, nerves visible as raised ridges externally, outer petals coriaceous, ovate lanceolate, 2–5 cm long, excavated at base, inner petals shorter with a very short claw, stamens many, carpels many. Monocarps glaucous, 10 or more, drying brown with a greyish bloom, ellipsoidal, c. 10 × 8 mm, apiculate, covered with red-brown hairs when young, becoming glabrescent, stipe c. 3 mm long, 1–2 mm thick. Seed 1, ellipsoidal, c. 10 × 7 mm, longitudinal groove.

Distribution. Malay Peninsula and Borneo. In Borneo widespread but little collected with specimens from Kalimantan, Sabah and Sarawak.

Ecology. Lowland and hill forest to 800 m.

2. *Friesodielsia biglandulosa* (Blume) Steen.
(Latin, *bi* = two, *glandulosa* = bearing glands; pair of glands at leaf base)

Blumea 12 (1964) 358. Kessler & van Heusden, Rheedea 3 (1993) 66. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 15. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 86. — *Guatteria biglandulosa* Blume, Fl. Javae Anonaceae (1828) 102, t. 51. — *Monoon biglandulosum* (Blume) Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 19. — *Oxymitra biglandulosa* (Blume) Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1870) 341. Ridley, Sarawak Mus. J. 1(3) (1913) 88. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 258. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 73. Airy Shaw, Bull. Misc. Inform. Kew 1939 (1939) 288. Masamune, Enum. Phan. Born. (1942) 291. Sinclair, Gard. Bull. Singapore 14 (1955) 459. — *Polyalthia biglandulosa* (Blume) Hook.f. & Thomson, Fl. Brit. Ind. 1 (1872) 65. — *Richella biglandulosa* (Blume) R.E. Fr. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, xvii a. Il. (1959) 139. TYPE: Java, in montibus provinciae Bantam.

Large woody climber. Twigs drying black or dark grey, striate or latticed, youngest parts with adpressed golden brown hairs, soon lost. Leaves chartaceous to coriaceous,

drying dark brown above, rarely grey-brown or pale brown, paler brown below with darker midrib and lateral veins, midrib slightly sunken above in dry leaves, prominent beneath, lateral veins very slightly raised above, raised beneath, lamina beneath with tiny, tightly adpressed, yellow-brown hairs, sometimes sufficiently dense to give a golden or coppery sheen to leaf underside, sometimes very sparse but can be found with a lens, lamina elliptic or oblong elliptic to obovate, 5–26 × 2–11 cm, base cuneate, obtuse, truncate to slightly rounded, glands visible as darkened patches in lamina edge near petiole attachment; lateral veins 7–13 pairs, arching forward, looping indistinctly, tertiary venation scalariform, distinct from both surfaces in dry leaves. Petiole 5–13 mm long, 1–3 mm in diameter. Inflorescences of solitary flowers, extra-axillary or on short twiggy, irregularly branched shoots with few flowers. Pedicel 5–10 mm long, c. 1 mm thick, drying dark brown, adpressed golden brown hairs, medial bract to 3 × 1 mm, sepals free, ovate lanceolate, 5 × 1 mm, adpressed coppery brown hairs, outer petals green, lanceolate, to 30 × 6 mm, base spoon-shaped, central ridge externally just visible, covered with dense adpressed pale hairs externally, glabrous internally, inner petals cream, coherent at edges, ovate lanceolate, 10 × 3–4 mm, apex acute, some adpressed hairs externally, central ridge evident, stamens numerous, c. 1 mm long, top of connective flat to slightly convex, carpels many, pubescent. Fruiting pedicel to 20 mm long, 2 mm thick, monocarps to 20, ripening yellow, ellipsoidal, 15–20 × 9 mm (rarely 2-seeded monocarps cylindrical to 30 mm long, with slight constriction between seeds in dry state) drying black, minutely bumpy, apex rounded, apiculate, stipe to 20 mm long, 1 mm thick, some adpressed brown hairs particularly near apex and on stipe. Seeds 1, rarely 2, ellipsoidal, c. 15–18 × 7–8 mm, drying brown, smooth with a longitudinal groove.

Distribution. Malay Peninsula, ?Sumatra and Borneo. In Borneo collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland to montane forest to 900 m, including heath and peat swamp forest.

3. *Friesodielsia borneensis* (Miq.) Steen.
(of Borneo)

Blumea 12 (1964) 358. Kessler & van Heusden, Rheedea 3 (1993) 66. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 86. — *Oxymitra borneensis* Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 30. Ridley, Sarawak Mus. J. 1(3) (1913) 88. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 258. Masamune, Enum. Phan. Born. (1942) 291. Sinclair, Sarawak Mus. J. 5 (1951) 606. TYPE: Borneo, Martapoera, s.dat., *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L 0037935)).

Oxymitra oxyphylla Miq., Ann. Mus. Bot. Lugd. Bat. 2 (1865) 29. Ridley, Sarawak Mus. J. 1(3) (1913) 89. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 259. Masamune, Enum. Phan. Born. (1942) 292. — *Friesodielsia oxyphylla* (Miq.)

Steen., Blumea 12 (1964) 361. TYPE: Borneo, Dano-Bahang, s.dat., *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L 0187213)).

Oxymitra beccarii Diels, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1931) 85. — *Friesodielsia beccarii* (Diels) Steen., Blumea 12 (1964) 358. TYPE: Borneo, Sarawak, Bintulu, September 1867, *O. Beccari P.B. 3742* (holotype: FI-B[×2](Erb. Becc. nos. 305 and 305A); isotypes: B, M).

Large woody climber. Twigs drying dark grey to black, striate or latticed, rusty tomentose when young. Leaves glaucous beneath, chartaceous, drying dark brown above, grey-brown or red-brown below, obovate to oblong obovate, 3.5–16 × 2–6 cm, base rounded to slightly auriculate, apex obtuse to shortly acuminate, midrib slightly sunken above in dry leaves, prominent beneath, lateral veins 9–11 pairs, flush above, prominent beneath. Petiole 3–10 mm long, 1–2 mm thick. Inflorescences single-flowered, extra-axillary. Flowering pedicel, 2–3 cm long, very slender, sepals c. 6 × 5 mm, hairy, outer petals coriaceous, flat, ovate lanceolate, to 6 cm long, c. 6 mm wide, base excavated, hairy externally, central ridge, glabrous internally, inner petals c. 8 × 4 mm, markedly acuminate, stamens many, carpels many. Fruiting pedicel 3–8.5 cm long, monocarps to 20 or more, globose to ellipsoidal, 8–12 × 7 mm, drying red- or mauve-brown with rusty pubsecence, sometimes more or less glabrous, minutely apiculate, stipe 6–13 mm long, more than 1 mm thick. Seeds 1, ellipsoidal c. 7–11 × 6 mm.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo this species has been recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. Material of this species outside Borneo is referred to var. *sumatrana*.

4. *Friesodielsia excisa* (Miq.) Steen.
(Latin, cut out)

Blumea 12 (1964) 359. — *Oxymitra excisa* Miq., Ann. Mus. Bot. Lugd. Bat. 2 (1865) 32. Ridley, Sarawak Mus. J. 1(3) (1913) 89. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 259. Masamune, Enum. Phan. Born. (1942) 291. Sinclair, Gard. Bull. Singapore 14 (1955)452. — *Richella excisa* (Miq.) R.E. Fr. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, xvii a. II. (1959) 171. TYPE: Sumatra, *P.W. Korthals s.n.* (lectotype, designated by Turner (2009), L (barcode no. L0182297)).

Fissistigma cordifolium Irawan, Floribunda 2(7) (2005) 176. TYPE: Borneo, West Kalimantan, Gunung Palung Nature Reserve, 21 June 1986, *van Balgooy & van Setten 5559* (holotype: BO (sheet no. BO-1372431); isotype: L).

Large woody climber. Twigs drying black, striate or latticed, persistently tomentose with short, dense, brown or red-brown hairs. Leaves chartaceous to coriaceous, densely brown hairy below covering a glaucous lamina, drying mid-brown above, generally darker brown below because of the tomentum, lamina oblong to obovate, or even obdeltoid, 9–36 × 5–15 cm, base rounded to slightly cordate, apex truncate or even emarginate to obtuse acuminate, midrib and lateral nerves sunken above in dry leaves, prominent beneath, 10–13 pairs of laterals, tertiary venation scalariform, readily discernable from both surfaces, many orders of venation visible below, all slightly raised, short pale hairs on lamina above lost with age but persisting on midrib and laterals, dense hairs below, rather hooked or curled. Petiole 5–10 mm long, 3–4 mm thick. Inflorescences single-flowered, extra-axillary. Flower, pedicel 5–12 mm long, 1–2 mm thick, densely brown hairy, medial bract ovate 5–7 × 6 mm, apex acute, sepals ovate, c. 6 × 6 mm, apparently enlarging after corolla drops, apex obtuse to rounded, red-brown hairs, veins raised externally, outer petals coriaceous, ovate lanceolate, 14–16 × 7–8 mm; inner petals coriaceous, ovate lanceolate, c. 12 × 6 mm, apex acute, stamens many, carpels many. Monocarps ripening red, to 20 or more, ellipsoidal, 15 × 9 mm, or more rarely if two-seeded to 20 mm long, drying dark brown, glabrous except for near apex and on stipe, stipe to 9 mm long, 2 mm thick. Seed 1 or rarely 2, ellipsoidal, c. 13 × 8 mm.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest to 500 m, including peat swamps.

5. *Friesodielsia formosa* I.M.Turner
(Latin, handsome, beautiful)

Edinburgh J. Bot. 66 (2009) 366. TYPE: Borneo, Central Kalimantan, headwaters of S. Kahayan, 5 km north-west of Tumbang Sian logging camp, 26 April 1988, *J.S. Burley et al. 832* (holotype: K (barcode no. K000580218); isotypes: E, L, SAR, SING).

Large woody climber. Twigs drying black or rather dirty brown, striate or latticed, with raised brown lenticels, darker and smoother when young, more or less glabrous. Leaves chartaceous, glaucous beneath, glabrous, drying dark brown or rather patchy dull brown above, red-purple brown beneath, sometimes with a greyish wash, with midrib and laterals dark brown or black, lamina oblong elliptic to oblong obovate, 17–33 × 6–10 cm, base obtuse, slightly decurrent to petiole but not auriculate, apex obtuse to slightly acuminate, midrib sunken above and prominent beneath, lateral veins c. 15 pairs, immersed above, prominent beneath, tertiary venation distinct from both surfaces in dry leaves, more so from above, less distinctly scalariform than other species in Borneo. Petiole 15–22 mm long, 2–3 mm thick, drying dark, shallowly furrowed. Inflorescences axillary or supra-axillary, few-flowered or solitary. Flowers fragrant,

pedicel 15–40 mm long, c. 0.5 mm thick, drying black, striate, tiny medial bract c. 1 mm long, sepals free, broadly ovate, 6–10 × 8 mm, tending to reflex at anthesis, apex blunt, drying black or dark brown, outer petals yellow or cream, reflexing at anthesis, thin, ovate lanceolate, 40–50 × 15–20 mm, drying very dark brown, sparse covering of tiny brown adpressed hairs on both surfaces, pale spots externally, inner petals ovate, 10–11 × 8 mm, apex acute, drying black with sparse very tiny brown adpressed hairs, stamens many, c. 2 mm long, carpels c. 6–10, c. 2 mm long, stigmas globose, hirsute. Fruiting pedicel to 4.5 cm long, 2 mm thick, monocarps 1–7, ripening orange-red, stipe green, ellipsoidal 4–5 × 1.5–2 cm, drying dark brown, deeply, irregularly wrinkled, wrinkles with rounded not sharp-edged margins, glabrous, apiculus scarcely discernible, stipe drying black, 2–3 cm long. Seed 1, c. 3 × 1.5 cm.

Distribution. Endemic to Borneo where it is known from Kalimantan and Sarawak.

Ecology. Lowland forest to 200 m, including on limestone.

6. *Friesodielsia glauca* (Hook.f. & Thomson) Steen.
(Greek, *glaukos* = bluish grey or bluish green; with the powdery bloom as on grapes)

Blumea 12 (1964) 359. — *Oxymitra glauca* Hook.f. & Thomson, Fl. Ind. 1 (1855) 146. Ridley, Sarawak Mus. J. 1(3) (1913) 88. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 259. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 176. Masamune, Enum. Phan. Born. (1942) 291. Sinclair, Gard. Bull. Singapore 14 (1955) 460. — *Richella glauca* (Hook.f. & Thomson) R.E.Fr. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, xvii a. II. (1959) 139. TYPE: Peninsular Malaysia, Prince of Wales Island [Penang], s. dat., *Anon.* [W.E. Phillips] *s.n.* (holotype: K (barcode no. K000691773)).

Oxymitra diadema Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 31. Ridley, Sarawak Mus. J. 1(3) (1913) 89 as '*diadema*'. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 258, as '*diadema*'. Masamune, Enum. Phan. Born. (1942) 291, as '*diadema*'. — *Friesodielsia diadema* (Miq.) Steen., Blumea 12 (1964) 358. TYPE: Borneo, Mt Sakoembang, *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L 0182284)).

Oxymitra linderifolia Ridl., Bull. Misc. Inform. Kew 1912 (1912) 385. Ridley, Sarawak Mus. J. 1(3) (1913) 89. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 259. Masamune, Enum. Phan. Born. (1942) 292. — *Friesodielsia linderifolia* (Ridl.) Steen., Blumea 12 (1964) 360. TYPE: Sarawak, Kuching, 19 April 1893, *G.D. Haviland 2333* (lectotype, designated by Turner (2012), K (barcode no. K000691760); isolectotypes: BM, K, SAR, SING).

Oxymitra argentea J.Sinclair, Gard. Bull. Singapore 14 (1955) 461. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 15. — *Friesodielsia argentea* (J.

Sinclair) Steen.. Blumea 12 (1964) 358. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 86. TYPE: Peninsular Malaysia. Trengganu. Bukit Kajang, 14 November 1935, *E.J.H. Corner SFN 30457* (holotype: SING (barcode no. SING 0048676); isotype: K).

Large woody climber. Twigs drying black, striate or latticed, when young smooth and brown, variably hairy, sometimes densely brown tomentose. Leaves chartaceous, glaucous below, drying dark brown above, grey-brown beneath, lamina glabrous or glabrescent, hairs more frequent on veins and midrib below, lamina obovate or oblong obovate to lanceolate, 4–21 × 1.5–8 cm, base obtuse, rounded or truncate, apex broadly and rather shortly acuminate, midrib and lateral nerves flush to slightly sunken above in dry leaves, prominent beneath, laterals 7–13 pairs. Petiole 5–9 mm long, 0.5–2 mm thick. Inflorescences, single or few-flowered, extra-axillary. Flower, pedicel 15–35 mm long, less than 1 mm thick, widening distally, very short dense brown pubescence, medial bract ovate c. 3–5 mm long, apex acute, sepals free, ovate, 4–6 × 2–4 mm, apex acute, hairy; outer petals coriaceous, ovate lanceolate, 20–40 × 4–7 mm, excavated at base internally, adpressed brown hairs externally, inner petals ovate acuminate 10–12 × 2–3 mm, central ridge externally, stamens many, carpels many. Fruiting pedicel 6–60 mm long, c. 1 mm thick; monocarps 20–25 or more, ripening red, globose or ellipsoidal 8–11 × 7–8 mm, apiculate, drying black or rusty brown, red-brown pubescent when young, sometimes persisting, stipe 4–20 mm long, c. 1 mm thick. Seeds 1,ellipsoidal, c. 7–10 × 6–7 mm.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. There is considerable variation in the material here recognised under the name *Friesodielsia glauca*, both within Borneo and across its range. Some of the entities included appear quite distinct but intermediate forms occur. *Friesodielsia linderifolia* is close to typical *F. glauca* and is certainly a synonym of it.

7. *Friesodielsia grandifolia* (Merr.) I.M.Turner, Edinburgh J. Bot. 66 (2009) 369. *Oxymitra grandifolia* Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 179. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 72. Masamune, Enum. Phan. Born. (1942) 291. TYPE: Borneo. Sabah, Sandakan, September–December 1920, *M. Ramos 1910* (lectotype, designated by Turner (2009b), BO (sheet no. BO-13593592)).

Oxymitra latifolia auct. non Hook.f. & Thomson. Sinclair, Sarawak Mus. J. 5 (1951) 607.

Friesodielsia latifolia auct. non (Hook.f. & Thomson) Steen.: Beaman et al., Pl. Mt. Kinabalu 4 (2001) 86.

Large woody climber. Twigs drying dark grey, younger twigs woolly hairy. Leaves chartaceous, glaucous or brown hairy below, drying dark brown, occasionally mid-brown, above, brown or grey-brown below, lamina oblong, oblong obovate or obovate, 12–30 × 4–14 cm, base clightly cordate to rounded, apex rounded, obtuse to acuminate, midrib slightly sunken above in dry leaves, raised below, lateral nerves 12–16 pairs, flush to slightly sunken above, raised beneath, tertiary venation clear from both surfaces unless hidden by tomentum below. Petiole 5–10 mm long, 2–4 mm thick. Inflorescence single-flowered, extra-axillary. Flower, pedicel 15–20 mm long, 1 mm thick, rusty tomentose, sepals free, triangular 5–8 × 5–7 mm, apex blunt to acute, rusty hairy, outer petals coriaceous, flat, oblong lanceolate, c. 32–45 × 8–10 mm, base excavated, externally with brown hairs, densest near base, central ridge discernible but not prominent, internally glabrous, minutely papillate inside excavation, inner petals coherent, ovate acuminate, c. 8–10 × 4–6 mm, glabrous except for a few scattered hairs externally with a slight central ridge, minutely papillate inside, stamens many, carpels many. Fruiting pedicel 10–20 mm long, 1–2 mm thick, monocarps to 25 or more, globose to ellipsoidal, 12–13 × 8 mm, to 17 mm long in two-seeded monocarps, drying black or dark brown with rusty hairs particularly dense near apex and on stipe, stipe to 13 mm long. Seeds, 1 or rarely 2, ellipsoidal, c. 10–12 × 6–7 mm.

Distribution. Endemic to Borneo where it is recorded from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest, also on limestone.

8. *Friesodielsia korthalsiana* (Miq.) Steen.
(Pieter W. Korthals (1807–1892), Dutch botanist who collected widely in Malesia)

Blumea 12 (1964) 360. — *Oxymitra korthalsiana* Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 29. Ridley, Sarawak Mus. J. 1(3) (1913) 89. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 259. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 73. Masamune, Enum. Phan. Born. (1942) 292. TYPE: Borneo, Banjoewiran, *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode L 0182331)).

Oxymitra acuminata Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 180. Masamune, Enum. Phan. Born. (1942) 291. — *Friesodielsia acuminata* (Merr.) Steen., Blumea 12 (1964) 357. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 86. TYPE: Borneo, Sabah, Sandakan, September-December 1920, *M. Ramos 1567* (lectotype, designated by Turner (2011b), BO (sheet no. BO-1349528); isolectotypes: BM, GH).

Large woody climber. Twigs black, striate or latticed, youngest with short brown woolly tomentum, soon lost. Leaves chartaceous, drying brown, generally dark or rich brown, above, cinnamon brown beneath, ferruginous hairy above when very young, soon hairs confined to midrib and laterals above, more or less glabrous below,

lamina oblong obovate, 6–16.5(–25) × 2–5.5(–9) cm, base truncate or rounded to slightly cordate, apex obtuse to acuminate, sometimes markedly so, midrib and lateral nerves slightly sunken above in dry leaves, prominent beneath, 8–13 lateral pairs, tertiary and higher-order venation distinct from both surfaces in dry leaves. Petiole 5–7 mm long, 1–2 mm thick. Inflorescence single-flowered, extra-axillary. Flower, pedicel 1–6.5 cm long, slender, c. 0.5 mm thick, medial bract linear-lanceolate 2–3 mm long, 1 mm wide, hairy adaxially, sepals ovate, 4–7 × 3 mm, apex sometimes acuminate, outer petals coriaceous, lanceolate, c. 36 × 6 mm, flat externally except for a faint central longitudinal ridge, adpressed brown hairs, inside with central ridge and excavated base, more or less glabrous, inner petals, ovate lanceolate, 10 × 4 mm, apex acuminate, glabrous, faint central longitudinal ridge, stamens many, carpels many, red hairy. Fruiting pedicel to 12 cm long, monocarps 10 or more, ellipsoidal to cylindrical, 11–17 × 7 mm, apiculate, drying black or brown with rusty pubescence, stipe 10–16 mm, less than 1 mm thick. Seed 1, ellipsoidal c. 10–15 × 5–6 mm.

Distribution. Endemic to Borneo, where it has been collected from Kalimantan and Sabah.

Ecology. Lowland forest.

Notes. A number of collections from montane forest at 1000–1500 m on Mt Kinabalu (Sabah) (*Clemens & Clemens 3766, 26205, 30534, 30866, 34022, Matamin Rumutom 279*) have narrow leaves and long pedicels, but may belong here.

9. *Friesodielsia ovalifolia* (Ridl.) I.M.Turner
(Latin, oval-leaved)

Blumea 55 (2010) 118. — *Melodorum ovalifolium* Ridl., Bull. Misc. Inform. Kew 1912 (1912) 387. Ridley, Sarawak Mus. J. 1(3) (1913) 92. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 287. — *Fissistigma ovalifolium* (Ridl.) Merr., Philipp. J. Sci., C. 15 (1919) 134 — *Oxymitra ovalifolia* (Ridl.) J. Sinclair, Sarawak Mus. J. 5 (1951) 607. — *Richella ovalifolia* (Ridl.) Steen., Blumea 12 (1964) 357. TYPE: Borneo, Sarawak, near Kuching, 17 May 1894, *G.D. Haviland & C. Hose 3151* (lectotype, designated by Turner (2010b), K (barcode no. K000574639)).

Large woody climber. Twigs drying dark grey or blackish, striate or latticed, youngest parts densely brown woolly hairy. Leaves chartaceous, drying dark brown above, brown or grey with brown veins below, scattered pale hairs on young leaves above, soon lost except for along midrib, similar below but brown hairs more persistent, lamina elliptic or elliptic oblong to slightly obovate, 2.5–8.5 × 1.5–3.5 cm, base rounded, truncate or slightly cordate, apex emarginate, obtuse or shortly acuminate, midrib sunken above, prominent beneath, lateral veins 7–8 pairs, flush above, prominent beneath,

tertiary venation distinct from both surfaces. Petiole 4–5 mm long, to 1 mm thick. Inflorescence single-flowered, extra-axillary. Pedicel 15–30 mm long, very slender, c. 0.4 mm thick, tiny medial bract, red-brown woolly hairy; sepals free, triangular, c. 3 × 3 mm, apex acute, red-brown woolly hairy, outer petals yellow, coriaceous, c. 2 cm long, 5 mm wide, brown woolly hairy outside with slight external central ridge, base excavated internally, glabrous inside; inner petals glabrous, ovate lanceolate, 6 × 2 mm, apex sharply acuminate; stamens many, carpels many. Fruiting pedicel c. 3 cm long, 1 mm thick, monocarps to 10 or more, ellipsoidal, 10–12 × 7 mm, brown hairy, apiculate, stipe 12–15 mm long. Seed 1, ellipsoidal, c. 9–11 × 5–6 mm.

Distribution. Endemic to Borneo where it appears restricted to the Kuching area of Sarawak (*Haviland & Hose 3141*, *3151*; *Hewitt A.7.13*, *S 27795*), though *Church et al. 818* from Central Kalimantan may be this.

Ecology. Lowland forest.

MITRELLA Miq.

(diminutive of Greek, *mitra* = mitre, cap)

Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 38. Sinclair, Gard. Bull. Singapore 14 (1955) 364. *Polyalthia* section *Kentia* Blume, Fl. Javae Anonac. (1830) 71. *Polyalthia* section *Schnittspahnia* Rchb., Deut. Bot. Herb.-Buch., *nom. superfl. Melodorum* section *Kentia* (Blume) Hook.f. & Thomson, Fl. Ind. (1855) 122. *Unona* section *Kentia* (Blume) Baill., Hist. Pl. 1 (1868) 213. TYPE: *Polyalthia kentii* (Blume) Blume (≡ *Unona kentii* Blume, ≡ *Mitrella kentii* (Blume) Miq.)

Woody climbers. Leaves tertiary venation reticulate. Inflorescences axillary or terminal, solitary or more rarely paired. Flowers bisexual, sepals 3, valvate, connate or not, petals valvate, two whorls of 3, inner much shorter than outer petals, stamens many, connectives with truncate or obtuse apex, carpels 6–15, ovules 1–many, biseriate. Fruits ellipsoidal or globose, stipitate. Seeds 1–many, smooth, shiny, sometimes pitted.

Distribution and diversity: About six species. Thailand and Malay Peninsula through to New Guinea and Australia. Three species in Borneo.

Notes. I find it difficult to see meaningful distinctions between *Mitrella* and *Pyramidanthe*. *Mitrella dielsii* appears to bridge the gap in morphological terms between *Mitrella kentii* and *M. clementis* on the one hand, and *Pyramidanthe prismatica* on the other. However I refrain from making a formal reduction feeling a wider morphological survey and molecular anlayses are required to undertake this step. However I include *P. prismatica* in the key below. I do not follow Ban (1974b) in including *Sphaerocoryne* in *Mitrella*.

Key to *Mitrella* and *Pyramidanthe* species

1a. Leaves when dry with secondary and intersecondary nerves clearly visible from below, outer petals ovate, dark brown velvety outside, monocarps strongly muricate, dark brown velvety ..... *M. dielsii*

b. Leaves when dry with indistinct secondary veins from below, outer petals ovate lanceolate, or if ovate not dark brown velvety outside, monocarps smooth to weakly muricate, not dark brown velvety 2

2a. Outer petals ovate lanceolate, calyx cup with rim more or less flat or with very broadly obtuse points, inner petals more or less glabrous, monocarps cylindrical or ellipsoidal, more than 3 cm long, seeds smooth ..... *P. prismatica*

b. Outer petals ovate or, if ovate lanceolate, calyx cup with relatively sharp points, inner petals hairy, at least on edges, monocarps globose or ellipsoidal, not exceeding 1.5 cm long, seeds pitted 3

3a. Outer petals ovate, inner petals covered with hairs on the outside ..... *M. kentii*

b. Outer petals ovate lanceolate, inner petals with hairs confined to the edges and margins ..... *M. clementis*

1. *Mitrella clementis* (Merr.) I.M.Turner

(Latin, *clementis* (*clemens* in genitive case) = of gentility, mildness, mercy; commemorative of Joseph Clemens (1862–1936), a Methodist minister, originally from England, who served with the US Army, and his American wife Mary Strong Clemens (1873–1968), who together collected plants professionally).

Malayan Nat. J. 61 (2009) 273. — *Fissistigma clementis* Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 178. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 71. Masamune, Enum. Phan. Born. (1942) 284. TYPE: Borneo, Sabah, Sandakan and vicinity, September–December 1920, *M. Ramos 1474* (lectotype, designated by Turner (2009c), K (barcode no. K000574737); isolectotypes: A[+2], BM, L, US).

Large woody climber. Twigs drying black or dark brown, striate or latticed, very youngest parts with some sparse red-brown hairs. Leaves chartaceous, drying grey-brown above, matt middle brown to pale grey-brown beneath, sparse small adpressed hairs on lamina below, glabrous above, midrib slightly sunken above in dry leaves, prominent beneath, laterals flush on both surfaces, lamina elliptic to oblong lanceolate, 3.5–11 × 1.5–3.5 cm, base obtuse, apex acuminate, 10–12 pairs of laterals, arching forward, looping obscurely, reticulations relatively indistinct. Petiole 5–12 mm long, 0.5–1 mm thick. Inflorescences single-flowered or more rarely in pairs, axillary. Flower, pedicel 5–7 mm long, c. 1 mm thick, with golden brown adpressed hairs, sepals connate, c. 2 × 3 mm, apiculate, outer petals, ovate lanceolate, 15–25 × 6 mm outside covered with short brown or pale hairs, inside excavated, very short

pale woolly hairs, excavation glabrous; inner petals ovate lanceolate, c. 5 × 2.5 mm, glabrous externally except for a very short pale wool along the margins and near the apex, stamens many, carpels many. Fruiting pedicel to 10 mm long, 1–2 mm thick, calyx persistent, monocarps to 8 or more, globose, ellipsoidal or rather irregular, 8–12 × 6–10 mm, drying brown sometimes minutely wrinkled, stipe, generally shorter than the seed-bearing portion of the monocarps, 3–4 mm long, c 1 mm thick. Seeds c. 4, discoid or hemispherical, c. 6–7 mm diameter, drying dark brown, shiny, pitted.

