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REVISION OF THE GENUS CLEISTANTHUS (EUPHORBIACEAE) IN THE PHILIPPINES

STEFAN DRESSLER

Rijksherbarium/Hortus Botanicus, P.O. Box 9514, 2300 RA Leiden, The Netherlands[1]

SUMMARY

The Philippine species of the euphorbiaceous genus *Cleistanthus* are revised. Sixteen species are recognised for this archipelago of which two are recorded from there for the first time. The oldest available combination from the Philippines [*C. orgyalis* (Blanco) Merr.] remains obscure and three collections from Palawan are tentatively treated as a separate taxon (*C. spec. A*). Three species are illustrated here and distribution maps for the Philippines are given for all species.

Key words: *Cleistanthus*, Philippines, taxonomy.

INTRODUCTION

The genus *Cleistanthus* was established in 1848 by Planchon for a single species from West Tropical Africa using an unpublished name of J.D. Hooker. Before and after that several species were described affiliated to other (partly new) genera (e.g., Roxburgh, 1802; Hasskarl, 1855; Miquel, 1861; Thwaites, 1861, 1864; Müller Argoviensis, 1863) but Müller Argoviensis (1866) soon clarified the taxonomy and made the necessary new combinations in his revision of the Euphorbiaceae for De Candolle's Prodromus. Later the genus was treated in some floras or regional revisions (e.g., Bentham, 1873; Hooker, 1887; Robinson, 1908).

Jablonsky (1915) still represents the most recent complete generic treatment. With all its weaknesses his infrageneric classification is the one still adopted nowadays (cf. Airy Shaw's various papers, see below) and indeed is a handy determination tool. However, I consider it to be rather artificial in parts (e.g., sections based on indumentum of sepals, division of styles), but without having revised the full genus no other is proposed here. Therefore, the alphabetical order was used in the taxonomic part of this paper.

The Philippine *Cleistanthus* species were selected for this revision as Airy Shaw has covered nearly all other areas of the Flora Malesiana region with his treatments (1972, 1975, 1980a 1980b, 1981, 1982) apart from this island group. His paper of 1983 merely represents an uncritical enumeration of species described from there with citation of herbarium specimens housed in Kew. The history of the genus in the Philippines dates back to Blanco (1845), the famous early phytographer for this archipelago. Unfortunately, the identity of his species *Gluta orgyalis* (= *Cleistanthus*

1) Current address: Herbarium Senckenbergianum, FIS, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany. E-mail: sdressle@sngkw.uni-frankfurt.de

orgyalis) remains unclear (see below). Fernandéz-Villar in Blanco (1880), Rolfe (1884), and Vidal (1886) published on this genus, but especially Robinson (1908, 1911) contributed substantially to our knowledge on Philippine *Cleistanthus*. He described many new species, and although his species concept was rather narrow, a considerable number of them are still recognised. Later Merrill (1912, 1914, 1920, 1923) described some new species of which most did not stand a critical revision. More recently only two enumerations have been published which cover *Cleistanthus* of the Philippines (Salvosa, 1963; Airy Shaw, 1983). The main weakness of nearly all these works was the very narrow geographical scope: with this approach often species were described as new for the Philippines which were already named particularly from Borneo. So a number of 'endemic species' were created which later turned out to be of a wider distribution. A critical reassessment of the genus is presented here as a precursory paper to the forthcoming Flora Malesiana treatment of the Euphorbiaceae.

Cleistanthus forms together with *Bridelia* the tribe Bridelieae within the subfamily Phyllanthoideae of the Euphorbiaceae. Both genera have a valvate sepal aestivation and thus are easily distinguishable from other taxa. *Cleistanthus* is characterised by having 3 ovary locules, woody capsules, and an always brochidodromous secondary venation, whereas *Bridelia* has 2 locules per ovary, mostly indehiscent drupes and a craspedodromous venation with a distinct intramarginal vein in the majority of the species. As described elsewhere (Dressler, 1996) species with certain intergrading features occur (e.g., *Bridelia triplocarya* with regularly trilocular fruits, *B. stipularis* with a dehiscent drupe or fleshy capsule). For a more detailed discussion of the relationships see the above mentioned paper as well.

Within the genus *Cleistanthus* the following characters turned out to be diagnostically important: stipule shape; indumentum of twigs, petioles, lower leaf surfaces, ovaries, and capsules; number and prominence of secondary veins; colour of dried leaves; shape of flower bearing branches; flowers/fruits pedicelled or not, capsules stipitate or not; dimensions of stipules, petioles, flower glomerules, capsules. The fact that the flower glomerules are borne either on normal leaved branches, on those with smaller leaves, or even on leafless branchlets was used by Jablonsky (1915) to define two of his ten sections. However, this phenomenon was found within rather variable species (*C. sumatranus*, *C. myrianthus*) and in the latter it was merely recognised to define varieties. In *Bridelia* species are known to show a variable leaf size on flowering branches too (e.g., *B. retusa*, *B. stipularis*). This character seems to be insufficiently consistent to base higher nomenclatural ranks on, but it facilitates the recognition of certain species. The sections proposed by Jablonsky (1915) are therefore not accepted here. The infrageneric delimitation needs critical reassessment. This was not an objective of the present work. Hence, the species recognised for the Philippines are treated in alphabetical order. The very narrow geographical scope of this work was contrary to detecting supraspecific entities.

Cleistanthus angustifolius, *C. pilosus*, *C. robinsonii*, and *C. spec. A* represent Philippine endemics, of which the taxonomic status of some is still not entirely certain. Close geographical relationships exist especially with Borneo and furthermore with Peninsular Malaysia: seven Philippine species also comprise those areas with their distribution. Two additional species have an even wider range including Peninsular

Thailand (*C. decurrens*) and Celebes, Flores, and Sumatra (*C. bridelifolius*). Widespread elements are the Indo-Australian *C. myrianthus*, Sino(?)-Malesian *C. pedicellatus*, and Sino-Indochinese-Malesian *C. sumatranus*. Two species *C. erycibifolius* and *C. rufescens* are newly recorded for the Philippines.

MATERIAL AND METHODS

Herbarium material was studied from the following herbaria: A, AAU, B, BO, BR, CAS, DS, E, F, G, GH, K, K-W, L, M, MA, NY, P, SING, TCD, U, US, WRSL (Holmgren et al., 1990). All specimens cited have been seen unless stated otherwise. The dimensions given are for dried material, except for flower characters which are taken from material rehydrated with water.

CLEISTANTHUS

Cleistanthus Hook.f. ex Planch. in Hook., Icon. Pl. 8 (1848) ad t. 779. — *Kaluhaburunghos* L. ex Kuntze, Revis. Gen. Pl. (1891) 607. — Type: *Cleistanthus polystachyus* Hook.f.

Nanopetalum Hassk., Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch. 4 (1855) 140. — Type: *Nanopetalum myrianthum* Hassk. [≡ *Cleistanthus myrianthus* (Hassk.) Kurz].

Lebidiera Baill., Étude Euphorb., Atlas (1858) 50, t. 27, f. 1–4. ≡ *Amanoa* sect. *Lebidiera* Baill., Étude Euphorb. (1858) 581. — Type: *Lebidiera ferruginea* Baill. [≡ *Cleistanthus ferrugineus* (Thwaites) Müll.Arg.].

Stenoniella Kuntze in T. Post & Kuntze, Lex. Gen. Phan. (1903) 535; nom. nov. for *Stenonia* Baill., Étude Euphorb. (1858) 578, (non Endl. 1847). — Type: *Stenonia boiviniana* Baill. [= *Cleistanthus stenonia* (Baill.) Jabl.].

Leiopyxis Miq., Fl. Ned. Ind., Eerste bijv. (1861) 445. — Type: *Leiopyxis sumatrana* Miq. [≡ *Cleistanthus sumatranus* (Miq.) Müll.Arg.].

Lebidieropsis Müll.Arg., Linnaea 32 (1863) 79. — Type: *Lebidieropsis collina* (Roxb.) Müll.Arg. [≡ *Cleistanthus collinus* (Roxb.) Benth.].

Schistostigma Lauterb., Fl. Schutzgeb. Südsee, Nachtr. (1905) 299. — Type: *Schistostigma papuanum* Lauterb. [≡ *Cleistanthus papuanus* (Lauterb.) Jabl.].

Godefroya Gagnep., Bull. Soc. Bot. France 70 (1923) 435. — Type: *Godefroya rotundata* (Jabl.) Gagnep. [≡ *Cleistanthus rotundatus* Jabl.].

Paracleisthus Gagnep., Bull. Soc. Bot. France 70 (1923) 499. — Lectotype (Wheeler, 1975: 537): *Paracleisthus subgracilis* Gagnep. [= *Cleistanthus sumatranus* (Miq.) Müll.Arg.].

[*Zenkerodendron* Gilg ex Jabl. in Engl., Pflanzenr. H. 65 (1915) 48; in syn., nom. nud.; authentic species: *Zenkerodendron bipindense* Gilg ex Jabl. (≡ *Cleistanthus bipindensis* Pax).]

Trees or shrubs, monoecious, branches scattered lenticellate. *Leaves* simple, alternate, stipulate, entire, membranaceous to coriaceous, petiolate; *petiole* subterete, (slightly) thicker than midrib and wrinkled when dry; brochidodromous *venation*, secondary veins becoming weaker distally towards their looping. *Inflorescences* axillary, glomerulate, sometimes on leafless or small-leaved branches, glomerules male or female or both. *Calyx* 5-lobed, mostly persistent, lobes valvate, tube shortly obconic. *Petals* 5, persistent, small, free. *Disc* annular, saucer-shaped in staminate flowers and divided in pistillate flowers into an outer saucer-shaped one, lining the receptacle, and an inner cup-shaped to tubular one with irregular margin, covering the ovary (or at least its base) and tearing into lobes during fruit development. *Stamens* 5, filaments connate into a column, free above, spreading, terete to flattened, tapering towards the apex, anthers extrorse, bilobed at the base, *pistillode* small, trifid or trilobed, borne at the

apex of the column. *Ovary* 3-locular, ovules 2 in each cell. *Styles* 3, subconnate below, bifid. *Capsules* 3-locular, subglobose or depressed, sessile or pedicelled, sometimes stipitate within the calyx, dehiscing apically loculicidal and completely septicidal, hence the valves falling apart, leaving the receptacle and columella. Dehiscence is mechanical, caused by the expansion of the internal endocarp tissue, additionally septae splitting during this process; endocarp bony, inside fibrous, each locule 2-seeded or frequently 1-seeded by abortion. *Seed* exarillate.

KEY TO THE PHILIPPINES SPECIES OF *CLEISTANTHUS*

1a. Leaves glabrous beneath (exceptionally scattered hairs present) 2
b. Leaves hairy beneath (at least on the main veins) 9
2a. Flowers (and fruits) clearly pedicellate (pedicel > 5 mm long) 3
b. Flowers and fruits (sub)sessile 4
3a. Leaves with conspicuously prominent, fine, dense, reticulate venation, greyish brown beneath. Many flowers in axils of normal leaves ... **10. C. pedicellatus**
b. Leaves with inconspicuous venation, dark coloured (blackish) beneath. Flowers on short axillary shoots (brachyblasts) ..... **4. C. erycibifolius**
4a. Capsules big, > 15 mm diam. Stipules 5–10 mm long, long persistent. Ovary glabrous. Leaves often conspicuously glaucescent beneath . **8. C. megacarpus**
b. Capsules smaller, < 15 mm diam. Stipules < 5 mm long. Ovary densely hairy* [*cf. *C. spec. A*: ovary presumed to be glabrous] 5
5a. Secondary veins more than 9 pairs. Capsules stipitate (2–4 mm) and subsessile to shortly pedicellate (2–4 mm), densely brownish tomentose. Petiole mostly > 7 mm, scattered pilose to glabrous ..... **13. C. rufescens**
b. Secondary veins less than 9 pairs. Capsules not stipitate and sessile, scattered pilose to glabrous. Petiole mostly < 7 mm, glabrous 6
6a. Stipules 2–4 mm long, triangular. Veins conspicuously prominent beneath. Flowers on smaller leaved branchlets ..... **15. C. venosus**
b. Stipules up to 1.5 mm long, scale-like or triangular. Veins faintly prominent beneath. Flowers axillary on normal leaved or short, leafless, axillary, spike-like branchlets 7
7a. Leaves yellowish or greenish when dry; base obtuse, slightly attenuate. Secondary veins not conspicuously long running towards apex ..... **6. C. glaber**
b. Leaves (olive) brownish when dry; base acute to round, rarely obtuse. Secondary veins with a rather acute angle of divergence and long running towards apex before arching 8
8a. Leaves conspicuously narrow-elliptic or narrow-ovate (nearly linear). Long drooping branches. Flower glomerules usually in the axils of normal leaves ..... **1. C. angustifolius**
b. Leaves not extraordinarily narrow. Branches short, not drooping. Flower glomerules on differentiated, often smaller leaved to leafless, terminal or axillary branchlets (like 'pearls-on-a-string') ..... **14. C. sumatranus**
9a. Capsule > 15 mm diam. Stipules conspicuous, 5–10 mm long, long persistent. Leaves conspicuously glaucescent beneath (see however *C. everettii* with 2–9 mm long stipules but not conspicuously glaucescent leaves) **8. C. megacarpus**

b. Capsule < 15 mm diam. Stipules < 5 mm long, not conspicuous, not long persistent (if so, see *C. everettii*). Leaves not conspicuously glaucescent beneath 10
10a. Leaves finely and closely appressed puberulous to sericeous beneath (lens!). Ovary and capsule glabrous 11
b. Leaves with erect hairs beneath. Ovary (and later capsule) ± hairy 12
11a. Leaves with coppery indumentum beneath. Secondary veins mostly 5–8 pairs . ..... **7. C. isabellinus**
b. Leaves with light to golden indumentum beneath. Secondary veins mostly 10–16 pairs ..... **9. C. myrianthus**
12a. Capsules not stipitate 13
b. Capsules stipitate 16
13a. Branchlets conspicuously long, light-coloured pilose, also main veins. Leaves greenish-brown when dry ..... **11. C. pilosus**
b. Branchlets fulvo-pubescent to -puberulous. Leaves pale green to olive when dry 14
14a. Leaves linear-oblong. Stipules minute, < 1 mm long, very inconspicuous ... . **12. C. robinsonii**
b. Leaves elliptic. Stipules 1 mm and longer 15
15a. Petioles 1.5–4 mm long. Capsules < 1 cm diam. Leaves mostly smaller (< 9 cm long) ..... **2. C. bridelifolius**
b. Petioles 4–8 mm long. Capsules > 1 cm diam. Leaves mostly larger (> 8 cm long) ..... **5. C. everettii**
16a. Glomerules few-flowered (< 10 flowers) 17
b. Glomerules many-flowered (> 10 flowers) 18
17a. Leaf base attenuate, conspicuously decurrent along petiole. Leaves dark reddish-brown when dry, blade elliptic to ovate. Stipules > 1 mm long. Sepals fulvo-strigose to subglabrous ..... **3. C. decurrens**
b. Leaf base acute, but not decurrent along petiole. Leaves greenish when dry, blade oblong. Stipules minute, < 1 mm long. Sepals glabrous .... **12. C. robinsonii**
18a. Leaves glabrous, rarely with some hairs, brown to greenish-grey when dry, often bullate. Secondary veins mostly up to 9 pairs. Capsules ≥ 1 cm diam., densely brownish tomentose, subsessile to shortly pedicellate (2–4 mm) .... **13. C. rufescens**
b. Leaves rusty pubescent to pilose, rarely subglabrous, dark reddish brown when dry. Secondary veins mostly less than 9 pairs. Capsules < 1 cm diam., scattered pilose to glabrous. Inflorescence glomerules conspicuously rufo-villose .... **16. C. vestitus**

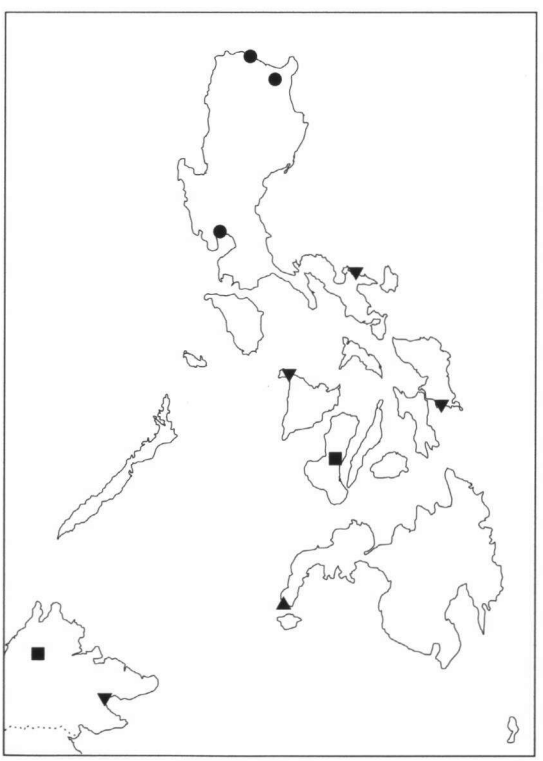
1. Cleistanthus angustifolius Merr. — Map 1

Cleistanthus angustifolius Merr., Philipp. J. Sci., Bot. 7 (1912) 386; Jabl. in Engl., Pflanzenr. H. 65 (1915) 52; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 419; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *C.M. Weber 1562* (holo A; iso E, F, G, GH, K, NY, P 3x, US), Philippines, Luzon, Prov. Cagayan, Abulug River, Jan. 1912.

