

New Species of, and Other Notes on, *Chisocheton* and *Walsura* (Meliaceae)

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Abstract

Chisocheton maxilla-pisticis Mabb., from Sabah, Malaysia, and Palawan, Philippines, and *C. velutinus* Mabb., from Sarawak, Malaysia, and Brunei, are described as new. A third new *Chisocheton* species, from Sarawak, is so far known only from a single fruiting specimen. *Walsura pinnata* Hassk. *sensu* T.Clark includes a number of distinctive Bornean entities, two of which are here afforded or re-afforded specific rank: *Walsura decipiens* Mabb., from northern Borneo and *W. grandifolia* Ridl. from the Sarawak limestone. *Chisocheton nicobarianus* Debnath & Sreek. is reduced to *C. macrophyllus* King, which is lectotypified here, while *Walsura yunnanensis* C.Y.Wu from China is reduced to *W. pinnata sensu lato* (*W. cochinchinensis* (Baill.) Harms).

Introduction

In preparing the text of Meliaceae for the *Tree Flora of Sabah and Sarawak*, it became clear that new *Chisocheton* species signaled in the author's monograph (1979; see also 1995) could now be described using materials collected since its publication. Examination of Borneo materials assigned by Clark (1994) to *Walsura pinnata* Hassk., a perplexingly variable species, has shown that two distinct species, one of them new, are better segregated from it. In passing, notes on allied taxa from outside Borneo are included.

Chisocheton Blume

1. *Chisocheton maxilla-pisticis* Mabb., sp. nov., Fig. 1

Chisocheton, *C. macrophylo* King *affinis*, *indumento dense-fulvo, foliolis costis paucioribus, pseudogemmula hiante vix circinnata, maxilla pisticis simulante, floribus pusillioribus, differt.* **Typus:** Malaysia, Sabah, Telupid, Pinangah F.R., 10 July 1993, Sawan Tingki SAN 136830 (holo SAN!, iso KEP!, SAR!).

