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REVISION OF THE GENUS CYATHOSTEMMA (ANNONACEAE)

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SUMMARY

The genus *Cyathostemma* Griff., occurring from SW China to NE Australia, is revised, and a total of ten species is recognised. One new species, *C. siamensis*, is described. The status of the genus *Tetrapetalum* Miq. is discussed and reduced, in part, to synonymy with *Cyathostemma*, and in part to *Uvaria* L. A key to taxa is given, with new descriptions and distribution maps.

Key words: Annonaceae, *Cyathostemma*.

INTRODUCTION

Cyathostemma Griff. is a genus of 10 species of lianas in the Annonaceae, distributed from China through Malesia and into North Australia. The last treatment of the family was by Keßler (1993), but this is at the generic level. Monographic work on South East Asian genera of the Annonaceae is currently neglected, and it is estimated that only 13% of the 55 South East Asian genera are currently under study (Keßler, 1990). This is the first time that a revision of *Cyathostemma* has been undertaken.

Cyathostemma belongs to the Uvarieae, a tribe of the subfamily Annonoideae characterised by valvate sepals, imbricate petals, stellate or caespitose indumentum, numerous often latrorse stamens with ligulate apices, many narrow carpels and laterally attached ovules on a shallowly conical torus with a flat apex (Van Heusden, 1992). The genus is characterised by globose buds, with small petals not expanding or reflexing at anthesis.

MORPHOLOGY

Members of *Cyathostemma* are climbers, 3–40 m long. The hairs of *Cyathostemma* are compound hairs composed of four or more hairs, up to eight, in a tuft which branches directly from the epidermis. These hairs are here termed caespitose (= tufted sensu Stearn, 1983), rather than stellate, as usually observed in *Uvaria* L. All members of *Cyathostemma* possess caespitose rather than stellate hairs, although some African members of *Uvaria* also possess caespitose hairs (Keßler, pers. comm.); this character is consequently not diagnostic of *Cyathostemma*.

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The inflorescence of *Cyathostemma* is a rhipidium (sensu Weberling, 1989): the inflorescence branches in a monochasial fashion from the axil of a single prophyll positioned on the adaxial side of the axillary shoot. The inflorescence position is extra-axillary, except for *C. micranthum* (A.DC.) J. Sinclair where it is terminal. The extra-axillary position is hypothesised here to be due to concaulescence. This occurs when the primordium of the axillary shoot is situated more towards the main axis, and it can grow upwards for a distance the same as the corresponding internode of the main axis (Weberling, 1989). If this growth is exactly the same as the internode of the main axis, an opposite inflorescence position will occur; if not exactly the same an extra-axillary position will occur. When this growth does not occur an axillary, or near axillary, position is found, as is sometimes seen in *C. excelsum* (Hook.f. & Thomson) J. Sinclair and *C. viridiflorum* Griff. The inflorescence position of *C. micranthum* is initially terminal on side branches, and it is hypothesised here that growth then continues in a sympodial manner and the initially terminal inflorescence position will become an extra-axillary one. The extra-axillary position in *C. micranthum* does not then come about by concaulescence, and this may also occur in *C. longipes* Craib, but in the herbarium material studied this growth pattern was not clearly seen.

Floral structure within the genus is quite uniform. *Cyathostemma* is distinguished by small globose flowers, and perianth segments which do not expand or reflex at maturity. Four petals are sometimes found in *C. excelsum*, although it is not known if this is because of two whorls of two petals or one whorl of four petals. The genus predominantly has yellow-green flowers, except for two species, *C. micranthum* and *C. argenteum* (Blume) J. Sinclair, which have yellow-green and red flowers. Data gained from herbarium labels of *C. micranthum* indicates that flower colour ranges from red through brown and orange to green. Petal colour may be dependent on reproductive biology, however, and all species may, at some time, have red petals, but collections have not been made at the correct time of year, or day, to see this character manifest.

Cyathostemma has numerous carpels with a glabrous U-shaped stigma which exudes a black sap, termed a compitum (Endress, 1982). *Cyathostemma hookeri* King, *C. glabrum* (Span.) Jessup ex Utteridge and *C. longipes* have a ring of hairs at the junction of the base of the stigma and the ovary.

Floral characters, notably flower colour, number of petals and ovule number, have in the past been used as diagnostic characters for species distinctions. This has resulted in the separation of *Tetrapetalum* Miq. from *Cyathostemma* and the artificial distinction between *C. vietnamense* Bân and *C. yunnanense* Hu (see the next chapter).

Fruit characters are not known or only partially known for *C. longipes* and *C. argenteum*. In those taxa where ripe fruits are known, the fruits are glabrous, except for *C. argenteum* and *C. excelsum* which both have densely pubescent fruits.

TAXONOMIC HISTORY

The genus was first named by Griffith (1854), who described the single species *C. viridiflorum*. Griffith was unsure of the relationship of this species, even within the Annonaceae, and thought that *Cyathostemma* was intermediate between the Annonaceae and the Schisandraceae, and that he knew of "no anonaceous plant with a corolla like that of this one."

King (1893) was the next author to describe new species of *Cyathostemma*, when he described four new species in the genus, namely: *C. hookeri*, *C. wrayi* King, *C. scortechinii* King and a gynodioecious species *C. acuminatum* King. *Cyathostemma hookeri* was described by King when he recognised that *Uvaria parviflora* Hook.f. & Thomson, an illegitimate later homonym of *Uvaria parviflora* A. Rich., was a member of *Cyathostemma*. *Cyathostemma scortechinii* was reduced to a variety of *C. viridiflorum* by Ridley (1922), and later to a synonym of *C. viridiflorum* by Sinclair (1955). *Cyathostemma acuminatum* is here treated as a dubious taxon, because the type has not been traced and no further collections of a gynodioecious member of *Cyathostemma* have been made in the one hundred years since this species was described. Gynodioecy is rare in the Annonaceae, androdioecy being more common (Van Heusden, 1992). A plant such as this would probably have been re-collected in an intensively studied area like Peninsular Malaysia.

Craib (1925) described *C. longipes* from a single collection by Kerr made in Thailand. Material additional to the type collection in the herbarium at P confirms that this is a distinct and legitimate species.

In the treatment by Sinclair (1955) of the Annonaceae from Peninsular Malaysia, seven species of *Cyathostemma* were recognised, including the dubious taxon *C. acuminatum*. In this work Sinclair transferred *Uvaria micrantha* Hook.f. & Thomson and *Mitrephora excelsa* Hook.f. & Thomson to *Cyathostemma*. These two species make up a large proportion of the material in herbaria, and therefore seem to be the most common species in the genus with the widest distributions (Map 2 & 5).

The distribution of the genus is now known to extend into southern China, following the description of *C. yunnanense* by Hu (1940). Bân (1974) described *C. vietnamense*, which is very similar to *C. yunnanense*, differing only in ovule number, and is here reduced to a synonym of *C. yunnanense*.

A continued understanding of the generic limits of *Cyathostemma* has resulted in *Uvaria glabra* Span., from northern Australia and Timor, being transferred to *C. glabrum* by Jessup, published here as a new combination.

Tetrapetalum volubile Miq. thought to be distinct from *Cyathostemma* solely because of its dimerous perianth, was described by Miquel in 1865. Merrill (1929) subsequently described *T. borneense* Merr. from Elmer's collections of Bornean plants, and recently *T. lambirense* K. Momose has been published by Momose (1998). Within the Annonaceae there are reports of dimerous flowers regularly occurring in species that normally have trimerous flowers (Sinclair, 1955; Koek-Noorman et al., 1990), and the separation of the two genera based on this single character has recently been doubted (Van Heusden, 1992; Keßler & Van Heusden, 1993). Apart from the difference in merosity, there are no other characters which support the separation of *T. volubile* from *Cyathostemma*, and *T. volubile* has recently been reduced to a synonym of *C. excelsum* by Keßler & Van Heusden (1993). The relationships of *T. borneense* and *T. lambirense* now remain to be assessed. The petals which enlarge and reflex at anthesis place both of these species outside of the generic limits of *Cyathostemma*, and they are more better placed as members of *Uvaria*. Indeed, Momose (1998) commented that *Tetrapetalum* would be reduced to *Uvaria* if the number of tepals is not used as generic character, but overlooked the reduction of *T. volubile* by Keßler & Van Heusden (1993). Consequently, the new combinations *U. borneense* and *U. lambirense* are proposed here (see 'Excluded taxa').