Scandent shrub or tree? *Branches* often long, of drooping appearance, glabrous, rarely scattered albo-pilose when young. *Stipules* very inconspicuous, triangular, c. 1 mm

long, base 0.5–1 mm wide, glabrous, scaly. *Leaves:* petiole subterete, darker coloured than midrib in dry state (blackish), glabrous, 3–6 mm long, 0.5–1 mm diam.; lamina very narrow ovate to narrow ovate-elliptic or narrow lanceolate (almost linear), 35–130 by 6–30 mm, index 3.6–9.6, chartaceous, base roundish, rarely obtuse, apex long acute to acuminate, acumen not discernible, margin entire. *Venation:* obscure above, very faintly prominent beneath, secondary veins in 5–8 pairs, long running towards apex before looping, sometimes with tertiary arches, irregular reticulate areolation. *Indumentum:* absent; leaves greyish brown to brownish olive above, greyish green to brownish grey beneath when dry, sometimes glaucescent beneath. *Inflorescence:* few-flowered glomerules (up to c. 5 flowers) in the axils of normal leaves, rarely on short, spike-like shoots. *Bracts* small, triangular, c. 1.5 by 1–1.5 mm, glabrous to albo-pilose, with sericeous margin, and/or hairy midvein. *Flowers* (not seen) sessile, 4–5 mm diam. *Sepals* (narrow-)triangular, c. 2 by 1–1.5 mm, albo-pilose outside. *Infructescence* with 1 or 2 fruits per glomerule. *Fruit* sessile, rarely minutely stipitate (1 mm), obtusely triangular and deeply 3-lobed from above or tricoccous-subgloboid, concavely depressed at apex, 5–6 mm tall, c. 8 mm diam., glabrous, basal and in sutures (grooves) with scattered pilose hairs, dark brown when dry. *Seeds* semigloboid to heart-shaped, ventrally with median hilum, dorsally slightly keeled, 6–7 by 4.5–5.5 by 3–3.5 mm; testa smooth, slightly lineate with occasional inconspicuous warts, brown.

Field note — Reported to be of scandent habit and to have slightly glaucous young leaves (*Lagrimas & Penarubia 607*, L).



Map 1. Distribution of *Cleistanthus angustifolius* Merr., (●), *C. erycibifolius* Airy Shaw (■), *C. glaber* Airy Shaw (▲), and *C. isabellinus* Elmer (▼) in the Philippines and adjacent Borneo.

Distribution — Philippines (Luzon).

Habitat & Ecology — On river.

Notes — The main characteristics are: conspicuously narrow leaves (nearly linear, narrow ovate to narrow elliptic), long drooping, glabrous branches, glabrous, chartaceous leaves with indistinct, i.e., hardly prominent venation, 5–8 secondary veins, sessile fruits, which are sparsely pilose and become subglabrous.

Only 4 collections of this species could be traced and all are in fruit.

It might well be that this species merely represents a very narrow leaved (rheophytic?) form of *C. sumatranus*. Unfortunately, there are no field notes. The type collection was collected at Abulug River, Cagayan Province, Luzon. Two other collections are both annotated with Cagayan Province only. All three were collected in January 1912. It is possible that all three originate from the same plant. An additional collection from Zambales Province, Luzon, has larger leaves which are already somewhat intermediate to *C. sumatranus*. However, the plants display the drooping habit.

I provisionally retain the species rank here. The taxon is separated from *C. sumatranus* by the combination of its distinct leaf shape and drooping habit.

2. **Cleistanthus bridelifolius** C.B. Rob. — Map 2

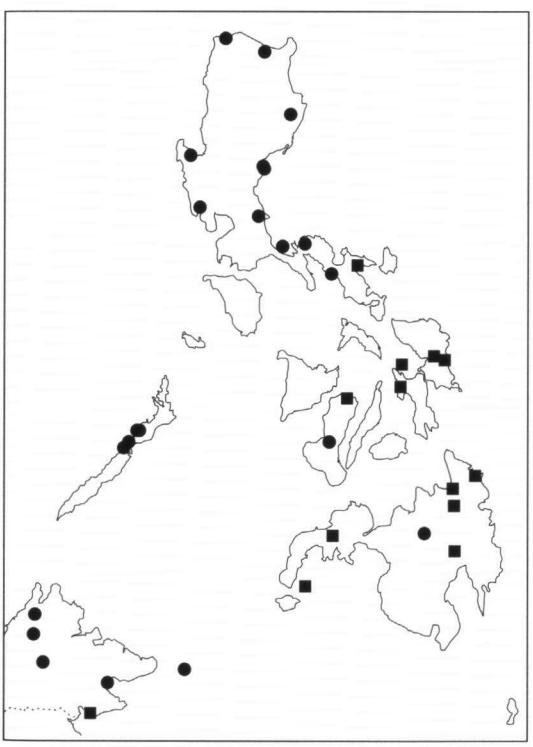
Cleistanthus bridelifolius C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 191; Philipp. J. Sci., Bot. 6 (1911) 323; Jabl. in Engl., Pflanzenr. H. 65 (1915) 25; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 419; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 78; Kew Bull. 33 (1978) 51; J.A.R. Anderson, Check L. Trees Saraw. (1980) 181; Airy Shaw, Kew Bull. 36 (1981) 280; Kew Bull. 37 (1982) 13; Enum. Euphorb. Philipp. Is. (1983) 14; Whitmore, Tree Fl. Indon., Checkl. Sumatra (1986) 80; Tree Fl. Indon., Checkl. Sulawesi (1989) 46; Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 123; Keßler & Sidiyasa, Trees Balikpapan-Samarinda Area, Tropenbos ser. 7 (1994) 126 in clavi. — Lectotype (here designated): *FB 7064*, leg. *Klemme* (holo US), Philippines, Luzon, Prov. Cagayan, San Vicente, 5 m, 7 May 1907. [Note: Airy Shaw (1978) suspected the type to be in NY. I did not receive a specimen from there.]

Cleistanthus subcordatus (J.J. Sm.) Jabl. in Engl., Pflanzenr. H. 65 (1915) 22; syn. nov.; Backer & Bakh.f., Fl. Java 1 (1964) 474 in clavi. — *Cleistanthus pallidus* (Thwaites) Müll.Arg. var. *subcordatus* J.J. Sm. in Koord. & Valeton, Bijdr. Boomsoort. Java 12 (1910) 304. — Type: *Teijsmann 1741 HB* (BO?), Java, Madoera, M. Gegu - protologue: "alleen verzameld in de res. Banten, afd. Tjaringin bij Tjemara op 10-200 m zeehoogte". [Note: Although I have not seen the actual type specimen, I am convinced of the conspecificity since material identified by J.J. Smith in L represents *C. bridelifolius*.]

Shrub to tree, up to 15 m high, reported with 6 m high bole and with up to 35 cm dbh. Bark smooth to rough, brown, inner bark reddish brown, cambium pinkish. Sapwood yellow. *Branches* fulvous-pubescent to -puberulous when young, later becoming glabrous, triangular stipules sometimes conspicuously densely concentrated and long persistent on the terminal branches often after the leaves have fallen. *Stipules* narrow to broadly ovate-triangular, subulate, glabrous to puberulous, 1–3.5 mm long, base 1–1.5 mm wide. *Leaves:* petiole subterete, densely pubescent to scattered pilose, rarely glabrous, 1.5–4 mm long, 1–1.4 mm diam.; lamina elliptic to lanceolate, rarely slightly ovate, 40–90(–130) by 10–30 mm, index 2.3–4.2, chartaceous, base acute, roundish to obtuse, sometimes slightly cordate, apex acute to acuminate, acumen up to 15 mm long, margin entire. *Venation:* secondary veins in 6–11(–12) pairs, (sub)prominent beneath, obsolete above, areolation indistinct. *Indumentum:* glabrous above, only single

hairs at midrib, or near base and margin, (scattered) pilose to glabrous beneath, densely hairy on base and major veins, rarely fully glabrous; leaves greyish green to olive when dry. *Inflorescence:* few-flowered glomerules with up to c. 8 flowers, axillary on normal-leaved branches. *Bracts* broadly ovate-triangular to triangular, c. 1 by 1–1.5 mm, densely whitish pubescent. *Flowers* sessile to shortly pedicellate, pedicel 1–2 (–3) mm long, pubescent, rarely glabrous, 3.5–5 mm diam. *Sepals* triangular, 1.5–2 by 1–1.5 mm, whitish pubescent to subglabrous outside. *Petals* whitish, spathulate to broadly obovate, lobulate at apex, 0.7–1 by 0.6–0.7 mm. *Disc* glabrous, sometimes pilose, in staminate flowers and outer one in pistillate flowers saucer-shaped, 1–1.5 mm diam., inner one cup-shaped with erose margin, 0.8–1.2 mm tall, glabrous to whitish pilose outside. *Staminal column* c. 1–1.2 mm long, free part of *filaments* up to c. 1 mm long. *Anthers* ovoid, c. 0.5 by 0.2–0.3 mm. *Pistillode* conico-ovoidal, whitish pilose, c. 0.5–0.7 mm tall, 0.2–0.4 mm diam. *Ovary* ovoid to globoid, 0.8–1.2 mm diam., 1–1.5 mm tall, densely whitish strigose. *Styles* 0.5–1(–1.5) mm long, apically bifid, lobulate. *Infructescence* with 1 or 2 (also 3?) fruits. *Fruit* sessile, triangular seen from above, shallowly 3-lobed in outline, concavely depressed at central apex, 5–7 mm tall, 7–9 mm diam., yellowish pilose to pubescent, rarely nearly glabrous. *Seeds* semi-ovoid to heart-shaped, sometimes abaxially keeled, 3–4 by 3.5–4.5 by 1.5–3 mm; testa smooth to rugulate, dark brown.

Field notes — Flowers fragrant, whitish to light green, calyx pale green, petals whitish, stamens yellowish; fruits light to yellowish green turning dark purple with greenish base.



Map 2. Distribution of *Cleistanthus bridelifolius* C.B. Rob. (●) and *C. everettii* C.B. Rob. (■) in the Philippines and adjacent Borneo.

Distribution — Peninsular Malaysia? (fide Whitmore, 1986), Sumatra, Borneo, Philippines, Java (fide Whitmore, 1986), Celebes, Flores (fide Airy Shaw, 1982).

Habitat & Ecology — Open or low statured primary or secondary lowland forests; at altitudes up to 800 m. Reported from ultrabasic, igneous-derived soils, black stony soil, or coral limestone.

Notes — The diagnostic characters of *C. bridelifolius* are: the pubescence of branches, petiole, inflorescence glomerules axillary; the stipules glabrous to scattered puberulous; petiole 2–4 mm long; inflorescences axillary; capsules sessile, < 1 cm diam. The leaves are smaller than those of *C. everettii*. It is very closely related to *C. everettii*; the distinguishing characters are petiole length and capsule size. Further studies are needed in order to show whether there is a real discontinuity between these species.

Ironically, this species does not particularly resemble *Bridelia* in its foliage. Robinson did not state in the protologue why he had chosen this name. There are other species which more closely resemble the leaves of certain *Bridelia* species of the sect. *Cleistanthoideae*. A flowering *Cleistanthus vestitus* Jabl. e.g. recalls *B. insulana* Hance or *B. glauca* Blume. The untrained eye has to examine the number of ovary locules or styles to trace the generic affiliation.

Airy Shaw recognises two varieties. His var. *calcicola* differs from the typical one in less abruptly and distinctly caudate leaf-apices, a rather rectangular angle of divergence of the secondary veins, pedicellate staminate flowers, glabrous sepals and its occurrence on limestone. This combination of characters is, at least in Philippine material, not consistent. Airy Shaw's (1978: 51) statement concerning an even higher ranking of this entity cannot be supported. Ecological field studies are necessary in order to decide whether a supposedly calcicole variety should be recognised at all.

3. **Cleistanthus decurrens** Hook.f. — Map 3

Cleistanthus decurrens Hook.f., Fl. Brit. India 5 (1887) 278; Jabl. in Engl., Pflanzenr. H. 65 (1915) 33; Ridl., Fl. Malay Penins. 3 (1924) 191; Gage, J. Asiat. Soc. Bengal 75 (1936) 508; Henderson, J. Malayan Branch Roy. Asiat. Soc. 17 (1939) 69; Airy Shaw, Kew Bull. 26 (1972) 236; Whitmore, Tree Fl. Malaya 2 (1973) 81 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 80; J.A.R. Anderson, Check L. Trees Saraw. (1980) 181; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14; Whitmore, Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 123. — *Kaluhaburunghos decurrens* (Hook.f.) Kuntze, Rev. Gen. Pl. 2 (1891) 607, nom. illeg. — Lectotype (here designated): *Scortechini 1916* (holo K), Peninsular Malaysia, Perak.

Cleistanthus decipiens C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 195, syn. nov.; Elmer, Leafl. Philipp. Bot. 4 (1911) 1284; Jabl. in Engl., Pflanzenr. H. 65 (1915) 33; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *FB 1001*, leg. *Clark* (holo K; iso NY), Philippines, Island Ticao, Niladlaran, 125 m, May–June 1904.

Cleistanthus ovatus C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 194, syn. nov.; Jabl. in Engl., Pflanzenr. H. 65 (1915) 34; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 421; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 15. — Lectotype (here designated): *BS 4051*, leg. *Fenix* (holo K; iso US), Philippines, Camiguin Island, Babuyanes, 21 June 1907.

Cleistanthus mattangensis Jabl. in Engl., Pflanzenr. H. 65 (1915) 33, syn. nov.: Airy Shaw, 1975; Merr., Bibl. Enum. Born. Pl. (1921) 334; Masam., Enum. Phan. Bornear. (1942) 392. — Lectotype (here designated): *Beccari 2040* (holo K; iso FI-B, photo seen), Borneo, Mattang, July 1866.

Cleistanthus decipiens auct. non C.B. Rob.: Elmer, Leafl. Philipp. Bot. 4 (1911) 1284; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420, p.p. quoad *Elmer 12888 & 12988.*

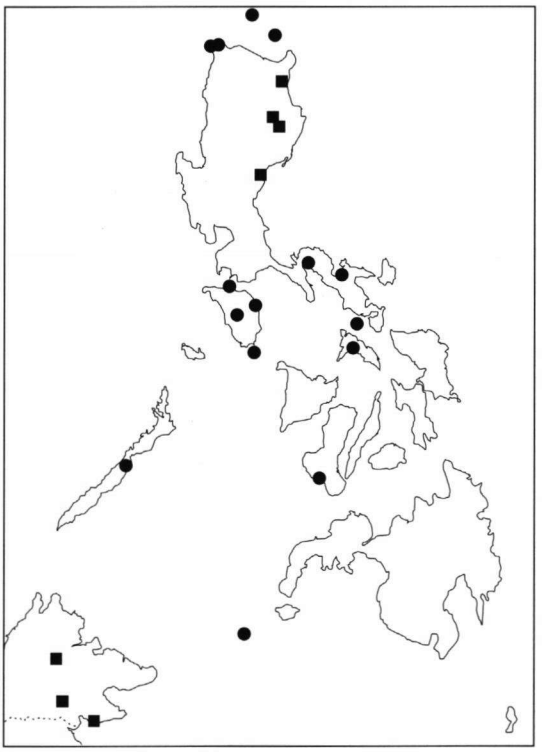
Shrub to small tree, up to 5 m high, with a suberect, crooked stem, dbh c. 3 cm. Outer *bark* yellowish grey, smooth, thin, sapwood yellowish-white, heartwood rose-red. *Branches* brownish strigose to scattered pilose when young, soon glabrescent. *Stipules* triangular, often scale-like, 1.5–2 mm long, base 1–1.5 mm wide. *Leaves:* petiole (sub)terete, darker coloured than midrib in dry state, brownish strigose, (3–)4–7 mm long, 1–2 mm diam.; lamina lanceolate, elliptic to (slightly) ovate, 35–215 by 18–99 mm, index 1.8–3.8, chartaceous to subcoriaceous, base attenuate, conspicuously decurrent on petiole, apex acuminate to (bluntly) acute, acumen up to 20 mm long, margin entire, slightly revolute. *Venation:* secondary veins in (5–)7–11 pairs, prominent beneath, (sub)prominent above, sometimes tertiary arches present, perfect reticulate areolation. *Indumentum:* scattered albo-pilose above, albo-pilose to subglabrous beneath, sometimes strigose near base and at midrib; leaves often conspicuously dark reddish brown when dry. *Inflorescence:* few-flowered glomerules (mostly 3 or 4, up to c. 7 flowers) axillary on normal-leaved branches, very rarely axillary, spike-like, leafless branches bearing the glomerules seen. *Bracts* fulvous, elliptic, ovate or broadly triangular, 1.5–2.5 by 1.5–2 mm, membranaceous, often conspicuously brownish strigose to pilose outside, sometimes glabrous with hairy midvein, with erose margin. *Flowers* sessile, 3–4.5 mm diam. *Sepals* triangular, 1.5–2 by 1–1.5 mm, brownish strigose to subglabrous with some hairs on apex outside. *Petals* whitish, spathulate, margin irregularly erose to lobulate, c. 1 by 0.5–0.8 mm. *Disc* glabrous, in staminate flowers and the outer one in pistillate flowers saucer-shaped, 1–1.5 mm diam., inner one cup-shaped, 0.5–0.8 mm tall. *Staminal column* 1–1.5 mm long, free part of *filaments* up to 1 mm long. *Anthers* ovoid, 0.5 by 0.2–0.4 mm. *Pistillode* cylindrical, with widened blunt apex, glabrous, up to 0.7 mm tall, c. 0.3 mm diam. *Ovary* (semi)-globoid, c. 1.5 mm diam., 1–1.5 mm tall, densely brownish strigose to pilose. *Styles* c. 1 mm long, apical quarter bifidly divided, widened tip, stigmas lobulate. *Infructescence* with up to 2 fruits. *Fruit* sessile, but 4–6 mm stipitate, obtusely triangular from above, shallowly tri-lobed, more or less rectangular to semiorbicular with concave depression in outline, 7–11 mm tall, 7–10 mm diam., sparsely pilose to glabrous with some scattered hairs in grooves and at base, shiny reddish brown when dry with prominent reticulum of veins, or tuberculate. *Seeds* heart-shaped in outline (?, collapsed), 5–6 by 3–3.5 by 2–3 mm; testa smooth to rugulate, light brown.