Distribution. Endemic to Borneo where it has been collected from Brunei, Kalimantan, Sabah and once from Sarawak (*S 52509*).

Ecology. Lowland forest, once from 1800 m in Sabah.

Notes. This species has been consistently confused with *M. kentii*. The flowers of the two species differ markedly in the shape of the outer petals. *Mitrella kentii* generally has more coriaceous leaves, but some collections have narrow, chartaceous leaves almost indistinguishable from *M. clementis*. The fruits are also very similar though *M. clementis* seems to have somewhat larger, but relatively shorter-stiped, monocarps with generally more seeds.

2. *Mitrella dielsii* J.Sinclair
(F.L.E. Diels (1874–1945), German botanist)

Gard. Bull. Singapore 15 (1956) 14. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 18. — *Melodorum beccarii* Diels, Notizbl. Bot. Gart. Berlin-Dahlem 11 (1931) 85, *non Melodorum beccarii* Scheff. (1885). TYPE: Borneo, Sarawak, near Sungai Igan, October 1867, *O. Beccari P.B. 3899* (holotype: FI-B; isotype: B(fragment)).

Large woody climber. Twigs drying very dark brown, uniform in colour, longitudinally striate, very youngest parts with dense, very short, curly dark red-brown tomentum. Leaves coriaceous, drying dark brown shiny above, matt brown beneath with darker redder-brown midrib and laterals, lamina hairy below, usually sufficiently so to give a felty feel, hairs curly, brown or red-brown, densest along nerves, expanding leaves with pale hairs above, soon lost, midrib slightly sunken above in dry leaves, prominent below, laterals flush above, raised slightly beneath, lamina ovate, ovate lanceolate or oblong elliptic, 5–19 × 2.5–7 cm, base obtuse, rounded or truncate, apex acuminate, lateral veins 10–15 pairs, arching forward, looping indistinctly, reticulations visible from both surfaces in dry leaves. Petiole 12–16 mm long, c. 2 mm thick. Inflorescences single-flowered, axillary. Pedicel 5–6 mm long, c. 2 mm thick, densely covered with curly brown hairs, sepals connate, broadly triangular, 2–3 × 5 mm, hairy outside, outer petals coriaceous, ovate, 16–19 × 9–12 mm, basally excavate on the inside, externally dark brown velutinous, internally covered with very short pale grey woolly hairs

except the glabrous excavation, inner petals concave, ovate, 5 × 3–4 mm, drying dark brown, more or less glabrous, stamens many, c. 1.5 mm long, apex of connective acute, carpels c. 10, c. 2 mm long, drying black, glabrous, stigma very short. Fruiting pedicel to 10 mm long, 6 mm thick, calyx persistent, monocarps to 9 or more, ellipsoidal, c. 3.5 × 2.5 cm, strongly muricate, densely covered with very short curly dark brown hairs, stipe to 7 mm long, 4 mm thick. Seeds to 12 or more, 2 rows, drying smooth, brown, flat, 11–13 × 8 × 2–4 mm.

Distribution. Endemic to Borneo where it is known from Brunei and Sarawak.

Ecology. Apparently restricted to peatswamp forest.

3. *Mitrella kentii* (Blume) Miq.
(William Kent, 1779–1827, Dutch gardener, first curator of the Botanic Garden in Buitenzorg, Java)

Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 39. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 260. Masamune, Enum. Phan. Born. (1942) 289. Sinclair, Gard. Bull. Singapore 14 (1955) 365. Kessler & van Heusden, Rheedea 3 (1993) 71. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 18. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 91. *Unona kentii* Blume, Bijdr. (1825) 16. — *Polyalthia kentii* (Blume) Blume, Fl. Javae Anonac. (1830) 77. — *Melodorum kentii* (Blume) Hook.f. & Thomson, Fl. Ind. 1 (1855) 116. Ridley, Sarawak Mus. J. 1(3) (1913) 93. — *Fissistigma kentii* (Blume) Merr., Philipp. J. Sci., C. 15 (1919) 132. TYPE: Java, *Anon. s.n.* (lectotype, designated by Turner (2011b), L (ex herb. Blume) (barcode no. L 0183051)).

[*Uvaria elegans* Wall., Numer. List (1832) no. 6474, *nom. nud.*]

Uvaria mabiformis Griff., Notul. 4 (1854) 709. — *Fissistigma mabiforme* (Griff.) Merr., Philipp. J. Sci., C. 15 (1919) 133. TYPE: Peninsular Malaysia, Malacca, Aloor Gajah, *Vernpha s.n.* [Kew Distib. no. 389] (lectotype, designated by Sinclair (1955), K(barcode no. K000574743)).

Melodorum elegans Hook.f. & Thomson, Fl. Ind. 1 (1855) 122. — *Fissistigma elegans* (Hook.f. & Thomson) Merr., Philipp. J. Sci., C. 15 (1919) 131. TYPE: Peninsular Malaysia, Penang, 1822, *Anon.* [N. Wallich] *s.n.* [EIC 6474A] (lectotype, designated by Turner (2011b), K ex herb. Hook. (barcode no. K000574739); isolectotypes: C, CAL, CGE, E, GZU, K, K-W, L, NY, PH).

Melodorum pisocarpum Hook.f. & Thomson, Fl. Ind. 1 (1855) 123. TYPE: Peninsular Malaysia, Malacca, *s. dat., W. Griffith s.n.* (lectotype, designated by Turner (2011b), K ex herb. Hook. (barcode no. K000574741)).

Orophea borneensis Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 26. Ridley, Sarawak Mus. J. 1(3) (1913) 87. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 265. Masamune, Enum. Phan. Born. (1942) 290. TYPE: Borneo, *W.H. de Vriese s.n.* (lectotype, designated by Keßler (1988), L (barcode no. L 0038052; isolectotype: L).

Large woody climber. Twigs drying blackish, dark brown or dark grey, sometimes with shallow longitudinal wrinkles or latticing, youngest parts with red-brown or pale hairs. Leaves chartaceous to subcoriaceous, drying pale grey brown to almost black above, uniform matt brown, midrib generally rather pale brown, glabrous above, below with tiny adpressed, red-brown or pale hairs, hairy on lamina and along nerves, midrib very slightly sunken below, raised beneath, lateral nerves flush above, very slightly raised beneath, lamina elliptic. ovate or ovate lanceolate, 5–13 × 2.5–6 cm, base obtuse, apex shortly acuminate, lateral nerves 9–13 pairs, arching forward, looping obscurely, reticulations visible from both surfaces in dry leaves. Petiole 8–16 mm long, 1–2 mm thick. Inflorescences 1–3-flowered, axillary. Pedicel 5–7 mm long, c. 1 mm thick, widening distally, drying dark brown with decumbent red-brown or brown hairs, medial bract absent, sepals connate, c. 2 × 3 mm, forming shallow triangular dish, externally red-brown hairy, glabrous within, outer petals coriaceous, ovate to elliptic, 9–11 × 5–9 mm long, 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 hairs from upper part, stamens many, 1–1.5 mm long, carpels many, glabrous. Fruiting pedicel 7–12 mm long, 1.4–2 mm thick, calyx persistent, monocarps to 12, globose or irregular, c. 7 mm diameter, drying brown, relatively smooth, glabrous, apex typically rounded, stipe 4–7 mm long, c. 1 mm thick. Seeds two or more, hemispherical, pitted, drying brown, c. 5 mm diameter.

Distribution. Malay Peninsula, Java and Borneo. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland and heath forest to 300 m.

Notes. See *M. clementis* for distinctions with that species and *Sphaerocoryne affinis* likewise.

PYRAMIDANTHE Miq.

(Greek, *pyramis*, *pyramidos* = pyramid, *anthos* = flower)

Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 39. Sinclair, Gard. Bull. Singapore 14 (1955) 362. *Unona* section *Pyramidanthe* (Miq.) Baill., Hist. Pl. 1 (1868) 213. *Melodorum* section *Pyramidanthe* (Miq.) Kurz, J. As. Soc. Bengal 43 (1870) 56. TYPE: *Pyramidanthe rufa* Miq.

Woody climbers. Leaves coriaceous, lateral nerves distinct, tertiary venation laxly reticulate. Flowers axillary. Sepals 3, valvate, united in a flat disc, petals in 2 whorls of 3, outer triquetrous, much longer than inner, stamesn with a truncate, dilated apex, carpels 5–6. Monocarps stipitate, tuberculate. Seeds in 2 rows, shiny.

Distribution and diversity: One species, *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr., found in Malay Peninsula, Sumatra and Borneo.

Notes. See comments under *Mitrella* regarding status of the genus and for a key including *P. prismatica.*

1. *Pyramidanthe prismatica* (Hook.f. & Thomson) Merr.
(Latin, having several longitudinal angles and intermediate flat surfaces)

J. Straits Branch Roy. Asiat. Soc., Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 296. Sinclair, Gard. Bull. Singapore 14 (1955) 362. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 22. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 97. — *Melodorum prismaticum* Hook.f. & Thomson, Fl. Ind. (1855) 121. Ridley, Sarawak Mus. J. 1(3) (1913) 88. — *Fissistigma prismaticum* (Hook.f. & Thomson) Merr., Philipp. J. Sci., C. 15 (1919) 135. TYPE: Peninsular Malaysia, Penang, August 1822, *N. Wallich s.n.* [EIC 6455] (lectotype, designated by Turner (2011b), K-W; isolectotypes: BM, CGE).

[*Uvaria prismatica* Wall., Numer. List (1832) no. 6455, *nom. nud.*]

Oxymitra bassiifolia Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indie 25 (1863) 419, as '*bassiaefolia*'. TYPE: Bangka, near Planyas, s.dat., *J.E. Teijsmann s.n.* [Herb. Bogor. no. 17645] (lectotype, designated by Turner (2011b), BO (sheet no. BO-1408032): isolectotype: BO (sheet no. BO-1408033)).

Pyramidanthe rufa Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 39. TYPE: Borneo australis in Martapoera; Sumatra occidentalis: Korthals

Melodorum cylindricum Maingay ex Hook.f. & Thomson, Fl. Brit. Ind. 1 (1872) 80. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 261. Masamune, Enum. Phan. Born. (1942) 284. — *Fissistigma cylindricum* (Maingay ex Hook.f. & Thomson) Merr., Philipp. J. Sci., C. 15 (1919) 131. Merrill, Univ. Calif. Publ. Bot. 15 (1929) 71. TYPE: Peninsular Malaysia, Malacca, 1865–1866, *A.C. Maingay 1507* [Kew Distrib. no. 78] (holotype: K (barcode no. K000574661); isotype: CAL).

Melodorum maingayi Hook.f. & Thomson, Fl. Brit. Ind. 1 (1872) 80. Ridley, Sarawak Mus. J. 1(3) (1913) 90. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 287. — *Fissistigma maingayi* (Hook.f.

& Thomson) Merr., Philipp. J. Sci., C. 15 (1919) 133. TYPE: Peninsular Malaysia, Penang, s.dat., *A.C. Maingay s.n.* [Kew Distrib. no. 108] (holotype: K (barcode no. K000574660)).

Pyramidanthe rufa var. *parvifolia* Boerl., Icon. Bogor. 1 (1899) 131, t. 44. — *Pyramidanthe prismatica* var. *parvifolia* (Boerl.) Merr., J. Straits Branch Roy. Asiat. Soc., Spec. No. (1921) 263. Masamune, Enum. Phan. Born. (1942) 297. TYPE: Borneo, Sarawak, nr Kuching, 1892, *G.D. Haviland 421* (lectotype, designated by Turner (2011b), BO (sheet no. BO-134059)).

Melodorum rigidum Ridl., Bull. Misc. Inform. 1912 (1912) 386. Ridley, Sarawak Mus. J. 1(3) (1913) 91. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 262. Masamune, Enum. Phan. Born. (1942) 288. — *Fissistigma rigidum* (Ridl.) Merr., Philipp. J. Sci., C. 15 (1919) 135. Sinclair, Sarawak Mus. J. 5 (1951) 600. TYPE: Borneo, Sarawak, near Kuching, *G.D. Haviland 421* [Garai leg.] [d.k.m.a.] (lectotype, designated by Turner (2012), K (barcode no. K000574656)).

Large woody climber. Twigs drying black or dark brown, with shallow longitudinal wrinkling or latticing, sometimes with raised brown lenticels, youngest parts with dark brown adpressed tomentum. Leaves chartaceous to coriaceous, drying dark brown to almost black above, brown to pale brown below with darker midrib and lateral veins, midrib slightly sunken above in dry leaves, prominent beneath, lateral veins very slightly raised on both surfaces, lamina glabrous above, variably hairy below from tiny adpressed to dense erect hairs, lamina oblong elliptic to obovate, 8–23.5 × 3.5–8 cm, base obtuse to rounded, apex acuminate, lateral veins 10–14 pairs, arching forward, looping indistinctly. Petiole 9–20 mm long, 2–3 mm in diameter. Inflorescences axillary. Pedicel 7–10 mm long, c. 1.5 mm thick, widening distally, red-brown adpressed hairy, tiny medial bract near the base of the pedicel, sepals connate, c. 2 × 5 mm, spreading, forming an almost circular salver under the corolla, externally brown or red-brown hairy, outer petals ovate lanceolate, to 40 × 8 mm, outside covered with dense short golden brown hairs, inside very short pale grey woolly except for lower part of excavation which is glabrous, inner petals ovate lanceolate, c. 7 × 4 mm, glabrous except for a few pale hairs near apex externally, drying brown, minutely wrinkled externally, more deeply wrinkled internally, stamens many, 1–1.5 mm long, connective apex polygonal, carpels many c. 2.5 mm long, sparsely hairy, stigma frilly. Fruiting pedicel to 10 mm long, 5 mm thick, calyx persistent, monocarps to 20 or more, often fewer, globose, ellipsoidal or cylindrical, 3.5–4.5 × 1.5–2.5 cm, drying relatively smooth to muricate, sometimes covered with short golden brown tomentum, stipe 8–10 × 2–4 mm. Seeds many, 2 rows, drying smooth, shiny dark brown, c. 10–12 × 6 × 2–4.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo widespread, recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

SPHAEROCORYNE (Scheff. *ex* Boerl.) Scheff. *ex* Ridl.
(Greek, *sphaera* = ball, globe, sphere, *coryne* = club)

J. Straits Branch Roy. Asiat. Soc. 75 (1917) 8. *Polyalthia* section *Sphaerocoryne* Scheff. ex Boerl., [Cat. Pl. Phan. 1 (1899) 26, *nomen*] Icon. Bogor. 1 (1899) 196. TYPE: *Polyalthia siamensis* Boerl. (≡ *Sphaerocoryne siamensis* (Boerl.) Ridl.).

Unona subgenus *Mesnya* Pierre, Fl. Forest. Cochinch. (1881) t. 17. TYPE: *Unona mesnyi* Pierre, *nom. illegit.* (≡ *Polyalthia aberrans* Maingay ex Hook.f. & Thomson).

Woody climbers or scandent shrubs, sometimes erect shrubs. Twigs glabrous or hairy. Leaves chartaceous to coriaceous. Inflorescences 1- or 2-flowered, terminal or axillary. Flowers bisexual, sepals 3, valvate more-or-less connate at the base, persisting in fruit, petals valvate in two whorls of 4, inner only slightly smaller than outer, stamens numerous, connective truncate, carpels numerous, ovules 1–2. Fruits monocarps many, stipitate. Seeds 1–2.

Distribution and diversity: Indo-China to the Philippines. Three species of which one species, *Sphaerocoryne affinis*, recorded from Borneo.

1. *Sphaerocoryne affinis* (Teijsm. & Binn.) Ridl.
(Latin, neighbouring, akin to)

J. Straits Branch Roy. Asiat. Soc. 75 (1917) 8. — *Polyalthia affinis* Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indië 27 (1864) 37. TYPE: Java, cult. in Hort. Bot. Bogor., s.dat., *Anon. s.n.* [Bogor. distrib. no. 113] (neotype, designated by Turner (2011b), L (barcode no. L0197456)).

Monoon submitratum Miq., Ann. Mus. Lugd. Bat. 2 (1865) 16. — *Polyalthia submitrata* (Miq.) Ridl., Sarawak Mus. J. 1(3) (1913) 82. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 257. Masamune, Enum. Phan. Born. (1942) 295. TYPE: Borneo, Moeara Karrau, *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L 0184462)).

Polyalthia aberrans Maingay ex Hook.f. & Thomson, Fl. Brit. Ind. 1 (1872) 67. — *Unona mesnyi* Pierre, Fl. Forest. Cochinch. (1881) t. 17, *nom. superfl.* — *Popowia mesnyi* Craib, Bull. Misc. Inform. Kew 1914 (1914) 5, *nom. superfl.* — *Mitrella mesnyi* (Craib) Bân, Bot. Zhurn. 59(2) (1974) 244, *nom. superfl.* — *Popowia aberrans* (Maingay ex Hook.f. & Thomson) Pierre ex Finet & Gagnep., Bull. Soc. Bot. Fr. Mem. 4(2) (1906) 109. — *Sphaerocoryne aberrans* (Maingay ex Hook.f. & Thomson) Ridl., J. Straits Branch Roy. Asiat. Soc. 75 (1917) 8. — *Melodorum aberrans* (Maingay ex Hook.f. & Thomson) J. Sinclair, Gard. Bull. Singapore 14 (1953) 41. Sinclair, Gard. Bull. Singapore 14 (1955) 332. — *Mitrella aberrans* (Maing. ex Hook.f. & Thomson)

Bân, Bot. Zhurn. 59(2) (1974) 244. TYPE: Peninsular Malaysia, Malacca, 28 April 1868, *A.C. Maingay 3141* [Kew distrib. no. 110] (lectotype, designated by Turner (2011b), K (barcode no. K000380043)).

Melodorum clavipes Hance, J. Bot. 15 (1877) 328. — *Sphaerocoryne clavipes* (Hance) Craib, Bull. Misc. Inform. Kew 1922 (1922) 168. TYPE: Cambodia, s.dat., *L. Pierre 19770* (holotype: BM (barcode no. BM000554028)).

Polyalthia siamensis Boerl., Cat. Pl. Phan. (1899) 26. — *Sphaerocoryne siamensis* (Boerl.) Ridl., J. Straits Branch Roy. Asiat. Soc. 75 (1917) 8. TYPE: Java, cultivated in Hort. Bot. Bogor. sub XI.A.71 and XI.A.41.

Dasymaschalon scandens Merr., Philipp. J. Sci., C. 10 (1915) 238. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 175. TYPE: Philippines, Palawan, Taytay, May 1913, *E.D. Merrill 9277* (lectotype, designated by Turner (2011b), K (barcode no. K0006911800)).

Tree or scandent shrub. Twigs drying brown, shallowly striate or latticed, glabrous but for a few pale hairs on the youngest parts. Leaves chartaceous, glaucous beneath, drying brown or grey-brown above, sometimes shiny, paler and duller beneath with midrib a contrasting red-brown, glabrous above, below with a scattering of pale adpressed hairs, sometimes almost glabrous, midrib flush above in dry leaves, prominent beneath, lateral nerves slightly raised on both surfaces, lamina elliptic, 4–14.5 × 1.5–5 cm, base acute, apex acuminate, lateral veins 14–18 pairs, tertiary venation clearly visible from both surfaces. Petioles 4–8 mm long, c. 1 mm thick. Inflorescences single-flowered, axillary. Flowers pedicel 15–16 mm long, c. 1 mm thick, widening distally, drying brown, striate, more or less glabrous, medial bract c. 1.5 × 1 mm, with sparse pale hairs, perianth sometimes 4-merous, sepals slightly connate at base, broadly ovate, c. 2 × 4 mm, drying black, sparse, short adpressed pale hairs outside, glabrous within, petals rather thick, outer petals broadly ovate, c. 7 × 6 mm, covered with short dense pale hairs, glabrous near base inside, inner petals c. 6 × 5 mm, hairy outside, more or less glabrous within, stamens many, carpels many, 1–1.5 mm long, white hairs near apex. Fruits pedicel 2–2.5 cm long, c. 1 mm thick, widening distally, calyx persistent, monocarps to 25 or more, ellipsoidal, typically drying 8–9 × 5–6 mm, 2-seeded fruits to 13 mm long, minutely beaked, drying dark red-brown, minutely pimpled, glabrous except for a few short pale hairs near the apex, stipe very slender, 8–14 mm long, c. 0.5 mm thick. Seeds 1, rarely 2, ellipsoidal, c. 8 × 6 mm, drying smooth, pale brown.

Distribution. Indo-China, Thailand, Malay Peninsula, ?Java, Borneo and the Philippines. In Borneo recorded from Sabah and once from Kalimantan (type of *Polyalthia subnitrata*).

Ecology. Lowland forests to 200 m altitude.

Notes. This species has generally been overlooked among material from Borneo.

Mostly collected in fruit, specimens have generally been confused among a group of superficially similar small-leaved species including *Mitrella kentii*, *Desmos acutus* or *D. dunalii*, and *Uvaria micrantha*. *Mitrella kentii* and *M. clementis* have adpressed hairs on the lower lamina unlike *S. affinis* which has a very sparse indumentum. The stipes of the monocarps also appear less slender in the *Mitrella* species. The *Desmos* species have moniliform monocarps, but in some poor specimens care must be taken to identify fruits with more than one seed. *Uvaria micrantha* has stellate pubescence but the hairs are small and may be difficult to see in the field. The confusable *Desmos* and *Uvaria* species do not have the calyx persisting in fruit like *Sphaerocoryne* (and *Mitrella*).

UVARIA L.

(Latin, *uva* = cluster, cluster or bunch of grapes; alluding to clustered fruits)

Sp. Pl. (1753) 536. Sinclair, Gard. Bull. Singapore 14 (1955) 199. Zhou et al., Syst. Biodivers. 7 (2009) 249–258. Zhou et al., Bot. J. Linn. Soc. 163 (2010) 33–43. LECTOTYPE: *Uvaria zeylanica* L. (designated by Hutchinson (1923)).

Marenteria Noronha ex du Petit-Thouars, Gen. Nova Madag. (1806) 18. TYPE: non designatus.

Cyathostemma Griff., Notul. Pl. Asiat. 4 (1854) 707. Utteridge, Blumea 45 (2000) 377. TYPE: *Cyathostemma viridiflorum* Griff.

Ellipeia Hook.f. & Thomson, Fl. Ind. (1855) 104. Sinclair, Gard. Bull. Singapore 14 (1955) 230. TYPE: *Ellipeia cuneifolia* Hook.f. & Thomson.

Anomianthus Zoll., Linnaea 29 (1858) 324. TYPE: *Anomianthus heterocarpus* (Blume) Zoll.

Tetrapetalum Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 23. TYPE: *Tetrapetalum volubile* Miq.

Rauwenhoffia Scheff., Ann. Jard. Buitenz. 2 (1885) 21. TYPE: *Rauwenhoffia siamensis* Scheff.

Uva Kuntze, Rev. Gen. 1 (1891) 7, *nom. superfl.*

Uvariella Ridl., Fl. Malay. Penins. 1 (1922) 22. TYPE: *Uvariella leptopoda* (King) Ridl.

Ellipeiopsis R.E. Fr., Ark. Bot. ser. 2. 3 (1955) 41. TYPE: *Ellipeiopsis ferruginea* (Buch.-Ham. ex Hook.f. & Thomson) R.E. Fr.

Dasoclema J. Sinclair, Gard. Bull. Singapore 14 (1955) 273. TYPE: *Dasoclema siamensis* (Craib) J. Sinclair.

Balonga Le Thomas, Adansonia sér. 2, 8 (1968) 106. TYPE: *Balonga buchholzii* (Engl & Diels) Le Thomas.

Woody climbers with stellate or caespitose hairs. Twigs glabrous or stellate hairy. Leaves chartaceous to coriaceous. Inflorescences fascicles or solitary flowers, terminal, leaf-opposed, rarely cauliflorous. Flowers bisexual, trimerous, rarely dimerous, sepals valvate, often connate, petals imbricate in two whorls, sometimes connate at the base, stamens numerous, outer sometimes sterile, truncate, carpels few to many, ovules few to many, uni- or biseriate. Fruits few to many stipitate, subglobose to ellipsoidal monocarps. Seeds few to many, in 2 rows.

Distribution and diversity: More than 100 species across the Old World tropics from Africa to Australia. 19 species recorded from Borneo.

Notes. For both nomenclatural and taxonomic reasons, Utteridge (2000) reduced *Tetrapetalum* to *Uvaria*. Recent molecular phylogenies have provided the critical weight for a number of other satellite genera to gravitate into an enlarged *Uvaria* (Zhou et al. 2009, 2010). Most relevant to the student of Bornean Annonaceae, *Cyathostemma* and *Ellipeia* have been reduced to *Uvaria*, unfortunately with many epithet changes.

Key to *Uvaria* species

1a. Plants cauliflorous with inflorescences arising from main stem 2
b. Plants not cauliflorous 3

2a. Calyx entirely enclosing flower in bud, petals reflexing at anthesis and more than 1 cm long, monocarps drying brown ..... *U. monticola*
b. Calyx not entirely enclosing flower in bud, petals not reflexing at anthesis, less than 1 cm long, monocarps drying black ..... *U. griffithii*

3a. Inflorescences, generally arising on branches behind leaves, congested cymes of 4–20 (sub)sessile flowers ..... *U. excelsa*
b. Inflorescences, generally arising among leaves, not congested cymes, flowers distinctly pedicellate 4

4a. Inner petals distinctly shorter than outer petals, monocarps smooth, stipitate with lateral attachment of stipe and apiculus 5
b. Petal whorls equal or subequal in length, monocarps sessile or stipitate with more or less basal attachment, apiculus terminal or absent 6

5a. Lateral nerves looping obscurely, lower lamina not distinctly rough to the touch, monocarps less than 2 cm long ..... *U. cuneifolia*

b. Lateral nerves looping distinctly within the margin of the leaf, lower lamina distinctly rough to the touch, monocarps more than 2 cm long .. *U. schefferi*

6a. Living leaves brown beneath ..... *U. lanuginosa*

b. Living leaves not brown beneath 7

7a. Leaves scabrous on upper surface ..... *U. javana*

b. Leaves not scabrous above 8

8a. Twigs densely covered with hairs 9

b. Twigs glabrous or with sparse hairs 11

9a. Twigs and leaves pilose, with long (1–3 mm) erect, straight red brown hairs ..... *U. hirsuta*

b. Twigs and leaves hairy but not pilose 10

10a. Flowers more than 5 cm across, monocarps cylindrical with longitudinal ridges ..... *U. grandiflora*

b. Flowers less than 3 cm across, monocarps globose ..... *U. curvistipitata*

11a. Flowers dimerous, monocarps stipitate, with stipe shorter than seed-bearing portion, cylindrical, rough to the touch but without longitudinal ridges ..... *U. borneensis*

b. Flowers trimerous, monocarps (sub)sessile or if stipitate then globose or ellipsoidal, or if cylindrical then with stipe longer than seed-bearing portion or bearing longitudinal ridges 12

12a. Petals more than 2 cm long, erect at anthesis, monocarps (sub)sessile and muricate, with a distinct lateral apiculus ..... *U. verrucosa*

b. Petals spreading or relexing at anthesis, or if not spreading or reflexing then less than 1 cm long, monocarps distinctly stipitate and not muricate, or if sessile and muricate (*U. beccarii*) then without a lateral apiculus 13

13a. Petals spreading at anthesis and at least 10 mm long, monocarps muricate, or if not muricate cylindrical and drying black, or globose–ellipsoidal with stipe c. 1 mm thick 14

b. Petals not spreading and less than 10 mm long, monocarps not muricate, if monocarps cylindrical then drying brown, or globose and ellipsoidal with very slender stipe c. 0.3 mm in diameter 17

14a. Petals white or yellow, monocarps sessile and muricate ..... *U. beccarii*

b. Petals red, monocarps distinctly stipitate, muricate or not 15

15a. Calyx entirely covering flower in bud, petals connate at base, monocarps cylindrical, smooth, drying black ..... *U. concava*

b. Calyx not entirely covering flower in bud, petals free at base, monocarps globose to ellipsoidal, drying brown..... 16

16a. Leaves with lateral nerves looping indistinctly in dry leaves, pedicel of flower 10 mm or less in length, monocarps muricate.....*U. lobbiana*

b. Leaves with lateral nerves looping distinctly in dry leaves, pedicel of flower 15 mm long or more, monocarps not muricate ..... *U. littoralis*

17a. Leaves typically less than 4.5 cm wide, stipe of monocarp very slender (c. 0.3 mm diam.) ..... *U. micrantha*

b. Leaves typically more than 4.5 cm wide, stipe of monocarp relatively thick (2 mm or more) 18

18a. Inflorescence subtended by a persistent foliose bract, monocarps with stipe shorter than seed-bearing portion ..... *U. argentea*

b. Inflorescence bract not foliose, monocarps with stipe longer than seed-bearing portion ..... *U. clementis*

1. *Uvaria argentea* Blume
(Latin, silvery)

Fl. Javae Anonaceae (1830) 24. Ridley, Sarawak Mus. J. 1(3) (1913) 73. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Masamune, Enum. Phan. Born. (1942) 297. — *Uva argentea* (Blume) Kuntze, Rev. Gen. Pl. 1 (1891) 7. — *Cyathostemma argenteum* (Blume) J. Sinclair, Sarawak Mus. J. 5 (1951) 599. Sinclair, Gard. Bull. Singapore 14 (1955) 220. Utteridge, Blumea 45 (2000) 382. TYPE: Java, *J.C.A. van Hasselt s.n.* (holotype: L).