RELATIONSHIPS OF CYATHOSTEMMA

The position of *Cyathostemma* within the tribe Uvarieae has remained unchanged since King (1893) moved the genus from the Unoneae, and within the subfamily Annonoideae except for Walker's (1971) classification (see below). The sister group of *Cyathostemma* is formed by the groups comprising *Uvaria* and *Rauwenhoffia* Scheff.

Below the tribal level, Fries (1959) placed *Cyathostemma* in the *Asimina* group on account of the inflorescence position being axillary. The position of the inflorescence in *Cyathostemma* is usually extra-axillary, although *C. viridiflorum* and *C. excelsum* sometimes have an axillary inflorescence position. In his description of the *Asimina* group, Fries (1959) notes that cauliflory has confused previous authors who have quoted *Cyathostemma* as possessing axillary inflorescences, and he was dissatisfied with the position of *Cyathostemma* within the group. The *Asimina* group sensu Fries consists of eight genera restricted to America, one African genus, one Australian genus, and four Asian genera, including *Cyathostemma*. This group appears to be unnatural, especially if biogeographic relationships are taken into account, and it is doubtful that the genera within this group have any affinities to each other.

Walker (1971) examined the pollen morphology and structure of all genera of the Annonaceae, and used these data as the basis for a classification. The Uvaria tribe was placed in the Malmea subfamily, and within the Uvaria tribe the genera *Uvaria*, *Anomianthus* Zoll., *Tetrapetalum* and *Cyathostemma* formed a natural group.

A more recent attempt at subtribal classification by Van Heusden (1992) places both *Cyathostemma* and *Tetrapetalum* into a Uvaria group which seems to be a more natural one than that of Fries. Van Heusden notes that several of Fries' groups, including the *Asimina* group, are unnatural. Van Heusden (1992) also notes that *Tetrapetalum* differs from *Cyathostemma* only in petal number. However, it should be noted that Van Heusden's groups are informal, and a new classification was not formally proposed. Momose (1998) states that *Cyathostemma* differs from *Tetrapetalum* in possessing bilobed stigmas compared to the flat, convex or slightly concave stigmas found in *Tetrapetalum*.

Cyathostemma forms a monophyletic group because of the globose buds maturing into small flowers, and petals with a subacute apex which do not expand or reflex at anthesis. However, it is debatable whether *Cyathostemma* will remain separate from *Uvaria* when a study of *Uvaria* and related genera is undertaken. Together with *Cyathostemma* (including *Tetrapetalum* p.p.) there are six other genera, viz. *Anomianthus*, *Balonga* Le Thomas, *Ellipeia* Hook.f. & Thomson, *Ellipeiopsis* R.E. Fr. and *Rauwenhoffia*, closely related to *Uvaria* which may in fact be a large genus with "several distinct flower morphological variants" (Van Heusden, 1992). At present a study of *Uvaria* has still to be conducted, and this work is presented here in the knowledge that a greater understanding of *Uvaria* and its related genera will possibly result in the 'loss' of several genera, *Cyathostemma* included.

DISTRIBUTION

The genus is distributed from southern China throughout Malesia and into North Australia. The most northern member of the genus is *C. yunnanense*, found in the Yunnan province of China and in Vietnam. Two species are found in North Australia,

C. micranthum and *C. glabrum*, particularly in mesophyll and notophyll vine forest (Jessup, 1990). The most widely distributed species is *C. micranthum*, which occurs throughout Malesia and extends north into Thailand and Vietnam (Map 5).

TAXONOMIC TREATMENT

CYATHOSTEMMA

Cyathostemma Griff., Not. pl. Asiat. 4 (1854) 707; Ic. pl. Asiat. 4 (1854) t. 650; King, J. Asiat. Soc. Bengal 61 (1893) 8; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 11; Ridl., Fl. Malay Penins. 1 (1922) 27; Hutch., Bull. Misc. Inform., Kew (1923) 256; Craib, Fl. Siam. (1925) 29; Ast, Fl. Gén. Indo-Chine Suppl. (1938) 70; J. Sinclair, Gard. Bull. Sing. 14 (1955) 219; R.E. Fr., Nat. Pflanzenfam. ed. 2, 17a II (1959) 73; Backer & Bakh.f., Fl. Java 1 (1964) 104; Hutch., Gen. Flow. Pl., Dicot. (1964) 82; Tsiang & P.T. Li, Fl. Reipubl. Pop. Sin. 30 (1979) 28, f. 11; Heusden, Blumea Suppl. 7 (1992) 144, f. 37c, f; Keßler in Kubitzki et al. (eds.), Fam. Gen. Vasc. pl. 2 (1993) 114; Keßler & Heusden, Rheedea 3, 1 (1993) 60, f. 3; Jessup, Fl. Australia 2 (in press). — Type species: *Cyathostemma viridiflorum* Griff.

Tetrapetalum Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 1; Benth. & Hook.f., Gen. pl. 1 (1867) 955; Engl. & Prantl, Nat. Pflanzenfam. 3, 2 (1888) 31; Hutch., Bull. Misc. Inform. Kew (1923) 257; Gen. Flow. Pl., Dicot. (1964) 86; Heusden, Blumea Suppl. 7 (1992) 142, p.p.; Keßler in Kubitzki et al. (eds.), Fam. Gen. Vasc. pl. 2 (1993) 111, p.p.; K. Momose, Blumea 43 (1998) 117. — Type species: *Tetrapetalum volubile* Miq.

Climbers with rufous caespitose hairs. *Leaves* alternate, elliptic, obovate usually oblong, base cuneate, rounded or emarginate. *Flowers* globose in pendulous or clustered monochasial cymes, extra-axillary or opposite from the old wood or terminal, never axillary, usually green or yellow, sometimes red. Sepals (2 or) 3, valvate, densely pubescent abaxially. Petals (4–)6, in two whorls of three or two whorls of two, whorls sub-equal in size, the inner whorl slightly smaller, valvate at base and imbricate at tips, coriaceous, not expanding or reflexing at anthesis, resulting in mature flowers with a small c. 5 mm opening, inner whorls slightly clawed, pubescent sometimes densely so abaxially, basally glabrous or very scarcely pubescent on the adaxial surface. Stamens numerous, with blunt or ligulate connective apex arching over and concealing anthers, anthers latrorse, introrse or extrorse. Carpels numerous, pubescent with hippocrepiform stigmas, style absent. Ovules 2–16(–18), lateral in two rows, basal when 2.

Note — A description of fruits is not given above because the fruits of some species are not known. Descriptions of fruits are given for each taxon if known.