Field notes — Leaves thinly coriaceous, dark green, glossy above, lighter beneath, with a swollen petiole when fresh; flowers pale green; fruits reddish green turning black, stipe yellow-green.

Distribution — Peninsular Thailand, Peninsular Malaysia, Borneo, Philippines, Java (?), Flores (?).

Habitat & Ecology — Primary or secondary forests, often reported from dense shade; at low altitudes to 500 m; very fertile, rocky soil, occasional on limestone (sec. Whitmore, 1973).

Notes — This species is characterised by the decurrence of the basal leaf-margins along the petiole, as well as by its reddish brown leaves in the dried state, its few-flowered glomerules, and its stipitate, nearly glabrous capsules.



Map 3. Distribution of *Cleistanthus decurrens* Hook.f. (●) and *C. vestitus* Jabl. (■) in the Philippines and adjacent Borneo.

Cleistanthus decipiens, described as endemic for the Philippines, is according to Jablonsky's key distinguished from *C. decurrens* by shorter stipitate capsules (< 4 vs. 6–10 mm) and more or less acuminate (vs. rotundate or obtusely acuminate) leaves. However, material from Peninsular Malaysia and Borneo shows all intergradations in leaftips. Airy Shaw annotated the isotype in K as "very near *C. decurrens*" but did not place the name into the synonymy of the latter. This is done here now. In the protologue of *C. decipiens* C.B. Robinson already stated that this species is "very similar in gross characters to *C. ovatus*, but quite distinct, especially in its venation". It is said to differ from the latter by having elliptic or oblong leaves (vs. ovate ones) and by curving secondary veins (vs. straight ones) which do not submarginally divide forming distinct tertiary loops as it was deemed to be typical in *C. ovatus*. Having examined some more material I have to state that this distinction is not consistent, but merely due to different developmental stages and shapes of the leaves. In fact, the tertiary loops are often present in all leaves, but sometimes not very clearly developed or very small and close to the margin.

The reference to Flores is based on *Verheijen 3077*, *Schmutz 4361* (both L), which are identified as cf. *decurrens*. There is also a collection of *C. decurrens* in Leiden (*Boerlage s.n.*, L no. 909.77-179, 909.76-164) which is filed among Javanese material, but the provenance is a bit doubtful as the label information is hardly legible (I would read: "Eiland Leiden, Boerlage"). Van Steenis-Kruseman (1950: 68) gives Pulau Leiden in the Bay of Batavia as a collecting locality of Boerlage in Sept. 1896.

4. **Cleistanthus erycibifolius** Airy Shaw — Fig. 1, Map 1

Cleistanthus erycibifolius Airy Shaw, Kew Bull. 20 (1967) 389; Kew Bull. 27 (1972) 76; Kew Bull., Add. Ser. 4 (1975) 80; Kew Bull. 32 (1978) 383; Whitmore, Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 124. — Type: *Schut K.24* (holo K; iso A n.v., BO, L, P n.v., PNH n.v., SING), E Indonesian Borneo, Kutei, River Tiram, 15 m, 29 Feb. 1954.

Tree, up to 30 m high, with a clear bole up to 10 m high, up to 25 cm dbh, and a round crown. Outer *bark* light brown, soft, peeling off, inner bark brown, sapwood yellowish to pale white. *Branches* glabrous to scattered puberulous. *Stipules* triangular, small, c. 1 mm long, base 0.6–1 mm wide, glabrous, scale-like, often inconspicuous. *Leaves:*

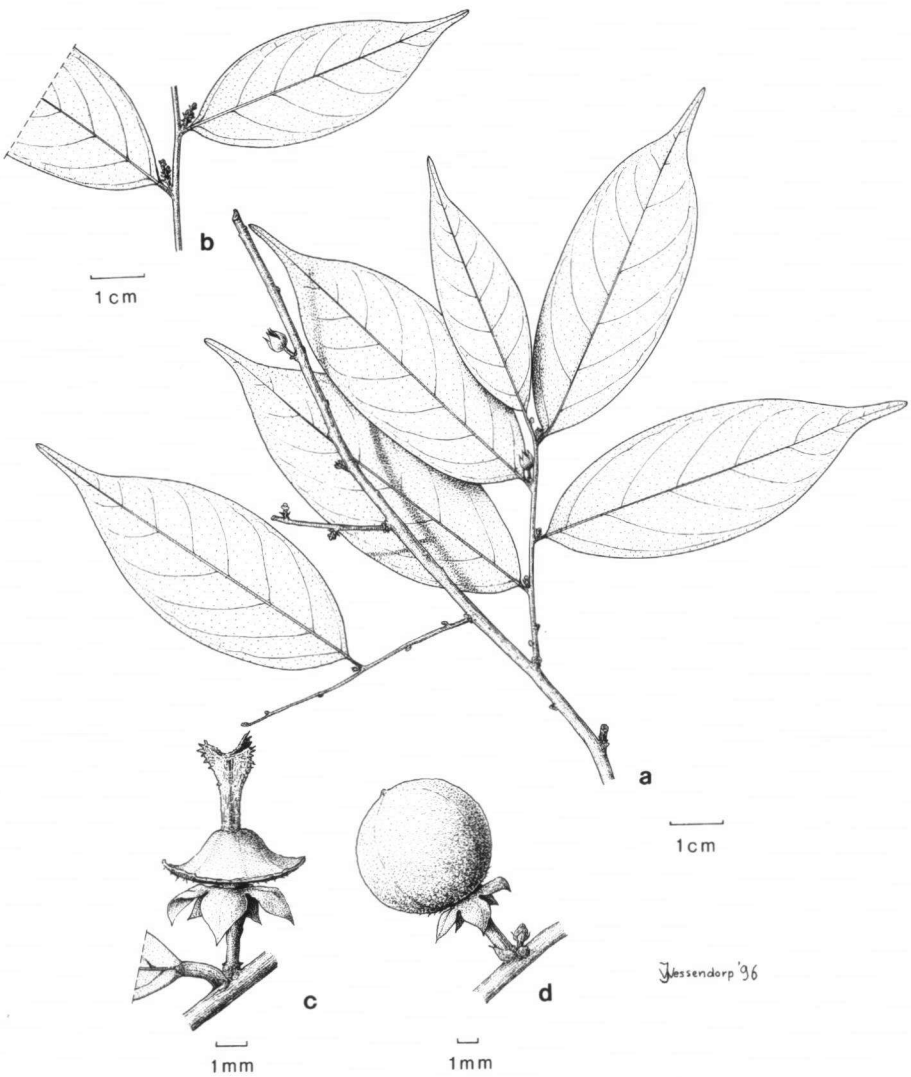


Fig. 1. *Cleistanthus erycibifolius* Airy Shaw. a. Habit; b. brachyblasts; c. dehisced fruit; d. capsule (all L; a: *SAN 96565*; b: *Endert 4918*; c, d: *Kostermans 10186*).

petiole subterete, dark coloured in dry state (blackish), glabrous, sometimes slightly obovate, 40–130 by 13–38 mm, index 2.4–3.9, subcoriaceous, base acute to obtuse, apex acuminate, acumen 15–20 mm long, margin entire, slightly revolute. *Venation:* inconspicuous on both sides, obscure above, obscure to indistinctly raised beneath, secondary veins in (5–)6–10(–11) pairs, secondary arches only slightly weaker than secondary veins, areolation indistinct. *Indumentum:* glabrous, rarely scattered puberulous on petiole and midrib beneath; leaves light brownish grey above, conspicuously light brown beneath when dry. *Inflorescence:* flowers on short, condensed, axillary brachyblasts, these on short axillary shoots or in axils of normal leaves. *Bracts* small, broadly ovate to ovate-triangular, 0.8–1.5 by 0.5–1 mm, glabrous to puberulous outside, margin erose, sometimes slightly ciliate, abaxially keeled (midvein). *Flowers* not seen!; distinctly pedicelled (?), 5–8 mm diam. (in fruit). *Sepals* triangular, 2–3 by 1.5–1.8 mm, glabrous. Inner pistillate disc cup-shaped, c. 1.2–1.5 mm tall (in fruit), margin irregular. *Styles* 1–1.5 mm long, deeply bifid (up to half of their length), stigmas widened, lobulate. *Infructescence* seen with up to 2 fruits per brachyblast. *Fruit* distinctly pedicelled, pedicel 3–7 mm long, 1–2 mm diam.; subglobose, depressed, trilobed from above, 7–9 mm tall, 8–10 mm diam., glabrous, only sporadic single hairs, especially basal. *Seeds* bean-shaped, ventrally concavely depressed with medial hilum, 6–7.5 by 4–5 by 4–5 mm; testa smooth, brown.

Field notes — Bark reported to be bitter, branches horizontal, leaves whitish or glaucous below, fruits greenish.

Distribution — Peninsular Malaysia, Borneo, Philippines (Negros).

Habitat & Ecology — Primary forests, locally common; up to 1400 m. Reported from sandy soil, sandstone, or sandy loam.

Notes — This only rather recently described but quite characteristic species is here reported for the first time for the Philippines. Its characteristics are: stoutly pedicelled fruits, which are borne on shortly condensed shoots (brachyblasts), subcoriaceous leaves with an indistinct venation and a conspicuous ochre-brown colour below, as well as its general glabrousness in young parts.

Probably most closely related to *C. pedicellatus* this species is easily distinguishable from that by its thicker leaves, which have an indistinct venation when dried (rarely faintly prominent) and the shorter, but stouter pedicel of the fruits. Non-fruiting collections sometimes recall *C. bridelifolius*, but seem strange because of their subcoriaceous, glabrous leaves, and their inconspicuous scale-like stipules.

5. Cleistanthus everettii C.B. Rob. — Fig. 2, Map 2

Cleistanthus everettii C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 194; Jabl. in Engl., Pflanzenr. H. 65 (1915) 53; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *FB 7274*, leg. *Everett* (holo K; iso US), Philippines, Negros, Himugaan River, 75 m, 21 May 1907.

Cleistanthus samarensis Merr., Philipp. J. Bot. 9 (1914) 475, syn. nov.; Enum. Philipp. Flow. Pl. 2 (1923) 422; Salvosa, Lex. Philipp. Trees (1963) 93; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 16. — Lectotype (here designated): *BS 1685*, leg. *Ramos* (holo G; iso BO, G, GH, L, NY, P, SING, US), Philippines, Samar, Mt Cauayan, Apr. 1914.

Cleistanthus acuminatissimus Merr., Univ. Calif. Publ. Bot. 25 (1929) 155, syn. nov.; Masam., Enum. Phan. Bornear. (1942) 391; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 41 in clavi; Bot. Bull. Herb. Forest Dept., Sabah 10 (1968) 232; Airy Shaw, Kew Bull., Add. Ser. 4

(1975) 77; Whitmore, Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 122. — Lectotype (here designated): *Elmer 20969* (holo PNH† replaced by L; iso BM n.v., BO, BR, DS, GH, K, L, M, NY, P, PH, SING, U, UC), British N Borneo, nr Tawao (Elphinstone Prov.), Oct. 1922–Mar. 1923.

Shrub to small tree, up to 6 m high and reported up to 20 cm dbh. Heartwood light olivaceous. *Branches* fulvous-pubescent to -pilose when young, later becoming glabrous, triangular stipules sometimes conspicuously densely concentrated and long persistent on the terminal branches. *Stipules* ovate- to narrow-triangular, subulate, glabrous to scattered pubescent, 2–9 mm long, base 1–2 mm wide. *Leaves:* petiole subterete, greenish to brownish when dry, pubescent to scattered pilose, 4–8 mm long, 1.5–2 mm diam.; lamina lanceolate to elliptic, rarely slightly obovate, 60–240 by 20–95 mm, index 1.9–4.5, chartaceous, base acute to obtuse, rarely slightly emarginate, apex attenuate to acuminate, acumen 15–25 mm long, margin entire. *Venation:* secondary veins in 9–12(–14) pairs, prominent beneath, obsolete above, areolation indistinct. *Indumentum:* glabrous above, only single hairs at midrib, or near base and margin, (scattered) pilose to glabrous beneath, densely hairy on base and major veins; leaves greyish green dry, reported to be deep green above, light green beneath when living; leaves sometimes conspicuously rugose. *Inflorescence:* few-flowered glomerules with up to 10(–15) flowers, axillary on normal-leaved branches, often with conspicuous whitish, dense pubescence. *Bracts* broadly triangular, 2.5–3 by c. 2.5 mm, whitish pubescent. *Flowers* sessile c. 5–6 mm diam. *Sepals* triangular, (1.5–)2–3 by 1–1.6 mm, densely, whitish- to yellowish-strigose to -pubescent outside. *Petals* whitish to light yellow, spathulate to broadly obovate, lobulate at apex, 0.8–1 by 0.8–1 mm. *Disc* in staminate flowers and outer one in pistillate flowers saucer-shaped, 2–3 mm diam., inner one cup-shaped with erose margin, 1.5(–2) mm tall, whitish strigose outside. *Staminal column* c. 1.5 mm long, free part of *filaments* up to c. 1 mm long. *Anthers* ovoid, c. 0.8 by 0.5 mm. *Pistillode* conical, whitish strigose to pilose, c. 0.8–1 mm tall, 0.5–0.7 mm diam. *Ovary* globoid, c. 1.5 mm diam., 1.5 mm tall, densely whitish strigose. *Styles* 0.7–1 mm long, apically indistinctly bifid. *Infructescence* with 1 or 2 (also 3?) fruits. *Fruit* (sub)sessile (base sometimes c. 1 mm stalked), roundly obtuse-triangular from above, 3-lobed in outline, concavely depressed at apex, 8–10 mm tall, 10–13 mm diam., densely yellowish pubescent. *Seeds* heart-shaped, sometimes abaxially keeled, 5–5.5 by 4.5–5 by 3.5–4 mm; testa smooth to rugulate, brown.

Distribution — Borneo, Philippines.

Habitat & Ecology — Primary forests; up to 700 m altitude. Reported from red clay soil.

Notes — This species is characterised by pubescent branches, petioles, and inflorescence glomerules, but glabrous (to scattered pubescent) stipules. The axillary inflorescences are often conspicuously whitish pubescent. The sessile capsules have a diameter > 1 cm and the leaves are larger than in *C. bridelifolius*.