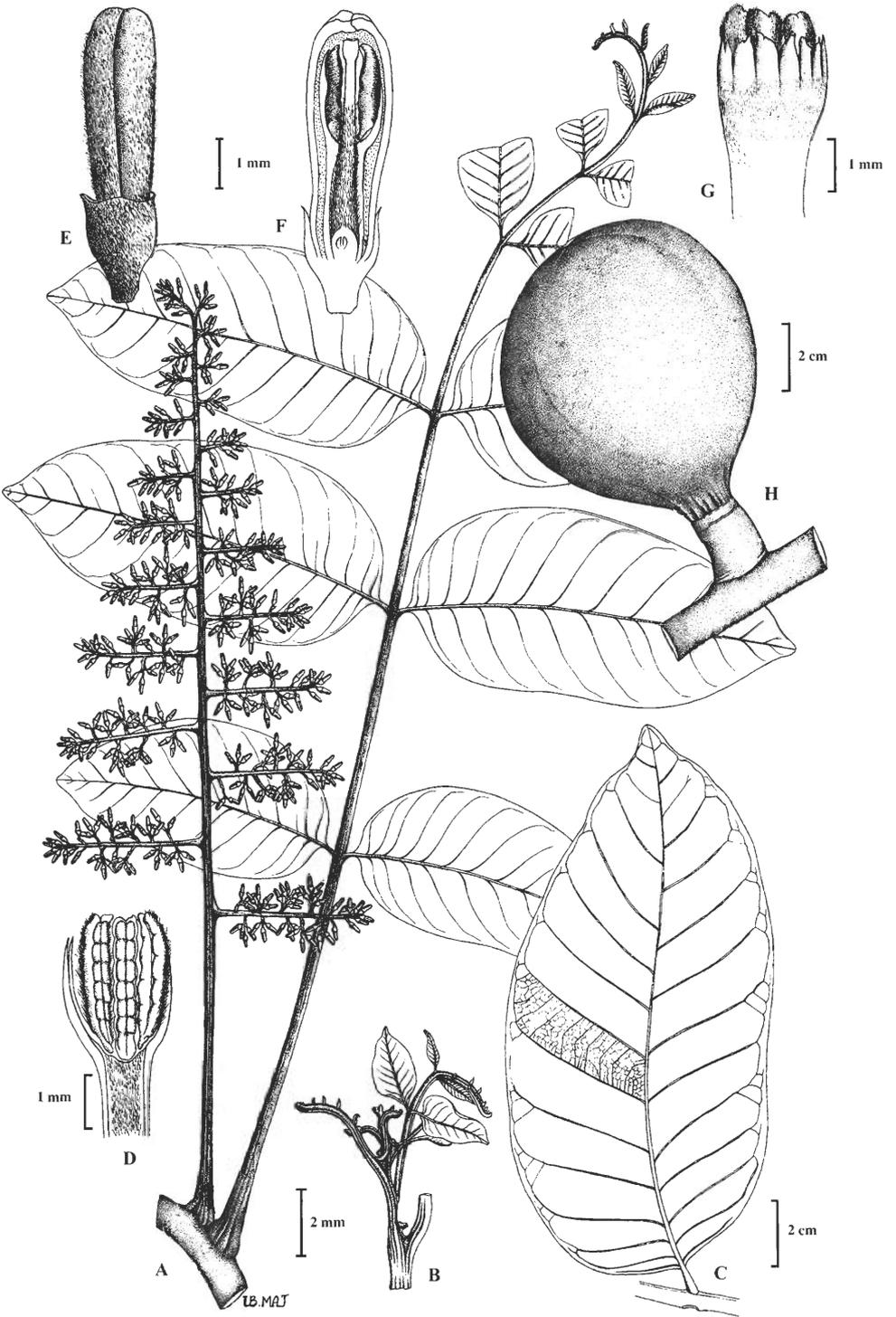
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Rather pachycaul tree with sparsely branched crown to 45 m tall; fluted bole to 90 cm diameter with steep buttresses to 1(–3) m tall. **Bark** smooth to scaly, markedly lenticellate; inner bark reddish brown; sapwood pale yellowish white. **Twigs** brown, with longitudinal cracks, cicatrices conspicuous, latex white. Leafy twigs 1.2–1.5 cm diameter, fulvous-tomentellous. **Leaves** in dense terminal spirals, to 1.3 m long, pseudogemmate; petioles 8.5–16.5 cm long, more or less angled or grooved, like rachis, indumentum sericeous to pilose; leaflets in up to at least 17 pairs, oblong-ovate, weakly falcate, to 21 x 8.5 cm, rather fleshy (Pennington), young ones brownish or reddish, densely pilose on midrib and costae, also abaxially scattered between veins, bases asymmetrical, rounded or, particularly in juveniles, cuneate, apices acute to shortly acuminate, costae *c.* 17 on each side, spreading, rather prominent adaxially *in sicco*, petiolules to *c.* 9 mm long, densely pilose; pseudogemma of rather unfurled leaflets, densely long-hairy. **Thyrse** to 50 cm long, narrowly paniculiform, tomentellous; peduncle *c.* 18 cm long, branches rather distant, to 10 cm long, squarrose; ultimate branchlets cymulose, many-flowered; pedicels tomentellous. **Calyx** *c.* 2 mm tall, cupular, sericeous, margin truncate to weakly 4-lobed. **Petals** 4 or 5, *c.* 11 mm long, *c.* 1.8 mm wide, linear-spathulate, sericeous without, glabrous within, imbricate, apices concave (corolla clavate in males). **Staminal tube** swollen at mouth, weakly adherent to petals at base, hairy at least along interlobe sutures near apex without, hairy within, margin with 6–8 linear, more or less 2- or 3-toothed, lobes to 2.5 mm long; anthers 5–8(9), *c.* 2 mm long, oblong, locellate, basifixed, slightly exerted. **Disc** obscure. **Ovary** 4-locular, sericeous; style sericeous in proximal 5/6; stylehead subcylindrical with flattened apex. **Infructescences** to 30 cm long, axillary or on twigs behind leaves. **Capsule** spherical, to at least 9 cm diameter, reddish brown, latex white; pedicel to 9 mm across. **Seeds** unknown.