Uvaria bracteata Roxb., Fl. Ind. (1832) 660. — *Uva bracteata* (Roxb.) Kuntze, Rev. Gen. Pl. 1 (1891) 7. TYPE: *Roxb. Icon. 2290* (lectotype, designated by Utteridge (2000), K).

Uvaria gomeziana A. DC., Mem. Soc. Phys. Genèv. 5 (1832) 203. TYPE: Burma, Tavoy, 8 September 1827, *W. Gomez 197* [N. Wallich 1279, EIC 6459] (lectotype, designated by Turner (2011a), K-W).

[*Cyathostemma nitidum* Bakh.f., Blumea 12 (1963) 61, *nom. inval.*]

Woody climber to 5 m long. Twigs densely pubescent when young, becoming glabrous with age. Leaves chartaceous to subcoriaceous, glabrous except for midrib above,

oblong-lanceolate, 10–15 × 4.5–6 cm, base cuneate or rounded, apex acute, lateral nerves 12–14 pairs. Petioles 3–5 mm long, c. 1 mm thick. Inflorescences, 1–4 flowered, opposite leaves, basal bract foliose, orbicular, 7–9 × 7–9 mm, sepals coriaceous, broadly ovate, 2 × 3 mm, apex obtuse, densely pubescent, petals broadly ovate, 5 mm long, stamens many, carpels many. Monocarps oblong-ellipsoid, c. 4 × 3 cm, apex rounded, drying slightly constricted between seeds, tuberculate with longitudinal ridges, stipe to 2.5 cm long, c. 5 mm thick. Seeds more than 6 in 2 rows.

Distribution. Bangladesh and Burma to Java and Borneo. In Borneo sparsely collected from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

2. *Uvaria beccarii* Attan., I.M.Turner & R.M.K.Saunders
(Odoardo Beccari (1843–1920), Italian naturalist and author of *Nelle Foreste di Borneo*)

Novon 21 (2011b) 161, Fig. 1. TYPE: Borneo, Sarawak, Mt Matang, 1863-1865, *O. Beccari P.B. 1648* (holotype: K; isotypes: BO, FI-B).

Large woody climber. Twigs dark grey or grey-brown, striate or latticed, young twigs densely brown stellate hairy. Leaves chartaceous to subcoriaceous drying dark brown, brown or grey-brown above, dark brown to brown below, midrib slightly sunken above in dry leaves, prominent beneath, lateral nerves more or less flush above, prominent beneath, glabrous above except for hairs on midrib above, densely stellate hairy on nerves below, with scattered hairs on lower lamina, lamina elliptic to narrowly oblanceolate, 6–14 × 2–5.5 cm, base obtuse, truncate or rounded, apex acuminate, lateral nerves 11–14 pairs, looping obscurely well within the margin, tertiary venation areolate, visible from below, indistinct from above. Petiole 3–5 mm long, 1–2 mm thick. Inflorescence subopposite leaves, single-flowered. Flower pedicel 12–22 mm long, 1 mm thick, densely brown stellate hairy, basal bract lanceolate c. 16 × 2 mm, brown hairy abaxially, sparsely hairy adaxially, medial bract ovate, c. 3 × 2 mm, hairy outside, glabrous within, calyx completely covering flower bud, sepals at anthesis triangular, c. 6 × 6 m, drying dark brown, outside with brown hairs densest near the base, inside with small pale hairs, petals white or pale yellow, reflexing at anthesis, oblong-ovate c. 10 × 5 mm, apex blunt, densely pale brown hairy on both surfaces, stamens many truncate, carpels many hairy. Fruiting pedicel c. 2.5 cm long, 4 mm thick, drying striate, brown stellate hairy, monocarps to 15 or more, sessile, pyriform, muricate, often with flat oblique faces basally, apex rounded, to 3.5 × 2.5 cm, drying brown, covered with short dense golden brown tomentum. Seeds several, ellipsoidal with one or two flattened faces, 12 × 6–8 × 3–6 mm, drying smooth, brown, shiny.

Distribution. Endemic to Borneo, where it has been collected from Brunei, Sabah and Sarawak.

Ecology. Lowland dipterocarp forests (primary and disturbed), near streams and freshwater swamps; 30–720 m.

Notes. Beccari appears to have recognised that the his collection represented a new species and distributed the material under the name '*Uvaria vallombrosana*', the proposed epithet deriving from the name of the house, 'Vallombrosa', he had built on Mt. Matang in Sarawak.

Fruiting material of *U. beccarii* is morphologically similar to that of *U. verrucosa*, although the two species are unlikely to be confused if flowering material is available. *Uvaria verrucosa* fruits are borne on shorter peduncles and pedicels, and the monocarps are smaller and subglobose with an apiculate apex, and have fewer seeds.

3. *Uvaria borneensis* (Merr.) Utteridge
(of Borneo)

Blumea 45 (2000) 393, as '*borneense*'. — *Tetrapetalum borneense* Merr., Univ. Calif. Publ. Bot. 15 (1929) 64. Masamune, Enum. Phan. Born. (1942) 297. Sinclair, Sarawak Mus. J. 5 (1951) 608. TYPE: Borneo, Sabah, Tawau, October 1922–March 1923, *A.D.E. Elmer 21211* (lectotype, designated by Utteridge (2000), K (barcode no. K000691249); isolectotypes: A, B, BISH, BM, BO, C, CM, DS, IBSL, L, MICH, MO, NY, P, S, U, Z).

Uvaria lambirensis (K. Momose) Utteridge, Blumea 45 (2000) 393, as '*lambirense*'. — *Tetrapetalum lambirense* K. Momose, Blumea 43 (1998) 117. TYPE: Borneo, Sarawak, Miri, Lambir Hills National Park, 1 April 1996, *K. Momose 5069* (holotype: KYO; isotypes: BM, BO, K, L).

Large woody climber. Young twigs rusty stellate hairy. Leaves chartaceous to coriaceous, hairy on midrib and veins above when young, ovate to ovate lanceolate, 7.5–27 × 3–12 cm. base rounded to truncate, apex acuminate. Inflorescence supra-axillary or behind leaves, pedunculate to 10 mm, usually with 1 or 2 flowers. Pedicel to 3 cm, often much shorter, densely stellate tomentose. Often drying with longitudinal wrinkles. Clasping medial bract c. 3 mm long; sepals 2, orbicular, 8–10 mm across, 4 mm long; petals 4, green, membranous, concave, oblong ovate, 13 × 10 mm; stamens many, carpels many. Monocarps to 30 or more, ellipsoidal, c. 3 × 2 cm, drying brown, minutely wrinkled, densely covered with very short hairs, apex blunt, stipe to 2 cm long. Seeds many, flattened, c. 15 × 10 × 3 mm, smooth, shiny.

Distribution. Endemic to Borneo. Known from Sarawak, Sabah and Kalimantan.

Ecology. Lowland forest.

4. *Uvaria clementis* (Merr.) Attan., I.M.Turner & R.M.K.Saunders
(Latin, *clementis* (*clemens* in genitive case) = of gentility, mildness, mercy; commemorative of Joseph Clemens (1862–1936), a Methodist minister, originally from England, who served with the US Army, and his American wife Mary Strong Clemens (1873–1968), who collected plants professionally).

Novon 21 (2011) 166. — *Artabotrys clementis* Merr., J. Straits Branch Roy. Asiat. Soc. 85 (1922) 174. Masamune, Enum. Phan. Born. (1942) 280. TYPE: Borneo, Sabah, Sandakan and vicinity, September-December 1920, *M. Ramos 1667* (lectotype, designated by Attanayake et al. (2011), K; isolectotype: A).

Uvaria parviflora Hook.f. & Thomson, Fl. Ind. 1 (1855) 103, *non U. parviflora* A. Rich. (1831), *nec U. parviflora* (Michx.) Torr. & A. Gray (1838). — *Uva parviflora* Kuntze, Rev. Gen. Pl. 1 (1891) 8. — *Cyathostemma hookeri* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1892) 10, *nom. superfl.* Ridley, Sarawak Mus. J. 1(3) (1913) 73. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 263. Masamune, Enum. Phan. Born. (1942) 297. Sinclair, Gard. Bull. Singapore 14 (1955) 223. Utteridge, Blumea 45 (2000) 386. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 83. TYPE: Peninsular Malaysia, Prince of Wales Island (Penang), *W.E. Phillips s.n.* (lectotype, designated by Attanayake et al. (2011), K (barcode no. K 000615957)).

Large woody climber. Twigs becoming glabrous with age. Leaves drying brown or grey-brown, coriaceous, sparsely pubescent below, oblong to obovate, 12–20 × 5.5–8 cm, base cuneate, apex acute to acuminate, lateral nerves 12–17 pairs. Petiole 4–7 mm long, 1–3 mm thick. Inflorescence opposite leaves, 3- or 4-flowered. Pedicel to 12 mm long, minutely verruculose, basal and medial bracts minute, sepals ovate 2.5–3 × 2.5–5 mm, petals, elliptic to ovate, 4–6 × 2–3 mm, stamens many, carpels many. Monocarps to 20 or more, globose or ellipsoidal, 3–4 cm long, c. 2–2.5 cm diameter, glabrous, drying dark red-brown, apex rounded, stipes 2–5 cm long. Seeds up to 8.

Distribution. Malay Peninsula and Borneo. In Borneo collected from Sarawak, Sabah and Kalimantan.

Ecology. Lowland forest.

Notes. Fruiting specimens can be difficult to distinguish from those of *U. concava* but the monocarps of *U. concava* dry black whereas those of *U. clementis* are a reddish brown in the dry state.

5. *Uvaria concava* Teijsm. & Binn.
(Latin, concave, curved inwards, hollowed out)

Natuurk. Tjdschr. Ned.-Indië 3 (1852) 331. Teijsmann & Binnendijk, Ned. Kruidk.

Arch. 3 (1855) 406. — *Uva concava* (Teijsm. & Binn.) Kuntze, Rev. Gen. Pl. 1 (1891) 8. TYPE: Java, cult. in Hort. Bot. Bogor., *S. Binnendijk s.n.* [Herb. Bogor. 17623] (lectotype, designated by Turner (2011b), BO (sheet no. BO-1824857)).

Uvaria lurida Hook.f. & Thomson, Fl. Ind. 1 (1855) 101. — *Uva lurida* (Hook.f. & Thomson) Kuntze, Rev. Gen. Pl. 1 (1891) 8. TYPE: India, Assam, Khasia, 2000 feet, 2 October 1850, *J.D. Hooker & T. Thomson 2468* (lectotype, designated by Turner (2011b), K (barcode no. K000380703)).

?*Uvaria sessiliflora* Rchb.f. & Zoll., Linnaea 29 (1858) 306, 312. TYPE: Java, Hort. Bot. Bogor, *H. Zollinger 1412* (isotype: P (barcode no. P00260015) (n.v.)).

Uvaria stellata Merr., Publ. Bur. Sci. Gov. Lab. 29 (1905) 14. TYPE: Philippines, Luzon, Province of Benguet, Twin Peaks, May 1904, *A.D.E Elmer 6322* (lectotype, designated by Turner (2011b), K (barcode no. K000691146); isolectotypes: NY, P, US).

Unona leytensis Elmer, Leafl. Philipp. Bot. 5 (1913) 1744. — *Uvaria leytensis* (Elmer) Merr., Philipp. J. Sci., C. 10 (1915) 230. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 155. TYPE: Philippines, Mindanao, Province of Agusan, Cadadbaran (Mt Urdanete), September 1912, *A.D.E. Elmer 13880* (lectotype, designated by Turner (2011b), L (barcode no. L0190815); isolectotypes: BM, BO, CAL, GH, K, L, NA(ex MOAR), NY, P, U, US).

Uvaria nudistellata Elmer, Leafl. Philipp. Bot. 5 (1913) 1746. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 156. TYPE: Philippines, Palawan, Puerto Princesa (Mt Pulgar), April 1911, *A.D.E. Elmer 13015* (lectotype, designated by Turner (2011b), L (barcode no. L0190867); isolectotypes: A, BISH, BM, CAL, K, L, MO, NSW, NY, U, US, Z).

Uvaria sympetala Merr., Univ. Calif. Publ. Bot. 15 (1929) 63. Masamune, Enum. Phan. Born. (1942) 298. TYPE: Borneo, Sabah, near Tawao, October 1922–March 1923, *A.D.E. Elmer 21090* (lectotype, designated by Turner (2011b), UC (sheet no. 289957); isolectotypes: A, BISH, BM[×2], BO, C, CM, DS, GH, K, L, M, MICH, MO, NY, P, PH, S, SING, U, UC, Z).

Large woody climber. Foliage largely glabrous. Twigs dark brown or grey-brown, latticed. Leaves drying olive green-grey, elliptic to lanceolate, 12–20 × 6–7 cm, base cuneate to rounded, apex acute to acuminate, reticulations very distinct from above. Petioles 5–10 × 1–2 mm. Inflorescence terminal, flowers solitary. Pedicel to 2 cm, covered with very short adpressed brown stellate hairs, sepals connate, entirely covering flower bud, splitting, petals red-brown, connate at base, obovate c. 15 mm long, concave, stamens many, carpels many. Monocarps many (40 or more), drying black, cylindrical, 4 × 1.5 cm, glabrous except for a scattering of very tiny brown stellate hairs, stipe to 7 cm long. Seeds many.

Distribution. India to Australia including the Malay Peninsula, Sumatra, Java, Borneo and the Philippines. In Borneo only recorded from Sabah.

Ecology: Lowland forest.

Notes. The monocarps drying black distinguish fruiting specimens from the otherwise similar *U. clementis* that has monocarps drying a reddish brown.

6. ***Uvaria cuneifolia*** (Hook.f. & Thomson) L.L.Zhou & al.
(Latin, *cuneatus* = wedge-shaped, *folius* = leaf)

Syst. Biodivers. 7 (2009) 255. — *Ellipeia cuneifolia* Hook.f. & Thomson, Fl. Ind. 1 (1855) 104, Ridley, Sarawak Mus. J. 1(3) (1913) 76. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Masamune, Enum. Phan. Born. (1942) 283. Sinclair, Gard. Bull. Singapore 14 (1955)230. TYPE: Peninsular Malaysia, near Malacca, *W. Griffith s.n.* (lectotype, designated by Turner (2011b), K (barcode no. K000382203)).

Ellipeia gilva Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 9. — *Uvaria gilva* (Miq.) L.L. Zhou *& al.*, Syst. Biodivers. 7 (2009) 255. TYPE: Borneo. *W.H. de Vriese s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L 0484299)).

Uvaria laha Miq., Fl. Ned. Ind., Eertse Bijv. (1861) 369. — *Ellipeia laha* (Miq.) Miq., Ann. Mus. Lugd.-Bat. 2 (1865) 10. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Masamune, Enum. Phan. Born. (1942) 283. TYPE: Sumatra, West Sumatra, Palembang near Tubuan, Ogau-ulu, *J.E. Teijsmann s.n.* [Herb. Bogor. 3811] (holotype: U (barcode no. U 0000268); isotype: BO (sheet no. BO-1349058)).

Large woody climber. Twigs longitudinally wrinkled or latticed, drying dark brown, young twigs densely short stellate hairy, glabrescent with age. Leaves chartaceous, drying dark above uniform brown beneath, or various shades of brown, lamina above with uniform but sparse covering of pale stellate hairs, lost with age, dense brown tomentum on midrib and nerves, beneath dense covering of stellate red-brown hairs, giving a felty feel, or almost glabrous except for a few hairs along the midrib, leaves ovate to obovate to more typically oblanceolate, 5–25 × 2–10 cm, base rounded, apex acuminate, lateral veins 15–20 pairs, arching forward, looping obscurely within the margin. Petioles 4–5 mm long, to 3 mm thick. Inflorescences terminal, many-flowered. Flowers pedicel 11–14 mm long with short dense red-brown stellate tomentum, basal bracteole narrowly ovate to 8 mm long, clasping medial bract to 3–4 mm long, sepals broadly triangular to ovate, 4 mm long, 4–5 mm across, apex obtuse, rusty stellate outside; petals creamy yellow, outer petals broadly ovate, 17 × 11 mm, apex obtuse, inner petals triangular, 4 mm long, 5 mm wide; stamens numerous, carpels many. Fruits pedicel to 20 mm long, 2 mm thick, monocarps to 20 or more, compressed ovoid, 15 × 8–10 × 6 mm, drying pale brown, shortly tomentose, minutely bumpy, apiculus lateral, stipe to 15 mm long. Seeds 1.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo collected from Sabah and Sarawak, and probably Kalimantan.

Exology. Lowland forest.

7. *Uvaria curvistipitata* Attanayake & al.
(Latin, *curvi-* = curved, *stipitatus* = with a stipe or short stalk; curved stipes to the monocarps)

Novon 21 (2011) 164, fig. 3. TYPE: Borneo, Sabah, Labuk and Sugut, west side of Bukit Doji pass from Telupid to Ulu Karamuak, 25 October 1968, *S. Kokawa & M. Hotta 435* (holotype: SAN; isotypes: KYO, L).

Large woody climber. Twigs drying dark brown or black, latticed, younger parts with dense, quite coarse, brown hairs. Leaves chartaceous to coriaceous, drying brown or grey brown above, often rather patchy, brown beneath, midrib slightly sunken above in dry leaves, prominent beneath, lateral nerves more or less flush above, prominent beneath, variably hairy above, sometimes restricted to veins, densely hairy beneath, lamina (oblong-)elliptic to typically obovate, 8–25 × 4–13 cm, base truncate, rounded or auriculate, apex shortly acuminate, lateral nerves 13–17 pairs, arching forward, looping obscurely within margin, tertiary venation visible from below, obscure from above. Petiole 5–8 mm long, 2–5 mm thick, densely hairy. Inflorescence subopposite leaves, several-flowered, peduncle c. 1 cm long. Flowering pedicel c. 8 mm long, 2.5 mm thick, densely hairy, medial bract very broadly elliptic, 3 × 8 mm, with short brown hairs, sepals broadly triangular, c. 5 × 7 mm, connate at base, hairy externally, petals, whorls similar, ovate, c. 8 × 8 mm, covered on both surfaces with short brown hairs, stamens many, carpels many. Fruiting pedicel c. 10 mm long, 4 mm thick, monocarps to 25 or more, globose to ellipsoidal, 1.5–2 × 1.5 cm, apex rounded, sometimes with some longitudinal ridges, densely brown hairy, stipe to 3.5 cm long, 3 mm thick. Seeds c. 6 in 2 rows, ellipsoidal, flattened on one or two faces, 11–12 × 7–8 × 4–6 mm, drying brown, smooth, shiny, glabrous.

Distribution. Endemic to Borneo. Collected from Kalimantan and Sabah.

Ecology. Lowland forest to 200 m.

8. *Uvaria excelsa* (Hook.f. & Thomson) King
(Latin, lofty, high)

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1893) 22. Ridley, Sarawak Mus. J. 1(3) (1913) 74. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Masamune, Enum. Phan. Born. (1942) 297. — *Mitrephora excelsa* Hook.f. &

Thomson, Fl. Ind. 1 (1855) 114. Ridley, Sarawak Mus. J. 1(3) (1913) 86. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 263. Masamune, Enum. Phan. Born. (1942) 289. — *Kinginda excelsa* (Hook.f. & Thomson) Kuntze, Rev. Gen. Pl. (1891) 7. — *Cyathostemma excelsum* (Hook.f. & Thomson) J. Sinclair, Gard. Bull. Singapore 14 (1955)226. Kessler & van Heusden, Rheedea 3 (1993) 60. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 14. Utteridge, Blumea 45 (2000) 384. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 83. TYPE: Peninsular Malaysia, Penang, *G. Porter s.n.* [ElC 6477] (holotype: K (barcode no. K000691369); isotypes: CGE, K, K-W, WU).

[*Uvaria excelsa* Wall., Numer. List (1832) no. 6477, *nom. nud.*]

Tetrapetalum volubile Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 1. Ridley, Sarawak Mus. J. 1(3) (1913) 73. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Masamune, Enum. Phan. Born. (1942) 297. TYPE: Borneo, 1857, *W.H. de Vriese s.n.* (holotype: L[×3] (barcode nos. L0037889, L0037900, L0037901); isotype: U).

Uvaria confertiflora Merr., Univ. Calif. Publ. Bot. 15 (1929) 61. Masamune, Enum. Phan. Born. (1942) 297. TYPE: Borneo, Sabah, Tawau, October 1922–March 1923, *A.D.E. Elmer 21081* (lectotype, designated by Utteridge (2000), L (barcode no. L 0037902); isolectotypes: A, BISH, BM[×2], BO, C, CM, DS, K, MICH, MO, NY, P, PH, S, SING, U, UC, Z).

Large woody climber. Twigs pubescent becoming glabrous with age. Leaves coriaceous, glabrous above except on midrib, below variably pubescent from extremely densely so, to almost glabrous, becoming less hairy with age, but apparently a lot of variability between plants or populations in hairiness; lamina oblong-obovate 13–22 × 6–12 cm, base cordate, apex acute or acuminate, lateral nerves 8–11 pairs. Petiole 7–12 mm long, 1–3 mm thick. Inflorescence clustered cymes of 4–20 flowers, on twigs behind leaves or supra-axillary. Pedicels 0–5 mm long, bracts coriaceous, pubescent, ovate, sepals 2 or 3, connate at base, coriaceous, suborbicular 2–4 × 3–5.5 mm, densely pubescent, petals 4 or 6, broadly ovate, 5–6 × 5–6 mm, apex obtuse, stamens many, carpels many. Monocarps to 20 or more, ripening yellow orange, densely pubescent, globose, 2–2.5 cm diameter, tuberculate, stipes to 3 cm long. Seeds c. 12 in two rows, semi-circular in outline with two flat faces and one convex, c. 14–16 × 8–10 × 5 mm, drying brown.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. Sometimes confused with *Polyalthia chrysotricha* Ridl., though this is a tree not a climber.

9. *Uvaria grandiflora* Roxb. ex Hornem.
(Latin, *grandis* = large, *florus* = flower, with large flowers)

Hort. Hafn., Suppl. (1819) 141. Kessler & van Heusden, Rheedea 3 (1993) 85. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 98. TYPE: India, cultivated in the Calcutta Botanic Garden, April 1818, *Anon. s.n.* (lectotype, designated by Turner (2011b), C).

[*Uvaria grandiflora* Roxb., Hort. Bengal. (1814) 43, *nom. nud.*]

Unona grandiflora DC., Prodr. 1 (1824) 91. — *Uva grandiflora* (DC.) Kuntze, Rev. Gen. Pl. 1 (1891) 8. TYPE: India, Bengal, 1821, *Leschenault de la Tour s.n.* (holotype: G-DC (barcode no. G00201447)).

Uvaria purpurea Blume, Bijdr. (1825) 11. Ridley, Sarawak Mus. J. 1(3) (1913) 75. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 156. Masamune, Enum. Phan. Born. (1942) 298. TYPE: In sylvis humilioribus Javae Insulae. Floret Nov Dec, nomen kadjang.

Uvaria platypetala Champ. ex Benth., Hooker's J. Bot. Kew Gard. Misc. 3 (1851) 257. TYPE: Hong Kong, East Point, low jungle near the Buddhist Temple, East Point, 1850, *J.G. Champion 38* (holotype: K (barcode no. K000380694)).

Uvaria rhodantha Hance ex Walp., Ann. Syst. Bot. 2 (1851) 19. TYPE: Hong Kong, April 1852, *H.F. Hance 933* (neotype, designated by Turner (2011b), BM; isoneotype: CGE).

?*Uvaria purpurea* var. *subbiflora* Miq., Fl. Ned. Ind., Eerste Bijv. 3 (1861) 368. TYPE: Sumatra austr. secus flumen Tarabangi (Teijsmann).

?*Uvaria flava* Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indië 25 (1863) 419. — *Uvaria purpurea* var. *flava* (Teijsm. & Binn.) Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1869) 4. TYPE: Bangka, Teijsmann.

?*Uvaria purpurea* var. *alba* Scheff., Natuurk. Tijdschr. Ned.-Indië 31 (1869) 4. TYPE: Sumatra, Priaman, Diepenhorst.

Uvaria purpurea var. *tuberculata* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1892) 18. — *Uvaria grandiflora* Roxb. ex Hornem. var. *tuberculata* (King) J. Sinclair, Gard. Bull. Singapore 14 (1955) 203. TYPE: Peninsular Malaysia, Perak, August 1883, *King's Collector* [H.H. Kunstler] *4786* (lectotype, designated by Turner (2011b), K (barcode no. K0003809129); isolectotype: CAL).

Uvaria rubra C.B. Rob., Bull. Torrey Bot. Club 35 (1908) 68. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 156. TYPE: Philippines, Mindanao, Prov. Davao, Santa Cruz, 29 June

1905, *R.S. Williams 3042* (holotype: NY(barcode no. 00059991); isotypes: NY[×2]).

?*Uvaria cardinalis* Elmer, Leafl. Philipp. Bot. 5 (1913) 1748, as '*cardinales*'. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 156. TYPE: Philippines, Luzon, Sorzogon, *A.D.E. Elmer 7317* (holotype: PNH (destroyed)).

Large woody climber. Twigs golden hairy when young, becoming glabrous with age. Leaves typically hirsute, chartaceous, obovate to (ob)lanceolate, 9–30 × 3–15 cm, base rounded to cordate, apex acuminate. Petiole 4–7 mm long, 2–3 mm thick. Inflorescence subopposite leaves, usually solitary, occasionally more than one flower. Pedicel to 2.5 cm long, basal bract foliose to 3 cm long, medial bract to 2 cm long, calyx entirely enclosing flower in bud, splitting into three orbicular sepals, 2 cm across, petals fleshy, red-purple (white or yellow reported from outside Borneo), ovate to obovate, 30 × 15 mm, stamens many, carpels many. Monocarps to 30 or more, cylindrical 5 × 1.5 cm, longitudinally ridged, covered in dense adpressed hairs, stipe to 1 cm. Seeds to 20 or more in two rows, more or less semi-circular, c. 10 × 5 × 3 mm, drying brown.

Distribution. From Burma and China, through Indochina to Java and the Philippines. In Borneo collected from Kalimantan, Sabah and Sarawak (only known from Gunung Subis).

Ecology. Lowland forest.

10. *Uvaria griffithii* L.L.Zhou & al.
(William Griffith (1810–1845), English surgeon and botanist)

Syst. Biodivers. 7 (2009) 255. — *Cyathostemma viridiflorum* Griff., Not. Pl. Asiat. 4 (1854) 707. Sinclair, Gard. Bull. Singapore 14 (1955) 221. Kessler & van Heusden, Rheedea 3 (1993) 62. Utteridge, Blumea 45 (2000) 390. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 83. TYPE: Peninsular Malaysia, Malacca, *W. Griffith s.n.* [Kew Distribution no. 432] (lectotype, designated by Utteridge (2000), K (barcode no. K000582099)).