Robinson described *C. everettii* in the same article as *C. bridelifolius*, and from the protologues it seems to be obvious that it is mainly based on the larger leaves, a longer petiole (5–8 mm), more secondary veins (11–13) and a shortly pedicelled capsule (this could not be confirmed in the type material in K and US). No qualitative characters could be found which distinguish *C. everettii* from *C. bridelifolius*. The distinguishing

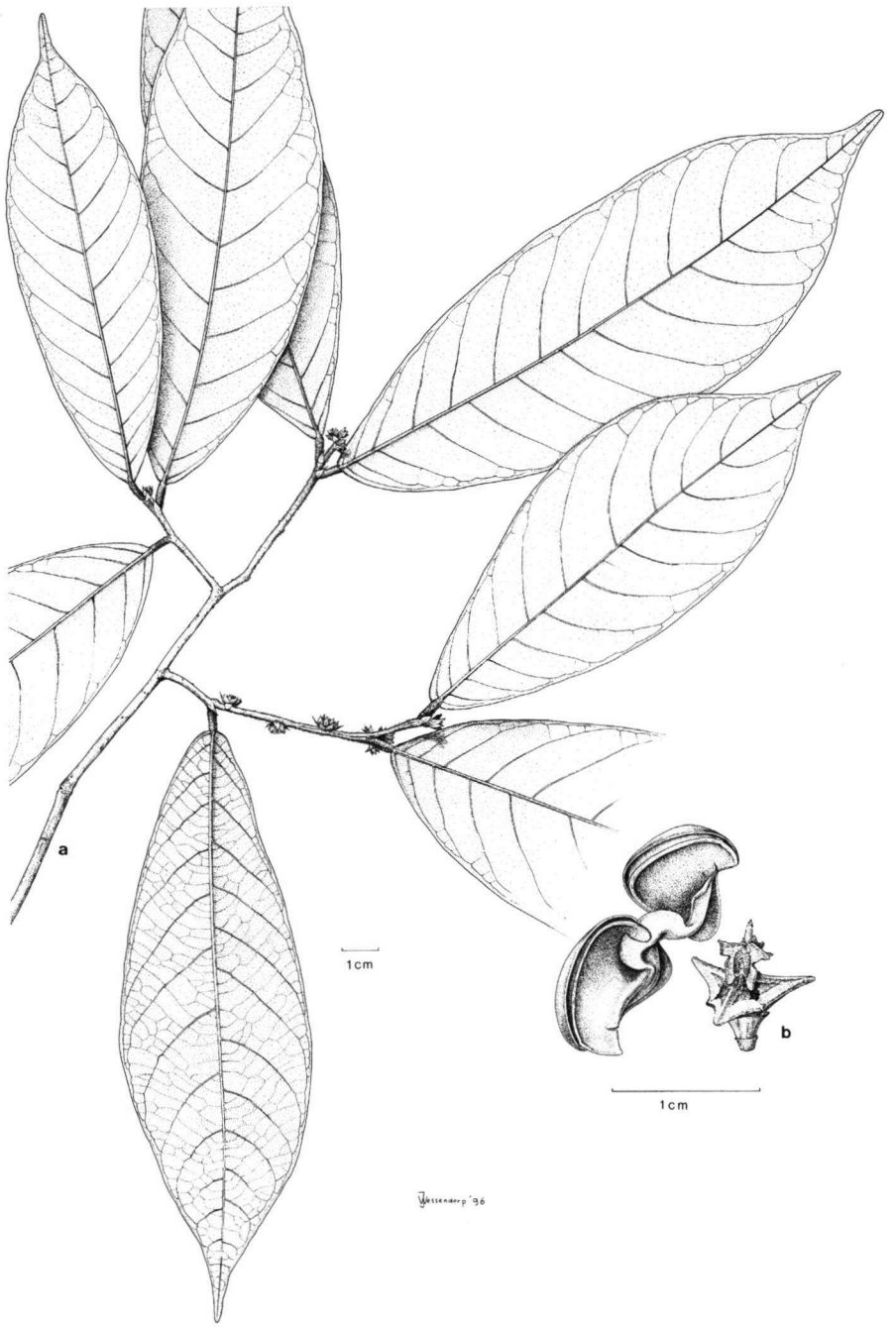


Fig. 2. *Cleistanthus everettii* C.B. Rob. a. Branch in flower; b. receptaculum and dehisced valve showing endocarp (all L; a: *PNH 41925*; b: *PNH 6328*).

characters between *everettii* and *bridelifolius* are: petiole length, leaf size, number of secondary veins, and size of the capsules. It seems that *C. everettii* merely represents a larger version of *C. bridelifolius*. The distinction between both is occasionally somewhat problematic and I am aware that the gap may appear rather artificial. However, I retain both here as species until further information is at hand: lumping both would render the species enormously variable in leaf size, and one would have to lump other taxa as well for the sake of inherent logic and consistency.

As so often field studies could contribute towards a clarification of this taxonomically unsatisfying situation.

The type of *C. samarensis* (*Ramos 1685*) was collected from a narrow-leaved specimen of *C. everettii*. From the protologues of these species it is evident that they differ only by lanceolate (*samarensis*) vs. elliptic or oblong leaves (*everettii*). As there are plenty of intermediate collections available, I consider them to be conspecific.

Due to the absence of distinguishing characters *C. acuminatissimus* is here subsumed under *C. everettii* which extends the latter's range to Borneo.

6. **Cleistanthus glaber** Airy Shaw — Map 1

Cleistanthus glaber Airy Shaw, Kew Bull. 21 (1968) 366; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 40 in clavi; Bot. Bull. Herb. Forest Dept., Sabah 10 (1968) 230; Whitmore, Tree Fl. Malaya 2 (1973) 80 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 80; J.A.R. Anderson, Check L. Trees Saraw. (1980) 181; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14; Whitmore, Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 124. — Type: *Clemens & Clemens 22236* (holo K; iso A, BO 2x, K, L, P), Borneo, Sarawak, Lundu, Mt Gadin, Oct. 1929.

Tree, up to 15 m high, with a clear bole up to 6 m high, girth up to 1 m. Outer *bark* green, flaky to scaly, inner bark white or reddish, cambium white or brown, sapwood pale yellowish-white to brown. *Branches* glabrous. *Stipules* scaly, often inconspicuous, triangular, minute, 0.7–1.2 mm long, base 0.5–1 mm wide. *Leaves:* petiole subterete, coloured differently from the blade in dry state (yellowish or blackish), glabrous, 3–7 (–8) mm long, 1–2 mm diam.; lamina elliptic to ovate, very rarely obovate, 44–165 by 18–87 mm, index 1.85–3.5, chartaceous, base obtuse, slightly attenuate, rarely acute, apex acuminate to acute, acumen (10–)15–25 mm long, margin entire. *Venation:* secondary veins in 4–9 pairs, prominent beneath, secondary veins rather irregular, perfect reticulate areolation. *Indumentum:* absent; leaves greenish to yellowish when dry, hardly glaucescent beneath, but reported to be glaucous beneath when living. *Inflorescence:* few-flowered glomerules (up to c. 10 flowers) axillary (mostly on terminal branches) or on short axillary spikes (up to 4 cm long) with the spike axis sometimes scattered pilose. *Bracts* small, ovate-triangular, c. 1 by 1 mm, pilose outside, midvein glabrous, with erose margin. *Flowers* sessile, staminate ones slender, c. 4 mm diam., pistillate ones 5(–6) mm diam. *Sepals* triangular, 1.8–2.5 by 1.4–1.8(–2) mm, brownish (staminate) or greenish (pistillate) when dry, densely to scattered, appressed albopilose outside, indumentum becoming scattered in fruit. *Petals* whitish, obovate to rhomboidal, margin irregularly erose, 0.8–1 by 0.5–0.6 mm. *Disc* in staminate flowers 1.6–1.7 mm diam., outer one in pistillate flowers saucer-shaped, c. 2 mm diam., inner one cup-shaped. *Staminal column* c. 0.6 mm long (immature), free part of *filaments* up to 0.7 mm long (immature). *Anthers* ellipsoid, two thecae well separated, 0.5–0.6 by c. 0.4 mm. *Pistillode* broadly ovoid, hairy, up to 0.5 mm tall, c. 0.3 mm diam.

Ovary globoid to slightly ovoid, apically terminating into style, 1.2–1.6 mm diam., 1–1.2 mm tall, densely hairy. *Styles* 1.5–2 mm long, united at base, apical branches of styles bifidly divided (upper thirds or quarters), stigmas papillose, widened. *Infructescence* with up to 4 fruits. *Fruit* sessile, 3-lobed, obtusely triangular from above, heart-shaped in outline, concavely depressed at apex, 5–7 mm tall, 8–11 mm diam., dark green when living, densely to sparsely hairy, often becoming glabrous, then the hairs only apical, basal, and in sutures. *Seeds* semigloboid to ovoid, heart-shaped in outline, sometimes abaxially keeled, 4.5–5 by 3–4 by 2–3.5 mm; testa smooth to rugulate, dark brown.

Distribution — Malaysia (fide Airy Shaw, 1975), Borneo, Philippines (Mindanao).

Habitat & Ecology — Primary forests; on brown to black, sandy soil; on hillside (sec. Whitmore, 1973).

Note — *Cleistanthus glaber* is mainly characterised by its glabrousness in branchlets and leaves (the petiole rarely bears some scattered erect hairs) and the greenish yellow leaf colour in the dried state. The fully glabrous *C. sumatranus*, with which this species could be confused, always dries brownish grey. *Cleistanthus bridelifolius* is similar in leaf shape, but always has an indumentum. *Cleistanthus baramicus* from Peninsular Malaysia (?) and Borneo differs from *C. glaber* by its larger stipules and the brownish colour of the dried leaves.

7. **Cleistanthus isabellinus** Elmer — Map 1

Cleistanthus isabellinus Elmer, Leafl. Philipp. Bot. 3 (1910) 911; Jabl. in Engl., Pflanzenr. H. 65 (1915) 40; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *Elmer 12268* [holo NY; iso A 2x, BO, DS, E, F, G 2x, GH, K, L, P, PNH (n.v., photo in A), U, US, WRSL], Philippines, Is. Sibuyan, Prov. Capiz, Magallanes (Mt Giting-Giting), Apr. 1910.

Tree, up to 20 m high, clear bole at least 7 m, dbh up to 25 cm. Outer *bark* dull brown, smooth, inner bark reddish, sapwood thin, whitish, heartwood reddish brown, moderately hard, heavy. *Branches* finely brownish sericeous when young, later glabrous. *Stipules* triangular, often scale-like, c. 1.5 mm long, base c. 1 mm wide. *Leaves:* petiole terete, rather slender, darker coloured than midrib in dry state, finely appressed hairy, brownish puberulous to sericeous, (5–)6–10 mm long, 1–1.2 mm diam.; lamina elliptic, rarely slightly oblong, sometimes very slightly obovate, 60–115 by 20–45 mm, index 2.3–3.8, chartaceous to (sub)coriaceous, base acute, apex distinctly acuminate, acumen up to 30 mm long, margin entire, rarely faintly revolute. *Venation:* secondary veins in 5–8(–10) pairs, indistinct to subprominent beneath, (sub)prominent above, sometimes tertiary arches present, reticulate areolation. *Indumentum:* glabrous with some scattered hairs above, finely appressed lightish to golden puberulous to sericeous beneath (lens!); leaves shiny olive to greenish brown above, lighter brown beneath; very young shoots sometimes fulvous hairy. *Inflorescence:* medium-flowered glomerules (up to c. 10 flowers) axillary on normal-leaved branches. *Bracts* fulvous, ovate triangular, up to 1 by 0.7–0.8 mm, membranaceous, brownish puberulous to sericeous outside. *Flowers* not seen, 3–6 mm diam. in fruit. *Sepals* triangular, 1.5–3 by 1–1.5 mm, glabrous to slightly albo-pilose. *Infructescence* with up to 8 fruits. *Fruit* subsessile (sometimes pedicel 0.5–1 mm long), but 2–4 mm stipitate, stipe

glabrous, 1–1.5 mm diam., obtusely trilobed from above with shallow grooves, depressed oval with concave apical depression in outline, c. 8–9 mm tall, 8–10 mm diam., glabrous, sometimes with very few whitish hairs, blackish when dry. *Seeds* compressed semiovoid, c. 4 by c. 3.5 by 3 mm; testa smooth, dark brown (only 1 seed seen).

Field notes — Leaves shiny deep green, glaucous green or yellowish brown beneath, folded upon the upper surface when young; flowers odourless; fruits erect, green turning reddish brown.

Distribution — Borneo (Sabah), Philippines (SW Luzon, Sibuyan Island, E Samar), New Guinea (W Irian: Merauke Distr.; Papua: Central Prov.).

Habitat & Ecology — Humid, primary forests; at altitudes up to 250 m. Reported from gravelly damp soil.

Notes — *Cleistanthus isabellinus* differs from the widespread *C. myrianthus* merely in the rather acuminate leaf apex and the conspicuous coppery colour of the abaxial leaf indumentum (especially present on the young leaves). Additionally the abaxial lateral veins are far less prominent in *C. isabellinus*. In all other features, especially in structure of this indumentum, the number of secondary veins and the shape and glabrousness of the capsules this species is very similar to the rather variable *C. myrianthus*. Both taxa are characterised by the dense appressed indumentum on the lower leaf surface. It is very likely that further work will allow this species to be included within *C. myrianthus*. This was already assumed by Jablonsky (1915: 40). More abundant material and field studies should answer this question. I still retain it as separate species which is characterised by the above mentioned character combination.

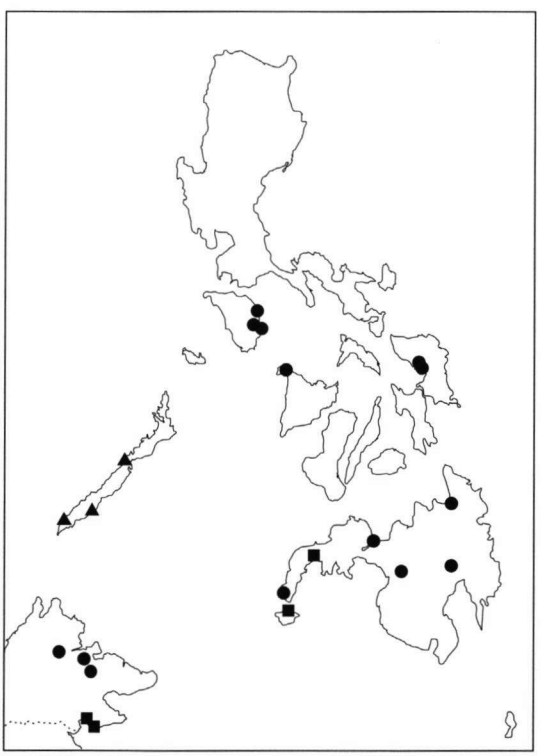
One collection from North Borneo (*SAN 36010*, leg. *Ambullah*, L) and two from New Guinea (*Van Royen 4707*, *Schodde 2953*, both L) indicate that this taxon is no Philippine endemic, but – although rarely collected – more widespread than thought.

8. Cleistanthus megacarpus C.B. Rob. — Fig. 3, Map 4

Cleistanthus megacarpus C.B. Rob., Philipp. J. Sci., Bot. 6 (1911) 323; Jabl. in Engl., Pflanzenr. H. 65 (1915) 31; Merr., J. Str. Branch Roy. As. Soc. 86 (1922) 322; Enum. Philipp. Flow. Pl. 2 (1923) 420; Holthuis & H.J. Lam, Blumea 5 (1942) 200; Masam., Enum. Phan. Bornear. (1942) 392; Salvosa, Lex. Philipp. Trees (1963) 92; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 39 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 83; J.A.R. Anderson, Check L. Trees Saraw. (1980) 182; Airy Shaw, Kew Bull. 37 (1982) 13; Enum. Euphorb. Philipp. Is. (1983) 14; Whitmore, Tree Fl. Indon., Checkl. Maluku (1989) 39; Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 124. — Lectotype (here designated): *Whitford 1443* (holo K; iso NY), Philippines, Mindoro, Camantigue, Bongabong River, Feb. 1906.

Shrub to tree, up to 13 m high, stem up to 7 m and dbh up to 26 cm reported. Outer *bark* dark grey to reddish, smooth, inner bark yellowish red to purplish brown, sapwood white red to light brown. *Branches* scattered albo-pilose to glabrous. *Stipules* obliquely narrow triangular, subulate, rather conspicuous, 5–10 mm long, base 1–3.5 mm wide, reddish to dark brown, chartaceous to membranaceous, glabrous, rarely with ciliate margin, margin membranaceous, conspicuously densely clustered on base of shoots and persistent even without leaves. *Leaves:* petiole conspicuously long, subterete, conspicuously dark in dry state, glabrous, rarely scattered pilose, 7–13 mm long, 1.5–2

(–2.5) mm diam.; lamina elliptic, often (slightly) obovate, 10–35 by 5–12 cm, index 2.2–3.2, submembranaceous to chartaceous, rarely subcoriaceous, base obtuse to acute, apex acuminate, acumen up to 30 mm long, margin entire, sometimes slightly revolute. *Venation:* secondary veins in 9–14(–17) pairs, prominent beneath, faintly subprominent or lighter coloured above, with rather acute angle of divergence, weak secondary arches, tertiary veins percurrent, reticulate areolation. *Indumentum:* glabrous on both sides, rarely scattered albo-pilose beneath; leaves light green when fresh, often conspicuously glaucescent beneath, greyish brown when dry. *Inflorescence:* few- to medium-flowered glomerules (up to 10 flowers) axillary on normal-leaved branches. *Bracts* broadly ovate-triangular, 1.5–2.5 by 1.5–2 mm, albo-pilose, dark midvein, margin membranaceous. *Flowers* sessile, 4–5.5(–7) mm diam. *Sepals* (narrow) triangular, 2–3.5 by 1–2.5 mm, glabrous. *Petals* whitish, spathulate to rhomboidal, margin sometimes lobulate, 1–1.5 by 0.7–1 mm. *Disc* glabrous, in staminate flowers and outer one in pistillate flowers saucer-shaped, c. 1.5 mm diam., inner one cup-shaped, c. 1.5 (?) mm tall. *Staminal column* not seen, free part of *filaments* up to 0.7 mm long. *Anthers* ovoid, c. 0.7 by 0.4 mm. *Pistillode* cylindrical, with widened blunt apex, glabrous, c. 1 mm tall. *Ovary* ovoidal, c. 1 mm diam., height ?, with a ring of brownish hairs at base (only 1 flower studied). *Styles* c. 0.5 mm long. *Infructescence* suberect, fruits mostly solitary, occasionally 2- or 3-clustered. *Fruit:* a large capsule, sessile, conspicuously stipitate, stipe rather robust, 4–10 mm long, 2–4 mm diam.; capsule subglobosely



Map 4. Distribution of *Cleistanthus megacarpus* C.B. Rob. (●), *C. rufescens* Jabl. (■) and *C. spec. A* (▲) in the Philippines and adjacent Borneo.