Other material seen: SABAH: Kinabatangan, Tedong, 21 July 1962, *Singh SAN 31087* (K!, L!, SAN!, SAR!); Lahad Datu, Kretam, 28 May 1954, *Wood SANA 4769* (KEP!, L!, SING!), Lahad Datu, road to Taliwas, Danum Valley, 24 June 2000, *Madani et al. SAN 143512* (SAN!); Ranau, Lohan F.R., 28 Oct 1963, *Pennington 7934* (FHO!, K!, KEP!, L!, SAN!); Sandakan, Sepilok, boundary between Compts 4 & 5, 22 Oct 1963, *Pennington 7915* (FHO!, L!, SAN! = *Meijer SAN 39141* (SAN!)), Sg. Daghat 1960 Coupe, 18 Oct 1961, *Meijer SAN 27861* (SAN!), 'Keratam lineated land', 27 May 1983, *Sigin & Lideh SAN 97058* (SAN!); Tawau, Kalabakan, 30 miles WNW of Tawau, 24 April 1954, *Wood SANA 3696* (KEP!, L!, SING!). KALIMANTAN: Loa Haur.

Figure 1.

Chisocheton maxilla-pisticis. A, flowering twig; B, young leafy shoot, C, older leaflet; D, adaxial view distal part of staminal tube; E, flower bud; F, longitudinal section of flower bud; G, abaxial view of distal part of staminal tube; H, fruit. (A from *SAN 31087*, B from *SAN 136830*, C from *Pennington 7915*, D–G from *SAN 31087*, H from *SANA 4769*.)



west of Samarinda, 60 m, 12 May 1952, *Kostermans* 6834 (A!, K!, KEP!, L!); Nunukan (northern part), 2 Dec 1953, *Kostermans* 8897 (K!, L!, SING!); W Kutei, Kelindjau River, 12 June 1954, *Kostermans* 9571 (K!, L!, SING!), *bb* 16168 (SING!); SE Borneo, Tidoeng vicinity, 15 m, *bb* 17894 (L!); Berouw, 400 m, 4 July 1934, *bb* 19239, (L!). PHILIPPINES: Palawan, Pagdanan Range, Ibanglely Brookside Hill, 21 Apr. 1984, *Ridsdale SMH* 496 (KEP!).

Habitat: Lowland dipterocarp forest.

Notes: Some older sterile and fruiting specimens were previously referred with a '?' (Mabberley, 1979: 346) to the closely allied *Chisocheton macrophyllus* King, which does not occur in the *Tree Flora* area. The specific epithet, meaning shark-jaw, refers to the open pseudogemmula characteristic of the leaf of this tree.

2. *Chisocheton velutinus* Mabb., sp. nov., Fig. 2

Chisocheton. *C. erythrocarpum affinis*, sed inflorescentia longiore facile separanda est. In ser. *Sandoricocarpis indumento velutino distincta* est. **Typus**: Wong 1536, Brunei, Temburong Dist., Bt. Belalong, west ridge from summit, 650 m, 23 July 1989 (holo SAN!; iso KEP!, SAR!, SING!).

Tree to 25 m tall; bole to 35 cm diameter with small buttresses. **Bark** smooth, medium brown to greyish, hoop-marked, inner bark pinkish to reddish brown; sapwood straw; buttresses to 1.3 m x 7.5 cm. Leafy twigs 1.2–2.5 cm diameter. **Leaves** to 1 m long, pseudogemmulate; petioles 10–15 cm, more or less angled, like rachis, fulvo-velutinous; leaflets in up to at least 12 pairs, oblong, to 24 x 9 cm, minutely pubescent on sunken midrib, densely velutinous on abaxial surface, bases asymmetrical, rounded, apices shortly acuminate, lateral veins 15–17 on each side, spreading, rather prominent adaxially *in sicco*, petiolules to 9 mm long. **Thyrse** to 40 cm long, paniculiform, velutinous; branches rather distant, to 13 cm long; ultimate branchlets cymulose, few-flowered; pedicels densely pubescent. **Calyx** c. 6 mm tall, cupular, pubescent, green, margin very obscurely 4-lobed to truncate. **Petals** 4(5), linear-spathulate, to 16 mm long, imbricate, puberulous to pubescent without, glabrous within, cream. **Staminal tube** cream, weakly adherent to petals at base, more or less hairy without, margin with 6–8 2-toothed lobes to 1 mm long; anthers 6–8, oblong, c. 3 mm long.