KEY TO CYATHOSTEMMA

1a. Leaves chartaceous or sub-coriaceous, drying green or pale green-yellow; mature branches reddish- or purplish-brown; inflorescence subtended by a persistent ovate-orbicular, chartaceous foliose bract 2

b. Leaves coriaceous, sometimes sub-coriaceous, drying green, brown, yellow, black or grey; branches when mature brown, dark brown or black; inflorescence subtended by a broadly ovate-ovate, coriaceous bract, or if foliose then vestigial 3

2a. Leaves sub-coriaceous; petals red to green-yellow ..... **1. C. argenteum**

b. Leaves chartaceous; petals never red ..... **10. C. yunnanense**

3a. Leaves oblong-elliptic, small, 2.5–8(–12) cm long, drying rusty-brown or black, adaxial midrib densely rufous pubescent; petiole very short, less than 3 mm long; inflorescence terminal, opposite or extra-axillary; flowers red, brown, yellow or green ..... **6. C. micranthum**

b. Leaves oblong-lanceolate or obovate-oblong, large, (6–)12–27 cm long, drying green, blue-green, yellow, or sometimes black and then completely glabrous adaxially; petiole greater than 3 mm long; inflorescence never terminal; flowers yellow or green, rarely red 4

4a. Twigs black, conspicuously striate; leaves abaxially pubescent, sometimes densely so and obscuring the leaf surface; peduncle absent; flowers sometimes dimerous; ripe monocarps tomentose ..... **2. C. excelsum**

b. Twigs grey, reddish brown or dark brown-black; leaves abaxially sparsely pubescent or glabrous; peduncle present; flowers always trimerous; ripe monocarps glabrous 5

5a. Leaves drying light blue-green, glabrous; petiole 6–12 mm long; peduncle greater than 5 cm long; inflorescence of up to 25 flowers ..... **8. C. viridiflorum**

b. Leaves drying dark green or brown, sparsely pubescent; petiole 1–6.5(–8) mm long; peduncle less than 3 cm long; inflorescence of 1–10 flowers, always less than 20 flowers 6

6a. Petiole 6.5–8 mm long; petals abaxially furrowed, less than 3 mm wide; stipe of ripe monocarps greater than 30 mm long ..... **4. C. hookeri**

b. Petiole 1–5(–7) mm long; petals never furrowed, greater than 4.5 mm wide; stipe of ripe monocarps less than 20 mm long 7

7a. Leaf apex acute or somewhat acuminate; inflorescence of 1–3 flowers; pedicels greater than 18 mm long; carpels pubescent at the base of the stigma 8

b. Leaf apex acuminate, with the acumen up to 3 cm long; inflorescence of 3 or more flowers, pedicels less than 12 mm long; carpels pubescent throughout 9

8a. Adaxial midrib glabrous; pedicel 1.8–2.2 cm long, leaves elliptic-oblong, 6–17 by 2.5–6 cm; mature flowers 8–10 mm diam.; bark dark brown-black ..... **3. C. glabrum**

b. Adaxial midrib pubescent; pedicel 3–9.5 cm long, leaves oblong-obovate, c. 20 by 6–6.5 cm; mature flowers c. 15 mm diam.; bark light brown **5. C. longipes**

9a. Twigs striate with inconspicuous lenticels; leaves 16–29 by 6–10 cm; inflorescence unbranched; peduncles becoming woody and somewhat tuberculate, greater than 5 mm long, up to 2 cm long; carpels c. 2 mm long ..... **9. C. wrayi**

b. Twigs slightly striate with conspicuous lenticels; leaves 6–14.5 by 3–4.5 cm; inflorescence branched; peduncles woody but smooth, less than 5 mm; carpels 4–5 mm long ..... **7. C. siamensis**

1. Cyathostemma argenteum (Blume) J. Sinclair — Map 1

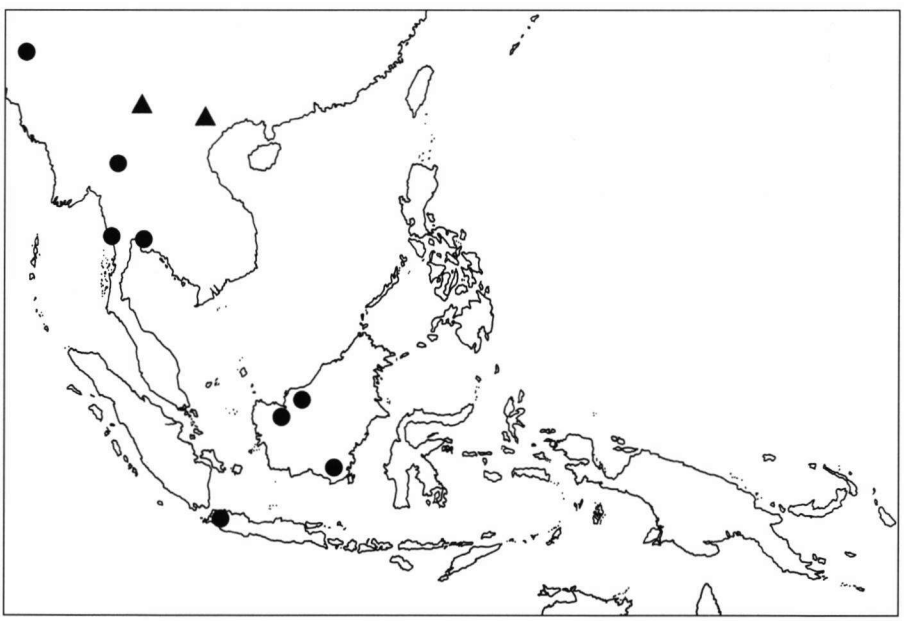
Cyathostemma argenteum (Blume) J. Sinclair, Sarawak Mus. J. 5, 3 (1951) 599; Gard. Bull. Sing. 14 (1955) 220; Backer & Bakh.f., Fl. Java 1 (1964) 104. — *Uvaria argentea* Blume, Fl. Javae 21 (1830) 24; Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 8; Boerl., Icon. Bogor. 1 (1899) 95; Ridl., Sarawak Mus. J. 1, 3 (1913) 73; Merr., Bibl. Enum. Born. pl. (1921) 253. — *Cyathostemma nitidum* Bakh.f., Blumea 12 (1963) 61, nom. illeg. — Type: *Van Hasselt s.n.* (holo L), Indonesia, Java, ?Bantam.

Uvaria bracteata Roxb., Fl. Ind. ed. 1832 (1832) 660. — Type: *Roxb. Icon 2290* (lecto K, here designated).

Uvaria gomeziana A. DC., Mém. Soc. Phys. Genève 5 (1832) 203. — Type: *Gomez s.n.* (*Wall. Cat. 6459*) (holo G n.v.; iso K-W) Burma, Tavoy, 8 September 1827.

Uvaria argentea auct. non Blume: Backer, Bekn. Fl. Java 3 (1941) 10. — No type designated.

Climber to 5 m. Twigs densely pubescent when young, later glabrous, reddish brown and finely striate; lenticels indistinct. *Leaves* chartaceous to sub-coriaceous; minutely puberulous when very young, later glabrous except for the adaxial pubescent midrib, drying green or pale green-yellow; lamina oblong-lanceolate, (4–)10–15(–21) by (1.5–)4.5–6(–7) cm, gradually narrowed to a cuneate or rounded base, apex acute; nerves 12–14 pairs, slightly prominent on both sides, curving and ascending and inter-arching in a faint broken line near the margin, reticulation visible on both surfaces forming a close-network; petiole 3–5 mm long. *Inflorescences* 1–4-flowered, opposite the leaves, sometimes extra-axillary. Peduncles absent; pedicels densely pubescent, c. 1 cm long; bracts abaxially pubescent, densely so along the 'midrib', membranaceous to sub-chartaceous, foliose, orbicular, 7–9 by 7–9 mm; bracteoles similar to bracts, attached c. one third of the way along the pedicel, c. 3 mm long. Sepals 3, coriaceous, broadly ovate, c. 2 by 3 mm, apex obtuse, densely pubescent both ad- and abaxially. Petals 6, broadly ovate, red or green-yellow, c. 5 mm long, apex acute-obtuse, sparsely pubescent on the abaxial surface, pubescent on the adaxial surface. Stamens 2–2.5 mm long, connective apices ligulate; anthers latrorse. Carpels 4-angled, pubescent along the edges, c. 2 mm long, stigma deeply slit on the adaxial side, ovules 16. Ripe monocarps minutely pubescent, oblong, slightly apiculate, slightly constricted, somewhat tuberculate, c. 4 by 2–2.5 cm, stipes stout, c. 4 cm long. *Seeds* several in 2 rows, smooth.