Fig. 3. *Cleistanthus megacarpus* C.B. Rob. a. Habit in fruit; b. dehisced capsule; c. flower (all L; a: *Kostermans 5297*; b: *SAN 93814*; c: *B-11792*).

trilobed, obtusely triangular from above, oval in outline, 18–23 mm tall, 20–25 mm diam., glabrous, rarely tuberculate, dark brownish when dry. *Seeds* semigloboidally heart-shaped with ventral groove, 10–12 by 9–10 by 6–8 mm; testa smooth, dark brown.

Field notes — Flowers whitish; stamens pale green to white; fruits reported as light yellow, pinkish green, or brown with a brown calyx.

Distribution — Sumatra (Simaloer Is.), Borneo, Philippines, Sangi and Talaud Is. (fide Airy Shaw, 1975); Morotai (fide Airy Shaw, 1982).

Habitat & Ecology — Reported from humid and primary forests, but also open woods; at low altitude up to 500 m. Reported from rich loamy and wet alluvial soils, and from coral limestone rocks.

Notes — This species is somewhat isolated among the taxa studied. Surprisingly there are only a very few collections in flower but many fruiting ones.

The main diagnostic characters are: the big, longly and stoutly stipitate capsules (more than 2 cm diam.); the characteristic, long subulate stipules (sometimes densely clustered on the base of shoots and persistent even after the leaves have fallen off) and the long, dark petioles. The leaves reach comparatively large dimensions. The flowers are poorly known due to a lack of material. Apart from the bracts the whole plant is rather glabrous; only the young branches and leaves sometimes have a scattered pilose indumentum.

9. **Cleistanthus myrianthus** (Hassk.) Kurz — Map 5

Cleistanthus myrianthus (Hassk.) Kurz, Prelim. Rep. Forest Pegu, App. A. (1875) cx; Forest Fl. Burma 2 (1877) 370; J. Asiat. Soc. Beng. 42, II (1874) 242, in note; Benth. & Hook.f., Gen. Pl. 3 (1880) 268 in nota; Fern.-Vill. in Blanco, Fl. Filip., ed. 3, Noviss. App. 4 (1880) 187, t. 353; Gamble, Man. Ind. timb. ed. 1 (1881) 598; Hook.f., Fl. Brit. India 5 (1887) 275; Boerl., Handl. Fl. Ned. Ind. 3 (1900) 271; Brandis, Ind. trees (1906) 561; C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 190; J.J. Sm., Nova Guinea 8 (1910) 231; in Koord. & Valeton, Bijdr. Boomsoort. Java 12 (1910) 297; Koord., Exkurs.-Fl. Java 2 (1912) 484 in clavi; Jabl. in Engl., Pflanzenr. H. 65 (1915) 37, f. 7 A–D; Merr., Bibl. Enum. Born. Pl. (1921) 334, Enum. Philipp. Flow. Pl. 2 (1923) 421; Ridl., Fl. Malay Penins. 3 (1924) 194; S. Moore, J. Bot. 63, Suppl. (1925) 93; Gagnep. in Lecomte, Fl. Indo-Chine 5 (1926) 482; Merr., Univ. Calif. Publ. Bot. 15 (1929) 154; Gage, J. Asiat. Soc. Bengal 75, 5 (1936) 515; Masam., Enum. Phan. Bornear. (1942) 392; Holthuis & H.J. Lam, Blumea 5 (1942) 200; K. Heyne, Nutt. Pl. Ned.-Ind., ed. 3 (1950) 918; Salvosa, Lex. Philipp. Trees (1963) 92; Backer & Bakh.f., Fl. Java 1 (1964) 474 in clavi; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 41 in clavi; Airy Shaw, Kew Bull. 26 (1972) 237; Whitmore, Tree Fl. Malaya 2 (1973) 82 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 83; Kew Bull. 31 (1976) 378; Kew Bull. 33 (1978) 43; Kew Bull., Add. Ser. 8 (1980a) 60; Kew Bull. 35 (1980b) 611; Muelleria 4 (1980c) 221; J.A.R. Anderson, Check L. Trees Saraw. (1980) 182; Airy Shaw, Kew Bull. 37 (1982) 13; Enum. Euphorb. Philipp. Is. (1983) 15; Whitmore, Tree Fl. Indon., Checkl. Sumatra (1986) 80; Checkl. Maluku (1989) 39; Checkl. Sulawesi (1989) 46; Checkl. Kalimantan 1 (1990) 124; Hnatiuk, Austral. Fl. Fauna Ser. 11 (1990) 180; A.D. Chapm., Austral. Fl. Fauna Ser. 12 (1991) 740; Pham-hoang Hô, Câyco Viêtnam 2, 1 (1992) 286; Keßler & Sidiyasa, Trees Balikpapan-Samarinda Area, Tropenbos ser. 7 (1994) 126 in clavi. — *Nanopetalum myrianthum* Hassk., Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch. 4 (1855) 141; Bot. Zeitung (Berlin) 14 (1856) 803; Flora 40 (1857) 534; Hort. Bogor. Descr. (1858) 66; Miq., Fl. Ned. Ind. 1, 2 (1859) 357; Müll. Arg. in DC., Prodr. 15, 2 (1866) 510; Kurz, J. Asiat. Soc. Beng. 42, II (1874) 242. — *Kaluhaburunghos myrianthus* (Hassk.) Kuntze, Rev. Gen. Pl. 2 (1891) 607, nom. illeg. — Lectotype: *Hasskarl* [holo BO, designated by Airy Shaw, 1980b, but not found there by the present author; iso L, U, possible iso K], W Java, Bantam, S coast, 1841.

Cleistanthus cupreus S. Vidal, Revis. Pl. Vasc. Filip. (1886) 235, syn. nov.: Airy Shaw, 1975; Koord., Versl. Minahasa = Meded. Lands Plantentuin 19 (1898) 582; C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 191. — *Cleistanthus myrianthus* subsp. *cupreus* (S. Vidal) Jabl. in Engl., Pflanzenr.

H. 65 (1915) 39; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 421. — Lectotype (here designated): *Vidal 560* (holo MA; iso A, AAU, K, L, MA), Philippines, Prov. Rizal, Distr. Morong, Bosoboso.

Cleistanthus apiculatus C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 189, syn. nov.; Jabl. in Engl., Pflanzenr. H. 65 (1915) 42; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 419; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *Williams 2356* (holo NY; iso GH, K, NY, US), Philippines, Mindanao, Distr. Zamboanga, Sax River, 165 m, 23 Feb. 1905.

Cleistanthus pseudocanescens Elmer, Leafl. Philipp. Bot. 3 (1910) 910, syn. nov.: Merr. 1923: 421; Elmer, Leafl. Philipp. Bot. 4 (1911) 1284. — *Cleistanthus pseudo-cinereus* sens. Airy Shaw, 1978: 45. — Lectotype (here designated): *Elmer 12140* [holo NY; iso A, DS, E, F, G 2x, GH, HBG n.v., K, L, P, U, US, WRSL], Philippines, Is. Sibuyan, Prov. Capiz, Magallanes (Mt Giting-Giting), March 1910.

Cleistanthus misamisensis C.B. Rob., Philipp. J. Sci., Bot. 6 (1911) 325, syn. nov.; Jabl. in Engl., Pflanzenr. H. 65 (1915) 41; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 15. — Lectotype (here designated): *FB 15463*, leg. *Pray & Cenabre* (holo US), Philippines, Mindanao, Prov. Misamis, Iligan, 50 m, Apr. 1910.

Cleistanthus mindanaensis C.B. Rob., Philipp. J. Sci., Bot. 6 (1911) 324, syn. nov.; Jabl. in Engl., Pflanzenr. H. 65 (1915) 41; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 15. — Lectotype (here designated): *FB 9474*, leg. *Whitford & Hutchinson* [holo K; iso L, P, PNH (n.v., photo in A), US], Philippines, Mindanao, Distr. Zamboanga, Port Banga, Feb. 1908.

Cleistanthus pseudomyrianthus Jabl. in Engl., Pflanzenr. H. 65 (1915) 41, syn. nov.: Whitmore, 1973: 82; Ridl., Fl. Malay Penins. 3 (1924) 194; Gage, J. Asiat. Soc. Bengal 75, 5 (1936) 516. — Lectotype: *Wray 2486* (holo K, designated by Gage 1936: 517, but not traced there by the present author; iso SING], Peninsular Malaysia, Perak, Larut, July 1888.

Cleistanthus castus S. Moore, J. Bot. 63, Suppl. (1925) 93, syn. nov.: Airy Shaw, 1981: 281. — Type: *H.O. Forbes 1622* (iso GH, L, SING), Sumatra, hills S of Goenoeng Trang, Lampongs, 380 ft, 1881–1882.

Tree, up to 30 m high, with a rather long and thick stem, clear bole up to 15 m, dbh up to 60 cm. Outer *bark* greyish, smooth to roughened blotched, inner bark roseous red, sapwood thin, whitish, heartwood rose-red, hard. *Branches* finely brownish sericeous when young, later glabrous. *Stipules* triangular, often scale-like, c. 1.5 mm long, base c. 1 mm wide. *Leaves:* petiole terete, rather slender, darker coloured than midrib in dry state, finely appressed hairy, brownish puberulous to sericeous, (5–)6–16 mm long, 1–2.5(–3) mm diam.; lamina elliptic to oblong, rarely lanceolate, sometimes slightly ovate or obovate, 60–270 by 16–99 mm, index 1.8–4.8, chartaceous to (sub)coriaceous, base obtuse, roundish to acute, apex acuminate, sometimes acute, acumen up to 45 mm long, margin entire, rarely faintly revolute. *Venation:* secondary veins in (9–)10–16(–19) pairs, prominent beneath, (sub)prominent above, sometimes tertiary arches present, reticulate areolation. *Indumentum:* glabrous with some scattered hairs above, finely appressed lightish to golden puberulous to sericeous beneath (lens!); leaves olive to greenish brown above, often rather glossy, sometimes bullate when dry, lighter brown beneath; very young shoots sometimes circinate (fern-like rolled inwards) and fulvous hairy. *Inflorescence:* many-flowered glomerules (more than 10 flowers) axillary on normal-leaved branches, sometimes axillary, spike-like, leafless branches bearing the glomerules, glomerules densely fulvo-pubescent to -sericeous because of bracteal indumentum, and often conspicuously protruding in fruiting state. *Bracts* fulvous, ovate triangular, c. 1 by 0.7–0.8 mm, membranaceous, brownish puberulous to sericeous outside. *Flowers* (sub)sessile, rarely up to 1.5 mm pedicelled (esp. staminate

flowers), 3–6 mm diam., often dark brown when dried. *Sepals* triangular, 1.5–2.5 by 1–1.5 mm, glabrous to slightly albo-pilose. *Petals* spathulate, rhomboid or obtriangular, margin sometimes lobulate, 0.6–1.2 by 0.5–0.7 mm. *Disc* glabrous, in staminate flowers and outer one in pistillate flowers saucer-shaped, 1.5–1.8 mm diam., inner one cup-shaped, 1–1.5 mm tall. *Staminal column* c. 1 mm long, free part of *filaments* up to 1.2 mm long. *Anthers* ovoid, 0.5–1 by 0.3–0.6 mm. *Pistillode* ovoid, apically turbinate, apex sometimes trifid, glabrous, up to 0.8 mm tall, c. 0.3–0.4 mm diam. *Ovary* semi-globoid to ovoid, c. 1–1.5 mm diam., c. 1 mm tall, glabrous. *Styles* c. 1.5–2 mm long, apical quarter bifid, widened at the tip. *Infructescence* with up to 10 fruits. *Fruit* subsessile (sometimes pedicel 0.5–1 mm long), but 2–5(–8) mm stipitate, stipe glabrous, 1.2–2.5 mm diam., obtusely trilobed from above with shallow grooves, depressed oval with concave apical depression in outline, 7–11 mm tall, 7–9(–14) mm diam., glabrous, sometimes with very sporadic whitish hairs, blackish when dry. *Seeds* semi-ovoid, adaxially with medial concave depression, apically blunt, 5–6 by c. 4 by 2–3 mm; testa smooth, dark brown.

Field notes — Twigs quite rigid, the blaze is said to have a sickly-sweet smell (Airy Shaw, 1980a). Leaves dark green, glossy above, greyish green, glaucous or golden hairy beneath, folded upon the upper surface when young, old leaves die bright yellow. Flowers citrinous to yellow green, odourless. Fruits green turning dull purple.

Distribution — Burma, Thailand, Andamans, Peninsular Malaysia, Sumatra, Borneo, Philippines, Java, Celebes, Talaud Is., Flores (?, cf. *C. myrianthus*), Ambon, Morotai, Moluccas (Bacau Is.), New Guinea, Solomon Islands, N Australia (Queensland).

Habitat & Ecology — Humid, primary forests; at altitudes up to 800 m. Reported from red or brown or sandy soil, or limestone scree.

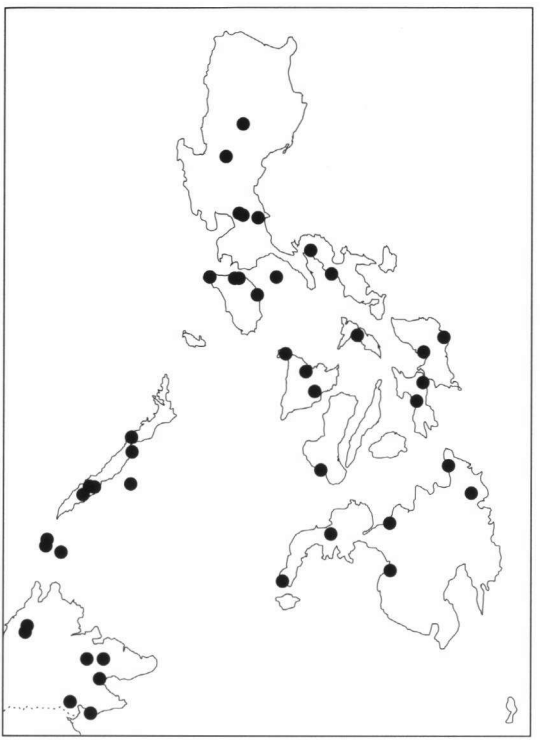
Uses — Leaves applied to treat asthma (*PNH 38375*).

Notes — This species is very variable with regards to its leaf characters: from narrow elliptic (nearly lanceolate) to broadly elliptic, from small to large, from chartaceous to bullate-coriaceous. Characteristic, however, is the finely appressed indumentum beneath. Additionally, the many-flowered inflorescence glomerules which become conspicuously protruding in fruit and the small, stipitate, glabrous capsules facilitate the recognition of this widespread species. Already in 1874 Kurz recognised the necessity of the new combination ("*Nanopetalum*, Hassk. ad *Cleistanthus* certissime reducendum est."), but without mentioning the epithet. The new combination of *Cleistanthus myrianthus* was formally made in Kurz (1875: App. A: cx). It is sufficient, as it refers to the basionym. Hence, Chapman's (1991: 740) opinion ("This name must be regarded as a new description and not as a new combination as Kurz makes no reference to a basionym." i.e., in his Forest Fl. Burma 1877) is erroneous.

The description above is based mainly on Philippine material where the truly spicate variety (var. *spicatus* Airy Shaw) was not found.

A var. *concinnus* (syn. *C. pseudocanescens*) was described by Airy Shaw based on the manifestly convex leaf, which is glossy on its upper surface. Such collections were made in the Philippines too. However, this character combination badly needs field study to assess its validity for nomenclatural recognition.

Cleistanthus apiculatus was based mainly on its narrower and longer acuminate leaves having an apiculate top in comparison with *C. myrianthus*. Having checked the type-material I am convinced that the former is only a rather narrow-leaved collec-



Map 5. Distribution of *Cleistanthus myrianthus* (Hassk.) Kurz in the Philippines and adjacent Borneo.

tion of the latter. The apiculate apex is not even a consistent characteristic of all leaves. In all important diagnostic features (e.g., number and prominence of lateral venation, indumentum of leaf and ovary) this material agrees with the very variable *C. myrianthus* and a separate status cannot be maintained.

Robinson stated that *C. mindanaensis* is closely allied to *C. isabellinus* but differs mainly by larger and thicker, less acuminate leaves with a greater number of lateral veins (10–13 pairs) and stouter branches. All this clearly matches with *C. myrianthus*. Only the coppery colour of the undersurface of (especially the young) leaves suggests *C. isabellinus*, whose specific justification is still somewhat questionable (see there!). Although the young fruits of the type collection show no distinct stipe I am convinced that *C. mindanaensis* is conspecific with *C. myrianthus*.

10. **Cleistanthus pedicellatus** Hook.f. — Map 6

Cleistanthus pedicellatus Hook.f., Fl. Brit. India 5 (1887) 281; Jabl. in Engl., Pflanzenr. H. 65 (1915) 44; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 421; Ridl., Fl. Malay Penins. 3 (1924) 187; Gage, J. Asiat. Soc. Bengal 75, 5 (1936) 498; Whitmore, Tree Fl. Malaya 2 (1973) 80 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 84; Kew Bull., Add. Ser. 8 (1980a) 61; Enum. Euphorb. Philipp. Is. (1983) 15; P.T. Li, Acta Phytotax. Sin. 25 (1987) 139; Whitmore, Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 125; R.I. Milne, Kew Bull. 49 (1994) 452; P.T. Li, Fl. Reipubl. Pop. Sin. 44, 1 (1994) 27. — *Kaluhaburunghos pedicellatus* (Hook.f.) Kuntze, Rev. Gen. Pl. 2 (1891) 607, nom. illeg. — Lectotype: *Curtis 169* (holo K, designated by Gage 1936: 499; iso K, SING 8x), Peninsular Malaysia, Penang, Government Hill, March 1885.