Figure 2.

Chisocheton velutinus. A, flowering twig; B, flower buds; C, longitudinal section of flower bud; D, abaxial view of staminal tube; E, adaxial view of staminal tube; F, young new shoot; G, older leaflet; H, fruit. (A–E from Wong 1536, F–H from Kirkup et al. 940.)



locellate, basifixed, apices within the tube. **Disc** obscure. **Ovary** 4-locular, sericeous; style more or less glabrous; stylehead shortly cylindrical. **Infructescences** to 30 cm long, axillary or on twigs behind leaves. **Capsule** globose, c. 5 cm diameter (immature), rostrate when young, velutinous, yellow turning red.

Other material seen: Restricted to Borneo. SARAWAK: Ulu Luak, Sg. Setap road, Miri, 15 May 1964, *S* 21307 (K!, SAR!, SING!); Kapit, Ulu Merit, Ng. Sebatong, 6 Oct 1969, *S* 28793 (K!, SAR!, SING!). BRUNEI: Temburong, Bt. Belitun, 29 Jan 1994, *Kirkup et al.* 940 (K!, KEP!, SAN!, SAR!, SING!). KALIMANTAN: Balikpapan, *Kostermans* 10024 (L!); Peak of Balikpapan (G. Beratus), sandstone, 700 m, 9 July 1952, *Kostermans* 7383 (K!, SING!); Sg. Wain region, N of Balikpapan, 30 m, *Kostermans* 4175 (SING!).

Habitat: Rain forest at altitudes to 650 m.

Notes: Some of the older fruiting specimens cited above (*Kostermans* 7383, *Kostermans* 10024 and *S* 28793) were tentatively placed under *Chisocheton* species B (Mabberley 1979: 372; 1995: 186). The remaining specimens from the *Tree Flora* region cited there (*S* 25844 from Kapit, Melinau, Ulu Sapurau, Bt. Salong, Sarawak (K!, SAR!), with flowers are in bud) is the flowering element used in that description and remains the only flowering material I have seen of that tree. Apparently conspecific with it is the fruiting specimen *S* 45515 (from the 7th Division, Belaga, Linau, Sg. Iban in Sarawak (FHO!, L!, SAR!), collected as *C. medusae*).

3. *Chisocheton* sp. nov. aff. *diversifolius* Miq.

Collected as *Aglaia affinis* Merr. [= *A. odoratissima* Blume], this fruiting collection of a 4 m tall treelet (*P.C. Yü* *S* 48450, Sarawak, 7th Division, Batang Balleh, Bukit Melatai, Camp 2; FHO!, SAR!) has delicate twigs with 7-jugate leaves, with very narrow multi-veined leaflets 5–6 times as long as wide, and a very delicate fruiting rachis c. 20 cm long with pubescent spherical fruits 3–4 cm diameter. It appears to be close to *C. diversifolius* Miq. from Sumatra, but that rarely collected treelet is known for certain only in flower and has broader leaflets (see Mabberley 1979: 358; 1995: 174).

4. *Chisocheton nicobarianus* Debnath & Sreek.

The only other species described in the genus since the author's monograph, now almost a quarter of a century old, is *Chisocheton nicobarianus* Debnath & Sreek.

from the Nicobars. Examination of an isotype shows it to be conspecific with *C. macrophyllus* King:

Chisocheton macrophyllus King in J. Asiat. Soc. Bengal 64(2) (1895) 32; Mabb. in Bull. Brit. Mus. Nat. Hist. Bot. 6 (1979) 345. **Type:** (lectotype [selected here from King's syntypes] *Curtis* 2469, Peninsular Malaysia, Penang, 'Polo Boeting' (CAL!); isolectotypes BM!, K!, K [ex SING!]). **Synonym:** *C. nicobarianus* Debnath & Sreek. in J. Econ. Tax. Bot. 16 (1992) 553. **Type:** *Dwivedi* 8541, Gt Nicobar, Laful forest, 18 May 1981 (holo CAL, *n.v.*; iso L!, PBL *n.v.*). **syn. nov.**

Note: This brings the total number of species in the genus to 53, with 22 in Borneo (11 restricted to that island), all of which are found in the *Tree Flora* area.