Map 1. Distribution of *Cyathostemma argenteum* (Blume) J. Sinclair (●), *C. yunnanense* Hu (▲).

Distribution — Bangladesh, Burma, Thailand, Java (type locality) and Borneo. Almost certainly present in Peninsular Malaysia.

Notes — *Cyathostemma argenteum* is distinguished by the chartaceous to subcoriaceous leaves, drying green or pale green-yellow, and the foliose bract subtending the 1–3-flowered inflorescence. The petals can be green-yellow or red which, together with the thicker leaves, distinguishes *C. argenteum* from the similar *C. yunnanense*.

Backer's usage of *U. argentea* [Bekn. Fl. Java 3: 10 (1941)] was not different from Blume's original concept, and so Bakhuizen's intended new name is unnecessary. Sealy (1956) discusses and lists Roxburgh's Flora Indica icons.

2. Cyathostemma excelsum (Hook.f. & Thomson) J. Sinclair — Map 2

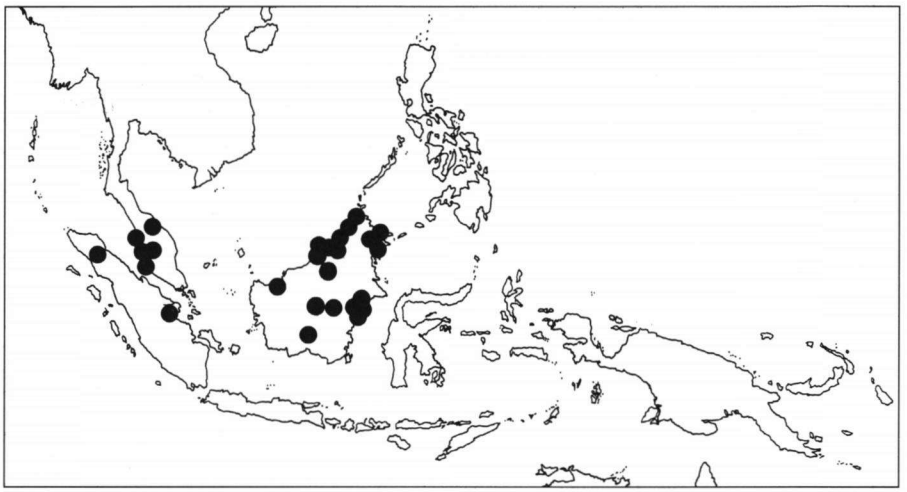
Cyathostemma excelsum (Hook.f. & Thomson) J. Sinclair, Gard. Bull. Sing. 14, 2 (1955) 226; Keßler & Heusden, Rheedea 3, 1 (1993) 60, f. 3. — *Mitrephora excelsa* Hook.f. & Thomson, Fl. Ind. 1 (1855) 114; Miq., Fl. Ind. Bat. 1 (1858) 31; Hook.f. & Thomson, Fl. Brit. Ind. 1 (1872) 77; Ridl., Sarawak Mus. J. 1, 3 (1913) 86; Merr., Bibl. Enum. Born. pl. (1921) 263. — Type: *Porter s.n.* (*Wall. Cat. 6477*) [holo K (herb. Hook.f.); iso K (herb. Benth.), K-W], Malaysia, Penang, 1832.

Uvaria excelsa Wall., Cat., nom. nud.; King, J. Asiat. Soc. Bengal 61 (1893) 22; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 26, f. 18; Ridl., Sarawak Mus. J. 1, 3 (1913) 74; Merr., Bibl. Enum. Born. pl. (1921) 253; Ridl., Fl. Malay Penins. 1 (1922) 34. — Type: *Porter s.n.* (*Wall. Cat. 6477*), [holo K-W; iso K (herb. Hook.f.), K (herb. Benth.)], Malaysia, Penang, 1832.

Tetrapetalum volubile Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 1; Becc., Nuovo Giorn. Bot. Ital. 3 (1871) 179; Ridl., Sarawak Mus. J. 1, 3 (1913) 73; Merr., Bibl. Enum. Born. pl. (1921) 254. — Type: *De Vriese s.n.* (holo L), Indonesia, Borneo, Kalimantan.

Uvaria confertiflora Merr., Univ. Calif. Publ. Bot. 15 (1929) 61. — Type: *Elmer 21081* (lecto L, designated here; iso K, NY, P), Malaysia, Sabah, Tawau Province.

Climber, 10–30 m long. Young twigs pubescent, later glabrous, very dark brown to black and conspicuously striate; lenticels indistinct. *Leaves* coriaceous; adaxially glabrous except for the pubescent sunken midrib, abaxially pubescent, sometimes densely so and obscuring the leaf surface, the degree of pubescence varying with age, drying very pale brown or sometimes pale green above, darker below sometimes orange-brown due to the dense hairs; lamina oblong-obovate, (9–)13–22(–37) by (4–)6–12(–16) cm, slightly narrowed to the emarginate or cordate base, apex acute-acuminate; nerves 8–11 pairs, curving and ascending rather crookedly, reticulation forming a close network, visible on both surfaces; petiole 7–10(–12) mm long, pubescent. *Inflorescences* clustered cymes of 4–20 flowers, sessile on the older twigs, extra-axillary. Peduncles absent; pedicels 0–5 mm long; bracts pubescent, coriaceous, ovate; bracteoles similar to the bracts, attached about halfway along the pedicel; both bracts and bracteoles usually obscured due to the densely clustered flowers. Sepals 2 or 3, connate at the base, coriaceous, semi-orbicular, 2–4 by 3–5.5 mm, apex sub-acute, densely pubescent on both surfaces but less so on the adaxial. Petals 4 or 6, broadly ovate, the inner whorl slightly clawed, green-yellow sometimes red, 5–6 by 5–6 mm, apex obtuse, rarely mucronate, pubescent as the sepals, basally glabrous abaxially. Stamens 2–2.5 mm long; connective apices ligulate; anthers latrorse to slightly introrse. Carpels 3 mm long, pubescent; ovules 12–16 lateral in 2 rows. Ripe monocarps densely pubescent, sub-globose to globose, tuberculate, yellow-orange sometimes brown, 2–2.6 by



Map 2. Distribution of *Cyathostemma excelsum* (Hook.f. & Thomson) J. Sinclair.

2–2.5 cm, on a swollen pubescent receptacle 2–2.5 cm diam.; stipes densely pubescent, c. 3 cm long. *Seeds* several, c. 12, in 2 rows.

Distribution — Sumatra, Peninsular Malaysia, Borneo. A single collection by *Pierre s.n.* (P), but with no locality data, extends the distribution north into Indochina.

Note — This species is easily recognised by the densely pubescent abaxial leaf surface, with clusters of tomentose flowers with short pedicels.

3. Cyathostemma glabrum (Span.) Jessup ex Utteridge, *comb. nov.* — Map 3

Uvaria glabra Span., Linnaea 15 (1841) 162. — Type: *Spanoghe s.n.* (holo L), Indonesia, Timor.

Climber. Young twigs and buds densely pubescent, soon becoming glabrous, brown-black tinged with red especially when young, distinctly striate; lenticels indistinct. *Leaves* sub-coriaceous, glabrous above, glabrescent below, drying rusty brown; lamina elliptic, ovate-elliptic or rarely obovate, (3.5–)6–17 by 2.5–6 cm, base rounded, apex acute or shortly and bluntly acuminate; nerves 8–12 pairs, interarching near the margin, sometimes bifurcating before joining together; petiole 2–4(–5) mm long, channelled above, sparsely pubescent. *Inflorescence* opposite the leaves, usually single-flowered. Peduncle absent; pedicels sparsely pubescent, 18–22 mm long; bracts pubescent, sub-coriaceous, ovate-obovate, 2–3 mm long; bracteoles similar to the bracts, attached c. halfway along the pedicel. Sepals 3, broadly ovate, 3.5–4 by 3–3.5 mm, apex acute or obtuse, pubescent abaxially, glabrous adaxially. Petals 6, broadly or depressed ovate, margins incurved, 5–7 by 4.5–7 mm, puberulous. Stamens somewhat dorsally-ventrally flattened, c. 1.5 mm long; connective apices somewhat blunt and rounded; anthers latrorse. Carpels numerous, 1.5–2 mm long, glabrous except for a ring of hairs at the junction of the stigma and ovary; ovules 5. Ripe monocarps glabrous, dark purple, 10–16 by 10–15 mm; stipes 12–20 mm long. *Seeds* 1–3.