Cleistanthus integer C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 196, syn. nov.: Airy Shaw, 1975: 84; Elmer, Leafl. Philipp. Bot. 3 (1910) 908; Jabl. in Engl., Pflanzenr. H. 65 (1915) 45, f. 6 E–G; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 420; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Kew Bull. 23 (1969) 65; Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *FB 3076*, leg. *Ahern*'s coll. (holo US; iso BO, NY), Philippines, Luzon, Prov. Rizal, Bosoboso, 17 May 1905.

Cleistanthus quadrifidus C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 197, syn. nov.: Airy Shaw, 1975: 84; Jabl. in Engl., Pflanzenr. H. 65 (1915) 44; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 421; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Kew Bull. 23 (1969) 64. — Lectotype (here designated): *FB 9478*, leg. *Whitford & Hutchinson* (holo US; iso K, NY), Philippines, Mindanao, Distr. Zamboanga, Port Banga, 20 m, 28 Feb. 1908.

Cleistanthus dichotomus J.J. Sm. in H. Lorentz, Nova Guinea 8 (1912) 786, t. 136, syn. nov.: Airy Shaw, 1975: 84; Jabl. in Engl., Pflanzenr. H. 65 (1915) 43. — Type: *Gjellerup 142* (iso BO 2x, K, L, U), Niederl. New Guinea, N-Küste bei Biwak Hollandia (Humboldt-Bai), 28 May 1910.

Cleistanthus pedicellatus f. *crassipes* Jabl. in Engl., Pflanzenr. H. 65 (1915) 44, syn. nov. — Type: *Wray 2375* (iso K ? n.v., SING), Peninsular Malaysia, Perak, July 1888.

[*Cleistanthus paucinervius* Merr. in P.K. Holmgren et al., Index to specimens filed in the New York Bot. Gard. Vasc. Pl. Type Herb. (1985) 281, nom. nud., syn. nov. — Authentic material: *FB 29311*, leg. *Aloba* (A, K, NY, US), Philippines, Luzon, Cagayan Prov., June 1922.]

Cleistanthus monocarpus R.I. Milne, Kew Bull. 49 (1994) 450, f. 3, syn. nov. — Type: *Greagh s.n.* (holo K), Borneo, Sabah, Pulau Gaya, May 1895.

Treelet to tree, up to 16 m high, with a clear bole up to 9 m high, up to 20 cm dbh. Outer *bark* yellowish grey, peeling in small, shredded plates, inner bark greenish, sapwood greenish white. *Branches* glabrous. *Stipules* ovate triangular to narrow triangular, subulate, small, sometimes tiny, often very inconspicuous, 1–2.5(–6) mm long, base 0.5–1 mm wide, glabrous. *Leaves:* petiole subterete, darker coloured than midrib in dry state (blackish), glabrous, sometimes with occasional hairs, (2.5–)4–7 mm long, (0.7–)1–1.5 mm diam.; lamina elliptic, sometimes ovate, 40–145 by 20–64 mm, index 1.4–3.3, (sub)coriaceous, base obtuse-rotundate to acute, or slightly attenuate, apex acuminate, acumen 10–25 mm long, margin entire, leaves greyish brown when dry. *Venation:* conspicuously prominent on both sides, distinctly reticulate beneath, secondary veins in 4–8(–9) pairs, reticulate areolation. *Indumentum:* absent. *Inflorescence:* many-flowered glomerules (up to c. 20 flowers) in the axils normal leaves, sometimes on short axillary leafless or smaller leaved shoots. *Bracts* very small, broadly triangular, 0.5–0.8 by 0.5–0.8 mm, glabrous, some with occasional hairs or hairy margin, abaxially keeled (midvein), with erose margin. *Flowers* distinctly pedicelled, pedicel slender, terete, glabrous, (2–)5–13 mm long, 0.2–0.5 mm diam., those of staminate flowers mostly more slender, flowers 5–7(–8 in fruit) mm diam. *Sepals* triangular, 2–3.5 by 1.2–1.8 mm, glabrous. *Petals* spathulate to broadly obtriangular, margin lobulate, 1–1.2 by 0.6–1 mm, midrib darker. *Disc* in staminate flowers and outer one in pistillate flowers saucer-shaped, 1.5–2 mm diam., inner one cup-shaped, c. 1 mm tall, covering base of ovary, glabrous, margin irregular. *Staminal column* 1–1.5 mm long, c. 0.5 mm diam., free part of *filaments* up to 1 mm long. *Anthers* ellipsoid to ovoid, 0.7–1 by 0.5–0.8 mm. *Pistillode* ellipsoid, deeply trifid at apex, glabrous, 1–1.3 mm tall, 0.4–0.5 mm diam. *Ovary* depressed globoid, 1.2–2 mm diam., 1–1.5 mm tall, whitish strigose to pilose. *Styles* 1.5–2 mm long, deeply bifid (up to half of their length), stigmas widened lobulate to bifidly divided (as quadrifid). *Infructescence* with up to 9 fruits per glomerule. *Fruit* distinctly pedicelled, pedicel 7–13 mm long, 1–2 mm diam.; subglobose capsule, depressed, often perfectly round from above, 5–8 mm tall, 7–10

mm diam., scattered fulvo-puberulous to later glabrous, hairs especially basal. *Seeds* semigloboidally broadly heart-shaped, ventrally concavely depressed, dorsally keeled, 3.5–4.5 by 3–4 by 2–3 mm; testa smooth, dark brown.

Field notes — Wood hard. Branches laxly rebranched, the ultimate ones very fine. Leaves thinly coriaceous, bright red brown when young. Flowers creamy white, odourless. Fruits ascending, yellowish green, reddish to blackish with dark persistent calyx.

Distribution — China (?; fide Li, 1987), Peninsular Malaysia, Borneo, Philippines, New Guinea.

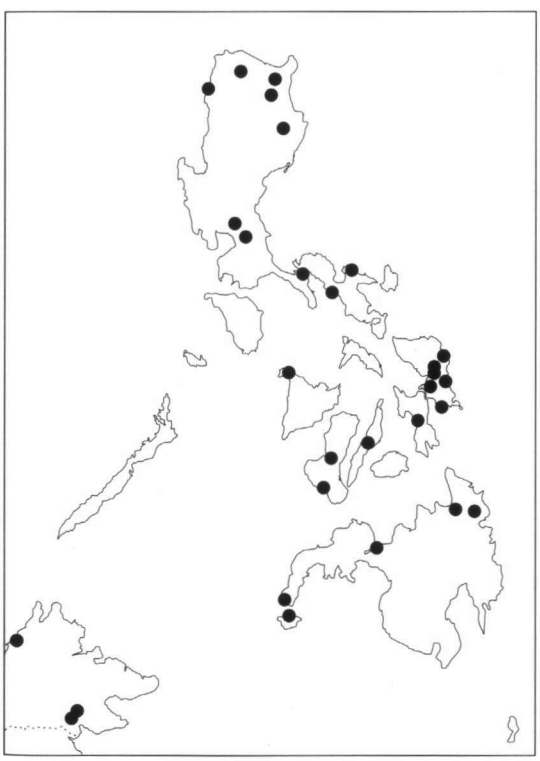
Habitat & Ecology — Primary lowland, also logged over, and secondary forests; up to 300 m. Reported from gravelly, stony, or red clay soil.

Uses — Wood locally used for construction or as fuel.

Notes — This species is well characterised by slenderly pedicelled flowers and fruits and by subcoriaceous to chartaceous leaves with a distinct prominent venation. It has only a few pairs of secondary veins and is glabrous in all young parts (only very occasionally pilose). Together with the newly recorded *C. erycibifolius* this species is the only pedicelled one in the Philippines.

Material collected in New Guinea tends to have longer, subulate stipules and denser pilose young fruits.

To me *C. monocarpus* represents a weak form of the normal *C. pedicellatus* as it differs only in having 1 fruit per infructescence and petioles of only 2 mm length. In fact, the paratype (*Kahar 5477*, L) has petioles of 2.5 mm length.

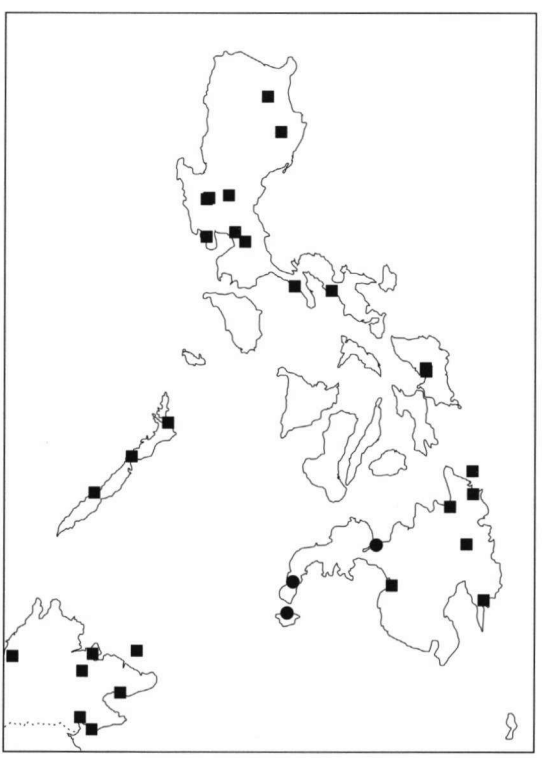


Map 6. Distribution of *Cleistanthus pedicellatus* Hook.f. in the Philippines and adjacent Borneo.

11. Cleistanthus pilosus C.B. Rob. — Map 7

Cleistanthus pilosus C.B. Rob., Philipp. J. Sci., Bot. 6 (1911) 326; Jabl. in Engl., Pflanzenr. H. 65 (1915) 33; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 421; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 15. — Type: *FB 19511*, leg. *Almagro* (iso K), Philippines, Basilan, Sept. 1910.

Treelet to tree, up to 4 m high, dbh 6 cm (only one collection with notes!). *Branches* long light-coloured-pilose to -velutinous when young. *Stipules* narrow to oblique triangular, 1.2–1.5 mm long, base 0.5–1.5 mm wide, pilose to glabrous, scaly, inconspicuous. *Leaves:* petiole subterete, darker coloured than midrib in dry state (blackish), pilose to velutinous, 2–3 mm long, c. 1 mm diam.; lamina (oblong) elliptic, very rarely slightly obovate, 40–90 by 13–35 mm, index 1.9–3.3, chartaceous to subcoriaceous, base subcordate, slightly asymmetric, apex shortly acuminate, acumen up to 20 mm long, margin entire. *Venation:* indistinct to subprominent above, prominent beneath, secondary veins in 7 or 8 pairs, secondary arches resemble tertiary veins, reticulate areolation. *Indumentum:* glabrous above, rarely with occasional hairs on midrib, glabrous beneath except midrib, and main veins pilose, sometimes also margin and lower part of leaf blade; leaves dull greyish brown above when dry, lighter beneath. *Inflorescence:* few-flowered glomerules (not seen) on short spike-like axillary shoots, rarely in the axils of normal leaves, the spike axis pilose. *Bracts* small, triangular, 1–2 by 0.7–1 mm, albo-pilose outside. *Flowers* not seen, sessile, 5–7 mm diam. (in fruit). *Sepals* narrow-triangular, c. 3.5 by 1–1.5 mm, albo-pilose to -sericeous outside. *Petals*



Map 7. Distribution of *Cleistanthus pilosus* C.B. Rob. (●) and *C. sumatranus* (Miq.) Müll. Arg. (■) in the Philippines and adjacent Borneo.

spathulate to roundish, margin often erose, 1–1.5 by c. 1.5 mm, albo-pilose outside. Inner *disc* in pistillate flowers up to 1 mm tall. *Styles* 1.5–2 mm long, apical half of styles bifidly divided. *Infructescence* with 1 (or 2?) fruit(s) per glomerule. *Fruit* sessile, ob-semigloboid, trilobed from above, compressed oval and concavely depressed at apex in outline, 10–11 mm tall, 10–12 mm diam., long pilose, becoming glabrescent, but still pilose in grooves and at base. *Seeds* semigloboid, ventrally and basally concavely depressed, 5–6 by 4.5–5 by 3–4 mm; testa smooth to somewhat striate, light brown.

Field notes — Twigs hairy brow. Leaves with hairy midrib beneath.

Distribution — Philippines (Basilan and Mindanao).

Habitat & Ecology — Reported from 60 m altitude.

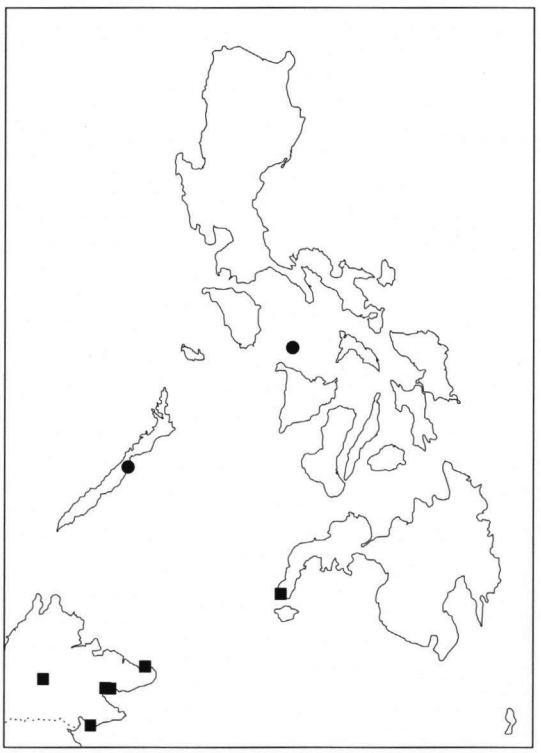
Uses — Used for lumber (*FB 27034*).

Note — This taxon is mainly characterised by the conspicuous pilose indumentum (especially of young twigs, petiole, midrib beneath, inflorescence axis). Furthermore, it has subcordate leaf bases, short spicate inflorescences and its leaves often dry greyish brown. Sessile capsules (which become glabrous), inconspicuous stipules, and albo-pilose petals as well as narrow triangular sepals are other distinctive features. Only a few collections could be affiliated to the species, which shows some morphological similarities with *C. bridelifolius*.

12. **Cleistanthus robinsonii** Elmer — Map 8

Cleistanthus robinsonii Elmer, Leafl. Philipp. Bot. 3 (1910) 909; Jabl. in Engl., Pflanzenr. H. 65 (1915) 52; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 422; Salvosa, Lex. Philipp. Trees (1963) 93; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 15. — Lectotype (here designated): *Elmer 12540* (holo NY; iso BO, E, F, G, HBG n.v., K, L, P, U, US, WRSL), Philippines, Is. Sibuyan, Prov. Capiz, Magallanes (Mt Giting-Giting), May 1910.

Slender and tall tree, up to 15 m high, trunk reported to be c. 60 cm (!?) thick, not straight, with main branches arising from the middle, conspicuously 'wadded', burly; wood dingy white on the outside, odourless and tasteless, hard. *Bark* relatively thin, brown, scaling in plates, reddish beneath the epidermis. *Branches* spreading, numerously rebranched, the ultimate ones very lax and spreading horizontally, appressed brownish pubescent. *Stipules* scaly, triangular, pubescent, minute, up to 0.5 by 0.5 mm. *Leaves:* petiole subterete, hardly thicker than midrib and smooth when dry, brownish when dry, fulvously pubescent, 5–8 mm long, up to 1 mm diam.; lamina linearly oblong, 4–10 by 1–2.5 cm, index 3.85–5.2 (4.33), submembranaceous to subcoriaceous, base acute (to round), apex slenderly acuminate, acumen 1–1.5 cm long, margin entire. *Venation:* secondary veins in 8–11 pairs, prominent above and beneath, sometimes with glands (?) in the angle between midrib and secondary veins, areolation indistinct. *Indumentum:* very scattered albo-pilose above, scarcely puberulent beneath; leaves drying green, glaucescently green beneath. *Inflorescence:* few-flowered glomerules with up to 6 flowers, axillary on normal-leaved branches, glomerules inconspicuous, with fulvous pubescence. *Bracts* broadly ovate-triangular, minute, c. 0.7 by c. 0.7 mm, fulvous pubescent. Staminate *flowers* sessile, c. 4–6 mm diam. *Sepals* triangular, 1.5–2 by 1 mm, glabrous outside. *Petals* whitish to light yellow, spathulate, 0.5–1 by 0.3–0.5 mm. *Disc* in staminate flowers saucer- to bowl-shaped, c. 2 mm diam., pistillate one not seen. *Staminal column* 1–1.5 mm long, free part of *filaments*



Map 8. Distribution of *Cleistanthus robinsonii* Elmer (●) and *C. venosus* C.B. Rob. (■) in the Philippines and adjacent Borneo.

up to 1.5–2 mm long, whitish. *Anthers* ovoid, c. 1 by 0.6 mm, yellowish brown. *Pistillode* conico-ovoid, glabrous, c. 1 mm tall, c. 0.4 mm diam.; pistillate flowers not seen, style thick, 1.5 mm long (sec. Elmer, 1910). *Fruit* not known.

Field note — Flowers purple.