Walsura Roxb.

In his revision of the genus *Walsura*, Clark (1994: 249, 279) discussed the variation in his concept of *W. pinnata* Hassk. and proposed informal entities for the major variants he recognised. In Sabah, these are the typical '*pinnata*', represented by *SAN* 86994 (SAN!, SAR!) from Keningau in Ranau district, and also his '*villamilii*' represented by *SAN* 57288 (SAN!, SAR!) from Lahad Datu, Sandakan, which has leaves with seven or nine, as opposed to five, leaflets with some costae failing to reach the leaf margin, but otherwise intergrading with '*pinnata*', the form found throughout most of the range of this tree which, according to Clark (1994: 279, fig. 12) is distributed from the mainland SE Asia to Peninsular Malaysia, Borneo, the Philippines and NW New Guinea.

Although there is a wide range of costa number in the leaflets of Sabah specimens, the great majority fall into Clark's broadly circumscribed *W. pinnata*, though specimens with a very small number of leaflet costae (6 or 7 as opposed to 14–19) and short inflorescences and infructescences (e.g. *SAN* 30551 and *SAN* 31339; both in SAN!, SAR!) from Tawau, and *SAN* 44553 (SAN!, SAR!) from Keningau, seem rather distinctive, at least within the *Tree Flora* area.

Moreover there is a small number of other sheets included by Clark and these are more clearly separable and indeed represent a distinct species described below.

1. *Walsura decipiens* Mabb., **sp. nov.**, Fig. 3

Walsura, *W. trichostemon* Miq. *affinis sed foliolis ovatis-acuminatis glabris facile distinguenda est.* **Typus:** *Meijer* *SAN* 36201, Sabah, Labuk Rd mile 25.5 (holo SAN!; iso K!, KEP!, L!, SAR!, SING! [duplicate ('Burseraceae') also sent to BO, *n.v.*]). **Synonym:** *W. pinnata* Hassk. *sensu* Clark (1994: 276, 300), *p.p.* & (1995: 48), *p.p.*

Tree to 28 m tall with bole to 6 m, 30 cm diameter. **Bark** scaly, outer bark dark reddish brown, inner bark pinkish red. Young twigs pale brown, finely sericeous, lenticellate, leafy ones *c.* 4–5 mm diameter; apical buds strongly fulvous-hairy. **Leaves** to 25 cm long, 2-jugate; petiole 3–5 cm long, terete; leaflets 5.5–14.5 x 2.0–4.5 cm, the apical larger than laterals, ovate, articulated at petiolule apices, glabrous, somewhat glaucous abaxially *in sicco*, base acute, apex acuminate, costae 8–12 on each side, arising almost at right angles to midrib but strongly arcuate, looping together but not reaching margin; petiolules 8–18 mm long, that of apical leaflet to 25 mm long, conspicuously swollen at both ends. **Inflorescences** subcorymbose cymes to 20 cm long, in axils of current flush of which apical leaves scarcely developed, all axes densely fulvous pilose; peduncle to 7 cm long, with branches to 9 cm long, bearing apical head of branchlets, each branched once or twice more and bearing cymules of 1–5 flowers; bracts to 2 mm long, usually much less, triangular, densely hairy, caducous; pedicels *c.* 1 mm long; bracteoles 0.5–1 mm, triangular, densely hairy, persistent. **Calyx** *c.* 0.8 mm high, green, lobes broadly triangular, apices rounded to acuminate, very hairy without. **Petals** oblong, *c.* 3 mm long, *c.* 1 mm wide, white, hairy without, apex obtuse. **Stamens** 10, with the filaments alternately long and short, the longer almost as long as petals, weakly bifid, apically strigose, pale green; anthers *c.* 0.7 mm long, ovate, apiculate, sparsely hairy, bright yellow, inserted between 2 apical lobes. **Disc** fleshy, annular. **Ovary** glabrous; style to 1.2 mm long; stylehead flattened with apical papilla and peripheral flange. **Fruits** ellipsoid, 2.5–3 cm long, brownish green tomentellous, apex usually apiculate. **Seed** 1, ellipsoid.