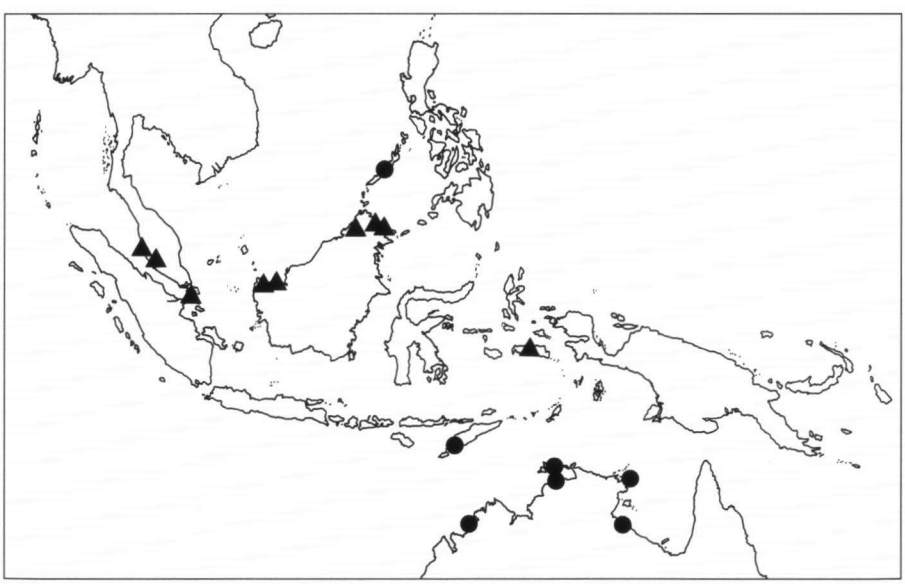
Distribution — Found on Timor and in northern Australia; one collection has been seen from the Philippines.

Note — *Cyathostemma glabrum* is distinguished by the glabrous adaxial midrib of the leaves, the pedicel 18–22 mm long, and the inflorescence which is subtended by a non-clasping 2–3 mm long bract. This species is similar to *C. micranthum* from which it differs in the glabrous midribs, the very long pedicels and the inflorescence opposite the leaves.

4. Cyathostemma hookeri King — Map 3

Cyathostemma hookeri King, J. Asiat. Soc. Bengal 61 (1893) 10; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 12, f. 40; Boerl., Icon. Bogor. 1 (1899) 125, t. 42; Merr., Bibl. Enum. Born. pl. (1921) 263; Ridl., Fl. Malay Penins. 1 (1922) 28; J. Sinclair, Gard. Bull. Sing. 14 (1955) 223. — Type: *Curtis 1213* (lecto K, here designated), Malaysia, Penang, Govt. Hill.
Uvaria parviflora Hook.f. & Thomson, Fl. Ind. 1 (1855) 103, nom. illeg.
Uvaria glabra auct. non Span.: Diels, Bot. Jahrb. Syst. 49 (1912) 124.

Climber, 8–25 m long. Young twigs sparsely pubescent, later glabrous, reddish brown and finely striate; lenticels small and numerous. *Leaves* thinly coriaceous, sparsely pubescent below, lamina drying light brown with the venation reddish brown; lamina oblong to obovate, (7.5–)12–20 by 5.5–8 cm, base cuneate or very slightly rounded, never emarginate, apex acute-acuminate; nerves 12–17 pairs, distinct on both surfaces, curving and anastomosing indistinctly near the margin; petiole 6.5–8(–10) mm long, glabrous. *Inflorescence* of 3 or 4 flowers opposite the leaves, never axillary. Peduncles 0–2 mm long; pedicels sparsely pubescent, 5–10 mm long; bracts foliose, vestigial and soon falling, c. 2.5 mm long; bracteoles c. 1 mm long, ovate, attached c. a third of the way along the pedicel. Sepals 3, ovate, 2.5–3 by 2.5–4.75 mm, abaxially pubescent, adaxially glabrous, apex acute or obtuse. Petals 6, furrowed or somewhat tuberculate



Map 3. Distribution of *Cyathostemma glabrum* (Span.) Jessup ex Utteridge (●) and *C. hookeri* King (▲).

on the abaxial surface, elliptic to ovate, inner whorl clawed, yellow, 4–6 by 2–3 mm, apex acute. Stamens 1–2 mm long; connective apices truncate, incurved and sometimes cleft and appearing bi-lobed; anthers latrorse to semi-introrse. Carpels 4-angled, 1.5–2.5 by 0.5–1 mm, glabrous except for a ring of hairs at the junction of the stigma and ovary; ovules (4–)10–12, in two rows. Ripe monocarps glabrous, slightly tuberculate, bulging around seeds, 3–4 by c. 2 cm, blue-green; stipes (2–)3.5–4.8 cm long. *Seeds* up to 8.

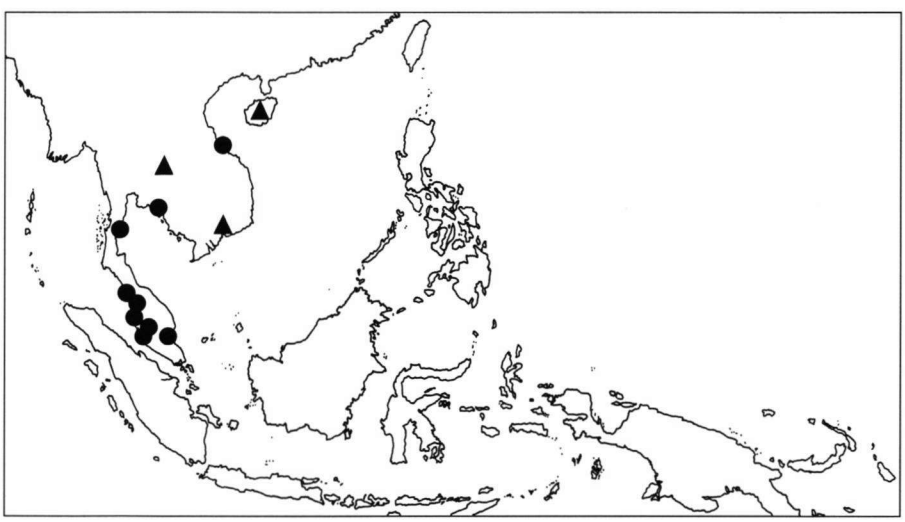
Distribution — Peninsular Malaysia, Sarawak and Sabah. Single collections have been seen from Ceram and Sumatra, though the exact locality was not traced for the latter. Additionally there is a cultivated record from Java.

Note — This species is distinguished by glabrous fruits, stipe usually 4 cm long, cymes of 3 or 4 flowers with outer petals vertically furrowed abaxially when dry. It can be seen that King (1893) did not select any particular specimen as the holotype, but gave special mention to the specimens of Curtis, hence the selection of a Curtis specimen as the lectotype.

5. **Cyathostemma longipes** Craib — Map 4

Cyathostemma longipes Craib, Bull. Misc. Inform. Kew (1925) 8; Fl. Siam. 1 (1925) 29. — Type: *Kerr 8607* (holo K; iso BM, P), Thailand, Pû, Udawn.