Cyathostemma scortechinii King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1893) 9. — *Cyathostemma viridiflorum* var. *scortechinii* (King) Ridl., Fl. Malay Penins. 1 (1922) 27. TYPE: Peninsular Malaysia, Perak, Gopeng, *King's Collector* [H.H. Kunstler] *5857* (lectotype, designated by Utteridge (2000), K (barcode no. K000380130); isolectotypes: BM, CAL, SING).

Large woody climber. Twigs slightly hairy when young, otherwise glabrous. Leaves typically drying grey above, grey-brown or brown below, coriaceous, glabrous except for midrib above, oblong-elliptic to oblong-lanceolate, 12–17 × 5.5–8 cm, base rounded, apex acute. Petiole 6–12 mm long, c. 2 mm thick. Inflorescence cauliflorous, many-flowered cymes, peduncles pendulous, 2.5–8 cm long, densely pubescent. Pedicel 6–9

mm long, bracts coriaceous, long-persistent, 3–4 mm long, sepals broadly ovate, 3 × 3–5 mm, connate at base, petals broadly ovate, greenish yellow, 5–6 × 4–5 mm, apex acute, stamens many, carpels many. Monocarps to 10 or more, cylindrical-ellipsoidal, drying black, stipes to 2 cm. Seeds 7–10 in 2 rows, semi-circular, c. 10 × 5 × 3 mm.

Distribution. Malay Peninsula, Sumatra and Borneo. In Borneo, once from Sarawak and a few collections from Kalimantan.

Ecology. Lowland forest.

11. *Uvaria hirsuta* Jack
(Latin, hairy)

Malay Misc. 1 (1820) 46. Sinclair, Sarawak Mus. J. 5 (1951) 608. Sinclair, Gard. Bull. Singapore 14 (1955) 203. — *Uvaria blumeana* Steud., Nomencl. 2 (1841) 737, *nom. superfl.* — *Uva hirsuta* (Jack) Kuntze, Rev. Gen. Pl. 1 (1891) 8. TYPE: Peninsular Malaysia, Penang, 1822, *N. Wallich s.n.* [EIC 6458B] (neotype, designated by Turner (2011b), K-W (barcode no. K000442828); isoneotypes: ?BM, ?K (barcode no. K000739195).

Uvaria velutina Roxb. ex Blume, Bijdr. (1825) 13, *non U. velutina* DC. in Dunal (1817). — *Uvaria hirsuta* Blume, Fl. Javae Anonac. (1830) 22, t. 5, *non U. hirsuta* Jack (1820), *nec U. hirsuta* Vell. (1829). TYPE: Java, West Java, Kuripan, *C.L. Blume s.n* (holotype: L (sheet no. 898.63-384)).

Uvaria trichomalla Blume, Fl. Java. Anonac. (1830) 42, t. 18. TYPE: Java, West Java, Tjikao, *Kuhl & van Hasselt 1837* (holotype: L).

Guatteria pilosa Roxb. ex G. Don, Gen. Hist. 1 (1831) 100. — *Uvaria pilosa* (Roxb. ex G. Don) Roxb., Fl. Ind. 2 (1832) 665. TYPE: ?Moluccas, *W. Roxburgh s.n.* [EIC Herb. 6458A] (lectotype, designated by Veldkamp (2011), K-W (barcode no. K000442826)).

Large woody climber. Twigs pale grey-brown, latticed, covered with 1–3 mm long, more or less straight, red-brown hairs. Leaves characteous to subcoriaceous, upper surface slightly rough to the touch, pilose below, drying brown, grey-brown or blackish brown above, brown below, midrib and laterals more or less flush to the surface above, prominent beneath, lamina elliptic, oblong-elliptic, obovate or oblong obovate, 5–24 × 3–8 cm, apex shortly or bluntly acuminate but very tip often a distinct slender apiculus, base truncate, obtuse, rounded or auriculate, lateral veins 9–13 pairs, arching forward and looping obscurely within the margin, tertiary venation indistinct, particularly from above. Petiole 3–6 mm long, 1–3 mm thick. Inflorescences among leaves, supra-axillary, generally single-flowered. Flowering pedicel, 2–3 cm long, red-brown pilose, medial bract lanceolate 4–10 × 1.5–3 mm, red-brown pilose on both surfaces, denser

outside, petals dark red, ovate c. 10 × 8 mm, stamens many, carpels many. Fruiting pedicel to 2.5 cm long, 2 mm thick, monocarps to 8, globose, ellipsoidal or cylindrical, 2–5 cm long, c. 1.5 cm diameter, densely covered with red-brown hairs, stipe 2–3.5 cm long, c. 2 mm thick. Seeds 12 or more in 2 rows, with two flat faces and one convex, 6–8 × 5 × 4 mm, drying brown, smooth.

Distribution. Burma, Thailand, Malay Peninsula, Java and Borneo. In Borneo from Sarawak.

Ecology. Lowland forest.

12. *Uvaria javana* Dunal
(of Java)

Monogr. Anonac. (1817) 91, pl. 14. Merr., Univ. Calif. Publ. Bot. 15 (1929) 62. Masamune, Enum. Phan. Born. (1942) 297. Sinclair, Gard. Bull. Singapore 14 (1955) 216. TYPE: Hab. in Java Lahaie (v.s.h. Deless.).

[*Uvaria ochroleuca* Zoll., Linnaea 29 (1858) 304, 307, *nom. inval.* (cf. ICBN Art. 34.1(b))]

?*Uvaria javana* var *blumei* Boerl., Cat. Pl. Phan. (1899) 13. TYPE: Java, cult. in Hort. Bot. Bogor. sub XI.A.44.

Uvaria larep auct. non Miq.:Merrill (1929: 62). Masamune (1942) 298.

Large woody climber. Twigs drying dark brown to black, smooth, longitudinally wrinkled or latticed, youngest parts covered in dense erect brown stellate pubescence. Leaves chartaceous to subcoriaceous, typically with a scabrous feel above, though some specimens are relatively smooth, drying grey-brown or grey above, brown or pale brown below with venation a darker shade, midrib very slightly sunken above in dry leaves, prominent below, lateral nerves more or less flush above slightly raised beneath, typically pubescent with a dense fringe of hairs on midrib above with scattered stellate hairs on upper lamina, below densely brown stellate hairy on nerves, lower lamina with dense pale stellate hairs giving a felty feel, otherwise pubescence relatively sparse, lamina elliptic, oblong-elliptic or obovate, 6–16.5 × 3–9.5 cm, base obtuse, truncate or rounded, apex (rarely emarginate) obtuse to shortly acuminate, lateral nerves 7–13 pairs, looping indistinctly within the margin; tertiary venation generally difficult to see unaided. Petiole 3–7 mm long, 1–3 mm thick, densely hairy. Inflorescences supra-axillary or on twigs behind leaves, single-flowered. Flowering pedicel 6–30 mm long, densely brown stellate hairy, medial bract ovate 3–4 × 3 mm, stellate hairy abaxially, glabrous adaxially, sepals triangular, c. 4 × 4 mm, apex obtuse to rounded, hairy outside, glabrous within, petals yellow, reflexing right back to pedicel

at anthesis, whorls similar, ovate-oblong 10–12 × 5–6 mm, apex obtuse, densely hairy on both surfaces, drying pale brown, stamens many 1.5–2 mm long, connective apex tongue-like, carpels many, c. 2 mm long, hairy, stigma drying black. Fruiting pedicel 1.5–2 cm long, 5–6 mm thick, monocarps to 35 or more, ellipsoidal typically with slight concavity on one long side and convexity on the other, to 4.5 × 3 cm, drying brown with dense, very short pale brown tomentum, markedly rugulose particularly in immature fruit, apex rounded, stipe, typically shorter than seed-bearing portion of monocarp, 0.5–2 cm long, c. 4 mm thick. Seeds many, in two rows, ellipsoidal, flattened, 10–12 × 7–8 × 4 mm, dark brown, smooth, shiny.

Distribution. Malay Peninsula, Java and Borneo. In Borneo collected from Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

13. *Uvaria lanuginosa* Ridl.
(Latin, woolly, downy)

Bull. Misc. Inform. Kew 1912 (1912) 382. Ridley, Sarawak Mus. J. 1(3) (1913) 75. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Masamune, Enum. Phan. Born. (1942) 298. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 23. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 99. TYPE: Borneo, Sarawak, near Kuching, 13 November 1894, *G.D. Haviland & C. Hose 3334*, 13 November 1894 (holotype, K (barcode no. K000380301); isotypes, BM, SAR).

Large woody climber. Leaves red-brown woolly floccose above and below when young, mature leaves coriaceous becoming glabrous above, very densely brown stellate hairy below, felty to the touch, ovate to obovate 7–13 × 3–6 cm, base rounded, apex acuminate. Inflorescence axillary, supra-axillary or below leaves on twigs, few flowered. Pedicels to 1.5 cm long, sepals, broadly triangular, 7 × 7 mm, apex blunt, petals yellow ovate, 10–15 × 5–10 mm, stamens many, carpels many. Fruits unknown.

Distribution. Endemic to Borneo. Collected from Brunei and Sarawak.

Ecology. Lowland forest.

14. *Uvaria littoralis* (Blume) Blume
(Latin, of the seashore)

Fl. Javae Anonac. (1830) 26. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Merr., Univ. Calif. Publ. Bot. 15 (1929) 61. Masamune, Enum. Phan. Born. (1942) 298. — *Unona littoralis* Blume, Bijdr. (1825) 16. — *Uvaria gamopetala*

Zoll., Linnaea 29 (1858) 304, 310, *nom. superfl.* TYPE: in Bataviae locis stagnosis. Floret Febr. Martio.

[*Uvaria macrophylla* Roxb., Hort. Bengal. (1814) 43, *nom. nud.*]

Guatteria cordata Dunal, Monogr. Anonac. (1817) 129, t. 30. — *Uva cordata* (Dunal) Kuntze, Rev. Gen. Pl. 1 (1891) 8. — *Uvaria cordata* (Dunal) Alston, Handb. Fl. Ceylon 6(suppl.) (1931) 4, *non U. cordata* Schumach. & Thonn. (1827). Sinclair, Gard. Bull. Singapore 14 (1955) 207. TYPE: Uvaria zeylanica (herb. Deless.), Hab in Java (v.s.h. Deless.)

Uvaria ovalifolia Blume, Fl. Javae Anonaceae (1830) 27, tab. 8. Ridley, Sarawak Mus. J. 1(3) (1913) 75. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Bygrave in Coode et al., Checkl. Fl. Pl. Gymnosp. Brunei (1996) 23. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 99. TYPE: van Hasselt cataractam Ramu prov. Bantam.

Uvaria macrophylla Roxb. ex Wall., Pl. As. Rariores 2 (1830) 22. pl. 122. TYPE: India, cultivated in Calcutta Botanic Garden, *N. Wallich s.n.* [EIC 6487A], lectotype, designated by Turner (2011b), K-W (barcode no. K000442833); isolectotypes: BM, CGE).

Uvaria rufescens A.DC., Mem. Soc. Phys. Genèv. 5 (1832) 202. TYPE: Burma, Prome, 1826, *N. Wallich 130* [EIC 6487B] (lectotype, designated by Turner (2011a), K-W (barcode no. K000442832)).

Unona camphorata Blanco, Fl. Filip. (1837) 468. TYPE: Philippines, [Alabat Island, December 1916], *Anon. s.n.* [Merrill: Species Blancoanae No. 1057] (neotype, designated by Turner (2011b), K; isoneotypes: L, P, US (barcode no. 00688554)).

Uvaria sorzogonensis C. Presl, Rel. Haenk. 2 (1835) 76. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 157. TYPE: Philippines, Luzon, Sorzogon, *T.P.X. Haenke s.n.* (holotype: PR[×2] (sheet nos. 212920A and 212920B).

?*Uvaria acrantha* Miq., Fl. Ned. Ind., Eerste Bijv. 3 (1861) 368. — *Uvaria ovalifolia* Blume var. *acrantha* (Miq.) Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 7. TYPE: Sumatra austr. in prov Lampongs prope Kebang, Teijsmann.

?*Uvaria macrophylla* var. *glabrior* Miq., Fl. Ned. Ind., Eerste Bijv. 3 (1861) 368. TYPE: Bangka, Teijsmann.

?*Uvaria ovalifolia* var. *borneensis* Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 7. Kessler & van Heusden, Rheedea 3 (1993) 86. TYPE: Borneo australis Korthals.

?*Uvaria ovalifolia* var. *normalis* Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 7. —

Uvaria littoralis var. *miquelii* Boerl., Cat. Pl. Phan. (1899) 14, *nom. superfl.* TYPE: Java, Sumatra, Borneo

?*Uvaria ovalifolia* var. *racemiflora* Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 7. Ridley, Sarawak Mus. J. 1(3) (1913) 75. TYPE: Borneo australis in regione fluminis Doessan, Korthals.

Magnolia fasciculata P. Parm., Bull. Sci. France Belg. 27 (1896) 204, 265. TYPE: India [probably wrongly localised], *s.dat.*, *T.S. Ralph s.n.* (lectotype, designated by Turner (2011b), P (barcode no. P00260050)).

Large woody climber. Twigs with very short brown hairs when young, becoming glabrous and darkening with age. Leaves chartaceous to subcoriaceous, stellate hairy along veins and lamina beneath when young, becoming glabrous except along midrib above, ovate to ovate lanceolate, 13–31 × 7–13 cm, base truncate to rounded, apex acute to acuminate. Petiole 3–13 mm long, 1–4 mm thick. Inflorescence terminal or supra-axillary, 3–4-flowered cymes. Pedicel 1.5–4 cm long, densely brown hairy, basal and medial bract 3 mm long, 5 mm wide, calyx connate forming a triangular cup, sepals c. 5 mm long, petals red or red-yellow, oblong to obovate, 10 mm long by 7 mm wide, inner whorl often slightly narrower, stamens many, often reduced to staminodes or even petalloid structures. Monocarps many, ripening orange, globose or ellipsoidal, c. 1 cm diameter, drying black or brown, glabrous, sometimes minutely beaked, stipe to 3 cm long. Seeds 1 to several, , flattened on one or both faces, 7–8 × 5–6 × 4 mm, smooth, light brown, shiny.

Distribution. From Sri Lanka and India to New Guinea. In Borneo collected from Brunei, Kalimantan, Sabah and Sarawak. Much collected in Sabah.

Ecology. Lowland forest.

15. *Uvaria lobbiana* Hook.f. & Thomson
(Thomas Lobb, 1820–1894, British plant collector who collected widely in tropical Asia, including Borneo over the period 1845–1856)

Fl. Ind. 1 (1855) 100. Sinclair, Gard. Bull. Singapore 14 (1955) 208. Kessler & van Heusden, Rheedea 3 (1993) 86. — *Uva lobbiana* (Hook.f. & Thomson) Kuntze, Rev. Gen. Pl. 1 (1891) 7. TYPE: Peninsular Malaysia, Malacca, 1845, *W. Griffith s.n.* (lectotype, designated by Turner (2011b), K (barcode no. K000380689)).

Uvaria subrepanda Wall. [Numer. List. (1832) no. 6483, *nom. nud.*] ex Hook.f. & Thomson, Fl. Ind. 1 (1855) 101. — *Uva subrepanda* (Wall. ex Hook.f. & Thomson) Kuntze, Rev. Gen. Pl. 1 (1891) 8. TYPE: Singapore, 1822, *N. Wallich s.n.* [EIC 6483] (lectotype, designated by Turner (2011b), K-W (IDC μfiche WA667/19) (barcode no. K00044825); isolectotype: CAL).

Uvaria ptychocalyx Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 4. Ridley, Sarawak Mus. J. 1(3) (1913) 74. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Masamune, Enum. Phan. Born. (1942) 298. — *Uva ptychocalyx* (Miq.) Kuntze, Rev. Gen. Pl. 1 (1891) 8. TYPE: Borneo, Poeloe Lampei, *P.W. Korthals s.n.* (lectotype, designated by Turner (2011b), L (barcode no. L0195619)).

Large woody climber. Twigs with tiny adpressed stellate hairs, becoming glabrous with age. Leaves generally glabrous, some adpressed stellate hairs along veins and midrib above, ovate, obovate to oblanceolate, 7–24 × 3–9 cm. Inflorescence subopposite leaves, one or a few flowered. Petiole 3–7 mm long, 1–3 mm thick. Pedicel 3–10 mm long, densely brown hairy, sepals broadly orbicular, 5–6 mm long, 7–10 mm wide, densely tomentose, petals red, broadly ovate to oblong, 10 × 9 mm, verruculose, densely pale tomentose, stamens many, carpels many. Monocarps very numerous (60 or more), globose or ellipsoidal, to 3 × 2 cm, drying muricate, stipe to 7 cm long. Seeds c. 5, generally with two flattened faces and one convex, c. 10 × 8 × 3–5 mm, drying brown, smooth.

Distribution. Burma, Thailand, Malay Peninsula, Sumatra and Borneo. In Borneo recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology: Lowland forest.

16. *Uvaria micrantha* (A.DC.) Hook.f. & Thomson
(Greek, *micros* = small, *anthos* = flower)

Fl. Ind. (1855) 103. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 155. Masamune, Enum. Phan. Born. (1942) 298. — *Guatteria micrantha* A. DC., Mem. Soc. Phys. Genev. 5 (1832) 218. — *Uva micrantha* (A. DC.) Kuntze, Rev. Gen. Pl. 1 (1891) 8. — *Cyathostemma micranthum* (A. DC.) J. Sinclair, Gard. Bull. Singapore, 14 (1955) 225. Utteridge, Blumea 45 (2000) 388. TYPE: Burma, Martaban, Amherst, 17 June 1827, *W. Gomez 15* [N. Wallich 1287, EIC 6449] (lectotype, designated by Utteridge (2000), K-W: isolectotypes: BM, G).

Polyalthia fruticans A. DC., Mém. Soc. Phys. Genève 5 (1832) 216. TYPE: Burma, Tavoy, 7 August 1827, *W. Gomez 49* [N. Wallich 1288, EIC 6430] (lectotype, designated by Turner (2011a), K-W: isolectotype: G (barcode no. G00237293)).

Anaxagorea sumatrana Miq., Fl. Ned. Ind., Eerste Bijv. 3 (1861) 382. — *Uvaria sumatrana* (Miq.) Kurz, Rep. Veg. Andaman Isl., App. A (1870) 8. — *Uva sumatrana* (Miq.) Kuntze, Rev. Gen. Pl. 1 (1891) 8. — *Cyathostemma sumatranum* (Miq.) Boerl., Icon. Bogor. 1 (1899) 126, t. 58. TYPE: Sumatra, Lampongs, near Tegineneng, *J.E. Teijsmann s.n.* [Herb. Bogor. no. 4383] (holotype: L; isotypes: GH, K, U).

Popowia nitida King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61(2) (1892) 92. TYPE: Andaman Islands, South Andaman, Hobdaypur, 4 July 1891, *G. King s.n.* (lectotype, designated by Utteridge (2000), K (barcode no. K000739196); isolectotype: K (barcode no. K000739197)).

Large woody climber. Young twigs hairy, becoming glabrous with age. Leaves chartaceous to subcoriaceous, glabrous above except on midrib, sparsely hairy beneath, oblong elliptic, 5–14 × 2–4.5 cm, base cuneate to rounded, apex acute to acuminate. Petiole 2–3 mm long, c. 1 mm thick. Inflorescence subopposite leaves, 2-flowered. Pedicel 2–7 mm, pubescent, sepals broadly ovate 2.5 mm long, petals ovate, 4–5 × 3 mm, stamens many, carpels many. Monocarps to 25 or more, irregularly globose, 12–20 × 10 mm, glabrous, stipe 3–10 mm long, drying very slender c. 0.3 mm thick. Seeds 1–2, rather irregular in shape with 1 or 2 flat faces, c. 5 × 4 ×3 mm, drying brown, smooth.

Distribution. Widespread from Burma and the Andaman Islands to the north coast of Australia. In Borneo recorded from Sabah and Kalimantan.

Ecology. Lowland forest.

Notes. In fruit this species can be confused with *Sphaerocoryne affinis*, but the presence of stellate hairs will confirm whether a specimen is *Uvaria*

17. *Uvaria monticola* Miq.
(Latin, mountaineer)

Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 5. Ridley, Sarawak Mus. J. 1(3) (1913) 74. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Masamune, Enum. Phan. Born. (1942) 298. TYPE: Borneo, Gunung Balaran, *P.W. Korthals s.n.* (holotype: L (barcode no. L 0038219)).

Uvaria scandens C.B. Rob., Bull. Torrey Bot. Club 35 (1908) 69. Merrill, Enum. Philipp. Fl. Pl. 2 (1923) 157. TYPE: Philippines, Mindanao, Prov. Davao, Santa Cruz, 5 May 1905, *R.S. Williams 2764* (holotype: NY (barcode no. 00059993); isotypes: NY, US).

Uvaria cauliflora Ridl., Bull. Misc. Inform. Kew 1912 (1912) 382. Ridley, Sarawak Mus. J. 1(3) (1913) 74. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 253. Masamune, Enum. Phan. Born. (1942) 297. Beaman et al., Pl. Mt. Kinabalu 4 (2001) 98. TYPE: Borneo, Sarawak, Tegora, *s.dat., G.D. Haviland 417* [c.k.q.a.] [Garai leg.] (lectotype, designated by Turner (2012), K (barcode no. K000380300); isolectotype: K (barcode no. K000380298)).

Uvaria elmeri Merr., Univ. Calif. Publ. Bot. 15 (1929) 61. Masamune, Enum. Phan. Born. (1942) 297. Kessler & van Heusden, Rheedea 3 (1993) 85. TYPE: Borneo, Sabah, Tawao, October 1922–March 1923, *A.D.E. Elmer 20870* (lectotype, designated by Turner (2011b), UC (sheet no. 289944); isolectotypes: A, BISH, BM, BO, C, CM, DS, GH, L, M, MICH, MO, NY, P, PH, S, SING, U, UC, US, Z).

Uvaria sp.: Merr., Univ. Calif. Publ. Bot. 15 (1929) 63.

Large woody climber. Twigs brown with tightly adpressed stellate hairs when young. Leaves with hairs along veins and midrib above, becoming glabrous with age, ovate to obovate or oblanceolate, 10–30 × 6–12 cm, base rounded to cuneate, apex acuminate. Petiole 2–11 mm long, 1–3 mm thick. Inflorescences mostly cauliflorous, multi-flowered fascicles or branching leafless twigs from near stem base. Pedicel to 6 cm long, 1 mm thick when dry, densely brown stellate hairy, medial bract c. 10 × 5 mm, flower buds c. 1 cm diameter, entirely enclosed within calyx, splitting irregularly during anthesis, petals yellow-green, membranous, oblong-ovate, 15 × 10 mm, densely brown hairy, reflexing with age, stamens many, carpels many. Monocarps to 25 or more, irregularly cylindrical, not strongly ridged, to 6 × 2 cm, apex rounded, drying brown becoming glabrous with age, rough to the touch, stipe to 2 cm. Seeds to 20 or more in 2 rows, roughly flattened semicircles, c. 13–15 × 7–10 × 3–5 mm, drying brown.

Distribution. Borneo and the Philippines. In Borneo widely collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

Notes. In probably the only published study of pollination in an annonaceous climber from Borneo, Nagamitsu & Inoue (1997) discovered that this species (as *Uvaria elmeri*) is mainly pollinated by cockroaches that visit the flowers to feed on stigmatic exudate and pollen.

18. *Uvaria schefferi* L.L.Zhou & al.
(R.H.C.C. Scheffer (1844–1880), Dutch botanist, Director of Buitenzorg Botanic Gardens)

Syst. Biodivers. 7 (2009) 255. — *Ellipeia coriacea* Scheff., Ann. Jard. Bot. Buitenzorg 2 (1885) 4. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Masamune, Enum. Phan. Born. (1942) 283. TYPE: Borneo, pris de Montrado, *J.E. Teijsmann s.n.* [Herb. Bogor. 10842] (holotype: BO (sheet no. BO-1350684)).

Large woody climber. Twigs drying dark grey or black with very tightly adpressed brown stellate hairs (like tiny mites). Leaves chartaceous to coriaceous, drying

typically dark brown above, mid-brown below with darker midrib and veins, lamina below with uniform distribution of dark dots which are clumps of long stellate hairs set in dense covering of stellate scales, giving a rough feel to the leaf, some collections are glabrescent beneath, young leaves have a uniform but sparse scattering of very fine, pale hairs above, soon dropping, oblong elliptic to obovate, 4.5–30 × 1.7–10 cm, base cuneate to obtuse, apex acuminate, midrib sunken above, prominent beneath, lateral veins 10–20 pairs, looping distinctly within the margin. Petioles 6–16 × 1–3 mm. Inflorescences terminal or subopposite leaves, 1–several-flowered. Flower pedicels 5–8 mm (possibly longer), densely brown stellate hairy, sepals broadly ovate, 5 × 7 mm, densely brown adpressed stellate hairy outside, inside tomentum paler brown, outer petals, ovate, c. 3.5 × 2 cm, densely short brown stellate hairy except for glabrous minutely verrucose patch near base on inner surface, inner petals lanceolate c. 2.5 × 1 cm, densely short brown stellate hairy except near base adaxially, stamens many, c. 1.5 mm long, apex of connective truncate, flat, polygonous, carpels many, c. 1 mm long, drying black with brown stellate hairs. Fruiting pedicels 15–30 mm long, to 3 mm thick, monocarps 3–5, ovoid, 2.5–4 × 2–3.5 × 2 cm, ripening orange, drying red-brown, scurfy, apiculus lateral, stipe to 3 cm long. Seeds 1, black shiny, shaped like an orange segment with a blunt end, 3 × 2 × 1.2 cm, pale hilum at blunt end.

Distribution. Endemic to Borneo where it has been collected from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland and hill forest to 1800 m.

19. *Uvaria verrucosa* Scheff.
(Latin, warty)

Ann. Jard. Bot. Buitenzorg 2 (1885) 3. Ridley, Sarawak Mus. J. 1(3) (1913) 74. Merrill, J. Straits Branch Roy. Asiat. Soc. Spec. No. (1921) 254. Masamune, Enum. Phan. Born. (1942) 298. TYPE: Borneo, Soengei-aja (Kapoeas), *J.E. Teijsmann s.n.* [Herb. Bog. no. 8192] (holotype: BO (sheet no. BO-1455790)).

Large woody climber. Twigs drying dark brown or dark grey-brown, striate or latticed, younger parts with small adpressed brown stellate hairs (like small mites with many legs). Leaves chartaceous to subcoriaceous, drying dark brown to pale grey-brown above, brown to dark brown below, midrib slightly sunken above in dry leaves, prominent below, lateral veins more or less flush above, slightly raised below, laminas elliptic to obovate, 6–12.5 × 2–4 cm, base acute, obtuse or rounded, apex obtuse to acuminate, glabrous above except for hairs on midrib, below with a scattering of tiny stellate hairs, densest on midrib base and petiole, lateral veins c. 14 pairs, arching forward and looping within margin, tertiary venation reticulat, generally indistinct. Petiole 2–5 mm long, c. 1 mm thick. Inflorescence subopposite leaves, sometimes appearing terminal when located above the last mature leaf on a twig, 1–2-flowered.

Flowering pedicel 3–8 mm long, c. 1 mm thick, densely brown stellate hairy, basal bract ovate, c. 7 × 4 mm, apex acute, distinct central nerve, hairy on both surfaces, medial bract (1–2), membranous, ovate, c. 15 × 15 mm, apex obtuse, hairy on both surfaces, sepals thin, ovate, c. 10 × 8 mm, apex obtuse, hairy on both surfaces, outer petals lanceolate, c. 40 × 11 mm, apex blunt, densely brown hairy on both surfaces except for a rounded glabrous patch near the base internally, inner petals slightly narrower (c. 7 mm), margins reflex but the petals appear to remain erect at anthesis, stamens many, c. 1.5 mm long, apex domed, villose, papillate, carpels many. Fruiting pedicel 6–10 mm long, 2–3 mm thick, monocarps to 10 or more, sessile to subsessile (stipe 1–2 mm long), globose to ellipsoidal, c. 10–15 × 10–15 mm, distinct lateral apiculus, drying dark brown, muricate, tuberculate, densely covered with dark brown stellate hairs. Seeds 2.

Distribution. Endemic to Borneo. Recorded from Brunei, Kalimantan, Sabah and Sarawak.