Distribution — Philippines (Palawan, Sibuyan).

Habitat & Ecology — On wooded cliffs and forested slopes at about 300 m altitude.

Notes — This species is still incompletely known. The sterile *Loher 4717* collection determined as *C. robinsonii* by Airy Shaw is in my opinion *C. sumatranus*. I could trace only one other specimen (*Ebalo 634*, A) from Palawan, additional to the type collection, of which only some specimens (e.g., NY, WRSL) bear a few flowers. Because of the paucity of material I have merely elaborated the description from the literature and added some minor things from the collections I had at hand. A recollection could possibly clarify its taxonomic situation.

The base of the leaves was erroneously reported to be obtuse (Elmer, 1910) but is in fact acute.

13. Cleistanthus rufescens Jabl. — Map 4

Cleistanthus rufescens Jabl. in Engl., Pflanzenr. H. 65 (1915) 30; Whitmore, Tree Fl. Malaya 2 (1973) 83; Airy Shaw, Kew Bull. 33 (1978) 49; Kew Bull. 36 (1981) 282; Whitmore, Tree Fl. Indon., Checkl. Sumatra (1986) 80. — Type: *Beccari 933* (iso FI-B 2x, n.v., photos seen, L), Sumatra, Padang, Sungei bulu, Sept. 1878.

Cleistanthus pseudopodocarpus Jabl. var. *pseudopodocarpus* auct. non Jabl.: Airy Shaw, Kew Bull. 27 (1972) 76; Kew Bull., Add. Ser. 4 (1975) 85, pro major parte, cum synon. (sec. Airy Shaw, 1978: 49).

Cleistanthus pseudopodocarpus var. *leptopus* Airy Shaw, l.c. 1972, 1975, syn. nov.: Airy Shaw, 1978: 49.

Cleistanthus pseudopodocarpus auct. non Jabl.: Whitmore, Tree Fl. Malaya 2 (1973) 83 (sec. Airy Shaw, 1978: 49).

(Small) tree, up to 10 m high, dbh up to 12 cm. *Branches* glabrous to brownish tomentose. *Stipules* (oblique) triangular, 1.5–2.5 mm long, base 1.5–2 mm wide, tomentose to glabrous. *Leaves:* petiole terete, rather slender, darker coloured than midrib in dry state, scattered pilose to glabrous, (5–)7–14 mm long, 1.5–2.3 mm diam.; lamina elliptic, sometimes slightly obovate, 95–240 by 35–90 mm, index 2.3–4, subcoriaceous to chartaceous, base acute to shortly decurrent, or obtuse, apex obtuse sometimes with acuminate tip, acumen up to 15 mm long, margin entire. *Venation:* secondary veins in (7–)9–12 pairs, prominent above and beneath, tertiary veins strongly parallel, reticulate areolation. *Indumentum:* glabrous above and beneath, rarely some scattered hairs beneath, especially when young (lens!); leaves greenish olive to dark brown above, sometimes bullate when dry, lighter to greyish brown to light green, glaucous beneath. *Inflorescence:* many-flowered glomerules (more than 10 flowers) axillary on normal-leaved branches, sometimes on axillary, spike-like, leafless shoots, axis then albo- or rufo-strigose or tomentose. *Bracts* ovate triangular, 1–2.5 by 1–2.5 mm, albo- to fusco-strigose to -pilose outside. *Flowers* (sub)sessile, rarely up to 0.5 mm pedicelled, 5–6(–8 in fruit) mm diam., not widely opened. *Sepals* triangular, 2–4 by 1.5–3 mm, appressed brownish tomentose outside. *Petals* spathulate to semilunate with narrowed base, margin erose, 1–1.5 by 0.6–1.2 mm. Staminate *disc* glabrous, saucer-shaped, c. 2 mm diam. *Staminal column* 1–1.7 mm long, free part of *filaments* up to 1.2 mm long. *Anthers* ovoid with sagittate base, 0.7–0.8 by 0.5–0.8 mm. *Pistillode* ovoid, apically turbinate but blunt on top, light hairs especially at base, 0.8–1 mm tall, 0.5–0.7 mm diam., pistillate flowers not seen. *Styles* c. 2 mm long, apical half bifidly divided, widened tip. *Infructescence* with up to 4 fruits seen. *Fruit* subsessile to shortly stalked (pedicel 2–4 mm long, 1–1.5 mm diam.) and 2–4 mm stipitate, stipe densely brownish tomentose, c. 1.5 mm diam., trilocular capsule obtusely trilobed from above with shallow grooves, semigloboidal with concave apical depression in outline, 8–10 mm tall, 10–13 mm diam., densely brownish tomentose, endocarp hairy inside. *Seeds* semigloboid to heart-shaped, adaxially with medial concave depression, dorsally keeled, c. 7 by 5–6.5 by 4.5–5 mm; testa smooth to rugose, dark brown.

Field note — Fruits pale yellowish green.

Distribution — Peninsular Malaysia (fide Airy Shaw, 1978), Sumatra, Borneo (Sarawak, Sabah, E Indonesian Borneo), Philippines (Basilan, Mindanao).

Habitat & Ecology — Lowland primary forests. Reported up to c. 100 m altitude. Growing in sandy loam (one reference).

Notes — This species is easily confused with *C. myrianthus*, but a thorough examination of the leaf underside reveals that it lacks the appressed indumentum of the latter. It does have the conspicuous prominent venation and a sometimes bullate leaf-surface when dried, like *C. myrianthus*, but in the densely brownish tomentose calyx, and the brownish tomentose stipe and capsule it is distinct from *C. myrianthus*, which has glabrous stipes and fruits.

This species is newly recorded for the Philippines. Two collections were seen from Basilan Island (*BS 15402*, *Santos 4236*) and one from Mindanao (*BS 36851*). The material clearly matches collections of *C. rufescens* from Borneo. However, the isotype specimen seen from Sumatra (*Beccari 933*, L) has axillary leafless inflorescences, but matches perfectly otherwise. With this the distinction between *C. rufescens* and *C. bakonensis* (see the key in Airy Shaw, 1978: 49) becomes doubtful. Since the material seen of *C. rufescens* has slightly stronger, a bit bullate, coriaceous leaves whereas *C. bakonensis* has chartaceous leaves with a conspicuously prominent venation beneath and the flowers resp. fruits are nearly always on slender leafless 'spikes', I still hesitate to lump them. Clearly, the distinction between 'spicate' and axillary glomerules is not a sharp one. Additionally, indumentum and colour are more variable than thought. The fruits of *C. rufescens* and *C. bakonensis* are shortly stipitate *and* shortly pedicellate sometimes (which was not known yet). The whole complex (*C. rufescens*, *C. bakonensis*, *C. pyrrhocarpus*, *C. pseudopodocarpus*, etc.) needs critical revision and I think also after Airy Shaw's (l.c.) key and remarks on the sect. *Ferruginosi* it is far from understood.

14. Cleistanthus sumatranus (Miq.) Müll. Arg. — Map 7

Cleistanthus sumatranus (Miq.) Müll. Arg. in DC., Prodr. 15, 2 (1866) 504; J.J. Sm. in Koord. & Valeton, Bijdr. Boomsoort. Java 12 (1910) 299; Koord., Exkurs.-Fl. Java 2 (1912) 484 in clavi; Jabl. in Engl., Pflanzenr. H. 65 (1915) 13, f. 2 A–E; Merr., Bibl. Enum. Born. Pl. (1921) 335; Ridl., Fl. Malay Penins. 3 (1924) 192; Merr., Philipp. J. Sci. 29 (1926) 381; Masam., Enum. Phan. Bornear. (1942) 393; Backer & Bakh.f., Fl. Java 1 (1964) 474 in clavi; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 40 in clavi; Airy Shaw, Kew Bull. 26 (1972) 238; Whitmore, Tree Fl. Malaya 2 (1973) 82 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 87; J.A.R. Anderson, Check L. Trees Saraw. (1980) 182; Airy Shaw, Kew Bull. 36 (1981) 282; Kew Bull. 37 (1982) 13; Enum. Euphorb. Philipp. Is. (1983) 16; Whitmore, Tree Fl. Indon., Checkl. Sumatra (1986) 81; P.T. Li, Acta Phytotax. Sin. 25 (1987) 138; Whitmore, Tree Fl. Indon., Checkl. Maluku (1989) 40; Checkl. Sulawesi (1989) 46; Kiu, Acta Phytotax. Sin. 27 (1989) 456; Whitmore, Tree Fl. Indon., Checkl. Kalimantan 1 (1990) 126; Pham-hoang Hô, Câyco Viêtnam 2, 1 (1992) 288; Siemonsma & Kasem Piluek (eds.), PROSEA 8 (1993) 286; P.T. Li, Fl. Reipubl. Pop. Sin. 44, 1 (1994) 25, t. 7, f. 4–8. — *Leiopyxis sumatrana* Miq., Fl. Ned. Ind., Eerste bijv. (1861) 446. — *Kaluhaburunghos sumatranus* (Miq.) Kuntze, Rev. Gen. Pl. 2 (1891) 607, nom. illeg. — Type: *Teijsmann s.n.* [holo U; iso B†, BO, G-DC (microfiche seen), GH n.v., K, L], S Sumatra, Prov. Lampong, in monte Gunung Batin, prope Tega-nennin.

Cleistanthus vidalii C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 193, nom. nov. ≡ *Cleistanthus blancoi* S. Vidal, Revis. Pl. Vasc. Filip. (1886) 234, non *C. blancoi* Rolfe, J. Linn. Soc., Bot. 21 (1884) 315, syn. nov., already assumed by Airy Shaw, 1972: 238; C.B. Rob., Philipp. J. Sci., Bot. 6 (1911) 327; Jabl. in Engl., Pflanzenr. H. 65 (1915) 15; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 422; Salvosa, Lex. Philipp. Trees (1963) 93; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 16. — *Kaluhaburunghos blancoi* (S. Vidal) Kuntze, Revis. Gen. Pl. (1891) 607, nom. illeg. — Lectotype (here designated): *Vidal 559* (holo MA; iso AAU, K, L, MA), Philippines, Luzon, Prov. Tarlac, Moriones.

Cleistanthus heterophyllus Hook.f., Fl. Brit. India 5 (1887) 276, syn. nov.: Airy Shaw, 1972: 238; Hallier f., Meded. 's Rijks Herb. 1 (1910) 7; Jabl. in Engl., Pflanzenr. H. 65 (1915) 14; Merr., Bibl. Enum. Born. Pl. (1921) 334; Ridl., Fl. Malay Penins. 3 (1924) 190; Gage, J. Asiat. Soc. Bengal 75, 5 (1936) 505; Masam., Enum. Phan. Bornear. (1942) 392. — Lectotype (here designated): *Maingay Kew Distrib. 1372* (holo K; iso K, L), Malacca.

Cleistanthus laevis Hook.f., Fl. Brit. Ind. 5 (1887) 277, syn. nov.: Airy Shaw, 1972: 238; C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 193; Jabl. in Engl., Pflanzenr. H. 65 (1915) 13. — Type: *Marton 109* (holo K), Singapore, jungle behind the Botanical Gardens, Dec. 1875.

Cleistanthus minahassae Koord., Meded. Lands Plantentuin 19 (1898) 625. = Versl. Minahasa (1898) 582, syn. nov; J.J. Sm. in Koord. & Valeton (1910) 301, in obs.; Jabl. in Engl., Pflanzenr. H. 65 (1915) 52. — Lectotype (here designated): *Koorders 16920* (holo L; iso BO), Celebes, Prov. Minahassa, Menado, 50 m, 1895.

Cleistanthus laevigatus Jabl. in Engl., Pflanzenr. H. 65 (1915) 12, syn. nov.: Airy Shaw, 1975: 87; Merr., Bibl. Enum. Born. Pl. (1921) 334; Masam., Enum. Phan. Bornear. (1942) 392; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 40 in clavi; Airy Shaw, Kew Bull. 21 (1968) 363, in obs. — Lectotype (here designated): *Beccari 3882* (holo K; iso FI-B, photo seen), Borneo, Sarawak, Oct. 1867.

Cleistanthus oligophlebius Merr., Philipp. J. Sci., Bot. 13 (1918) 80, syn. nov.: Airy Shaw, 1975: 87; Merr., Bibl. Enum. Born. Pl. (1921) 335; Univ. Calif. Publ. Bot. 15 (1929) 154; Masam., Enum. Phan. Bornear. (1942) 393. — Lectotype (here designated): *Villamil 399* (protol. erroneously sub no. 339?) (holo K), British North Borneo, Marutai watershed nr Tawau, 4 June 1917.

Cleistanthus saichikii Merr., Philipp. J. Sci. 23 (1923) 248, syn. nov.: Airy Shaw, 1972: 238; Gagnep. in Lecomte, Fl. Indo-Chine 5 (1926) 499, f. 64.5–7; Merr. & Chun, Sunyatsenia 1 (1930) 64; Chun & Chang (eds.), Fl. Hainanica 2 (1965)141; Anonymous, Iconogr. Corm. Sin. 2 (1972) 592, f. 2914. — Type: *Canton Christian College 9148*, leg. *Mc Clure* (iso A 2x, CAS, E, K, NY 2x, P), China, Hainan, Fan Ta, 18 Apr. 1922.

Paracleisthus subgracilis Gagnep., Bull. Soc. Bot. France 70 (1923) 500; in Lecomte, Fl. Indo-Chine 5 (1926) 500, syn. nov.: Airy Shaw, 1972: 238. — Syntypes: *Thorel s.n.* (syn P?, n.v.), Laos mérid., Bassac; *Magnien, Gourgand* etc. *s.n.* (syn P?, n.v.), Cambodge, Pnom-penh; *Pierre 6300* (syn E, K: s.n., P?, n.v.), Cambodge, Phu-quoc; *Thorel s.n.* (syn BR, K, P?, n.v.), *Lefevre 252* (syn P?, n.v.), Cochinchine, Point A; *Harmand 81* (syn P?, n.v.), Cochinchine, Chaudoc; *Poilane 165* (E, K, P?, n.v.), Cochinchine, Sang-dinh., 15 July 1919; *Poilane 172* (syn P?, n.v.), Cochinchine, Gia-ray.

Cleistanthus euphlebius Merr., Pap. Michigan Acad. Sci. 1938, 24 (1939) 78, syn. nov.: Airy Shaw, 1975: 87; Airy Shaw, Kew Bull. 21 (1968) 363, in syn. — Type: *Rahmat si Toroes 818* (iso A n.v., E, MICH n.v., NY n.v., SING), Sumatra, E Coast, Asahan, Silo Maradja, nr Taloen Djoring, July–Aug. 1928.

Tree, up to 18 m high, with a clear bole up to 12 m tall, dbh up to 35 cm. Outer *bark* brownish to pale grey, finely cracked, inner bark thin, white to pale brown, sapwood reddish, hard. *Branches* glabrous, rarely scattered albo-pilose when young. *Stipules* (oblique) triangular, 1–1.5 mm long, base 0.8–1.5 mm wide, glabrous, rarely with some hairs. *Leaves:* petiole subterete, darker coloured than midrib in dry state (blackish), glabrous, rarely some scattered hairs adaxial, 2–6(–7) mm long, 0.7–1.2(–1.5) mm diam.; lamina (narrow) ovate to (ovately) elliptic, rarely lanceolate, 27–150 by 11–55 mm, index 2.25–4.25, chartaceous to subcoriaceous, base acute to roundish, rarely obtuse, apex (shortly) acuminate to acute, acumen 15–25 mm long, margin entire. *Venation:* obscure above, faintly prominent beneath, secondary veins in (4–) 5–8 pairs, often acute angles of divergence, long running towards apex before looping, sometimes tertiary arches, irregular reticulate areolation. *Indumentum:* absent; leaves brownish olive above, brownish grey beneath when dry, hardly glaucescent beneath, but paler greyish when dry, above often conspicuously shiny. *Inflorescence:* few-flowered glomerules (up to c. 7 flowers) in the axils of very small leaves or on leafless spike-like shoots, glomerules resemble 'pearls-on-a-string'. *Bracts* small, triangular, c. 1.5 by 1–1.5 mm, glabrous to albo-pilose, with sericeous margin. *Flowers* sessile, 4–5 mm diam. *Sepals* (narrow-)triangular, 2–2.5 by 1–1.5 mm, glabrous with occasional hairs at apex to albo-pilose outside. *Petals* narrow spathulate, margin slightly lobulate, 0.7–1.2 by 0.3–0.4 mm. *Disc* in staminate flowers and outer one in pistillate flowers saucer-shaped, c. 1.5 mm diam., inner one cup-shaped, 0.7–1.2 mm tall, covering

base of ovary, glabrous. *Staminal column* 1–1.5 mm long, free part of *filaments* up to 1 mm long. *Anthers* ellipsoid, 0.3–0.5 by 0.2–0.4 mm. *Pistillode* ovoid to ellipsoid, glabrous with some hairs at base, 0.6–0.8 mm tall, c. 0.3 mm diam. *Ovary* globoid, 1–1.2 mm diam., 1–1.2 mm tall, densely albo-strigose. *Styles* c. 1–1.3 mm long, basally united, apical thirds of styles bifidly divided, stigmas widened. *Infructescence* with 1 or 2 fruits per glomerule. *Fruit* sessile, rarely minutely stipitate (1 mm), obtusely triangular and deeply 3-lobed from above or tricoccous-subgloboid, compressed oval and concavely depressed at apex in outline, 7–9(–13) mm tall, 8–10(–13) mm diam., glabrous, basal and in sutures (grooves) with scattered pilose hairs. *Seeds* ovoid with blunt apex to heart-shaped, ventrally with median hilum, dorsally slightly keeled, 5–6 by 4–4.5 by 3–4 mm; testa smooth, slightly lineate with occasional inconspicuous warts, brown.