Climber. *Leaves* chartaceous to sub-coriaceous, pubescent on the upper midrib and lateral nerves, abaxial midrib and lateral nerves sparsely pubescent, drying dull olive-green; lamina oblong-oblanceolate, 6.5–19 by 3.5–5.5(–6.5) cm, base rounded, often unequal, apex acuminate or caudate-acuminate; nerves 10–14 pairs, interarching indistinctly near the margin, prominent on both sides, reticulation sub-prominent on both sides; petiole 3–5 mm long, channelled above, below transversely furrowed, similarly covered with indument as the branches. *Inflorescence* two-flowered, extra-axillary.



Map 4. Distribution of *Cyathostemma longipes* Craib (▲) and *C. wrayi* King (●).

Peduncles densely pubescent, 1–3 mm long; pedicels sparsely pubescent, 3–9.5 cm long; bracts pubescent, coriaceous lanceolate-ovate, 3–6 mm long; bracteoles sparsely pubescent, lanceolate-ovate, 1–2 mm long, attached c. halfway along the pedicel. Sepals 3, broadly ovate, c. 5 by 5 mm, apex obtuse-acuminate abaxial, surface sparsely pubescent, adaxial surface glabrous. Petals 6, coriaceous, broadly ovate, 1–2 by 1–1.7 cm, adaxially densely pubescent at the tips becoming more sparse towards the base, abaxially pubescent only at the tip, elsewhere glabrous. Stamens somewhat dorsally-ventrally flattened, 0.8–1 mm long; anthers latrorse. Carpels c. 1 mm long, not projecting above stamens, glabrous except for a ring of hairs at the junction of the stigma and ovary; ovules 2, basal. Ripe monocarps unknown.

Distribution — China (Hainan province), Indochina and Thailand.

Note — This species is very distinct within the genus and is easily distinguished by the few-flowered inflorescence and the very long pedicels. The inflorescence is a monochasial cyme like all members of *Cyathostemma*. It is two-flowered; the youngest flower does not develop, and because of the highly condensed nature of the inflorescence this gives the appearance of a dichasial cyme with a non-developing terminal flower. When the position of the bracts is examined the inflorescence is obviously a monochasial cyme.

6. Cyathostemma micranthum (A.DC.) J. Sinclair — Map 5

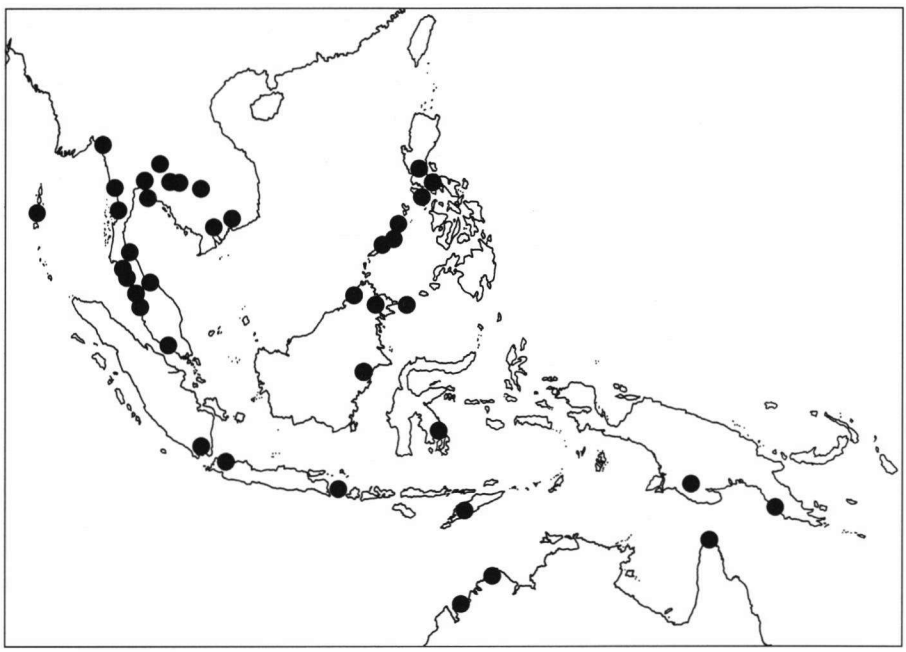
Cyathostemma micranthum (A.DC.) J. Sinclair, Gard. Bull. Sing. 14, 2 (1955) 225; Jessup, Fl. Australia 2 (in press). — *Guatteria micrantha* A.DC., Mém. Anon. (1832) 42. — *Uvaria micrantha* (A.DC.) Hook.f. & Thomson, Fl. Ind. 1 (1855) 103; Fl. Brit. Ind. 1 (1872) 51; Kurz, Forest fl. Burma 1 (1877) 29; King, J. Asiat. Soc. Bengal 61 (1893) 21; Ann. Roy. Bot. Gard. (Calcutta) 4 (1893) 26, f. 18; Finet & Gagnep., Bull. Soc. Bot. France 4 (1906) 70; Fl. Gén. Indo-Chine 1 (1907) 54; Merr., Philipp. J. Sc., Bot. 10 (1915) 230; Ridl., Fl. Malay Penins. 1 (1922) 33; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 155; Ast, Fl. Gén. Indo-Chine Suppl. (1938) 63. — Type: *Wall. Cat. 6449* (holo K-W; iso BM), Burma, Amhearst.

Polyalthia fruticans A.DC., Mém. Anon. (1832) 42. — Type: *Gomez s.n.* (*Wall. Cat. 6430*) (holo K-W; iso BM), Burma, Tavoy.

Cyathostemma sumatrana (Miq.) Boerl., Icon. Bogor. 1 (1899) 126, t. 58. — *Anaxagorea sumatrana* Miq., Fl. Ned. Ind., Eerste bijv. 3 (1861) 382. — Type: *Teijsmann 4383* (holo L; iso GH, K), Sumatra, Lampung, near Tegineneng.

Popowia nitida King, J. Asiat. Soc. Bengal 61 (1893) 92. — Type: *King s.n.* (lecto K, here designated), India, South Andaman Islands, Hobdaypur, 4 July 1891.

Climber, (2–)8–10(–15) m. Young twigs pubescent, later glabrous, brown-black and finely striate; lenticels indistinct on the young twigs, later very pale and quite somewhat distinct. *Leaves* thinly coriaceous, adaxially glabrous except for the densely pubescent midrib, abaxially sparsely pubescent, drying rusty-brown or black; lamina oblong-elliptic, (2.5–)3–8(–14) by (2–)5.5–8 cm, base shortly cuneate or rounded, apex acuminate or acute; nerves 8–15 pairs, curving irregularly often dividing into two before reaching the margin, faint on both surfaces; petiole 1.5–3 mm long, channelled above, sparsely pubescent. *Inflorescence* of 2 flowers, initially sub-terminal then appearing opposite due to continued sympodial growth, up to three inflorescences per branch. Peduncle woody, sparsely pubescent, 0–3 mm long; pedicels pubescent, 2–7(–10) mm long; bracts pubescent, chartaceous, ovate, 4–5 by 3.5–4 mm; bracteoles pubescent, ovate, c. 2 mm long, attached c. halfway along the pedicel. Sepals 3, broadly ovate-rounded, obtuse, 2–2.5 by 2.5 mm, abaxially pubescent. Petals 6, ovate, green,



Map 5. Distribution of *Cyathostemma micranthum* (A.DC.) J. Sinclair.

yellow, orange, red or brown, inner petals 4.5–5 by 3 mm, outer petals 4 by 3 mm, apex acute, both whorls pubescent. Stamens 0.8–1 mm long, connective apices rounded or truncate; anthers introrse. Carpels c. 1 mm long, ovules 4–6. Ripe monocarps glabrous, 12–20 by 10 mm, red to black, stipes 3–10 mm long, perianth segments sometimes remaining below the fruiting torus. *Seeds* 1–2(–4).