Ecology. Lowland forest.

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Appendix. List of specimens examined.
Material was seen from the following herbaria: A, BM, BO, GH, K, KEP, L, SAR, SAN, SING.

Abbe, E.C.; 10267: *U. beccarii* (K); 12074: *P. prismatica* (A, K). **Abdul Rahim**; A343: *U. littoralis* (K, SING); A446: *A. suaveolens* (K, L, SING); A493: *Fiss. fulgens* (A, K, SING). **Abu Bakar**; 4241: *A. suaveolens* (K, SING). **Afriastani**, J.J.; 1200: *U. littoralis* (K). **Alston**, A.H.G.; 13100: *Fr. excisa* (BM). **Ambriansyah**; AA 647: *A. macropodus* (K, L). **Ambriansyah & Arbainsyah**; AA 145: *M. keutii* (K); AA 223: *Fiss. latifolium* (K); AA 279: *A. ochropetalus* (K, L); AA 284: *U. borneensis* (K); AA 286: *U. lobbiana* (K); AA 336: *M. clemensis* (K); AA 486: *U. javana* (K); AA 648: *D. chinensis* (K); AA 724: *M. clemensis* (K); AA 987: *U. argentea* (K); AA 1176: *D. chinensis* (K); AA 1272: *A. ochropetalus* (K, SAN); AA 1646: *D. dumosus* (K, L); AA 1660: *U. excelsa* (K); AA 1675: *Fiss. elmeri* (K, SAN); AA 1703: *M. clemensis* (K); AA 1822: *D. dumosus* (K, SAN); AA 2132: *Fr. borneensis* (K). Ambri[ansyah] & Arifin; AA 337: *Fr. biglandulosa* (K, L); AA 338: *M. clemensis* (K); AA 345: *U. lobbiana* (K); AA 349: *A. ochropetalus* (K, L); AA 474: *U. monticola* (K); AA 934: *U. littoralis* (K); W 344: *Fr. glauca* (L); W 705: *Fiss. manubriatum* (K); W 811: *U. littoralis* (K); W 815: *A. suaveolens* (K); W 871: *Fiss. manubriatum* (K); W 876 (K): *Fiss. manubriatum* (K); W 995: *U. monticola* (K). **Ambri et al.**; AA 1219: *A. suaveolens* (SAN); AA 1482: *U. littoralis* (K); AA 1498: *A. suaveolens* (SAN); AA 1590: *A. suaveolens* (L, SAN). **Amdjah**; 005: *A. suaveolens* (K); 50: *A. suaveolens* (K); 805: *A. suaveolens* (K); 865: *U. lobbiana* (K); 878: *D. acutus* (A, K, SING); 883: *Fr. korthalsiana* (L); 885: *A. suaveolens* (L); 914: *U. littoralis* (K). **Andau**, D.; 242: *U. grandiflora* (K); 270: *U. monticola* (K); 303: *A. suaveolens* (K, SAN); 590: *A. suaveolens* (K); 817: *U. littoralis* (K); 888: *U. littoralis* (K). **Anderson**, J.A.R.; 4024: *D. dumosus* (SAR); 4201: *Fiss. montanum* (K, L, SAN, SAR, SING); 8396: *D. chinensis* (K, SAR, SING); 8562: *M. dielsii* (K, SING); 9289: *P. prismatica* (K, SING); 9708: *M. dielsii* (K); 9730: *P. prismatica* (K, SING); 12532: *U. hirsuta* (K); 13285: *A. sarawakensis* (K, L). **Andrews**, S.; 737: *U. monticola* (K); 778: *A. costatus* (K). **Angian**; 7757: *D. chinensis* (K, SING); 10481: *U. littoralis* (L, SING). **Apostol**; 6743: *U. littoralis* (K, SING); 7688: *D. chinensis* (K, SING). **Arbainsyah**; AA 1851: *A. gracilis* (K); 1945: *U. excelsa* (K). **Argent**, G.; 93132: *P. prismatica* (K); 93163: *P. prismatica* (K); 94120: *U. schefferi* (K). **Argent, G. & Ruskani**; 5013: *A. ochropetalus* (A, K). **Argent, G. & Saridan**, A.; 9326: *Fr. affinis* (K, L); 9376: *A. ochropetalus* (K, L SAN); 9390: *U. verrucosa* (K). **Argent, G. et al.**; 93123: *A. ochropetalus* (K, L, SAN). **Arifin, Z. & Ambriansyah**; B 1539: *Fiss. elmeri* (K, SAN). **Arifin, Z. & Arbainsyah**; B 1344: *A. polygynus* (L). **Arifin & Insyah**; AA 1049: *A. suaveolens* (L, SAN). **Arfin et al.**; AA 1106: *A. suaveolens* (SAN); AA 1697: *U. grandiflora* (K). **Arsat**; 1064: *U. littoralis* (A); 1336: *U. littoralis* (K). **Azmi**, R.; RA 389: *S. affinis* (L).

Bakia, K.; 299: *U. littoralis* (K). **Balajadia**, D.; 3810: *U. excelsa* (K); 3749: *U. littoralis* (K). **Barber**, E.; 127: *U. borneensis* (K); 376: *D. dunalii* (K). **Bartlett**, E.; sn(1893): *A. maingayi* (BM); sn: *Fiss. manubriatum* (BM); sn: *A. gracilis* (BM). **Bayak**; 2117: *U. littoralis* (K). **Beaman**, J.H.; 520: *U. excelsa* (K); 7103: *A. suaveolens* (K); 7178: *A. suaveolens* (K); 7831: *U. littoralis* (K); 9306: *U. littoralis* (K); 11017: *A. roseus* (K); 11834: *Fiss. crassicaule* (K); 11983: *A. suaveolens* (K); 12406: *U. borneensis* (K). **Beccari**, O.; P.B. 232: *Fr. affinis* (K); P.B. 318: *U. cuneifolia* (BO, K); P.B. 381: *A. maingayi* (K); P.B. 393: *P. prismatica* (K); P.B. 554: *A. roseus* (K); P.B. 713: *A. maingayi* (K); P.B. 802: *Fr. grandifolia* (K); P.B. 1041: *Fiss. rugosum* (K); P.B. 1107: *Fr. grandifolia* (K); P.B. 1112: *Fr. biglandulosa* (BM, K); P.B. 1120: *U. monticola* (K); P.B. 1410: *Fiss. rugosum* (K); P.B. 1648: *U. beccarii* (K); P.B. 1760: *U. littoralis* (K); P.B. 1811: *U. clementis* (K); P.B. 2268: *M. kentii* (K); P.B. 2911: *Fr. glauca* (K); P.B. 3190: *A. gracilis* (K); P.B. 3420: *D. acutus* (K); P.B. 3571: *Fr. affinis* (K); P.B. 3740: *M. kentii* (K); P.B. 3742: *Fr. glauca*? (K); P.B. 3748: *A. suaveolens* (K); P.B. 3789: *Fiss. multivenium* (K); P.B. 3899: *M. dielsii* (K); P.B. 3945: *D. acutus* (K); P.B. 3976: *U. cuneifolia* (K). **Bernstein**, J.H.; JHB 520: *U. excelsa* (K). **Brooke**, W.M.A.; 8740: *Fiss. latifolium* (K); 10678: *F. rugosum* (BM, L). **BRUN** Series; BRUN 1: *Fr. glauca* (K); BRUN 546: *Fr. borneensis* (K); BRUN 569: *D. dunalii* (K, SAR); BRUN 606: *U. excelsa* (K); BRUN 2343: *Fiss. montanum* (K, L); BRUN 5209: *A. hirtipes* (K, L); BRUN 5517: *Fr. biglandulosa* (K, L); BRUN 5902: *Fr. biglandulosa* (K); BRUN 15028: *U. excelsa* (SAR); BRUN 15251: *A. suaveolens* (L, SAN); BRUN 15253: *A. maingayi* (K, L, SAN); BRUN 15350: *U. lobbiana* (K, SAR); BRUN 15462: *U. excelsa* (K); BRUN 15501: *U. monticola* (K, SAN, SAR); BRUN 15504: *Fr. glauca* (K, SAN); BRUN 15578: *Fiss. fulgens* (K, SAN, SAR); BRUN 16219: *D. dumosus* (K); BRUN 16270: *U. littoralis* (K, SAN); BRUN 16422: *U. excelsa* (SAN); BRUN 16423: *Fr. excelsa* (K, SAN); BRUN 16430: *A. polygynus* (L, SAN); BRUN 16431: *A. suaveolens* (SAN); BRUN 16521: *U. littoralis* (SAN); BRUN 16633: *P. prismatica* (K SAN); BRUN 16644: *M. clementis* (K, SAN); BRUN 16710: *A. sarawakensis* (K, L); BRUN 16924: *A. suaveolens* (L, SAN); BRUN 16988: *M. kentii* (K, SAN); BRUN 17078: *M. kentii* (K, SAN); BRUN 17310: *U. excelsa* (K); BRUN 17542: *Fiss. rugosum* (SAN); BRUN 17526: *U. monticola* (K); BRUN 17762: *A. ochropetalus* (K); BRUN 115410: *P. prismatica*? (K). **Burley, J.S. & Lee**, B.; 272: *A. costatus* (A, K, L, SAN, SING); 347: *Fr. glauca* (K, SING). **Burley, J.S. et al.**; 731: *Fiss. elmeri* (K, L, SAR, SING); 830: *Fiss. kingii* (K, SAR, SING); 832: *Fr. formosa* (K, L, SAR, SING); 2713: *A. hirtipes* (K, L); 3288: *A. hirtipes* (K, L); 3321: *Fiss. rugosum* (K, SING). **Buwalda**, P.; 7839: *A. roseus* (A, K, L).

Campbell, E.J.F.; EG152: *A. ochropetalus* (L); EG228: *Fr. biglandulosa* (SAN). **Castillo**, M.; 635: *U. monticola* (K). **Chew**, W.L.; CWL 125: *U. monticola* (K, SAN, SING); CWL 297: *Fr. excisa* (K, L SAR, SING); CWL 608: *U. lobbiana* (K, SING); CWL 684: *U. lobbiana* (SAR); CWL 1366: *M. kentii* (K, SING). **Chew, W.L. et al.**; 1846: *Fiss. montanum* (K, SAN, SING). **Church, A.C. et al.**; 482: *A. gracilis* (L, SING); 483: *A. gracilis* (L SING); 612: *D. dumosus* (K, SAR, SING); 661: *U. monticola* (K, SAR, SING); 774: *Fr. affinis* (A, K, SING); 818: *Fr.* cf. *ovalifolia* (A, BO); 821: *U. clementis* (A, SING); 860: *Fr. formosa* (A, BO, SING); 969: *Fr. formosa* (A, BO, K, SING); 983: *Fiss. kingii* (K, SAR, SING); 1062: *Fr. formosa* (A, BO, SING); 1067: *Fr. formosa* (A, BO, K, SING); 1210: *A. suaveolens* (SING); 1244: *A. hirtipes* (A, L); 1275: *A. gracilis* (L, SING); 1740: *A. hirtipes* (A, K, L, SAN); 2671: *Fiss. manubriatum* (L); 2701: *Fiss. elmeri* (A, K, L). **Clemens, J. & Clemens, M.S.**; 3766: *Fr. korthalsiana* (BM, K); 20150: *Fiss. elmeri*

(A, BM, K, SAR); 20347: *U. lobbiana* (SAR); 20925: *A. suaveolens* (A, L); 21113: *Fr. biglandulosa* (A, K); 21270: *U.* sp. (A); 21276: *Fr. glauca* (A, SAR); 21341: *U. argentea* (A, K, SING); 26008: *U. monticola* (K); 26205: *Fr. korthalsiana* (K, L); 26286: *Fiss. kinabaluense* (A, K, L); 26377: *Fr. biglandulosa* (BM, K); 26407: *Fiss. kinabaluense* (K); 26424: *A. polygynus* (K, L); 26431: *U. schefferi* (K); 26541: *U. clementis* (K); 26620: *A. costatus* (A, K, L); 26701: *A. costatus* (A, K, L); 26811: *Fiss. kinabaluense* (K); 26829: *Fr. biglandulosa* (BM, K, L); 26831: *Fr. biglandulosa* (BM, L); 26877: *D. acutus* (K); 26891bis: *Fiss. kinabaluense* (K); 27436: *Fr. biglandulosa* (BM); 27439: *Fiss. latifolium* (K); 27447: *Fiss. kinabaluense* (K); 28127: *Fiss. montanum* (K); 28328: *Fiss. latifolium* (K); 28435: *A. polygynus* (SING); 28489: *Fiss. latifolium* (K); 28674: *A. kinabaluensis* (SING); 28697: *A. kinabaluensis* (A, BM, K, L, SING); 28764: *A. kinabaluensis* (A, BM, BO, K, SING); 29306: *Fiss. latifolium* (BM); 29341: *A. kinabaluensis* (BM); 29342: *A. costatus* (K, L); 30351: *A. kinabaluensis* (A, K, L); 30367: *Fiss. kinabaluense* (K); 30368: *Fiss. kinabaluense* (K); 30534: *Fr. korthalsiana* (BM); 30651: *Fr. korthalsiana* (A); 30866: *Fr. korthalsiana* (A, K); 31616: *U.* sp. (A, BM, K); 31652: *Fiss. latifolium*? (A, L); 32448: *Fiss. montanum* (K); 33978: *Fiss. montanum* (A, BM); 34022: *Fr. korthalsiana* (A, K, L); 40326: *A. polygynus* (K); 40422: *Fiss. carrii* (A, K, L); 40491: *U. schefferi* (K); 40584: *Fiss. kingii* (K); 40731: *Fr. biglandulosa* (BM, K); 40781: *Fiss. latifolium* (Kinabalu form) (L); 40874: *A. kinabaluensis* (BM); 50348: *A. kinabaluensis* (BM); 50373: *A. polygynus* (A, L); 50379: *A. veldkampii* (A, K); 50469: *A. polygynus* (K, L); 51035: *A. polygynus* (K); 51310: *Fiss. elmeri* (A, BM, K); 51624: *Fiss. elmeri* (A, BM, K). **Clemens, M.S.**; 9670: *U. clementis* (A); 9776: *M. clementis* (A, K); 9783: *U. littoralis* (A); 11158: *A. suaveolens* (K); 11097: *Fr. glauca* (A). **Coode**, M.J.E.; 6353: *A. gracilis* (K); 6444: *U. littoralis* (K, SAN); 6477: *Fiss. fulgens* (K, SAR, SAN); 6758: *U. excelsa* (K); 6770: *A. maingayi* (K, L, SAN); 6981: *U. littoralis* (SAN); 7119: *U. lanuginosa* (K, SAN); 7353: *M. dielsii* (K); 7661: *U. excelsa* (K).

Creagh, C.V.; sn (4/1895): *U. grandiflora* (K); sn(4/1894): *U. littoralis* (K); sn(19/4/1895): *D. chinensis* (K); sn(4/1895): *D. dumosus* (K); sn(4/1895): *Fiss. fulgens* (K). **Cuadra**, A.; A 1151: *A. suaveolens* (K).

Darnton, S.; 100: *U. littoralis* (A). **de Jong**, W.; 723: *P. prismatica* (L). **de Vriese**, W.H.; s.n. (L0484299): *U. cuneifolia* (L); s.n. (L0484297): *U. cuneifolia* (L). **Dilmy**, A.; 1034: *U. griffithii* (L). **Dransfield**, J.; 6284: *U. littoralis* (K); 7154: *Fiss. paniculatum* (K, SAR); 7284: *M. kentii* (K, SAN); 7320: *D. dumosus* (K, SAN, SAR); 7346: *A. suaveolens* (SAN); 7383: *Fiss. kingii* (K, SAR); 7439: *A. suaveolens* (SAN); 7447: *A. suaveolens* (SAN).

Elmer, A.D.E.; 20117: *U. littoralis* (K, SING); 20118: *A. hirtipes* (K, SING); 20138: *A. suaveolens* (K, SING); 20196: *U. littoralis* (K, SING); 20197: *Fr. grandifolia* (BM, K, SING); 20318: *Fiss. fulgens* (K, SING); 20338: *M. clementis* (K); 20407: *Fr. borneensis* (BM, K, SING); 20418: *Fr. grandifolia* (BM, K, SING); 20489: *A. hirtipes* (K, SING); 20516: *Fiss. latifolium* (K, SING); 20525: *D. dumosus* (K); 20604: *U. littoralis* (K, SING); 20732: *U. javana* (K, SING); 20802: *Fr. borneensis* (BM, K, SING); 20814: *Fiss. latifolium* (K, SING); 20857: *U. javana* (SING); 20870: *U. monticola* (K, SING); 20879: *Fr. grandifolia* (BM, K, SING); 20881: *Fiss. elmeri* (K); 21081: *U. excelsa* (K, SING); 21090: *U. concava* (K, SING); 21103: *Fr. glauca*? (K, SING); 21167: *Fr. borneensis* (BM, K, SING); 21181: *Fr. grandifolia* (BM, SING); 21197: *A. ochropetalus* (K, L, SING); 21211: *U. borneensis* (K, SING); 21300: *Fiss. paniculatum* (A, BM, K, SING);

21663: *A. ochropetalus* (K, L, SING); 21689: *Fr. biglandulosa* (BM, K, SING); 21721: *U. monticola* (K, SING). **Endert**, F.; 1551: *U. excelsa* (K); 1610: *Fiss. fulgens* (K); 1935: *Fiss. fulgens* (K); 2234: *U. griffithii* (K); 2244: *M. kentii* (K); 2333: *U. lobbiana* (A, BO, K); 2423: *Fiss. kingii* (K); 2511: *A. polygynus* (A); 2513: *U. littoralis* (K); 2715: *Fr. korthalsiana* (A); 3299: *Fiss. kingii* (A, K); 3312: *M. keutii* (K, SING); 3430: *A. ochropetalus* (K, L); 3904: *Fiss.* sp. (L); 4471: *A. hirtipes* (K); 4793: *A. veldkampii* (K, L); 4836: *M. kentii* (K); 5035: *Fiss. multivenium* (K); 5169: *U. grandiflora* (K). **Enggoh**; 10205: *A. suaveoleus* (SING).

Fabia, M.P.; A3060: *Fr. glauca* (K, SING). **Forman**, L.L.; 479: *M. kentii* (K, SING); 997: *U. littoralis* (K, SAN); 1149: *Fr. glauca* (K); 1151: *U. littoralis* (SAN). **Fraser**, M.; 168: *U. littoralis* (K); 185: *U. littoralis* (K). **Frodin**, D. & Ismawi; 2049: *A. suaveolens* (K).

Geesink, R.; 9220: *A. atractocarpus* (L). **Geh**, S.Y.; GSY 309: *Fiss. latifolium* (SING). **Gibbs**, L.S.; 2580: *A. suaveolens* (K). **Giesen**, W.; 137: *A. suaveolens* (L). **Goklin**, T.; 2091: *D. chiuensis* (K); 2094: *Fiss. fulgens* (K); 2341: *D. chinensis* (K); 2544: *Fiss. fulgens* (K); 2727: *U. littoralis* (K). **Goverse, E. & Adriansyah**; Berau 446: *M. kentii* (K). **Gregson**, J.; 72: *A. ochropetalus* (SAN); 100: *U. littoralis* (SAN); 137: *U. littoralis* (SAN); Gregson, J. & Bernardus Bala Ola; 72: *A. ochropetalus* (K, SAN).

Haegens, R.M.A.P. & Klazenga, N.; 438: *A. atractocarpus* (K, L, SAR). **Haegens, R.M.A.P. et al.**; 445: *Fiss. kingii* (K). **Hallier**, H.; 815: *M. kentii* (K); 1018: *U. littoralis* (SING); 1080: *A. suaveolens* (K); 3023: *A. hirtipes* (L). **Haviland**, G.D.; 3: *A. gracilis* (K, SING); 403: *U. monticola* (K); 411: *Fiss. manubriatum* (K); 416: *Fiss. fulgeus* (K, SING); 417: *U. monticola* (K); 421: *P. prismatica* (K); 422: *U. borneensis* (K); 540: *U. uonticola* (SAR); 849: *Fiss. latifolium* (K, SAR, SING); 877: *Fiss. rugosum* (K); 1021: *Fiss. uanubriatum* (SAR); 1310: *Fiss. kinabaluense* (K, SING); 1504: *U. cuneifolia* (BO, K, SAR, SING); 1518: *A. suaveolens* in part (K); 1540: *A. suaveolens* (K); 1750: *A. costatus* (K, SING); 1775: *A. pandanicarpus* (K); 1831: *Fr. grandifolia* (K, SING); 1845: *Fiss. paniculatum* (K, SING); 1845bis: *Fiss. paniculatum* (K); 1968: *U. excelsa* (K, SING); 2102: *Fiss. longipetalum* (BM, K); 2103: *Fr. excisa* (K); 2106: *A. hirtipes* (K, SING); 2212: *Fiss. manubriatum* (SAR); 2213: *Fr. excisa* (BM, SING); 2216: *Fr. excisa* (BM, K, L, SING); 2250: *U. clementis* (A, K, SING); 2315: *U. littoralis* (K); 2325: *U. littoralis* (K); 2326: *A. hirtipes* (K); 2333: *Fr. glauca* (BM, K); 3152: *Fr. glauca* (BM, K, SAR); 3334: *U. lanuginosa* (K); 3336: *Fiss. kingii* (BM, K, SAR, SING); b.y.l.a.: *Fiss. rugosum* (K); b.z.d.d.: *A. gracilis* (K); sn(14/3/1893): *A. suaveoleus* (K); sn(3/1893): *Fiss. fulgens* (K); sn(9/1892): *A. suaveolens* (K); sn(9/1892): *U. cuneifolia* (K); sn(12/10/1894): *A. roseus* (BO); sn: *P. prismatica* (BM, K). **Haviland, G.D. & Hose**, C.; 3: *A. gracilis* (K); 1629 (26/10/1894): *A. maingayi* (BM, L); 1629 (13/11/1894): *A. maingayi* (K); 1629E (L0180470): *A. polygynus* (L); 2106: *A. hirtipes* (K); 3141: *Fr. ovalifolia* (K, SAR, SING); 3151: *Fr. ovalifolia* (K); 3160: *A. sarawakensis* (K); 3334: *U. lanuginosa* (SAR, SING); 3335: *Fr. glauca* (BM, K, SAR); 3339: *A. suaveolens* (K. SAR); 3340: *A. roseus* (K, SAR); sn (4/12/1894): *A. gracilis* (K). **Hewitt**, J.; 40: *Fiss. fulgens* (SAR); 164: *Fr. ovalifolia* (SAR); 200: *P. prismatica* (K); 209: *Fr. borneensis* (SAR); 347: *Fr. borneensis* (SAR); 348: *Fiss. kingii* (SAR); 538: *Fiss. kingii* (SAR); 912: *Fr. borneensis* (SAR); A.7.13: *Fr. ovalifolia* (SAR); A.12.16: *Fiss. fulgens* (SAR). **Hose**, C.; 83: *U. littoralis* (K); 112: *U. littoralis* (K); 160: *A. sarawakensis* (BM, K); 180: *U. littoralis* (K); 302: *A. sarawakensis* (BM, K); 397: *Fiss. kingii* (A, BM, K); 601: *U. borneensis* (K); 635: *Fiss. fulgeus* (K). **Hotta**, M.; 12677: *A. roseus* (L); 12737: *A. roseus* (L).

ITTO/BB 0148: *U. monticola* (SAR).

Jacobs, M.; 5138: *U. monticola* (K, SAR); 5234: *Fiss. kingii* (K, SAR, SING); 5362: *Fr. biglandulosa* (K, L, SAR); 5407: *A. polygynus* (L, SING); 5481: *A. suaveolens* (K). **Jaheri**; 320: *A. lanuginosus* (BO). **Jarvie, J.K. & Ruskandi**, A.; 5013: *A. ochropetalus* (A, L, SAN); 5293: *A. roseus* (A, K, L); 5312: *A. veldkampii* (A, L); 5314: *U. excelsa* (A); 5319: *M. kentii* (A K); 5322: *P. prismatica* (A, K, L); 5730: *A. polygynus* (A, L); 6008: *A. veldkampii* (A, L).