Other material seen: Restricted to the northern parts of Borneo. SABAH: Nabawan, Sg. Millian, 7 Nov 1986, *Krispinus* SAN 118575 (L!, SAN!); Sandakan, Lungmanis Timber Camp, 9 Aug 1962, *Mikil* SAN 31560 (KEP!, L!, SAN!, SAR!); Tawau mile 12.5 Kalabakan road, 25 July 1962 (first record), *Aban Gibot* SAN 30552 (KEP!, L!, SAN!, SAR!); Keningau, Saang Lian logging area, LANAS, 28 Oct 1986, *Krispinus* SAN 118523 (E!, K!, KEP!, SAN!). SARAWAK: Baram, Batang Tinjar, Ulu Sg. Sekiwa, Long Kerangan, 1 Sept 1974, *Tong S* 35017 (KEP!, L!, SAN!, SAR!).

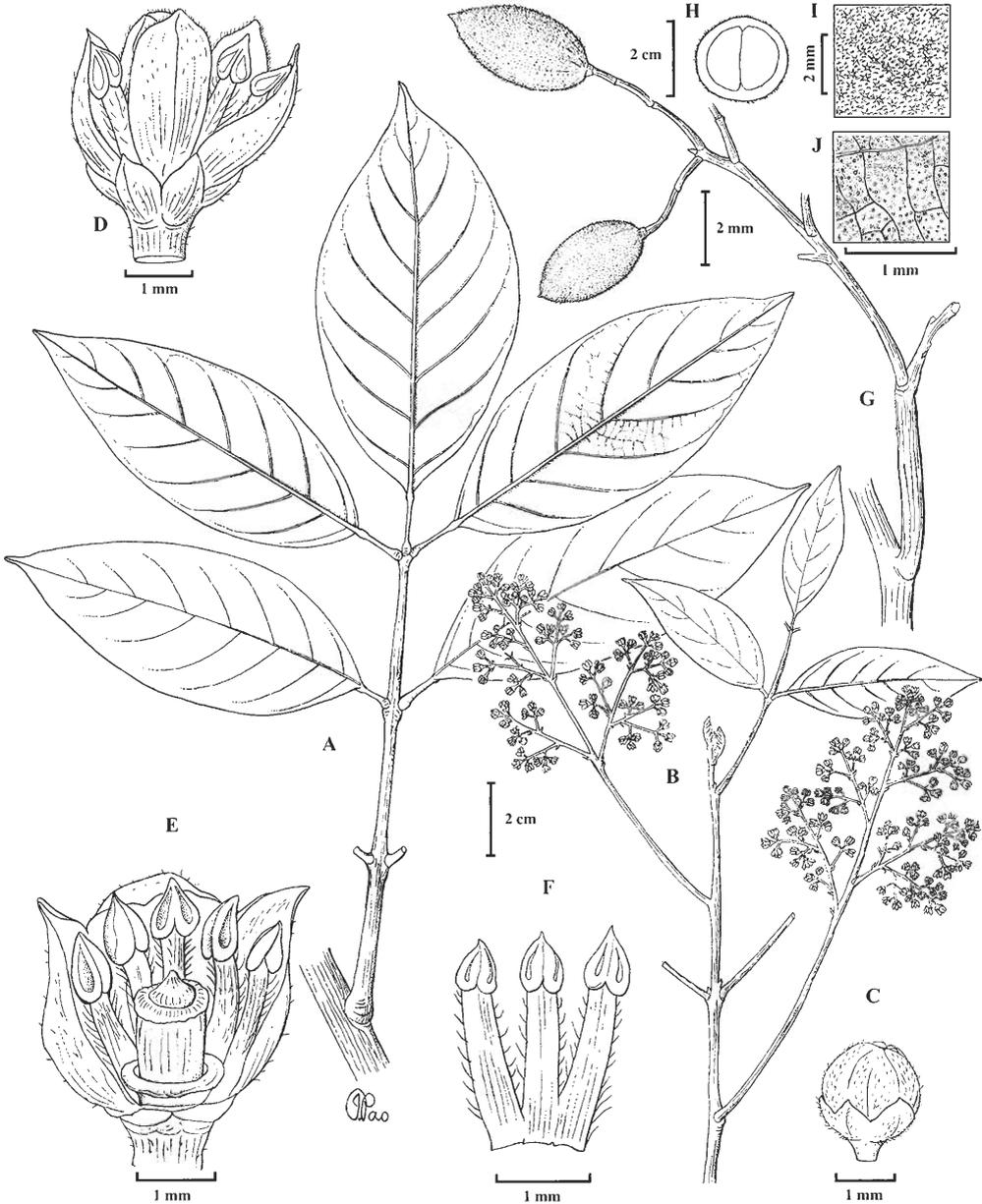
Habitat: Rain forest, at least sometimes on sandstone, to 150 m.