Distribution — From Burma and the Andaman Islands through Malesia into North Australia. This is the most widely distributed species.

Note — This species is distinguished by the small leaves 4–6 cm long, always less than 12 cm, small monocarps less than 20 mm long, stipes of the monocarps less than 10 mm long, and the terminal or extra-axillary inflorescence of red, orange, or yellow-green flowers.

7. **Cyathostemma siamensis** Utteridge, *spec. nov.*

Differt a *Cyathostemma wrayi* foliis parvis, nervis intra marginem arcuatis confluentibus, lenticellis conspicuis et pedunculis gracilis et ramis. — Typus: *Kostermans 428* (holo L; iso K), Thailand, South Western: Kanchanaburi [Tripagodas, Burmese border (Kwae Noi River Basin Expedition)].

Large climber. Young twigs and buds pubescent, becoming glabrous when mature, dark brown-grey and slightly striate; lenticels distinct on the older twigs. *Leaves* coriaceous, glabrous above and below except for the pubescent midrib and secondary veins, drying pale brown; lamina elliptic-obovate, 6–14.5 by 3–4.5 cm, base rounded or cuneate obtuse, apex attenuate; nerves 8–10 pairs, brochidodromus, interarching 3–4

mm from the margin; petiole 3–7 mm long, densely pubescent when young, less so with age. *Inflorescence* of 3–5 flowers terminal or cauliflorous, when terminal growth then continuing sympodially. Peduncles woody, densely pubescent, 15–25 mm long; pedicels densely pubescent, 7–12 mm long; bracts adaxially glabrous, abaxially pubescent, chartaceous-sub-coriaceous, 2–3 mm long; bracteoles similar to the bracts, attached c. half to two thirds along the pedicel. Sepals 3, broadly ovate, 4 by 5–6 mm, apex rounded, glabrous adaxially, sparsely pubescent abaxially. Petals 6, broadly ovate, whitish-green, 6–9 by 5–9 mm, apex rounded, pubescent like the sepals. Stamens c. 5 mm long, connective apices ligulate; anthers latrorse to slightly extrorse. Carpels 4–5 mm long, angular, pubescent along their length. Ripe monocarps unknown.

Distribution — Type locality.

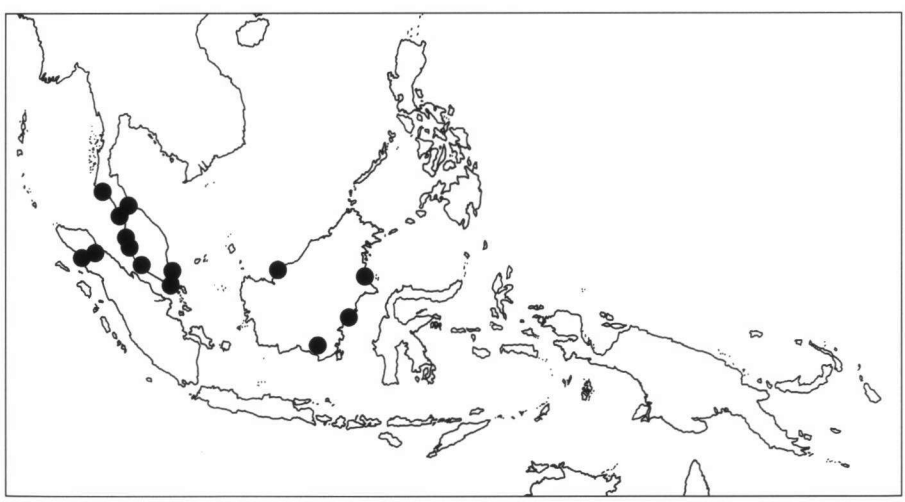
Note — This species is close to *C. wrayi*, but differs in the smaller elliptic-obovate leaves drying rusty brown, conspicuous lenticels, with more flowers per inflorescence, and having a branched inflorescence.

8. Cyathostemma viridiflorum Griff. — Map 6

Cyathostemma viridiflorum Griff., Not. pl. Asiat. 4 (1854) 707; Ic. pl. Asiat. 4 (1854) t. 650; King, J. Asiat. Soc. Bengal 61 (1893) 8; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 12, f. 37; Ridl., Fl. Malay. Penins. 1 (1922) 27; J. Sinclair, Gard. Bull. Sing. 14 (1955) 221; Keßler & Heusden, Rheedea 3, 1 (1993) 62. — Type: *Griffith 432* (lecto K, here designated), Malaysia, Malacca.

Cyathostemma scortechinii King, J. Asiat. Soc. Bengal 61 (1893) 9; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 12, f. 38. — *Cyathostemma viridiflorum* var. *scortechinii* (King) Ridl., Fl. Malay Penins. 1 (1922) 27. — Type: *King's collector (Scortechini) 5857* (lecto K, here designated; iso BM), Peninsular Malaya, Perak, Gopeng.

Climber, 15–25 m long. Young twigs slightly pubescent, later glabrous, dark brown-black and finely striate; lenticels indistinct. *Leaves* coriaceous, glabrous except for the pubescent adaxial midrib, drying light blue-green; lamina oblong-elliptic or oblong-lanceolate, (8–)12–17(–27) by 5.5–8 cm, base emarginate or rounded, apex acute;



Map 6. Distribution of *Cyathostemma viridiflorum* Griff.

nerves 10–13 pairs, distinct above and prominent on the lower surface, curving irregularly to the margin, interarching near the margin in a broken line, reticulation visible but not prominent; petiole 6–12 mm, channelled above with transversely arranged lenticels, pubescent. *Inflorescence* cauliflorous, each cyme producing up to 25 flowers of which only 2 will be at anthesis at any one time. Peduncles densely pubescent, pendulous, 2.5–8 cm long; pedicels pubescent, 6–9 mm long; bracts pubescent, coriaceous, 3–4(–6) mm long, persisting after the flowers have fallen; bracteoles similar in size and shape to the bracts and attached c. halfway along the pedicel. Sepals 3, broadly ovate, 3 by 3–5 mm, apex obtuse or acute, connate at the base, abaxially rusty-tomentose. Petals 6, broadly ovate, both whorls with a rudimentary claw, greenish yellow sometimes orange, 5–6 by 4–5 mm, apex acute. Stamens c. 2 mm long, apex papillate; connective apices bluntly ligulate, truncate. Carpels 3–4 mm long, pubescent, ovules 16, lateral in two rows. Ripe monocarps glabrous, oblong-ovoid, 2.5–4 cm long, 15–20 mm wide, with irregular bulges due to the seeds, stipes c. 2 cm long. *Seeds* 7–10.

Distribution — Peninsular Malaysia, Sumatra and Borneo.

Note — This species is distinguished by its elongated peduncle, and cymes of up to 25 flowers which are represented by persistent bracts on the inflorescence. The only specimen which can be considered to have been definitely examined by Griffith, and therefore the original material from which he published *C. viridiflorum,* is *Griffith 432* (K). This specimen is therefore selected as the lectotype.

9. **Cyathostemma wrayi** King

a. var. **wrayi** — Map 4

Cyathostemma wrayi King, J. Asiat. Soc. Bengal 61 (1893) 9; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 12; Ridl., Fl. Malay Penins. 1 (1922) 27; J. Sinclair, Gard. Bull. Sing. 14, 2 (1955) 224. — Type: *Scortechini 1316* (lecto K, here designated), Malaysia, Perak.