Kadir, A.; 2073: *Fiss. kingii* (K, SING). **Kadir, A. & Enggoh**; 10348: *Fr. korthalsiana* (K, SING). **Kalat**, A.; ARK 26: *U. lobbiana* (K); ARK 104: *U. excelsa* (K, SAN, SAR). **Kandilis**; 6245: *A. suaveolens* (A, K, L, SING). **Kartawinata**, K.; 919: *Fr. grandifolia* (K). **Kato, M. et al.**; 20643: *M. clementis* (A); 20731: *U. lobbiana* (A); 23423: *A. suaveolens* (A); 23425: *D. acutus* (BM). **KEP** series; KEP 80018: *Fiss. latifolium* (K, SING). **Kessler**, P.J.A.; PK 287: *A. roseus* (L); 548: *A. ochropetalus* (L); PK 598: *A. ochropetalus* (K, L). **Kessler, P.J.A. et al.**; PK 353: *U. littoralis* (K); PK 617: *Fr. biglandulosa* (L); PK 625: *Fr. borneensis* (L); PK 648: *U. littoralis* (K); PK 819: *U. javana* (K); PK 833: *U. javana* (K); PK 868: *U. javana* (K); PK 890: *A. suaveolens* (K); PK 904: *A. suaveolens* (SAN); PK 908: *M. clementis* (K); PK 914: *U. borneensis* (K); PK 946: *U. borneensis* (K); PK 955: *Fiss. manubriatum* (L); PK 958: *M. clementis* (SAN); PK 993: *A. ochropetalus* (K, L, SAN); PK 997: *A. ochropetalus* (K, L, SAN); PK 1009: *M. clementis* (K, SAN); PK 1040: *M. clementis* (L); PK 1044: *D. chinensis* (K); PK 1046: *Fr. borneensis* (K, L, SAN); PK 1047: *Fr. glauca* (K); PK 1058: *A. ochropetalus* (K, L, SAN); PK 1063: *Fiss. kingii* (K); PK 1074: *Fiss. manubriatum* (K); PK 1103: *U. littoralis* (SAN); PK 1141: *U. grandiflora* (SAN); PK 1157: *M. clementis* (K, SAN); PK 1160: *U. littoralis* (SAN); PK 1170: *U. grandiflora* (K, SAN); PK 1176: *D. chinensis* (K, SAN); PK 1180: *U. micrantha* (K, SAN); PK 1188: *U. javana* (K); PK 1200: *Fiss. multivenium* (K, SAN); PK 1211: *A. suaveolens* (SAN); PK 1213: *U. grandiflora* (K); PK 1224: *U. lobbiana* (K); PK 1228: *M. clementis* (K, SAN); PK 1229: *A. suaveolens* (L, SAN); PK 1342: *A. suaveolens* (SAN); PK 1358: *U. grandiflora* (K); PK 1362: *M. clementis* (K, SAN); PK 1364: *A. suaveolens* (SAN); PK 1369: *U. grandiflora* (K); PK 1374: *A. suaveolens* (SAN); PK 1410: *P. prismatica* (K, SAN); PK 1434: *A. suaveolens* (L, SAN); PK 1441: *Fr. borneensis* (K, SAN); PK 1454: *Fiss. manubriatum* (SAN); PK 1457: *D. dumosus* (K, SAN); PK 1745: *A. suaveolens* (L); PK 1746: *U. littoralis* (K, SAN); PK 1757: *D. chinensis* (K); PK 1855: *M. clementis* (K); PK 1867: *U. littoralis* (K); PK 1922: *A. suaveolens* (L); PK 1928: *A. suaveolens* (L); PK 2018: *Fr. borneensis* (K, SAN); PK 2099: *Fiss. manubriatum* (L); PK 2293: *Fr. excisa* (K, SAN); PK 2312: *M. clementis* (K); PK 2314: *U. excelsa* (SAN); PK 2361: *M. clementis* (K); PK 2362: *A. suaveolens* (SAN); PK 2384: *D. chinensis* (K, SAN, SAR); PK 2425: *A. suaveolens* (L); PK 2621: *Fr. affinis* (BO, K, L, SAN, SAR); PK 2728: *A. gracilis* (K); PK 2740: *M. clementis* (K); PK 2799: *M. clementis* (K); Berau 20: *M. clementis* (K, SAN); Berau 133: *A. lanuginosus* (K, SAN); Berau 241: *U. littoralis* (K); Berau 254: *A. suaveolens* (L); Berau 276 (K): *U. javana* (L); Berau 446: *M. kentii* (SAN); Berau 867: *A. polygynus* (BO, K, L, SAN); Berau 1384: *Fiss. manubriatum* (SAN); Berau 1436: *U. littoralis* (K, SAN); W 898: *Fiss. kingii* (K). **Keith**, H.G.; 3102: *U. monticola* (K). **Kirkup**, D.W.; 330: *A. lanuginosus* (K, L, SAN); 674: *A. hirtipes* (K); 825: *U. littoralis* (K). **KL** series; KL 3598: *U. monticola* (K); KL 3600: *U. monticola* (SING); KL 3602: *Fiss. kingii* (K); KL 3616: *U. lobbiana* (SING). **Kokawa**, S.; 6336: *U. littoralis* (SAN); 6345: *A. suaveolens* (L, SAN); 6347: *U. littoralis* (SAN). **Kokawa, S. & Hotta**, M.;

435: *U. curvistipitata* (SAN); 2605: *D. clinensis* (SAN); 2751: *A. suaveolens* (L, SAN). **Korthals**, P.W.; sn: *D. clinensis* (K); sn(9/1864): *D. dumosus* (K); sn (L0182331): *Fr. korthalsiana* (L); sn (L0182332): *Fr. korthalsiana* (L); sn (L0037935): *Fr. borneensis* (L); sn (L0037936): *Fr. borneensis* (L); sn (L0037937): *Fr. borneensis* (L); sn (L0037938): *Fr. borneensis* (L); sn (L0187212): *Fr. borneensis* (L); sn (L0187213): *Fr. borneensis* (L); sn (L0182284): *Fr. glauca* (L); sn (L0182285): *Fr. glauca* (L); sn (L0182286): *Fr. glauca* (L); sn: *U. argentea* (L); sn (L0180796): *A. sumatranus* (L); sn (L0180797): *A. sumatranus* (L); sn (L0180798): *A. sumatranus* (L); sn (L0187136): *Fr. biglandulosa* (L); sn (L0187137): *Fr. biglandulosa* (L); sn (L0182243): *Fr. biglandulosa* (L); sn (L0182244): *Fr. biglandulosa* (L); sn (L0187138): *Fr. biglandulosa* (L); sn (L0182262): *Fr. ovalifolia*? (L); sn (L0182131): *Fiss. manubriatum* (L); sn (L0182132): *Fiss. manubriatum* (L); sn (L0182133): *Fiss. manubriatum* (L); sn (L0182134): *Fiss. manubriatum* (L); sn (L0187006): *Fiss. manubriatum* (L); sn (L0187007): *Fiss. manubriatum* (L); sn (L0187009): *Fiss. manubriatum* (L); sn (L0186729): *Fiss. latifolium* (L); sn (L0186730): *Fiss. latifolium* (L); sn (L0186731): *Fiss. latifolium* (L); sn (L0187083): *P. prismatica* (L). **Kramadibrata**, K.; 142: *M. clementis* (K). **Kostermans**, A.J.G.H.; 4266: *A. ochropetalus* (K, L); 4272: *A. suaveolens* (SING); 4354: *A. ochropetalus* (K, L); 4375: *A. ochropetalus* (K, L, SING); 4452: *M. kentii* (K); 4508: *U. borneensis* (K); 4665: *D. acutus* (K, SING); 4666: *U. concava* (A, SING); 4733: *U. excelsa* (K, SING); 4919: *U. lobbiana* (A, K, SING); 5001: *A. suaveolens* (SING); 5176: *M. kentii* (K); 5497: *Fr. affinis* (K, L, SING); 5710: *Fiss. multivenium* (L); 5793: *U. monticola* (A, K, SING); 5924: *Fr. formosa* (BO, K); 5975: *Fr. formosa* (BO, K, SING); 6412: *P. prismatica* (K); 6820: *A. sumatranus* (BM, K); 6909: *A. suaveolens* (SING); 6961: *U. grandiflora* (A, K, SING); 6963: *U. monticola* (K); 7107: *Fiss. manubriatum* (K); 7965: *Fiss. manubriatum* (K); 8017: *M. dielsii* (K); 8034: *M. kentii* (K); 8648: *M. clementis* (K, SING); 8788: *Fiss. kingii* (K, SING); 8801: *U. monticola* (L); 9180: *P. prismatica* (K, L, SING); 9577: *A. ochropetalus* (K, L, SING); 9675: *Fr. excisa* (K, SING); 9800: *P. prismatica* (K); 9921: *Fiss. kingii* (K); 10165: *A. suaveolens* (SING); 10172A: *M. kentii* (K); 10495: *U. monticola* (K, SING); 10562: *A. gracilis* (L, SING); 10594: *Fiss. kingii* (K); 10764: *M. kentii* (L); 12620: *Fiss. kingii* (L); 13473: *A. veldkampii* (K, L); 13732: *A. ochropetalus* (K, L, SING); 13905: *Fiss. elmeri* (K, SING); 21245: *U. monticola* (K); 21257: *D. clinensis* (K, SING); 21280: *D. chinensis* (K, SING); 21657: *M. kentii* (K); 21682: *U. lobbiana* (K); 21683: *M. kentii* (K); 82017: *P. prismatica*? (K).

Laman, T.; TL 225: *U. monticola* (A); TL 263: *M. kentii* (K); TL 274: *M. kentii* (K); TL 877: *U. monticola* (A, K); TL 951: *Fiss. fulgens* (A); TL 971: *Fr. biglandulosa* (K); TL 996: *U. monticola* (A); TL 1223: *Fr. borneensis* (A, K, L); TL 1237: *U. monticola* (A); TL 1246: *A. ochropetalus* (K, L); TL 1299: *Fr. excisa* (A, K); TL 1413: *Fiss. fulgens* (L); TL 1763: *Fiss. multivenium* (K). **Lamb**, A.; 305: *U. littoralis* (SAN); ALFB 111/87: *U. grandiflora* (K). **Latupeirissa**, E.R.; 95012: *Fiss. latifolium* (L, SAN). **Leeuwenberg, A.J.M. & Rudjiman**; 13048: *Fiss. longipetalum* (L); 13418: *Fiss. manubriatum* (L); 13428: *Fiss. paniculatum* (L); 13431: *A. suaveolens* (L); 13433: *A. suaveolens* (L). **Leeuwenberg, A.J.M. et al.**; 14504: *A. suaveolens* (L, SAN). **Leighton**, M.; 159: *Fr. affinis*? (L); 214: mixed coll. *A. polygynus* & *A. ochropetalus* (L); 242: *Fr. biglandulosa* (L); 259: *Fr. affinis* (L); 353: *Fr. affinis* (K, L); 420: *A. roseus* (L); 1068: *Fr. grandifolia* (L). **Lugas**, L.; 73: *U. littoralis* (K); 131: *U. littoralis* (K); 179: *A. suaveolens* (K); 310: *U. littoralis* (K); 457: *A. costatus* (K); 713: *M. clementis* (K); 1481: *Fr. grandifolia* (K); 1708: *A. costatus* (K, SAN); 1742: *U. littoralis* (K, SAN); 1761: *A. costatus* (K, SAN); 1763: *Fiss. multivenium* (SAN); 2295: *Fr. excisa* (K); 2612: *A. costatus* (K).

Mahyar, U.W.; 982: *U. lobbiana* (A, SING). **Maidim**, S. Md.; 1529: *U. littoralis* (K); 1530: *A. suaveolens* (K); 2339: *A. suaveolens* (K). **Mail**, A.; 3972: *A. ochropetalus* (K, SING); 7754: *Fiss. fulgens* (K, SING). **Mat Salleh**, K.; 1740: *Fr. glauca* (SAN); 1955: *U. cuneifolia* (K, SAN); 2119: *U. grandiflora* (SAN); 2414: *M. kentii* (K); 3333: *U. excelsa* (A, SAN). **Md. Shah & Kadim**; MS 1022: *U. micrantha* (K, SING). **Md. Tahir**; 715: *S. affinis* (A). **Meijer**, W.; 2023: *Fr. borneensis* (K, L); 2235: *Fiss. kingii* (K). **Melegrito**; 3353: *U. littoralis* (K). **MB** 449: *U. grandiflora* (K). **Mogea**, J.; 3517: *Fr. glauca* (K); 4016: *A. macropodus* (L); 4023: *U. monticola* (K). **Motley**, J.; 15: *D. chinensis* (K); 39: *Fiss. mambriatum* (K); 76: *U. littoralis* (K); 127: *U. borneensis* (K); 173: *U. littoralis* (K); 326: *D. dunalii* (K). **Museum Dyaks**; 245: *Fiss. latifolium* (SAR); 260: *Fiss. fulgens* (SAR); 381: *U. cuneifolia* (SAR). **Museum Saifatt**; 669: *U. cuneifolia* (SAR).

Naiang; 2488: *U. hirsuta* (SAR). **Nais**, J.; 3676: *U. littoralis* (SAN). **Nangkat**, N.; NN 64: *U. littoralis* (K, SAN); NN 239: *A. suaveolens* (L, SAN).**Native collector**; 159: *Fiss. mambriatum* (K); 226: *Fiss. latifolium* (A, K); 852: *Fiss. latifolium* (A); 1794: *A. suaveolens* (A). **Nooteboom**, H.P.; 1207: *Fiss. kingii* (K, L, SAN); 1314: *D. dumosus* (L). **Nooteboom, H.P. & Chai**, P.; 1823: *A. macropodus* (L, SAR).

Ogata, K.; Og-B 407: *A. suaveolens* (L); 11392: *Fiss. kingii* (L).

Paie, I.; 8464: *Fiss. fulgens* (SAR, SING). **Pannell**, C.M.; 2567: *A. suaveolens* (K). **Pascual**, G.; 1048: *U. monticola* (A). **Pereira**, J.T.; JTP 213: *U. concava* (A, SAN); JTP 396: *U. monticola* (K, SAN); JTP 509: *A. suaveolens* (L, SAN); JTP 514: *U. littoralis* (SAN). **Poklin**; 2727: *U. littoralis* (K). **Poore**, D.; H66: *Fiss. montanum* (K). **Prance**, G.T.; 30612: *U. excelsa* (K); 30698: *A. hirtipes* (K, L, SAN); 30714: *Fr. biglandulosa* (L, SAN). **Puasa**; 1356: *U. littoralis* (K); 2746: *D. chinensis* (K). **Puasa & Angian**; 3828: *Fiss. kinabaluense* (K). **Purseglove**, J.W.; P 3190: *A. gracilis* (K); P 4419: *A. suaveolens* (K, SING); P 4679: *Fiss. paniculatum* (A, K, L, SAR, SING); P 4965: *U. excelsa* (K, SAR, SING); P 5133: *U. monticola* (K, SAR, SING); P 5205: *Fr. glauca* (SAR, SING); P 5402: *A. gracilis* (L, SING); P 5459: *U. littoralis* (SING).

Rahayu, M.; 652: *Fr. biglandulosa* (K); 692: *Fr. borneensis* (K). **Ramos**, M.; 1143: *Fiss. fulgens* (K); 1170: *Fr. grandifolia* (K); 1171: *Fr. korthalsiana* (K); 1178: *A. suaveolens* (A, BM, K, L); 1281: *Fiss. elmeri* (A); 1366: *A. polygyna* (A, BM, BO, K, L); 1380: *A. gracilis* (L); 1389: *A. ochropetalus* (K, L); 1465: *A. hirtipes* (BM, K); 1474: *M. clementis* (A, K, L); 1480: *U. clementis* (K); 1499: *Fiss. latifolium* (A, K L); 1667: *U. clementis* (K); 1734: *A. gracilis* (K); 1793: *Fiss. fulgens* (K); 1910: *Fr. grandifolia* (BO); 1911: *Fr. grandifolia* (BM, K); sn: *Fr. grandifolia* (K). **Reksodihardjo**, S.; 17: *U. littoralis* (K); 90: *Fiss. manubriatum* (K); 97: *P. prismatica* (K); 103: *M. clementis* (K); 731: *Fr. biglandulosa* (L). **Richards**, P.W.; 1192: *Fiss. kingii* (K, SING); 1217: *Fr. glauca* (K, SING); 1258: *A. suaveolens* (K, SING). **Ridley**, H.N.; 12464: *D. dumosus* (B M, K, SING); sn(_/1/1915): *U. borneensis* (K); sn(_/1/1915): *D. chinensis* (K). **Ridsdale**, C.E.; 1980: *Fiss. bygravei* (A, K, L, SAN); 2047: *U. excelsa* (A, K, SAN); Cerol/27: *A. macropodus* (L). **RSNB** series; 4080: *Fiss. montanum* (K, SAN, SING); 4285: *Fiss. montanum* (K, SAN, SING); 4431: *A. kinabaluensis* (K, L, SAN, SING); 4881: *A. costatus* (K); 8382: *A. kinabaluensis* (K, SING). **Rumutom**, M.; 163: *A. suaveolens* (K); 244: *U. concava* (K); 279: *Fr. korthalsiana* (K); 530: *U. concava* (SAN).

S series: S 0436: *Fiss. paniculatum* (SING); S 4024: *D. dunosus* (SAR); S 5277: *Fiss. rugosum* (SAR); S 5387: *Fr. borneensis* (K, SAR); S 5902: *Fr. biglandulosa* (SAR); S 7835: *Fiss. latifolium* (K, L, SAR); S 8464: *Fiss. fulgens* (K); S 9114: *A. suaveolens* (K, SING); S 11021: *M. kentii* (K); S 11999: *Fr. biglandulosa* (K, L, SAR, SING); S 12090: *U. littoralis* (K); S 12319: *M. dielsii* (K, SING); S 12403: *Fr. affinis* (SAR, SING); S 12428: *M. dielsii* (K, SING); S 12519: *U. lobbiana* (SAR); S 12532: *U. hirsuta* (SING); S 13188: *U. lobbiana* (SAR); S 13261: *A. suaveolens* (K, SAN, SING); S 13262: *Fiss. latifolium* (K, SAN, SAR, SING); S 13285: *A. sarawakensis* (SING); S 13286: *U. lanuginosa* (K, SING); S 13288: *Fiss. kingii* (K, L, SAR); S 13728: *U. monticola* (K, SAR); S 13755: *Fr. glauca* (K); S 13756: *U. monticola* (SAR); S 13775: *Fr. borneensis* (SAR, SING); S 14366: *U. monticola* (SAR, SING); S 14780: *U. beccarii* (K, SAR); S 15965: *Fr. biglandulosa* (K, L, SAN, SAR, SING); S 15966: *Fiss. latifolium* (K, SAN, SAR, SING); S 16030: *U. grandiflora* (SAR); S 16279: *U. littoralis* (K, SAN, SING); S 16300: *U. littoralis* (K); S 16323: *Fr. biglandulosa* (A, K, L, SAN, SAR, SING); S 16410: *U. beccarii* (K, SAR, SING); S 16417: *U. excelsa* (K, SAR, SING); S 16666: *Fiss. kingii* (A, K, L, SAN, SAR, SING); S 16969: *A. roseus* (L); S 18364: *M. kentii* (K, SING); S 18434: *Fr. excisa* (K, SAN, SAR, SING); S 18493: *U. lobbiana* (A, K, SAR, SING); S 19129: *Fr. excisa* (K, SAR); S 19270: *A. hirtipes* (K); S 19561: *D. acutus* (K, SAN, SING); S 19647: *Fr. biglandulosa* (K, SAR, SING); S 20272: *U. lobbiana* (SAR); S 20889: *A. hirtipes* (A, K, L, SING); S 20923: *A. venustus* (L); S 20991: *P. prismatica* (K); S 21376: *U. excelsa* (K, SAN, SAR, SING); S 21469: *U. monticola* (A, K, SAR, SING); S 21549: *Fiss. maoubriatum* (K); S 21634: *U. littoralis* (SAR); S 22561: *M. dielsii* (SING); S 22619: *U. excelsa* (A, K, SING); S 22770: *Fiss. crassicaule* (K, L, SAR); S 23003: *U. monticola* (A, K, SAR, SING); S 24371: *Fiss. kingii* (K, SAN, SAR, SING); S 24726: *M. kentii* (A, K, SAN, SING); S 25265: *Fiss. kingii* (K, L, SAN, SAR, SING); S 25281: *M. kentii* (K, SING); S 25409: *A. suaveolens* (K, SING); S 25414: *Fiss. rugosum* (SAR); S 25433: *A. suaveolens* (K, SING); S 25436: *Fiss. paniculatum* (K, SAR, SING); S 25440: *Fiss. paniculatum* (SAR); S 25448: *Fr. borneensis* (K, SAR, SING); S 25560: *Fr. excisa* (K, SAR, SING); S 25629: *D. acutus* (K, SAR, SING); S 26041: *U. lanuginosa* (SAR); S 26258: *Fr. ovalifolia* (SAN, SAR, SING); S 26861: *P. prismatica* (K, SING); S 26894: *P. prismatica* (K); S 26958: *A. venustus* (L); S 27003: *Fiss. rugosum* (K, SAR); S 27068: *A. hirtipes* (K, L); S 27180: *Fiss. latifolium* (K, SAN, SAR, SING); S 27220: *Fiss. kingii* (K, SAR); S 27247: *Fiss. kingii* (K, SAR, SING); S 27553: *U. concava* (SAR); S 27588: *Fiss. fulgens* (A, SAR, SING); S 27599: *U. littoralis* (A, K, SAN, SING); S 27674: *U. clementis* (SAR); S 27677: *Fiss. paniculatum* (K, SAR, SING); S 27722: *U. monticola* (K, SAR); S 27749: *A. veldkampii* (K, L); S 27795: *Fr. ovalifolia* (K, SAR); S 27914: *Fr. borneensis* (SAR); S 27935: *Fr. glauca* (K, SAN, SAR, SING); S 28010: *A. maingayi* (K, L, SAN); S 28025: *A. pandanicarpus* (K, L, SAN); S 28103: *Fr. formosa* (K, SAR, SAN, SING); S 28185: *Fr. affinis* (K, SING); S 28488: *A. suaveolens* (K, SING); S 28541: *A. suaveolens* (K, SING); S 28701: *U. monticola* (SAR); S 29261: *U. monticola* (SAR); S 29583: *Fiss. longipetalum* (K, L, SAR); S 29684: *A. maingayi* (A, K, L, SAN); S 29863: *U. lobbiana* (SAR); S 30047: *Fiss. latifolium* (K, SAR, SING); S 31124: *U. monticola* (K, SAR, SING); S 31543: *Fiss. kingii* (K, SAN, SAR, SING); S 31576: *U. lobbiana* (SAR); S 31679: *U. grandiflora* (SAR); S 31743: *U. verrucosa* (K, SAN, SAR, SING); S 31744: *Fiss. kingii* (K, SAR, SING); S 32005: *M. kentii* (K, SAN); S 32106: *Fiss. latifolium* (SAR); S 32139: *A. sarawakensis* (L, SING); S 32176: *M. kentii* (K, SAN, SING); S 32369: *U. borneensis* (K, SING); S 33129: *U. cuneifolia* (A, K, SAR); S 33297: *A. maingayi* (A, K, L); S 33431: *Fr. glauca* (K, SAR); S 33571: *Fiss. rugosum* (K, SAR); S

33748: *U. lobbiana* (A, SAR); S 34274: *Fr. borneensis* (K, SAR); S 34349: *U. monticola* (K, SAR); S 34995: *U. monticola* (SAR); S 35028: *Fr. formosa* (K, SAR); S 35073: *Fiss. elmeri* (A, K, SAR); S 35143: *Fiss. paniculatum* (SAR); S 35288: *U. cuneifolia* (A, K, SAR); S 35345: *Fiss. montanum* (K, L, SAR); S 35632: *Fiss. paniculatum* (K, SAR); S 35681: *U. monticola* (K, L, SAR); S 35743: *Fiss. paniculatum* (K, SAR); S 35788: *U. monticola* (K, SAR); S 36639: *Fiss. rugosum* (K, SAN, SAR); S 36712: *M. kentii* (K); S 36716: *Fiss. manubriatum* (K, SAR); S 36727: *U. monticola* (SAR); S 36826: *U. lobbiana* (K, SAR); S 36863: *U. monticola* (SAR); S 36885: *Fiss. paniculatum* (K, SAR); S 36894: *A. veldkampii* (L); S 37247: *Fr. biglandulosa* (K, L, SAN, SAR); S 37307: *U. cuneifolia* (L, SAR); S 37445: *U. clementis* (K); S 37958: *U. beccarii* (K, SAN, SAR); S 38404: *M. kentii* (K, SAN); S 38446: *A. suaveolens* (K, L, SAN); S 39344: *U. schefferi* (K, SAR); S 39566: *U. monticola* (SAN, SAR); S 39705: *M. kentii* (K); S 39840: *Fiss. brevistipitatum* (K, SAR); S 40078: *U. lobbiana* (SAR); S 40121: *D. acutus* (K, SAN, SAR); S 40123: *U. lobbiana* (K, SAN, SAR); S 40553: *U. lobbiana* (SAR); S 40656: *A. costatus* (K, L, SAN); S 40742: *U. schefferi* (K, SAR); S 40773: *Fiss. rugosum* (K, SAN, SAR); S 41241: *Fr. glauca* (K, SAR); S 41259: *U. borneensis* (K, SAN SAR); S 41890: *U. littoralis* (K, SAN, SAR); S 41931: *Fiss. manubriatum* (SAR); S 42357: *Fr. formosa* (K, SAN, SAR); S 42563: *Fr. biglandulosa* (K, L, SAR); S 42624: *Fiss. manubriatum* (K, SAN, SAR); S 43014: *A. suaveolens* (K, SAN); S 43022: *M. kentii* (K, SAN); S 43387: *Fiss. longipetalum* (K, SAN, SAR); S 43494: *Fr. borneensis* (K, SAN, SAR); S 43619: *Fr. borneensis* (K, L, SAR); S 43645: *U. monticola* (SAR); S 43716: *Fr. borneensis* (K, L, SAR); S 43726: *U.* sp. (SAN); S 43894: *A. suaveolens* (K, SAN); S 43907: *A. roseus* (L, SAN); S 43926: *U. verrucosa* (SAR); S 44015: *U. monticola* in part (L, SAR); S 44372: *Fiss. fulgens* (K, L, SAR); S 45260: *U. lobbiana* (SAR); S 45276: *A. veldkampii* (L, SAN); S 45350: *A. suaveolens* (K, L SAN); S 45583: *Fr. biglandulosa* (K, L, SAN, SAR); S 45667: *A. roseus* (K, L, SAN); S 45671: *Fr. borneensis* (K, SAN); S 46308: *Fiss. latifolium* (K, L, SAN, SAR); S 46801: *P. prismatica* (K); S 46893: *Fr. biglandulosa* (K, L, SAR); S 47417: *Fiss. manubriatum* (K, SAR); S 47651: *Fiss. montanum* (K, SAR); S 48014: *A. atractocarpus* (K, L, SAN); S 48037: *Fiss. multivenium* (K, SAR); S 48054: *A. suaveolens* (L); S 48169: *U. cuneifolia* (K, SAN, SAR); S 48343: *Fr. biglandulosa* (K, SAN, SAR); S 48393: *U. monticola* (SAR); S 49037: *Fr. glauca* (K, SAR); S 49373: *U. lobbiana* (K, SAN, SAR); S 49458: *U. monticola* (K, SAR); S 49548: *Fiss. elmeri* (K, L); S 50454: *Fr. biglandulosa* (K, SAR); S 51016: *A. veldkampii* (K, L, SAN); S 51299: *U. monticola* (SAR); S 51463: *Fiss. kingii* (K, SAN, SAR); S 51561: *A. suaveolens* (K, L, SAN); S 52314: *U. monticola* (K, SAN, SAR); S 52340: *U. borneensis* (K, SAN); S 52509: *M. clementis* (K, SAN, SAR); S 52659: *U. littoralis* (SAR); S 52668: *U. cuneifolia* (SAN, SAR); S 53355: *Fr. biglandulosa* (K, SAN, SAR); S 53500: *A. atractocarpus* (L); S 53516: *Fr. biglandulosa* (K, SAR); S 53725: *Fr. biglandulosa* (K, SAN, SAR); S 53908: *Fiss. kingii* (K, SAR); S 54000: *U. schefferi* (SAR); S 54564: *A. maingayi* (K, L, SAN); S 54662: *U. excelsa* (K, SAR); S 56453: *U. monticola* (SAR); S 57104: *Fiss. manubriatum* (K, L); S 57164: *Fiss. kingii* (K, SAN, SAR); S 57672: *Fiss. kingii* (SAN, SAR); S 57834: *Fiss. bygravei* (K, L, SAN, SAR); S 58599: *U. lobbiana* (SAR); S 58897: *Fiss. kingii* (SAR); S 59637: *Fiss. fulgens* (SAR); S 59936: *M. kentii* (K, SAN); S 60572: *Fiss. kingii* (SAR); S 60776: *A.* cf. *lanuginosus* (L); S 60849: *Fiss. montanum* (SAR); S 60921: *U. schefferi* (SAR); S 61120: *Fiss. kingii* (K, L, SAN, SAR); S 61465: *Fiss. multivenium* (K, SAR); S 62313: *A. atractocarpus* (L, SAN); S 62346: *Fr. glauca* (K, SAR); S 63087: *Fr. glauca* (SAR); S 63251: *U. monticola* (SAR); S 63627: *Fiss. bygravei* (K, L, SAN, SAR); S 63673: *Fr. biglandulosa* (SAN, SAR); S 63698: *Fr. glauca* (K, SAR); S 64063: *A. ochropetalus* (K,