Notes: The only flowering material known to me is that of the type.

Plants of this species have misled many field collectors who have referred

Figure 3.

Walsura decipiens. A, leafy twig; B, flowering twig; C, flower bud; D, open flower; E, open flower with some sepals and petals removed; F, stamens; G, fruiting twig; H, cross-section of fruit; I, indumentum of fruit wall; J, indumentum of lower leaflet surface. (A from SAN 31560, B–F from SAN 36201, G–J from S 35017.)



them variously to *Dialium* (Leguminosae), Burseraceae and to several genera in the Sapindaceae, curators filing them variously (and even in Lauraceae), so the wide deception is commemorated in the specific epithet.

2. *Walsura grandifolia* Ridl.

In Sarawak, 'typical' *Walsura pinnata* has rarely been collected, though forms with a wide range of costa number (see above) are preserved (e.g. *S* 64519 from Kuching (SAR) and *S* 23959 (SAR) [18 or 19 costae], *Pennington 8000* [8 or 9] (SAR) from Kapit), but *S* 35017 from Baram District included by Clark in his broad concept of the species is here referred to *W. decipiens* (see above).

Some other Sarawak sheets included by Clark constitute another discrete entity worthy of specific rank, much as he has afforded the striking stout-shooted *W. pachycaulon* Mabb. ex T. Clark. (Clark, 1994). These distinctive specimens, with very large rugose leaflets and long inflorescences, were collected from treelets apparently restricted to limestone and they include the type of *W. grandifolia* Ridl., which is here resurrected from Clark's synonymy, bringing to 16 the number of extant species of *Walsura* now recognised, seven in Borneo (to which six are restricted), all recorded in the *Tree Flora* area.

Walsura grandifolia differs from *W. pinnata* not only in its very large leaflets, inflorescences and flowers, but also in its androecium of almost free filaments, which have no apical teeth, its larger disc and its longer cylindrical stylehead. In its androecium therefore it more approaches sect. *Surwala* (M. Roem.) Hook.f. (see Clark 1994, 1995), such that the distinction between that section and sect. *Walsura*, to which *W. pinnata* belongs, seems hardly worth maintaining. On the other hand, the third group, sect. *Ruswala* T. Clark, with the sole species *W. dehiscens* T. Clark, is marked by its distinctive dehiscent fruit and, in that, approaches *Heynea* Roxb.

Walsura grandifolia Ridl. in Bull. Misc. Info. Kew 1930 (1930) 370, *q.v.* for description, amplified in *Tree Flora* account. **Type:** *Kalong in Haviland 1635*, Sarawak, nr Kuching ['e.s.f.' = 5 Oct 1892] (holo K!; iso SAR!). **Synonym:** *W. pinnata* Hassk. *sensu* Clark (1994: 276, 300) & (1995: 48), *p.p.*

Distribution: Restricted to Kuching Division, Sarawak. Other sheets seen: Teng Bukap, mile 32 Padawan Road, *S* 32633 (SAR!); Bt Mentawa, mile 34 Padawan Road, *S* 41069 (SAR!); Bt. Bidi, Bau, *S* 50390 (L!, SAR!); and Bt. Taipu, *S* 74985 (SAR!).