Climber, 40 m long. Young twigs minutely pubescent, later glabrous, dark brown and distinctly striate; lenticels indistinct. *Leaves* chartaceous-coriaceous, glabrous adaxially except for a few hairs on the midrib, sparsely abaxially, drying olive-green; lamina oblong-obovate or broadly oblanceolate, (10–)16–25(–29) by 6–10 cm, narrowed to the emarginate base, acuminate with acumen 2–3 cm long, sometimes acute; nerves 10–14 pairs, curving but not evenly, impressed above, prominent beneath, interarching distinctly about 5 mm from the margin, reticulation distinct on both surfaces, especially on the lower; petiole 4–6 mm long, pubescent. *Inflorescence* of 1 or 2 flowers, opposite the leaves arising from tubercles on the older wood. Peduncles woody, sparsely pubescent, up to 2 cm long. Pedicels sparsely pubescent, c. 1 cm long; bracts sparsely pubescent, broadly ovate, c. 3 mm long; bracteoles similar to bracts, attached c. halfway along the pedicel. Sepals 3, ovate, c. 3 by 4 mm, acute, rufous-pubescent abaxially, glabrous adaxially. Petals 6, coriaceous and slightly warty, ovate-orbicular with an incurved base or rudimentary claw, inner whorl narrower with a more distinct claw, yellow-green, 8–10 by 10 mm, apex sub-acute, outer whorl minutely puberulous. Stamens c. 1.5 mm long; connective apices truncate; anthers latrorse-introrse. Carpels

c. 2 mm long, pubescent. Ripe monocarps glabrous, ovoid, reddish, 1–1.5 cm long; stipes c. 1 cm long. *Seeds* 1 or 2.

Distribution — Vietnam to Peninsular Malaysia.

Note — *Cyathostemma wrayi* is recognised by the large almost glabrous leaves, with 2 cm long peduncles which become woody and tuberculate, and the large, c. 10 by 10 mm petals.

b. var. **indochinensis** Ast

Cyathostemma wrayi var. *indochinensis* Ast, Notul. Syst. (Paris) 9 (1940) 86. — Syntypes: *Poilane 15387* (P n.v.), Cambodia, Mimot; *Poilane 21936* (P), Vietnam, Annam; *Poilane 22517* (P n.v.), ibid.

Climber. *Leaves* acute-acuminate, 25–28 by 5–9 cm, nerves 15–17 pairs. Ripe monocarps red, 1–1.5 cm long.

Distribution — Cambodia and Vietnam.

Note — This variety apparently differs from var. *wrayi* because of the narrower leaves, much longer acumens, and more secondary veins. The petal whorls are oval-orbicular, and never acute at the tip, and the ovary is glabrous only at the base. The only specimen the author has seen is *Poilane 21936* (P), which has acumens within the range of var. *wrayi*, although the secondary veins are greater in number and the leaves slightly thinner. The author is unable to establish if this variety is distinct.

10. **Cyathostemma yunnanense** Hu — Map 1

Cyathostemma yunnanense Hu, Bull. Fan Mem. Inst. Biol. 10 (1940) 121; Tsiang & P.T. Li, Fl. Reipubl. Pop. Sin. 30 (1979) 28, t. 11. — Type: *Wang 74879* (holo PE n.v.; iso GH), China, Yunnan province, Fo-Hai.

Cyathostemma vietnamense Bân, Bot. Zhurn. 59 (1974) 1157. — Type: *To Thuc Vat 1823* (holo LE), Vietnam, Tonkin, Yen bai, Dong tam. Paratype: *To Thuc Vat 1823A* (LE), ibid.

Climber to c. 3 m long. Young twigs pubescent, becoming glabrous when mature, dark purple-brown and striate; lenticels indistinct. *Leaves* chartaceous, glabrous except puberulous along the slender elevated midrib and secondary veins and reticulate above, sparsely pubescent along the prominent midrib and elevated secondary veins and reticulate beneath, drying green or pale green-yellow; lamina obovate, 7–17(–20) by 5.5–9 cm, rounded to sub-cordate at the base, apex cuspidate; nerves 12 or 13 pairs, arching and forming loops near the margins; petioles channelled above, 5–6(–8) mm long, pubescent or glabrescent. *Inflorescence* few-flowered in extra-axillary cymes. Peduncles absent; pedicels sparsely pubescent, 1–1.5 cm long; bracts sparsely pubescent, foliose, ovate-orbicular, 4.5–5 mm long; bracteoles similar, attached c. one third to halfway along the pedicel. Sepals 3, pubescent. Petals 6, coriaceous, broadly ovate, 6–7 by 5–7 mm, apex obtuse, pubescent at the apex both inside and outside. Stamens 2.5–3.5 mm long; connective apices bluntly ligulate; anthers introrse. Carpels pubescent along their length, 3.5–4.5 mm long; ovules (4–6)–14 in 2 rows. Half-grown monocarps pubescent, ripe monocarps unknown.

Distribution — China and Vietnam.

Note — Tsiang & P.T. Li (1979) note that *C. vietnamense* differs only in the number of ovules (*C. vietnamense* 4–6, *C. yunnanense* 14), but they were unable to see the

type material. *Cyathostemma vietnamense* is included in *C. yunnanense* here, since the author has seen the type material of both taxa and concludes that they are the same, the only difference being ovule number. *Cyathostemma yunnanense* is closely allied to *C. argenteum*, differing only in leaves being more chartaceous, petals never red. These two taxa may be conspecific, or *C. yunnanense* may be better placed as a subspecies of *C. argenteum*. More material of these two taxa needs to be collected, especially from Vietnam, Thailand and South China, before any taxonomic decision can be made.

DUBIOUS TAXA

Cyathostemma acuminatum King, J. Asiat. Soc. Bengal 61 (1893) 10; Ann. Roy. Bot. Gard. (Calcutta) 4, 1 (1893) 13. — Type: *Wray 3468* (?CAL not traced), Malaysia, Upper Perak.

Note — This taxon is described as having hermaphrodite and female flowers. The type has not been seen, although no other material of *Cyathostemma* examined has gynodioecious flowers. Sinclair (1955) doubted the integrity of this taxon, and noted that from the description it seems very like *C. wrayi*.

EXCLUDED TAXA

Uvaria borneense (Merr.) Utteridge, *comb. nov.* — *Tetrapetalum borneense* Merr., Univ. Calif. Publ. Bot. 15 (1929) 64. — Type: *Elmer 21211* (lecto K, here designated; iso BM, IBSC, L, NY n.v., P), Malaysia, Sabah, Tawau.

Uvaria lambirense (K. Momose) Utteridge, *comb. nov.* — *Tetrapetalum lambirense* K. Momose, Blumea 43 (1998) 117. — Type: *K. Momose 5069* (holo KYO n.v.; iso L (photo!), SAR n.v.), Malaysia, Sarawak, Lambir Hills National Park, Miri.

Note — Neither of these taxa are members of *Cyathostemma* because of the petals which enlarge and reflex at anthesis, and are better placed in *Uvaria*. It is interesting to note that *T. borneense* possesses a hirsute stigma, a character not found within members of *Cyathostemma*. The type specimen of *T. borneense* at BM includes fruiting material which is not Annonaceous.

Cyathostemma grandifolium K. Schum. & Lauterb. = *Haplostichanthus longirostris* Heusden.

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LIST OF COLLECTIONS

Cyathostemma
1 = *argenteum*
2 = *excelsum*
3 = *glabrum*
4 = *hookeri*
5 = *longipes*
6 = *micranthum*
7 = *siamense*
8 = *viridiflorum*
9 = *wrayi*
10 = *yunnanense*

Uvaria
11 = *borneense*
12 = *lambirense*

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Carr 11088: 6; 11509: 6 — Chin 1077: 9 — Church et al. 821: 4 — Clemens 21341: 1; 26541: 4; 31146: cf. 2; 31534: 6; 32081: cf. 2 — Cockburn & Saikeh SAN 70051: 2 — Collins 162: 6; 1582: 6 — Coode 6758: 2; 7661: 2 — Corner SFN 29460: 8 — Curtis 50: 2; 1213: 4; 2808: 6; 3015: 6; 3018: 6; 3505: 8.

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The number after each name is the number of the species in the text; (dub.) = dubious taxa; (excl.) = excluded taxa. Accepted names are printed in roman, synonyms in *italics*, new names in **bold**.