L, SAN); S 64120: *U. schefferi* (SAR); S 64121: *U. schefferi* (SAR); S 64648: *U. monticola* (K, SAR); S 64929: *Fr. glanca* (K, SAR); S 64963: *Fiss. latifolium* (SAR); S 65020: *Fr. ovalifolia* (SAR); S 65060: *Fiss. kingii* (K, L, SAN, SAR); S 65838: *Fiss. kingii* (SAR); S 65840: *Fiss. kingii* (SAR); S 65898: *Fr. borneensis* (SAR); S 65972: *Fr. borneensis* (SAR); S 65995: *U. cuneifolia* (SAR); S 66213: *U. javana* (K, SAN, SAR); S 66268: *Fr. borneensis* (SAR); S 66917: *Fiss. longipetalum* (SAR); S 67395: *U. clementis* (SAR); S 67557: *A. sarawakensis* (K, L, SAN); S 68733: *Fiss. rugosum* (K, SAR); S 68936: *U. excelsa* (K, SAN, SAR); S 69529: *D. dumosus* (SAR); S 69940: *U. monticola* (SAR); S 70965: *Fr. biglandulosa* (SAR); S 70982: *U. ?borneensis* (SAR); S 71221: *U. cuneifolia* (SAN, SAR); S 71304: *Fr. biglandulosa* (SAR); S 71502: *U. cuneifolia* (SAR); S 71542: *Fiss. kingii* (SAR); S 71629: *U. schefferi* (SAN, SAR); S 71664: *A. hirtipes* (SAR); S 71748: *Fiss. latifolium* (SAR); S 71954: *Fiss. montanum* (SAR); S 72129: *A. costatus* (SAR); S 72196: *Fiss. latifolium* (SAR); S 72432: *Fiss.* cf. *kingii* (L, SAN, SAR, SING); S 72541: *U. beccarii* (SAN, SAR); S 72588: *Fiss. rugosum* (SAR); S 72718: *Fr. ovalifolia* (SAR); S 72967: *U. lobbiana* (SAR); S 73364: *Fiss. membriatum* (K, SAR); S 73705: *A. suaveolens* (K); S 73763: *A. gracilis* (SAN); S 74389: *U. monticola* (SAR); S 74644: *U. monticola* (SAR); S 74973: *Fiss. membriatum* (SAR); S 75099: *A. atractocarpus* (K, SAN, SAR); S 76671: *Fr. borneensis* (SAR); S 77208: *Fiss. kingii* (SAN, SAR, SING); S 78109: *Fiss. rugosum* (SAR); S 78263: *Fiss. rugosum* (SAR); S 78272: *Fr. biglandulosa* (SAR); S 78316: *U. monticola* (SAR); S 78747: *Fr. borneensis* (SAR); S 79056: *A. sarawakensis* (SAR); S 79113: *Fr. borneensis* (SAR); S 79426: *Fiss. kingii* (SAR); S 79464: *U. lobbiana* (SAR); S 79995: *D. acutus* (SAN, SAR); S 80674: *U. excelsa* (SAN, SAR); S 80953: *A. suaveolens* (L, SAR); S 81252: *D. dumosus* (SAR); S 81280: *A. costatus* (L, SAN, SAR); S 81317: *U. monticola* (SAR); S 81603: *U. cuneifolia* (SAR); S 81631: *Fiss. membriatum* (SAR); S 82117: *U. lobbiana* (SAR); S 82539: *Fr. excisa* (SAR); S 82825: *Fiss. fulgens* (SAR); S 83219: *U. concava* (SAR); S 83237: *U. lobbiana* (SAR); S 83331: *Fiss. rugosum* (L, SAN, SAR); S 83363: *Fiss. longipetalum* (SAR); S 83388: *U. lobbiana* (SAR); S 83406: *U. monticola* (SAR); S 83484: *A. suaveolens* (L); S 83496: *Fiss. longipetalum* (L, SAR); S 83550: *U. lobbiana* (SAR); S 83584: *U. schefferi* (SAR); S 84231: *U. cuneifolia* (SAR); S 84434: *Fiss. rugosum* (SAR); S 84552: *Fiss. rugosum* (SAR); S 85820: *U. excelsa* (SAR); S 85883: *U. cuneifolia* (SAR); S 86189: *Fr. biglandulosa* (SAR); S 87259: *U. excelsa* (SAR); S 87265: *Fr. ovalifolia* (SAR); S 87300: *D. dumosus* (SAR); S 87644: *Fiss. membriatum* (SAR); S 87683: *Fiss. kingii* (SAR); S 88105: *A. atractocarpus* (SAR); S 89284: *U. lobbiana* (SAR); S 89404: *U. grandiflora* (SAR); S 89703: *Fr. ovalifolia* (SAR); S 90803: *U. monticola* (SAR); S 90815: *U. monticola* (SAR); S 91077: *U. monticola* (SAR); S 91589: *Fiss. paniculatum* (SAR, SING); S 91755: *U. monticola* (SAR); S 93100: *U. excelsa* (SAR); S 96230: *U. lobbiana* (SAR). **SAN** series; SAN A 2920: *A. ochropetalus* (K); SAN A 4226: *A. ochropetalus* (K); SAN A 4291: *U. borneensis* (A); SAN A 4380: *A. veldkampii* (A, L); SAN 2699: *U. littoralis* (SAN); SAN 3382: *U. littoralis* (SAN); SAN 7374: *Fiss. elmeri*; SAN 11508: *Fr. affinis* (SAN); SAN 16390: *A. suaveolens* (A, L, SING); SAN 16546: *Fr. glanca* (K, L, SING); SAN 17053: *Fr. biglandulosa* (K, L); SAN 17070: *A. suaveolens* (L); SAN 17079: *U. verrucosa* (K); SAN 17103: *P. prismatica* (A, SAN, SING); SAN 17134: *U. verrucosa* (K, SAN); SAN 17316: *A. ochropetalus* (K, SAN); SAN 17403: *U. monticola* (A, SING); SAN 17404: *A. hirtipes* (A, K, L, SING); SAN 17507: *P. prismatica* (A, K); SAN 17597: *Fr. biglandulosa* (A, L, SING); SAN 18566: *M. clementis* (K, SAN); SAN 19255: *Fr. glanca* (K, SING); SAN 19617: *U. borneensis* (SAN, SING); SAN 19794: *P. prismatica* (K); SAN 19795: *A. suaveolens* (K,

L); SAN 20053: *U. littoralis* (K); SAN 20330: *U. littoralis* (K, SING); SAN 20451: *Fr. glauca* (SAN); SAN 20882: *U. littoralis* (SAN); SAN 20926: *A. suaveolens* (K, L, SAN, SING); SAN 21060: *Fiss. brevistipitatum* (K, SAN); SAN 22793: *U. monticola* (SAN, SING); SAN 23074: *A. suaveolens* (K, L, SAN); SAN 24589: *D. dimosus* (K, SAN, SING); SAN 24592: *A. suaveolens* (L, SAN); SAN 24978: *Fr. borneensis* (K, SAN, SAR, SING); SAN 25044: *U. excelsa* (K, SAN); SAN 25150: *U. concava* (K, SAN); SAN 25608: *U. littoralis* (SAN); SAN 26014: *A. suaveolens* (K, SAN); SAN 26325: *Fiss. multivenium* (K, L, SAN); SAN 26676: *A. costatus* (SAN); SAN 26678: *D. dimosus* (K, SAN, SING); SAN 26679: *U. javana* (SAN); SAN 26755: *D. chinensis* (SAN); SAN 27117: *Fiss. fulgens* (K, L, SAN, SAR, SING); SAN 27124: *U. littoralis* (K SAN); SAN 27266: *U. littoralis* (K, SAN); SAN 27452: *U. grandiflora* (K, SAN); SAN 27733: *Fr. glauca* (K, SAN); SAN 27739: *U. littoralis* (K, SAN); SAN 27869: *Fr. grandifolia* (K SAN); SAN 28158: *A. suaveolens* (K, L, SAN, SING); SAN 28161: *A. suaveolens* (SAN); SAN 28339: *D. acutus* (K, SAN, SING); SAN 28381: *U. littoralis* (SAN); SAN 28526: *Fiss. kinabaluense* (K, L, SAN); SAN 29372: *U. littoralis* (K, SAN, SING); SAN 29601: *Fr. borneensis* (K, SAN); SAN 29711: *U. concava* (SAN, SING); SAN 30002: *U. grandiflora* (K, SAN); SAN 30010: *Fr. borneensis* (K, SAN, SAR); SAN 30015: *U. excelsa* (K, SAN, SING); SAN 30151: *A. suaveolens* (SAN); SAN 30152: *P. prismatica* (K, SAN); SAN 30295: *U. littoralis* (K, SAN); SAN 30327: *P. prismatica* (SAN); SAN 30561: *Fiss. bygravei* (K, L, SAN, SAR, SING); SAN 30855: *U. excelsa* (K, SAN); SAN 31082: *U. monticola* (SAN); SAN 31090: *A. rosens* (K, SAN); SAN 31107: *A. suaveolens* (K, SAN); SAN 31320: *Fiss. kingii* (K, L, SAN, SAR); SAN 31322: *Fr. formosa* (SAN); SAN 31663: *D. dimosus* (K, SAN); SAN 31746: *U. littoralis* (SAN); SAN 31988: *P. prismatica* (K, SAN); SAN 32519: *U. cmeifolia* (K, SAN); SAN 32686: *Fr. korthalsiana* (K, SAN, SAR, SING); SAN 32690: *A. suaveolens* (K, SAN, SING); SAN 32739: *Fr. borneensis* (K, SAN); SAN 32752: *U. littoralis* (K, SAN); SAN 32834: *U. borneensis* (K, SAN); SAN 32837: *P. prismatica* (SAN); SAN 33045: *S. affinis* (SAN, SAR); SAN 33192: *A. suaveolens* (K, L, SAN, SING); SAN 33257: *Fr. borneensis* (SAN); SAN 33456: *U. littoralis* (K, SAN, SING); SAN 33659: *S. affinis* (SAN); SAN 33826: *U. borneensis* (K, SAN); SAN 33960: *U. littoralis* (SAN); SAN 33999: *U. littoralis* (K, SAN, SING); SAN 34084: *Fr. borneensis* (K, SAN, SAR, SING); SAN 34135: *Fiss. mambriatum* (K, SAN); SAN 34960: *Fiss. kingii* (K, SAN, SAR, SING); SAN 35396: *Fr. excisa* (K, SAN); SAN 35416: *A. suaveolens* (SAN, SING); SAN 35616: *Fr. biglandulosa* (K, SAN, SING); SAN 35802: *Fiss. latifolium* (Philippines form) (SAN); SAN 35869: *U. monticola* (SAN); SAN 35871: *U. schefferi* (K, SAN, SING); SAN 35914: *Fiss. mambriatum* (K, SAN, SAR, SING); SAN 35917: *M. kentii* (K, SAN, SING); SAN 36859: *P. prismatica* (K); SAN 36863: *M. clementis* (SAN, SING); SAN 37034: *M. clementis* (K, SAN); SAN 37089: *U. verrucosa* (K, SAN, SING); SAN 37741: *A. suaveolens* (K, SAN, SING); SAN 38102: *D. chinensis* (K, SAN); SAN 38390: *D. chinensis* (K, SAN, SING); SAN 39641: *P. prismatica* (SAN); SAN 40263: *A. costatus* (SAN); SAN 40335: *Fiss. elmeri* (K, L, SAN, SAR); SAN 40798: *U. concava* (K, SAN); SAN 40802: *Fiss. fulgens* (SAN, SING); SAN 40837: *U. concava* (SAN, SING); SAN 40846: *D. chinensis* (K, SAN); SAN 41074: *A. veldkampii*? (SAN); SAN 41257: *U. littoralis* (K, SAN); SAN 41357: *U. littoralis* (K, SAN, SING); SAN 41432: *P. prismatica* (SAN); SAN 41655: *U. micrantha* (K, SAN); SAN 41799: *U. schefferi* (K, SAN); SAN 41801: *M. clementis* (K, SAN); SAN 42578: *U. excelsa* (SAN); SAN 42662: *Fr. glauca* (K, SAN); SAN 43015: *S. affinis* (SAN); SAN 43192: *U. littoralis* (K, SAN); SAN 43443: *A. macropodus* (SAN); SAN 44321: *U. excelsa* (K, SAN); SAN 45063: *U.* sp. (SAN);

SAN 46087: *D. dumosus* (K, SAN); SAN 46339: *Fr. korthalsiana* (K, SAN); SAN 47261: *U. grandiflora* (K, SAN); SAN 47422: *U. lobbiana* (K, L, SAN); SAN 47489: *P. prismatica* (SAN); SAN 47864: *A. suaveolens* (K, L, SAN); SAN 48163: *U. excelsa* (K, SAN); SAN 48258: *Fr. glauca* (SAN); SAN 48259: *Fr. glauca* (SAN); SAN 48430: *A. gracilis* (K, SAN); SAN 48566: *A. suaveolens* (SAN); SAN 48591: *A. suaveolens* (K, SAN); SAN 48980: *A. ochropetalus* (SAN); SAN 49173: *U. micrantha* (K, SAN); SAN 49298: *Fiss. kingii* (K, L, SAN); SAN 49359: *A. suaveolens* (K, SAN); SAN 49364: *S. affinis* (K SAN); SAN 49558: *U.* sp. (K, SAN); SAN 49589: *M. kentii* (K, SAN); SAN 49666: *A. roseus* (SAN); SAN 49673: *A. suaveolens* (SAN); SAN 49852: *A. suaveolens* (SAN); SAN 49888: *Fiss. fulgens* (SAN); SAN 49941: *Fr. glauca* (SAN); SAN 49942: *U. littoralis* (SAN); SAN 50360: *P. prismatica* (SAN); SAN 50416: *A. gracilis* (K, SAN); SAN 50461: *U. lobbiana* (SAN); SAN 50492: *U. excelsa*? (SAN); SAN 50555: *S. affinis* (SAN); SAN 50557: *D. chinensis* (K, SAN, SING); SAN 50560: *S. affinis* (SAN); SAN 50976: *A. suaveolens* (K, SAN); SAN 51509: *U. monticola* (SAN); SAN 51630: *A. suaveolens* (SAN); SAN 51652: *D. chinensis* (K, SAN, SAR, SING); SAN 51849: *U. lobbiana* (SAN); SAN 52758: *Fiss. paniculatus* (K, L, SAN, SAR); SAN 52848: *M. kentii* (K, SAN); SAN 53056: *U. littoralis* (K, SAN); SAN 53063: *U. littoralis* (K, SAN); SAN 53422: *Fiss. kingii* (K, SAN, SAR); SAN 53450: *U. verrucosa* (SAN); SAN 54333: *Fr. glauca* (SAN); SAN 54502: *Fiss. kingii* (K, SAN); SAN 54507: *A. ochropetalus* (SAN); SAN 54532: *U. beccarii* (K, SAN); SAN 54634: *U. excelsa* (SAN); SAN 54856: *A. lanuginosus* (SAN); SAN 54917: *U. borneensis* (SAN); SAN 54958: *U. littoralis* (SAN); SAN 55367: *A. suaveolens* (K, L, SAN); SAN 55727: *D. acutus* (SAN); SAN 55773: *U. lobbiana* (K, SAN, SAR, SING); SAN 56191: *Fiss. elmeri* (K, SAN); SAN 56382: *Fiss. carrii* (SAN); SAN 56772: *U. curvistipitata* (SAN); SAN 56821: *Fiss. membriatus* (K, SAN); SAN 56951: *U. borneensis* (K, SAN); SAN 56972: *U. schefferi* (K, SAN); SAN 57200: *U. littoralis* (SAN); SAN 57256: *U. schefferi* (K, SAN); SAN 57259: *Fiss. elmeri* (K, L, SAN, SAR, SING); SAN 57343: *Fr. korthalsiana* (K, L, SAN, SING); SAN 57374: *Fiss. elmeri* (K, L, SAN, SAR); SAN 57383: *Fiss. membriatus* (K, SAN); SAN 57391: *U. littoralis* (SAN, SING); SAN 58052: *U. schefferi* (K, SAN); SAN 59263: *Fiss. latifolius* (Philippines form) (SAN); SAN 59589: *U. excelsa* (SAN); SAN 59830: *U. littoralis* (SAN); SAN 60004: *A. suaveolens* (K, SAN, SING); SAN 60026: *U. concava* (SAN); SAN 60039: *U. concava* (K, SAN); SAN 60242: *Fiss. multivenius* (K, L, SAN); SAN 60274: *Fr. glauca* (K, SAN); SAN 60280: *U. concava* (SAN); SAN 60404: *U. concava* (SAN); SAN 60661: *Fiss. carrii* (K, SAN); SAN 60896: *U. borneensis* (SAN); SAN 60940: *U. excelsa* (SAN); SAN 61894: *D. chinensis* (SAN); SAN 62880: *A. suaveolens* (SAN); SAN 64442: *D. chinensis* (SAN); SAN 64464: *D. chinensis* (SAN); SAN 64738: *A. suaveolens* (K, SAN); SAN 64780: *U. cuneifolia* (SAN, SING); SAN 65449: *U. borneensis* (K, SAN); SAN 65480: *Fiss. kingii* (K, L, SAN); SAN 65500: *Fiss. bygravei* (K, L, SAN, SAR, SING); SAN 65925: *U. littoralis* (K, SAN); SAN 66329: *A. macropodus* (SAN); SAN 66697: *U. concava* (SAN); SAN 66814: *U. grandiflora* (SAN); SAN 67224: *U. excelsa* (K, SAN); SAN 67271: *A. suaveolens* (SAN, SING); SAN 67272: *U. concava* (SAN); SAN 67313: *U. littoralis* (SAN); SAN 67318: *A. suaveolens* (K, SAN); SAN 67368: *U. schefferi* (K, SAN); SAN 67436: *U. concava* (SAN); SAN 67456: *Fr. glauca* (SAN); SAN 67468: *A. ochropetalus* (SAN); SAN 67555: *U. concava* (SAN); SAN 67683: *A. ochropetalus* (SAN); SAN 67960: *Fr. borneensis* (SAN); SAN 68191: *A. hirtipes* (SAN); SAN 68499: *Fiss. multivenius* (K, SAN, SING); SAN 68720: *U. monticola* (K, SAN); SAN 68811: *A. macropodus* (SAN); SAN 69118: *U. borneensis* (SAN); SAN 69200: *U. sp.* (K, SAN); SAN 69461: *Fiss. fulgens* (SAN); SAN 69465: *A.*

ochropetalus (SAN); SAN 69532: *U. littoralis* (SAN); SAN 70051: *U. excelsa* (K, SAN); SAN 70583: *A. ochropetalus* (K, L, SAN); SAN 70609: *A. suaveolens* (K, SAN); SAN 70686: *U. verrucosa* (K, SAN); SAN 71177: *A.* sp. (SAN); SAN 71181: *A. suaveolens* (K, SAN, SING); SAN 71272: *A. macropodus* (K, SAN); SAN 71283: *Fiss. kingii* (K, SAN, SAR, SING); SAN 72409: *Fr. glauca* (K, SAN, SAR, SING); SAN 73349: *Fiss. fulgens* (K, SAN, SING); SAN 73676: *U. monticola* (K, SAN); SAN 73821: *Fiss. kingii* (K, SAN, SAR, SING); SAN 74364: *A. rosens* (L, SAN); SAN 74866: *U. littoralis* (K, SAN); SAN 74975: *Fr. affinis* (K, SAN, SING); SAN 75338: *A. ochropetalus* (K, L, SAN); SAN 75645: *A. ochropetalus* (SAN); SAN 75662: *U. littoralis* (K, SAN, SING); SAN 76069: *U. littoralis* (K, SAN); SAN 76088: *U. excelsa* (K, SAN); SAN 76878: *A. macropodus* (K, L, SAN, SING); SAN 76919: *A. hirtipes* (SAN); SAN 77134: *U. grandiflora* (SAN); SAN 77206: *U. grandiflora* (K, SAN, SING); SAN 77652: *A. suaveolens* (K, SAN, SING); SAN 77819: *M. kentii* (K, SAN, SING); SAN 77851: *A. gracilis* (K, SAN); SAN 77873: *U. borneensis* (K, SAN, SING); SAN 77946: *D. chinensis* (K, SAN, SAR, SING); SAN 78027: *P. prismatica* (SAN); SAN 78073: *M. clementis* (K, SAN); SAN 78075: *Fr. excisa* (K, SAN, SING); SAN 78486: *U. littoralis* (SAN); SAN 78517: *A. gracilis* (SAN); SAN 79055: *U. littoralis* (SAN); SAN 79125: *U. littoralis* (SAN); SAN 79170: *Fiss. kinabaluense* (SAN); SAN 79171: *Fr. glauca* (K, SAN, SAR, SING); SAN 79183: *Fr. glauca* (SAN, SAR, SING); SAN 79195: *U. littoralis* (SAN); SAN 79233: *Fr. ?borneensis* (K, SAN, SAR); SAN 79615: *A. ochropetalus* (L, SAN, SING); SAN 79666: *M. clementis* (SAN); SAN 79705: *A. ochropetalus* (SAN); SAN 79796: *M. clementis* (K, SAN); SAN 80014: *P. prismatica* (SAN); SAN 80089: *D. acutus* (SAN); SAN 80214: *A. gracilis* (K, L, SAN); SAN 80237: *U. concava* (SAN); SAN 80259: *Fiss. fulgens* (SAN); SAN 80265: *A. hirtipes* (SAN); SAN 80277: *A. ochropetalus* (SAN, SING); SAN 80316: *P. prismatica* (SAN); SAN 80354: *Fiss. fulgens* (SAN); SAN 80355: *A. suaveolens* (SAN); SAN 80396: *A. ochropetalus* (SAN); SAN 80632: *P. prismatica* (SAN); SAN 80781: *S. affinis* (K, SAN); SAN 80810: *U. excelsa* (K, SAN); SAN 80980: *Fiss. kingii* (K, L, SAN); SAN 81362: *Fiss. bygravei* (K, L, SAN); SAN 81393: *A. ochropetalus* (K, L, SAN); SAN 81444: *Fiss. bygravei* (SAN); SAN 81456: *Fiss. kingii* (K, SAN); SAN 81504: *U. cnrvistipitata* (K, SAN, SAR); SAN 81923: *A. suaveolens* (K, SAN, SING); SAN 81977: *U. beccarii* (K, SAN); SAN 81997: *U. cnneifolia* (K, SAN); SAN 82035: *Fiss. fulgens* (K, SAN, SING); SAN 82176: *U. concava* (SAN, SING); SAN 82231: *A. veldkampii* (K, L, SAN); SAN 82277: *U. micrantha* (K, SAN); SAN 82415: *Fiss. fulgens* (K, SAN, SAR); SAN 82456: *Fiss. fulgens* (SAN, SAR, SING); SAN 82574: *A. ochropetalus* (K, L, SAN, SING); SAN 82635: *Fr. grandifolia* (SAN); SAN 82657: *A. suaveolens* (SAN, SING); SAN 83513: *A. suaveolens* (K, L, SAN); SAN 83616: *M. kentii* (SAN); SAN 83764: *U. lobbiana* (K, SAN); SAN 84152: *Fr. glauca* (K, SAN, SAR); SAN 84428: *U. concava* (SAN); SAN 84436: *A. suaveolens* (K, SAN); SAN 84477: *U. concava* (SAN, SING); SAN 84583: *A. suaveolens* (SAN, SING); SAN 84597: *U. littoralis* (K, SAN); SAN 84697: *U. clementis* (SAN, SAR, SING); SAN 84744: *A. suaveolens* (SAN, SING); SAN 84795: *Fr. affinis* (K, L, SAN, SAR); SAN 84859: *Fr. glauca* (K, SAN, SAR, SING); SAN 85055: *A. suaveolens* (K, SAN, SING); SAN 85119: *U. monticola* (SAN); SAN 85299: *U.? javana* (SAN); SAN 85325: *U. littoralis* (SAN); SAN 85365: *Fiss. latifolium* (K, SAN); SAN 85995: *A. suaveolens* (SAN, SING); SAN 86075: *Fiss. latifolium* (Kinabalu form) (L, SAN); SAN 86173: *U. littoralis* (K, SAN); SAN 86195: *A. rosens* (K, SAN); SAN 86201: *A. suaveolens* (K, L, SAN); SAN 86244: *Fr. biglandulosa* (SAN); SAN 86341: *Fiss. fulgens* (SAN); SAN 86404: *Fiss. fulgens* (SAN); SAN 86405: *A. suaveolens* (SAN); SAN 86468: *Fiss. fulgens* (SAN); SAN 86619: *Fiss. mambriatum* (K,

SAN, SING); SAN 86641: *A. suaveolens* (SAN, SING); SAN 86645: *Fr. borneensis* (K, SAN); SAN 86651: *Fr. grandifolia* (K, SAN, SAR); SAN 86687: *U. borneensis* (K, SAN); SAN 86795: *U. littoralis* (SAN); SAN 87341: *U. concava* (SAN); SAN 87377: *Fr. glauca* (SAN); SAN 87379: *U. concava* (SAN); SAN 87761: *A. ochropetalus* (SAN); SAN 87770: *M. clementis* (SAN, SAR); SAN 87837: *A. ochropetalus* (K, L, SAN, SING); SAN 88055: *Fr. biglandulosa* (SAN, SAR); SAN 88117: *U. littoralis* (SAN); SAN 88124: *Fr. glauca* (A, SAN, SAR, SING); SAN 88135: *U. verrucosa* (SAN, SING); SAN 88138: *A. suaveolens* (SAN); SAN 88176: *Fiss. mannbriatum* (SAN); SAN 88263: *Fr. glauca* (SAN, SAR); SAN 88271: *A. polygynus* (SAN); SAN 88357: *A. polygynus* (SAN, SING); SAN 88411: *A. suaveolens* (SAN); SAN 88432: *Fr. borneensis* (K, SAN, SAR); SAN 88484: *D. chinensis* (SAN, SAR); SAN 88910: *U. grandiflora* (SAN); SAN 88965: *Fr. glauca* (SAN, SAR, SING); SAN 89042: *U. littoralis* (SAN); SAN 89118: *D. chinensis* (SAN, SAR, SING); SAN 89139: *A. suaveolens* (SAN); SAN 89141: *M. clementis* (SAN, SAR); SAN 89176: *Fr. borneensis* (K, SAN, SAR); SAN 89317: *A. ochropetalus* (SAN); SAN 89516: *A. suaveolens* (SAN, SING); SAN 89745: *P. prismatica* (SAN); SAN 89799: *U. borneensis* (SAN); SAN 89818: *Fr. borneensis* (SAN); SAN 89867: *Fr. glauca* (SAN); SAN 89920: *A. ochropetalus* (SAN, SING); SAN 90152: *A. polygynus* (L, SAN); SAN 90305: *Fr. glauca* (SAN); SAN 90443: *A. polygynus* (SAN); SAN 90669: *Fr. glauca* (SAN); SAN 91078: *D. dumosus* (SAN, SAR); SAN 91080: *U. littoralis* (SAN); SAN 91106: *U. concava* (K, SAN); SAN 91116: *A. gracilis* (SAN); SAN 91358: *D. dumosus* (SAN, SAR); SAN 91359: *Fr. borneensis* (K, SAN, SAR); SAN 91373: *M. clementis* (SAN, SAR); SAN 91389: *U. concava* (SAN); SAN 91401: *U. concava* (SAN); SAN 91420: *A. suaveolens* (K, SAN); SAN 91422: *A. ochropetalus* (SAN); SAN 91433: *A. suaveolens* (K, SAN, SING); SAN 91465: *U. concava* (SAN); SAN 91488: *Fr. glauca* (SAN, SAR, SING); SAN 91745: *A. ochropetalus* (SAN); SAN 91782: *A. ochropetalus* (SAN); SAN 91801: *U. javana* (SAN); SAN 91823: *S. affinis* (SAN); SAN 91828: *U. concava* (K, SAN); SAN 91913: *D. dumosus* (K, SAN, SAR, SING); SAN 91948: *A. lanuginosus* (K, SAN); SAN 92017: *U. excelsa* (K SAN); SAN 92041: *A. suaveolens* (SAN, SING); SAN 92475: *A. ochropetalus* (L, SAN); SAN 92595: *A. suaveolens* (SAN, SING); SAN 92972: *Fiss. fulgens* (K, SAN, SAR, SING); SAN 92973: *A. polygynus* (L, SAN, SING); SAN 93088: *Fr. grandifolia* (K, L, SING); SAN 93096: *Fiss. brevistipitatum* (SAN, SAR, SING); SAN 93552: *Fiss.* cf. *latifolium* (K, SAN, SAR); SAN 93980: *U. excelsa* (K); SAN 94050: *A. hirtipes* (K, SAN, SAR, SING); SAN 94457: *U. concava* (SAN); SAN 94477: *A. suaveolens* (SAN); SAN 94664: *Fiss. kingii* (K, SAN, SAR, SING); SAN 94721: *U. borneensis* (SAN); SAN 94762: *S. affinis* (SAN, SAR); SAN 94763: *U. javana* (K, SAN, SAR); SAN 94786: *A. suaveolens* (K, SAN); SAN 94791: *U. littoralis* (SAN); SAN 94799: *Fr. glauca* (SAN, SAR); SAN 94815: *U. lobbiana* (K, SAN, SAR, SING); SAN 94826: *A. suaveolens* (K, SAN); SAN 94835: *Fiss. mannbriatum* (K, SAN); SAN 94876: *A. suaveolens* (K, SAN); SAN 94966: *Fr. affinis* (A, K, SAN, SING); SAN 94983: *Fiss. brevistipitatum* (SAN, SAR); SAN 95021: *U. littoralis* (SAN); SAN 95105: *A. ochropetalus* (SAN); SAN 95178: *M. kentii* (SAN); SAN 95310: *U. excelsa* (K, SAN); SAN 95434: *A. ochropetalus* (K, L, SAN); SAN 95552: *Fr. glauca* (SAN, SAR); SAN 95633: *A. polygynus* (L, SAN); SAN 95637: *A. ochropetalus* (L, SAN, SING); SAN 95689: *A. ochropetalus* (L, SAN); SAN 95725: *A. suaveolens* (K, SAN); SAN 95743: *D. dunalii* (K, SAN); SAN 95962: *A. ochropetalus* (SAN); SAN 96010: *A. macropodus* (K, SAN); SAN 96052: *A. ochropetalus* (L, SAN); SAN 96132: *Fr. glauca* (A, K, SAN, SAR); SAN 96158: *Fr. borneensis* (SAN, SAR); SAN 96160: *Fr. glauca* (SAN); SAN 96169: *A. ochropetalus* (L, SAN); SAN 96173: *U. excelsa* (SAN); SAN