Habitat: Forest on limestone at altitudes to 220 m.

Notes: Of other specimens referred to *Walsura pinnata* by Clark (1994: 300), *Mogea*

3711 (L!) is *Sandoricum borneense* Miq.; SAN 28613 (SAR!) is *Aglaiia leptantha* Miq. (and, of those referred to *Pseudoclausena chrysogyne* (Miq.) T. Clark there): Kokawa & Hotta 3069 (SAN!) = *Heynea trijuga* Roxb.; S 26985 (SAR!) = *Aphanamixis borneensis* (Miq.) Harms; S 35236 (SAR!) = *Micromelum minutum* (Forst.f.) Wight & Arn. [Rutaceae]; and S 39029 = *Aglaiia leptantha* [C.M. Pannell, pers. comm.]. Nonetheless, the rest of the perplexing complex (see diversity of costa-number and inflorescence size above) around *W. pinnata* needs further collecting and analysis in the field across its range, particularly concentrating on whether certain small flowering trees are really juvenile forms of larger ones, or comprise distinct species like *W. grandifolia*. As it stands, even shorn of all the above, *W. pinnata* still seems to me to be heterogeneous, and certainly so across its range, a conviction confirmed by a cursory examination of Peninsular Malaysian material now available.

3. *Walsura yunnanensis* C.Y.Wu

Among his 'insufficiently known species', Clark (1994: 290) has *W. yunnanensis* C.Y.Wu. Examination of the type preserved at KUN shows it to be *W. pinnata sensu lato* (*W. cochinchinensis* (Baill.) Harms), already known from Yunnan:

Walsura pinnata Hassk., *Retzia* 1 (1855) 147, 235, *sensu lato*; Clark (1994: 276), *p. maj. p.* **Type** (selected by Clark, *l.c.*): *Koorders* 971, Java, Bogor, tree no. III b 20 [grown from material coll. Hasskarl, South Bantam, Sept-Oct 1841], 26 June 1892 (neotype BO; 'clonotype' *Anon. s.n., idem*, L [Acc. 926258-685!]). **Synonym:** *Walsura yunnanensis* C.Y. Wu, *Fl. Yunnanica* 1 (1997) 226 cum tab.; Luo *et al.* in *J. Nat. Prod.* 63 (2002) 947 & *Acta Bot. Yunn.* 23 (2001) 515. **Type:** *Y.H. Li* 2927, Yunnan, Mengla, highway km. 20–37, Feb. 1961 (holo KUN!), **syn. nov.**

4. ***Walsura xizangensis*** C.Y.Wu & H.Li, referred to *Glycosmis* Corrêa (Rutaceae) by Clark (1994) on the advice of van Balgooy, has been transferred to that genus as *G. xizangensis* (C.Y.Wu & H.Li) D.D.Tao (syn. *G. motuoensis* D.D.Tao, *G. medogensis* D.D.Tao ex P.H.Huang) in *Acta Phytotax. Sin.* 32 (1994) 369, though *Glycosmis* is badly in need of a thorough overhaul.

Acknowledgments

This work was carried out as part of the *Tree Flora of Sabah and Sarawak Project* (IRPA Grant 08-04-01-0165/2003). I am greatly indebted to the Director General of FRIM, the Director of the Sabah Forestry Department, the Director of the Sarawak Forestry Department, and to Engkik Soepadmo (KEP) for arranging my involvement in the project, and to the staff at the participating organisations for their kindness and co-operation. I acknowledge the generosity

of the Keepers and Curators of herbaria (K, KEP, KUN, L, SAN, SAR and SING) for the loan of specimens and facilities rendered. I am also grateful to Anne Sing (Oxford University Herbaria) for help in checking a number of points in FHO, Ding Hou (L) with help in reading Chinese characters, Ruth Kiew (SING) for locating an isotype of *Walsura decipiens*, and to Ubaldo Majawal (SAN) and Joseph Pao (SAR) for the illustrations.

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