96177: *A. macropodus* (K, SAN); SAN 96289: *U. grandiflora* (A, K, SAN, SING); SAN 96353: *A. suaveolens* (K, SAN); SAN 96363: *U. grandiflora* (SAN); SAN 96368: *M. clementis* (SAN); SAN 96389: *Fiss. bygravei* (SAN); SAN 96465: *U. borneensis* (K, SAN); SAN 96492: *A. ochropetalus* (SAN); SAN 96546: *A. gracilis* (K, SAN); SAN 96565: *U. borneensis* (SAN); SAN 96649: *A. ochropetalus* (K, L, SAN); SAN 96870: *Fiss. kingii* (SAN); SAN 96982: *A. ochropetalus* (K, L, SAN); SAN 97014: *M. clementis* (K, SAN, SAR); SAN 97017: *U. grandiflora* (K, SAN); SAN 97313: *U. littoralis* (SAN); SAN 97658: *U. excelsa* (SAN); SAN 97684: *Fr. glauca* (K, SAN, SAR, SING); SAN 99225: *U. littoralis* (SAN); SAN 99417: *U. excelsa* (K, SAN, SAR); SAN 99424: *A. veldkampii* (K, L, SAN); SAN 99452: *U. concava* (SAN); SAN 99639: *U. borneensis* (SAN); SAN 99642: *U. littoralis* (A, K, SAN); SAN 99648: *U. grandiflora* (A, SAN); SAN 99753: *M. clementis* (K SAN); SAN 99970: *Fiss. fulgens* (SAN); SAN 99995: *U. borneensis* (SAN); SAN 100267: *A. suaveolens* (SAN, SING); SAN 100312: *M. clementis* (SAN); SAN 100331: *U. littoralis* (K, SAN); SAN 100394: *U. concava* (A, K, SAN); SAN 101266: *U. littoralis* (SAN); SAN 101323: *Fiss. latifolium* (SAN); SAN 101458: *A. ochropetalus* (SAN); SAN 101474: *Fr. biglandulosa* (SAN, SING); SAN 101773: *D. chinensis* (SAN); SAN 101797: *U. concava* (SAN); SAN 102214: *U. concava* (SAN); SAN 102372: *M. kentii* (SAN); SAN 102663: *A. suaveolens* (K, SAN); SAN 102711: *U. cuneifolia* (K, SAN); SAN 102743: *U. littoralis* (SAN); SAN 102777: *A. suaveolens* (SAN); SAN 102792: *P. prismatica* (SAN); SAN 103013: *A. suaveolens* (SAN); SAN 103037: *Fiss. fulgens* (SAN); SAN 103087: *P. prismatica* (SAN); SAN 103098: *P. prismatica* (SAN); SAN 103232: *P. prismatica* (SAN); SAN 103273: *A. suaveolens* (SAN); SAN 103285: *U. littoralis* (SAN); SAN 103290: *P. prismatica* (SAN); SAN 103565: *U. monticola* (K, SAN); SAN 103632: *A. suaveolens* (K, SAN); SAN 103825: *U. littoralis* (K); SAN 104062: *U. concava* (SAN); SAN 104063: *A. ochropetalus* (L, SAN, SING); SAN 104313: *Fiss. bygravei* (SAN); SAN 104316: *Fr. biglandulosa* (SAN); SAN 104321: *Fiss. manubriatum* (SAN); SAN 105255: *Fiss. manubriatum* (SAN); SAN 105281: *Fr. biglandulosa* (K, SAN); SAN 105313: *Fr. biglandulosa* (SAN); SAN 105350: *Fiss. manubriatum* (SAN); SAN 105610: *A. suaveolens* (K, L, SAN); SAN 105648: *U. littoralis* (SAN); SAN 105998: *U. clementis* (K, SAN); SAN 106121: *A. suaveolens* (K, SAN); SAN 106704: *U. littoralis* (SAN); SAN 106738: *A. suaveolens* (SAN); SAN 106808: *U. littoralis* (SAN); SAN 106864: *A. polygynus* (SAN); SAN 106934: *U. clementis* (SAN); SAN 106984: *Fr. glauca* (SAN); SAN 107131: *U. littoralis* (K, SAN); SAN 107163: *U. littoralis* (SAN); SAN 107220: *Fr. borneensis* (SAN); SAN 107247: *Fr. glauca* (K, SAN, SAR, SING); SAN 107334: *Fr. formosa* (SAN); SAN 107610: *A. suaveolens* (K, SAN); SAN 107617: *M. clementis* (K, SAN); SAN 107714: *Fr. borneensis* (SAN); SAN 107737: *U. littoralis* (SAN); SAN 108087: *U. littoralis* (SAN); SAN 108114: *A. macropodus* (SAN); SAN 108162: *U. littoralis* (SAN); SAN 108284: *A. ochropetalus* (K, L, SAN); SAN 108469: *Fiss. fulgens* (K, SAN, SAR); SAN 108555: *U. grandiflora* (SAN); SAN 108595: *U. littoralis* (SAN); SAN 108635: *Fr. excisa* (SAN); SAN 108643: *A. ochropetalus* (K, L, SAN); SAN 108711: *Fr. glauca* (SAN); SAN 109284: *U. littoralis* (SAN); SAN 109353: *A. suaveolens* (SAN); SAN 109422: *A. suaveolens* (SAN); SAN 109597: *Fiss. kingii* (SAN); SAN 109643: *U. excelsa* (K, SAN); SAN 109908: *A. suaveolens* (SAN); SAN 109937: *Fiss. brevistipitatum* (SAN); SAN 109980: *D. dumosus* (K, SAN); SAN 109985: *Fiss. multivenium* (SAN); SAN 110000: *U. littoralis* (K, SAN); SAN 110093: *U. argentea* (K, SAN); SAN 110109: *Fr. biglandulosa* (SAN); SAN 110136: *Fiss. kingii* (SAN); SAN 110143: *A. ochropetalus* (SAN); SAN 110145: *D. dumosus* (SAN); SAN 110271: *U.* sp. (SAN); SAN 110272: *A. costatus* (K, L,

SAN); SAN 110334: *Fr. glauca* (K, SAN); SAN 110391: *Fr. affinis* (SAN); SAN 110454: *U. clementis* (SAN); SAN 110856: *Fr. glauca* (K, SAN); SAN 110904: *Fiss. kingii* (K, SAN, SAR, SING); SAN 111013: *A. ochropetalus* (SAN); SAN 111028: *A. suaveolens* (K, SAN); SAN 111037: *D. acutus* (K, SAN); SAN 111109: *A. ochropetalus* (SAN); SAN 111112: *U. littoralis* (SAN); SAN 111248: *A. suaveolens* (SAN); SAN 111420: *P. prismatica* (SAN); SAN 111446: *Fiss. fulgens* (SAN); SAN 111508: *Fr. affinis* (K); SAN 111537: *U. littoralis* (SAN); SAN 111657: *U. verrucosa* (SAN); SAN 112135: *U. borneensis* (SAN); SAN 112195: *U. littoralis* (SAN); SAN 112310: *U. grandiflora* (SAN); SAN 112938: *A. ochropetalus* (K, L, SAN); SAN 113087: *A. suaveolens* (SAN); SAN 113183: *A. suaveolens* (SAN); SAN 113188: *Fr. glauca* (SAN); SAN 113233: *U. verrucosa* (SAN); SAN 113265: *A. hirtipes* (SAN); SAN 113300: *U. schefferi* (K, SAN); SAN 113314: *M. clementis* (SAN); SAN 113330: *A. suaveolens* (K, SAN); SAN 113343: *U. cuneifolia* (SAN); SAN 113482: *U. littoralis* (SAN); SAN 113576: *A. costatus* (SAN); SAN 113741: *Fiss. kinabaluense* (SAN); SAN 113868: *Fr. affinis* (SAN); SAN 113934: *U. monticola* (K, SAN); SAN 113950: *Fiss. kingii* (SAN); SAN 113988: *U. excelsa* (K, SAN); SAN 113994: *A. suaveolens* (K, SAN); SAN 114010: *U. borneensis* (SAN); SAN 114024: *M. clementis* (K, SAN); SAN 114030: *Fr. glauca* (K, SAN); SAN 114042: *Fiss. bygravei* (SAN); SAN 114050: *Fiss. bygravei* (SAN); SAN 114057: *A. suaveolens* (SAN); SAN 114066: *A. rosens* (SAN); SAN 114275: *U. excelsa* (SAN); SAN 114305: *U. littoralis* (SAN); SAN 114313: *U. grandiflora* (SAN); SAN 114875: *Fiss. fulgens* (SAN); SAN 114905: *A. suaveolens* (L, SAN); SAN 115294: *S. affinis* (K, SAN); SAN 115307: *A. gracilis* (SAN); SAN 115392: *P. prismatica* (SAN); SAN 115410: *P. prismatica* (SAN); SAN 115418: *U. littoralis* (SAN); SAN 115576: *A. suaveolens* (SAN); SAN 115616: *P. prismatica* (SAN); SAN 115672: *A. suaveolens* (SAN); SAN 115823: *Fiss. bygravei* (SAN); SAN 115835: *M. clementis* (K, SAN); SAN 115877: *Fiss. brevistipitatum* (K, SAN); SAN 116060: *A. suaveolens* (K, SAN); SAN 116294: *A. suaveolens* (SAN); SAN 116333: *A. suaveolens* (K, SAN); SAN 116369: *A. suaveolens* (SAN); SAN 116414: *A. suaveolens* (SAN); SAN 116433: *U. clementis* (SAN); SAN 116446: *U. littoralis* (SAN); SAN 116450: *A. suaveolens* (SAN); SAN 116618: *A. costatus* (K, SAN); SAN 116646: *A. gracilis* (SAN); SAN 116702: *Fiss. brevistipitatum* (K, SAN); SAN 116719: *A. gracilis* (K, SAN); SAN 116737: *Fr. biglandulosa* (K, SAN); SAN 116866: *A. ochropetalus* (SAN); SAN 116946: *Fr. biglandulosa* (K, SAN); SAN 116964: *U. littoralis* (K, SAN); SAN 117020: *U. littoralis* (SAN); SAN 117033: *Fiss. kingii* (SAN); SAN 117035: *A. suaveolens* (K, SAN); SAN 117128: *A. suaveolens* (K, SAN); SAN 117158: *M. clementis* (K, SAN, SAR); SAN 117355: *A. suaveolens* (K, SAN); SAN 117534: *U. littoralis* (K, SAN); SAN 117542: *A. gracilis* (K, SAN); SAN 117675: *A. macropodus* (SAN); SAN 117822: *U. grandiflora* (K, SAN); SAN 117834: *A. macropodus* (SAN); SAN 117901: *A. suaveolens* (SAN); SAN 117910: *A. suaveolens* (K, SAN); SAN 118225: *A. suaveolens* (K, SAN); SAN 118257: *Fiss. kingii* (K, SAN); SAN 118278: *A. suaveolens* (K, SAN); SAN 118305: *Fr. biglandulosa* (SAN); SAN 118308: *A. suaveolens* (K, SAN); SAN 118411: *D. dimosus* (K, SAN); SAN 118466: *A. suaveolens* (SAN); SAN 118571: *Fiss. brevistipitatum* (A, K, L, SAN); SAN 118574: *Fr. glauca* (SAN); SAN 118612: *Fr. glauca* (K, SAN); SAN 118670: *U. excelsa* (K, SAN); SAN 118730: *A. suaveolens* (K, SAN); SAN 118815: *Fr. glauca* (SAN); SAN 118829: *U. lobbiana* (SAN); SAN 118908: *U. grandiflora* (K, SAN); SAN 118944: *U. littoralis* (K, SAN); SAN 118972: *U. concava* (K, SAN); SAN 119020: *Fiss. fulgens* (K, SAN); SAN 119024: *A. polygynus* (SAN); SAN 119025: *A. suaveolens* (K, SAN); SAN 119371: *Fr. glauca* (K, SAN); SAN 119374: *A. polygynus* (SAN); SAN 119398: *U.* sp. (K, SAN); SAN 119423: *U. excelsa* (K, SAN);

SAN 119442: *Fr. glauca* (SAN); SAN 119493: *U. borneensis* (K, SAN); SAN 119497: *A. suaveolens* (SAN); SAN 119514: *Fr. biglandulosa* (SAN); SAN 119557: *Fiss. brevistipitatum* (SAN); SAN 119613: *A. suaveolens* (SAN); SAN 119715: *A. suaveolens* (K, SAN); SAN 119735: *Fiss. brevistipitatum* (SAN); SAN 119825: *A. suaveolens* (SAN); SAN 119936: *A. gracilis* (SAN); SAN 119976: *Fr. glauca* (K, SAN); SAN 120041: *A. gracilis* (K, SAN); SAN 120069: *Fr. glauca* (K, SAN); SAN 120344: *M. clementis* (K, SAN); SAN 120385: *A. roseus* (K, L); SAN 120444: *U. grandiflora* (SAN); SAN 120667: *D. chinensis* (K, SAN); SAN 120940: *A. suaveolens* (K, SAN); SAN 120990: *A. ochropetalus* (SAN); SAN 121129: *Fr. glauca* (SAN); SAN 121194: *A. suaveolens* (K, SAN); SAN 121491: *A. suaveolens* (SAN); SAN 121609: *A. suaveolens* (K, SAN); SAN 121643: *A. suaveolens* (K, SAN); SAN 121781: *M. clementis* (K, SAN); SAN 121900: *A. suaveolens* (K, SAN); SAN 122034: *A. ochropetalus* (K, L, SAN); SAN 122048: *U. littoralis* (SAN); SAN 122066: *U. excelsa* (SAN); SAN 122084: *Fr. glauca* (K, SAN); SAN 122215: *U. excelsa* (K, SAN); SAN 122217: *A. suaveolens* (K, SAN); SAN 122358: *D. acutus* (SAN); SAN 122390: *M. clementis* (SAN); SAN 122417: *Fr. biglandulosa* (K, SAN); SAN 122483: *U. littoralis* (SAN); SAN 122647: *A. suaveolens* (SAN); SAN 122702: *U. grandiflora* (SAN); SAN 122722: *Fiss. fulgens* (SAN); SAN 122751: *A. suaveolens* (K, SAN); SAN 122760: *U. littoralis* (K, SAN); SAN 122884: *A. suaveolens* (K, SAN); SAN 123129: *A. suaveolens* (K, SAN); SAN 123242: *A. suaveolens* (K, SAN); SAN 123244: *Fr. biglandulosa* (K, SAN); SAN 123368: *A. suaveolens* (K, SAN); SAN 123449: *Fr. biglandulosa* (SAN); SAN 123452: *Fiss. brevistipitatum* (SAN); SAN 123491: *U. grandiflora* (K, SAN); SAN 123595: *A. suaveolens* (K, SAN); SAN 124067: *Fr. glauca* (SAN); SAN 124107: *A. lanuginosa* (SAN); SAN 124313: *U. concava* (SAN); SAN 124315: *A. ochropetalus* (SAN); SAN 124435: *A. suaveolens* (SAN); SAN 124588: *Fr. korthalsiana* (K, SAN); SAN 124640: *U. excelsa* (SAN); SAN 124681: *Fr. borneensis* (SAN); SAN 125345: *M. clementis* (SAN); SAN 125435: *Fiss. bygravei* (SAN); SAN 125626: *A. suaveolens* (SAN); SAN 125629: *Fiss. multivenium* (K, SAN); SAN 125670: *Fiss. kingii* (SAN); SAN 125675: *U. littoralis* (K, SAN); SAN 125676: *A. suaveolens* (K, SAN); SAN 125693: *Fr. glauca* (K, SAN); SAN 125700: *Fiss. bygravei* (K, SAN); SAN 125782: *Fr. grandifolia* (SAN); SAN 125787: *A. gracilis* (SAN); SAN 126103: *U. littoralis* (SAN); SAN 126174: *P. prismatica* (SAN); SAN 126305: *S. affinis* (SAN, SAR); SAN 126386: *A. suaveolens* (K, SAN); SAN 126420: *Fr. glauca* (SAN); SAN 126487: *A. suaveolens* (K, SAN); SAN 126546: *A. suaveolens* (K, SAN); SAN 126716: *Fr. borneensis* (SAN); SAN 126731: *Fiss. fulgens* (SAN); SAN 126796: *Fiss. fulgens* (K); SAN 126847: *S. affinis* (SAN); SAN 126913: *S. affinis* (SAN); SAN 126915: *U. grandifolia* (K, SAN); SAN 127022: *A. suaveolens* (SAN); SAN 127122: *U. littoralis* (SAN); SAN 127364: *P. prismatica* (SAN); SAN 127597: *A. suaveolens* (SAN); SAN 127952: *A. suaveolens* (SAN); SAN 128075: *A. gracilis* (K, SAN); SAN 128125: *A. gracilis* (K, SAN); SAN 128155: *Fr. glauca* (SAN); SAN 128245: *M. clementis* (SAN); SAN 128311: *Fr. biglandulosa* (K, SAN); SAN 128460: *Fr. biglandulosa* (SAN); SAN 128859: *A. polygynus* (SAN); SAN 129337: *A. suaveolens* (K, SAN); SAN 129344: *A. costatus* (K, L, SAN); SAN 129351: *Fiss. carrii* (L, SAN); SAN 129431: *A. suaveolens* (SAN); SAN 129510: *D. acutus* (K, SAN); SAN 129559: *A. ochropetalus* (K, SAN); SAN 129595: *U. littoralis* (SAN); SAN 129933: *A. suaveolens* (SAN); SAN 130000: *A. costatus* (L, SAN); SAN 130103: *U. cuneifolia* (SAN); SAN 130134: *M. clementis* (K, SAN); SAN 130144: *Fiss. kingii* (SAN); SAN 130289: *U. grandiflora* (SAN); SAN 130604: *U. verrucosa* (SAN); SAN 130859: *U. excelsa* (SAN); SAN 130884: *Fiss. membriatum* (K, SAN); SAN 131106: *U. excelsa* (SAN); SAN 131493: *Fr. biglandulosa*

(L, SAN, SAR); SAN 131515: *Fr. biglandulosa* (K, SAN); SAN 131931: *Fiss. brevistipitatum* (SAN); SAN 132017: *U. littoralis* (SAN); SAN 132255: *Fr. glauca* (SAN); SAN 132360: *U. grandiflora* (SAN); SAN 132626: *A. suaveolens* (SAN); SAN 132687: *Fr. biglandulosa* (SAN, SAR); SAN 132860: *Fiss. kingii* (SAN); SAN 132936: *Fr. glauca* (K, SAN, SAR); SAN 132949: *A. ochropetalus* (K, L, SAN); SAN 133079: *U. excelsa* (SAN); SAN 133165: *U. littoralis* (SAN); SAN 133299: *Fiss. brevistipitatum* (SAN, SING); SAN 133301: *A. macropodus* (SAN); SAN 133340: *Fiss. kingii* (A, K, SAN); SAN 133407: *A. suaveolens* (SAN); SAN 133454: *A. polygynus* (L, SAN); SAN 133461: *U. littoralis* (SAN); SAN 133971: *Fr. excisa* (K, SAN, SAR); SAN 134272: *A. polygynus* (L, SAN); SAN 134410: *Fr. biglandulosa* (A, SAN, SAR); SAN 134484: *U. monticola* (SAN); SAN 134563: *D. chinensis* (K, SAN, SAR); SAN 134815: *U. monticola* (SAN); SAN 135137: *A. costatus* (SAN); SAN 135255: *U. excelsa* (SAN); SAN 135723: *U. borneensis* (SAN); SAN 135822: *Fr. glauca* (SAN); SAN 135848: *M. clementis* (SAN); SAN 135917: *M. clementis* (SAN); SAN 135928: *A. ochropetalus* (L, SAN); SAN 135966: *D. dumosus* (SAN, SAR); SAN 135978: *Fiss. bygravei* (SAN); SAN 136077: *Fiss. bygravei* (L, SAN); SAN 136574: *U. grandiflora* (SAN); SAN 136711: *A. suaveolens* (L, SAN); SAN 136733: *Fr. biglandulosa* (K, L, SAN); SAN 136795: *A. suaveolens* (SAN); SAN 136853: *A. veldkampii* (SAN); SAN 136950: *U. excelsa* (K, SAN); SAN 136998: *Fiss. kingii* (K, SAN); SAN 137121: *M. clementis* (SAN); SAN 138346: *U. littoralis* (SAN); SAN 138410: *A. suaveolens* (SAN); SAN 139193: *A. suaveolens* (SAN); SAN 139291: *Fr. glauca* (SAN); SAN 139350: *A. suaveolens* (SAN); SAN 139526: *A. polygynus* (SAN); SAN 139559: *A. suaveolens* (SAN); SAN 139610: *A. suaveolens* (SAN); SAN 141048: *A. ochropetalus* (SAN); SAN 141487: *A. suaveolens* (SAN); SAN 141639: *U. borneensis* (SAN); SAN 141985: *Fiss. multivenium* (SAN); SAN 142979: *A. hirtipes* (K, L, SAN); SAN 143182: *U. monticola* (SAN); SAN 143349: *Fiss. kingii* (K, L, SAN, SING); SAN 143368: *U. javana* (SAN); SAN 143374: *A. ochropetalus* (SAN); SAN 143377: *D. chinensis* (K, SAN); SAN 143390: *U. littoralis* (SAN); SAN 143460: *Fiss. montanum* (K, L, SAN, SING); SAN 143523: *A. costatus* (K, SAN); SAN 143950: *U. monticola* (SAN); SAN 144055: *U. littoralis* (SAN); SAN 144147: *U. littoralis* (SAN); SAN 144148: *A. suaveolens* (SAN, SING); SAN 144330: *U. littoralis* (K, SAN); SAN 144516: *A. ochropetalus* (SAN); SAN 144753: *U. concava* (SAN); SAN 144767: *U. borneensis* (SAN); SAN 146089: *A. gracilis* (SAN); SAN 146096: *M. clementis* (SAN); SAN 146945: *A. suaveolens* (SAN); SAN 147972: *A. ?veldkampii* (SAN, SAR); SAN 148887: *A. suaveolens* (SAN); SAN 168499: *Fiss. multivenium* (SAN). **SBC** series; SBC 252: *U. lobbiana* (SAR); SBC 606: *U. lobbiana* (SAR); SBC 1479: *U. lobbiana* (SAR). **SFN** series; SFN 10303: *Fr. affinis* (K, SING); SFN 10487: *U. lanuginosa* (K); SFN 10524: *M. kentii* (K); SFN 10532: *Fiss. fulgens* (K, SAR); SFN 25128: *Fiss. latifolium* (K); SFN 25286: *Fr. biglandulosa* (K, SING); SFN 27006: *Fiss. carrii* (SING); SFN 27100: *Fiss. montanum* (SING); SFN 38982: *Fiss. fulgens* (K, SING). **Sibil**, J.; 136: *U. littoralis*; 306: *Fiss. kingii* (K, SAN). **Sidiyasa**, K.; 490: *U. curvistipitata* (L); 600: *M. kentii* (L); 668: *A. lanuginosus* (L); 775: *Fr. biglandulosa* (L); 1188: *U. javana* (K, SAN); 1270: *A. macropodus* (K, SAN); 1285: *U. monticola* (K); 1440: *Fiss. maubriatum* (K); 1602: *Fiss. kingii* (K, L); PBU 333: *A. gracilis* (L); PBU 342: *D. dumosus* (K); PBU 344: *M. kentii* (K); PBU 410: *A. gracilis* (L); PBU 422: *U. excelsa* (K); PBU 673: *A. macropodus* (K, L). **Sidiyasa, K. & Arifin**, Z.; 1602: *Fiss. kingii* (BO); 2003: *M. clementis* (BO). **Sidiyasa, K. & Kochummen**, K.M.; 565: *U. excelsa* (BO). **Sidiyasa, K. et al.**; Berau 1218: *A. suaveolens* (L); Berau 1235: *A. suaveolens* (L); Berau 1254: *A. macropodus* (L); Berau 1257: *A. macropodus* (K, L).

Sidkan, A.; 1101: *U. littoralis* (SAN). **Simpson**, D.A.; 2144: *U. littoralis* (K, SAN); 2617: *U. littoralis* (SAN). **Sinclair**, J.; 10490: *A. polygynus* (L). **Soetisna**, U.; 56: *M. clementis* (K). **Stevens, P.F. et al.**; 6: *D. dumosus* (SAN); 157: *Fiss. rugosum* (A, SAR, SAN); 365: *Fiss. fulgens*; 385: *Fiss. fulgens* (A, K, L, SAN); 400: *A. macropodus* (A, L, SAN); 410: *A. macropodus* (A, L, SAN); 419: *A. hirtipes* (A, L, SAN); 687: *U. littoralis* (A, SAN). **Subok**; 1064: *U. littoralis* (A). **Sugau**, J.; 288: *A. suaveolens* (K, SAN); 320: *U. littoralis* (SAN).

Teo, L.E. & Pachiappan, G.; T & P 1088(KL 3588): *Fr. korthalsiana* (K); T & P 1098 (KL 3598): *U. monticola* (K); T & P 1100 (KL 3600): *U. monticola* (K); T & P 1102 (KL 3602): *Fiss. kingii* (K); T & P 1116 (KL 3616): *U. lobbiana* (K). **Tadong, D.**; 13: *Fr. grandifolia* (K); 150: *D. chinensis* (K); 255: *U. concava* (K); 620: *U. excelsa* (K). **Tadong, L.**; 210: *U. littoralis*; 475: *U. littoralis* (K); 541: *U. littoralis* (K). **Takashi**, S.; 1405: *U. littoralis* (SAN). **Tandom**: 2955: *Fiss. fulgens* (K); 3317: *Fiss. fulgens* (K); 4212: *D. chinensis* (K, SING); 4791: *A. suaveolens* (K). **Teijsmann**, J.E.; 10838: *Fiss. rugosum* (L). **Thomas**, S.A.; 93: *A. suaveolens* (SAN); 232: *A. suaveolens* (SAN). **Tukirin**; 392: *U. schefferi* (K).

USEP; 56: *M. clementis* (K).

Valera, J.; 3819: *S. affinis* (K); 3823: *D. chinensis* (K). **van Balgooy**, M.M.J.; 5837: *A. gracilis* (L); 6083: *Fr. borneensis* (K, L); 6091: *Fiss. manubriatum* (L). **van Balgooy, M.M.J. & Kessler**, P.J.A.; 5923: *M. kentii* (K). **van Balgooy, M.M.J. & van Setten**, A.K.; 5499: *Fr. affinis* (BO, K, L); 5553: *Fr. excisa* (L); 5559: *Fr. excisa* (BO, L). **van Niel**, J.P.; 3906: *A. gracilis* (L); 3913: *Fiss. fulgens* (L); 4069: *Fiss. fulgens* (L); 4072: *Fiss. fulgens* (L); 4259: *M. kentii*; 4278: *Fiss. fulgens* (L); 4361: *Fr. biglandulosa* (L); 4465: *A. roseus* (L). **van Valkenburg**, J.L.C.H.; 1295: *P. prismatica* (K). **van Welzen**, P.C.; 866: *A. ochropetalus* (L). **Veldkamp**, J.F.; 8567: *A. veldkampii* (L); 8577: *A. gracilis* (L); 8574: *Fiss. bygravei* (L, SAR).

Winkler, H.; 2641: *Fiss. manubriatum* (K); 3000: *D. dumosus* (K). **Wiriadinata**, H.; 256: *M. clementis* (A, K); 3540: *Fr. glauca* (A); 3547: *A. ochropetalus* (L); 3550: *U. schefferi* (A, K); 3571: *A. veldkampii* (A, L). **Wong**, K.M.; WKM 109: *Fiss. fulgens* (K, SAN, SAR); WKM 308: *U. excelsa* (K); WKM 570: *U. beccarii* (K); WKM 1554: *A. suaveolens* (L, SAN); WKM 1851: *Fiss. montanum* (K); WKM 2233: *A. suaveolens* (K, SAN, SING); WKM 2319: *U. borneensis* (K, SAN, SING); WKM 2680: *A. ochropetalus* (K, L, SAN); sn: *U. littoralis* (SAN). **Wood, D.D.**; 444: *Fr.* ?*borneensis* (K); 1231: *Fr. biglandulosa* (A); 1303: *A. ochropetalus* (A); 2202: *Fiss. fulgens* (K). **Wood, G.H.S.**; A2920: *A. ochropetalus* (A, L, SING); A3686: *Fr. korthalsiana*? (K, SING); A4014: *U. grandiflora* (K, SING); A4040: *A. suaveolens* (K, SING); A4291: *U. borneensis* (A, SING); A4380: *A. veldkampii* (A, L, SING). **Wood, G.H.S. & Wyatt-Smith**, J.; A4226: *A. ochropetalus* (L, SING).