Field notes — Leaves reported as somewhat glaucous beneath. Flowers brownish yellow with red. Fruits red when ripe.

Distribution — China: Guangdong (fide Kiu, 1989), Hainan, Indochina, Thailand, Peninsular Malaysia, Sumatra, Borneo, Philippines, Java, Celebes, Bali, Ambon.

Habitat & Ecology — Dry to alluvial primary forests, also in secondary forests; up to 700 m altitude. Reported from rocky (granitic) alluvial soil and limestone.

Notes — This species has a rather wide distribution in SE Asia. Nevertheless it is not exceedingly variable and hence easily recognizable, especially by its characteristic smaller leaved to leafless axillary shoots bearing the flower glomerules ('pearls-on-a-string' appearance). It is also characterised by its glabrous, chartaceous to subcoriaceous leaves, which are often glossy above and dry greyish brown, by its few secondary vein pairs, which show a conspicuously acute angle of divergence and run widely towards the apex before looping. It might be confused with *C. venosus*, which is larger in most parts. The bigger leaves of the latter are more oblong and have more secondary veins which do not run as far towards the apex and which are conspicuously prominent whereas the lateral veins in *C. sumatranus* are remarkably obscure. The leaves of the former dry conspicuously yellowish or greyish green. The two species are doubtlessly very closely related.

Cleistanthus gracilis from Peninsular Malaysia and Borneo is supposed to differ from *C. sumatranus* merely by smaller leaves and their distinct acumen. These characters should be carefully compared. Both taxa might well prove to be conspecific.

15. Cleistanthus venosus C.B. Rob. — Map 8

Cleistanthus venosus C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 192; Jabl. in Engl., Pflanzenr. H. 65 (1915) 12; Merr., Bibl. Enum. Born. Pl. (1921) 335; Enum. Philipp. Flow. Pl. 2 (1923) 422; Masam., Enum. Phan. Bornear. (1942) 393; Salvosa, Lex. Philipp. Trees (1963) 93; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 87; Kew Bull. 36 (1981) 282; Enum. Euphorb. Philipp. Is. (1983) 16; Whitmore, Tree Fl. Indon., Checkl. Sumatra (1986) 81; Checkl. Kalimantan 1 (1990) 126. — Lectotype (here designated): *Williams 2187* (holo NY; iso GH, K, NY, US), Philippines, Mindanao, Distr. Zamboanga, Sax River, 150 m, 4 March 1905.

Cleistanthus elmeri Merr., Univ. Calif. Publ. Bot. 15 (1929) 154, syn. nov.: Meijer, 1968: 232; Masam., Enum. Phan. Bornear. (1942) 392; Meijer, Bot. News Bull. Forest Dept., Sabah 7 (1967) 40 in clavi; Bot. Bull. Herb. Forest Dept., Sabah 10 (1968) 232. — Lectotype (here designated): *Elmer 21694* (holo PNH† ?, replaced by L; iso A, B, BO, BR, DS, K, L, M, NY, P, PH, SING, U, US), British N Borneo, Elphinstone Prov., nr Tawao, on steep forested river banks, Oct. 1922–Mar. 1923.

Treelet to tree, up to 12 m high, with a clear bole up to 9 m high, girth up to 1 m. Outer *bark* light green to pale grey, smooth, inner bark pale to brownish green, sapwood white to whitish brown. *Branches* very young scattered pilose, later glabrous. *Stipules* triangular, 2–4 mm long, base c. 1 mm wide, glabrous, occasionally some hairs at apex. *Leaves:* petiole subterete, darker coloured than midrib in dry state (blackish), glabrous, 5–9(–10) mm long, 1–2.5 mm diam.; lamina elliptic, very rarely slightly obovate, 75–270 by 20–100 mm, index 2.64–4.3, chartaceous, base acute to roundish, slightly asymmetric, rarely slightly emarginate, apex acuminate, acumen 10–30 mm long, margin entire. *Venation:* conspicuously prominent beneath, secondary veins in 5–8(–10) pairs, secondary arches resemble tertiary veins, irregular reticulate areolation. *Indumentum:* absent; leaves greenish to yellowish when dry, hardly glaucescent beneath, but pale greenish when dry. *Inflorescence:* few-flowered glomerules (mostly 3 or 4 flowers, rarely up to c. 10 flowers) in the axils of very small, lanceolate leaves which are conspicuously hairy beneath, these on spike-like branches in the axils of normal leaves with the spike axis sometimes scattered pilose. *Bracts* small, triangular, 1.5–2.3 by 1.2–2 mm, albo-pilose to -strigose outside, abaxially keeled (midvein), with erose margin. *Flowers* sessile, staminate ones slender, 4–7 mm diam. *Sepals* narrow-triangular, 2–3.5 by 1–1.5 mm, appressed albo-strigose outside. *Petals* spathulate to obovate, margin often erose, (1–)1.5–2 by (0.3–)1–1.5 mm. *Disc* in staminate flowers saucer-shaped, 1.5–2.5 mm diam., outer one in pistillate flowers saucer-shaped, 2–3 mm diam., inner one cup-shaped, 1–1.5(–2) mm tall, covering base of ovary, glabrous to weakly pilose outside. *Staminal column* 1.2–1.5 mm long, c. 0.5 mm diam., free part of *filaments* up to 1.2 mm long. *Anthers* ovoid, 0.7–1.2 by 0.5–0.8 mm. *Pistillode* ovoid to globoid, apex blunt, glabrous, 1–1.3 mm tall, c. 0.6 mm diam. *Ovary* globoid, 1.5–2.2 mm diam., 1.4–2.2 mm tall, densely albo-strigose. *Styles* c. 2 mm long, apical third of styles bifidly divided, stigmas papillose, widened. *Infructescence* with 1 or 2 fruits per glomerule. *Fruit* (sub)sessile (to 1 mm stalked), obtusely triangular and deeply 3-lobed from above, compressed oval and concavely depressed at apex in outline, 9–11 mm tall, 9–13 mm diam., scattered pilose, hairs only apical, basal, and in sutures (grooves). *Seeds* broadly bean-shaped, ventrally and basally concavely depressed, dorsally keeled, c. 7 by 4 by 4.5 mm; testa smooth, slightly lineate with occasional inconspicuous warts, dark brown.

Field note — Fruits reddish green.

Distribution — Peninsular Malaysia, Sumatra (Simaloer Is.), Anambas Is., Borneo, Philippines (Mindanao).

Habitat & Ecology — Primary lowland forests; up to 600 m altitude; on brown to black, sandy soil.

Notes — The smaller-leaved, spike-like flower bearing branches generally characterise *C. venosus* together with the conspicuous prominence of venation of higher order (3° and more) on the lower leaf surface. Moreover, the chartaceous leaves are glabrous with only scattered hairs beneath. They often dry greenish. The narrow-triangular sepals show a strong indumentum, the deeply lobed, sessile capsules are pilose but become glabrous later.

From *C. everettii* it differs by the glabrous petiole and the fewer-flowered glomerules. The leaves often reach a larger size too. Field studies have to prove whether

these characters are consistent and both taxa are really distinct. *BS 18614 (McGregor)* seems to represent a collection intergrading between both.

From *C. sumatranus* it is distinguished by the larger stipules, the colour of the dried leaves and by shape of the flower-bearing branches.

Airy Shaw (1975) states: "Closely related to *C. winkleri*, with which it shares rather large flowers and long narrow sepals, but differing in that the sepals and petals are externally long pilose". In my opinion the distinction between these taxa should be re-examined when better material is available.

16. Cleistanthus vestitus Jabl. — Map 3

Cleistanthus vestitus Jabl. in Engl., Pflanzenr. H. 65 (1915) 32; Merr., Bibl. Enum. Born. Pl. (1921) 335; Gage, J. Asiat. Soc. Bengal 75, 5 (1936) 514; Masam., Enum. Phan. Bornear. (1942) 393; Whitmore, Tree Fl. Malaya 2 (1973) 83 in clavi; Airy Shaw, Kew Bull., Add. Ser. 4 (1975) 87; J.A.R. Anderson, Check L. Trees Saraw. (1980) 182; Airy Shaw, Kew Bull. 36 (1981) 282; Whitmore, Tree Fl. Indon., Checkl. Sumatra (1986) 81; Checkl. Kalimantan 1 (1990) 126. — Lectotype (here designated): *Teijsmann 11331* (holo L; iso BO), Borneo, Sungei Landak.

Cleistanthus perakensis (Jabl.) Gage ex Ridl., Fl. Mal. Penins. 3 (1924) 195, syn. nov.: Gage, 1936: 514 [Note: Although Gage does not explicitly mention this species in the synonymy, he cites both syntypes of *C. perakensis* under *C. vestitus*, which has to be considered as a synonymisation]; *Cleistanthus vestitus* f. *perakensis* Jabl. in Engl., Pflanzenr. H. 65 (1915) 32. — Type: *Scortechini 1822 & 1823* (syn K), Peninsular Malaysia, Perak.

Cleistanthus barrosii Merr., Philipp. J. Sci. 20 (1922) 400, syn. nov.: Airy Shaw, 1975: 88; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 419; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. — Lectotype (here designated): *FB 26070*, leg. *Barros* (holo US), Philippines, Luzon, Isabella Prov., Ilagan, c. 200 m, 23 June 1916.

Cleistanthus sp. Merr., Univ. Calif. Publ. Bot. 15 (1929) 155 (*Elmer 21567*).

Bridelia cinnamomea auct. non Hook.f., Fl. Brit. India 5 (1887) 273, p.p. (cf. Gage, 1936: 514).

Shrub to small tree, up to 6 m high. Outer *bark* dark brown, smooth, thin, sapwood yellowish. *Branches* fulvo-pubescent to -pilose when young. *Stipules* (narrow) triangular, 2–4 mm long, base 1–1.5 mm wide, pubescent to glabrous. *Leaves:* petiole (sub)-terete, darker coloured than midrib in dry state, light brownish pubescent to pilose, later glabrous, 4–9 mm long, 1–2 mm diam.; lamina elliptic, often slightly ovate, sometimes lanceolate, 5–20 by 2–8 cm, index 2–3.5, chartaceous, base obtuse, roundish to acute, rarely attenuate, apex shortly acuminate to acute, acumen up to 20 mm long, margin entire. *Venation:* secondary veins in 6–9(–10) pairs, prominent beneath, (sub)prominent above, with very weak secondary arches, sometimes arches tertiary, perfect reticulate areolation. *Indumentum:* scattered albo- to fulvo-pilose above, later glabrescent, rusty pubescent to pilose beneath, becoming subglabrous, indumentum at base and main veins usually denser; leaves often conspicuously dark reddish brown when dry. *Inflorescence:* conspicuously reddish-woolly, many-flowered glomerules axillary on normal-leaved branches, sometimes axillary, spike-like, leafless branches bearing the glomerules. *Bracts* fulvous, ovate or broadly triangular, c. 2 by c. 1.5 mm, membranaceous, often conspicuously brownish strigose to pubescent outside, sometimes glabrous with hairy midvein, with erose margin. *Flowers* sessile, 3–4(–5) mm diam. *Sepals* triangular, 1.5–2.5 by 0.7–1.5(–2) mm, brownish pubescent. *Petals* whitish, spathulate to rhomboidal, margin lobulate, 0.6–1 by 0.5–0.9 mm. *Disc* glabrous, in staminate flowers and outer one in pistillate flowers saucer-shaped, 1.5–2 mm

diam., inner one cup-shaped, c. 0.5 mm tall. *Staminal column* up to 1.5 mm long, free part of *filaments* up to 1 mm long. *Anthers* ovoid to ellipsoid, 0.5–0.7 by 0.3–0.4 mm. *Pistillode* cylindrical, with widened blunt apex, glabrous, up to 1.2 mm tall, 0.4–0.6 mm diam. *Ovary* (semi)globoid, c. 1.5 mm diam., c. 1 mm tall, densely brownish pubescent. *Styles* c. 1 mm long, apical quarter bifidly divided, widened tip, stigmas lobulate. *Infructescence* with up to 5 fruits seen. *Fruit* sessile, but 2–4(–5) mm stipitate, stipe rather slender, 1–2 mm diam.; capsule obtusely triangular from above, shallowly tri-lobed, more or less rectangular to broadly ovate in outline, 6–7 mm tall, 7–9 mm diam., scattered pilose to glabrous, hairs mainly in grooves and at base, brownish when dry. *Seeds* heart-shaped in outline, abaxially keeled, c. 4 by 3 by 2.5–3 mm; testa smooth, brown.

Field notes — Flowers brown. Fruits light brown or brownish grey.

Distribution — Peninsular Malaysia, Sumatra, Borneo, Philippines (Luzon).

Habitat & Ecology— Reported from disturbed or secondary forests, but infrequently collected; on low altitudes up to 300 m. Reported from sandy, clayey soil.

Notes — This species has its morphologically closest relative in *C. decurrens*, but can be recognised by the conspicuously reddish tomentose, many flowered glomerules and non decurrent leaf base.

Cleistanthus vestitus is sometimes confused with the very variable *C. myrianthus* because of its leaf shape and the stipitate capsules. The latter differs, however, sufficiently in its appressed abaxial leaf-indumentum. Additionally it has mostly glabrous capsules. Despite the fact that another Philippine species was named *C. bridelifolius* I think the leaves of *C. vestitus* resemble much more closely those of some *Bridelia* species (see under *C. bridelifolius*)

The typical *C. barrosii* described as a Philippine endemic never has spicate inflorescences, a feature which sometimes characterises *C. vestitus* (and is noted in its protologue). However, this is not consistent among the material studied of the latter from Borneo and Sumatra. I therefore confirm Airy Shaw's synonymisation.

DOUBTFUL SPECIES

Cleistanthus spec. A — Map 4

I have seen three collections, all from Palawan, which in my opinion do not match any other of the species known from the Philippines: *Ridsdale 1008* (A, BO, K, L 2x), *Soejarto et al. 6833* (A, CHI n.v., F n.v., K, L, PNH n.v.), *Soejarto et al. 8412* (A n.v., CHI n.v., F, L, PNH n.v.). I also could not relate them to a Bornean species. They might belong to a yet undescribed taxon, which I did not venture to describe, as the material is rather poor in the generative phase (no flowers, only dehisced capsule bases present).

This taxon is characterised by the following features: Tree of reported height up to 25 m, dbh 20 cm with dry, brown erect inflorescences, being glabrous on branches, petioles, leaves, sepals (only young shoot tips are covered by a brownish indumentum). Stipules triangular, scaly, tiny, c. 0.5 mm wide at base, c. 0.7 mm long. Leaves with 3–10 mm long petioles; blade lanceolate, elliptic to slightly obovate, rather small, 2–10 by 0.8–4 cm, apex (shortly) acuminate, base obtuse to acute; of coriaceous texture, glossy above, with somewhat revolute margin, and conspicuously raised

secondary venation when dried; 8–10 pairs of secondary veins. Flowers in few-flowered glomerules on normal leaved branches; bracts broadly ovate-triangular with brownish pubescent indumentum. Sepals triangular, c. 2 by 1 mm, glabrous. Capsule sessile, not stipitate, glabrous (at least basal), c. 5–6 mm tall.

All these collections originate from ultrabasic slopes (collector's statement on two labels; the third, *Soejarto et al. 6833*, was found in forest of low stature on a thin soil layer). The plant appears to be common in the area and withstands rather dry conditions.

1. *Cleistanthus orgyalis* (Blanco) Merr., Rev. Blancos Fl. Filip. (1905) 75, nom. rej. prop. (Dressler & Hoffmann, 1998); C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 189; Jabl. in Engl., Pflanzenr. H. 65 (1915) 42; Merr., Sp. Blancoan. (1918) 220; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 421; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 15. ≡ *Gluta orgyalis* Blanco, Fl. Filip, ed. 2 (1845) 451. — Type: not designated.

2. *Cleistanthus blancoi* Rolfe, J. Linn. Soc., Bot. 21 (1884) 315; Merr., Rev. Blancos Fl. Filip. (1905) 75, in syn.; C.B. Rob., Philipp. J. Sci., Bot. 3 (1908) 193; Hallier, Meded. 's Rijks Herb. 1 (1910) 7; Jabl. in Engl., Pflanzenr. H. 65 (1915) 13; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 419; Salvosa, Lex. Philipp. Trees (1963) 92; Airy Shaw, Enum. Euphorb. Philipp. Is. (1983) 14. ≡ *Cleistanthus ferrugineus* auct. non Müll.Arg., Fern.-Vill. in Blanco, Fl. Filip., ed. 3, Noviss. App., 4 (1880) 187. — Type: Fernández-Villar in Blanco, Fl. Filip., ed. 3, Noviss. App. (1880) t. 353.

Note: The true identity of the Blanco species *Gluta orgyalis* always remained obscure, as there obviously is no herbarium material extant. An analytical plate in Fernández-Villar [in Blanco, Fl. Filip., ed. 3, Noviss. App. (1880) t. 353] was drawn after Blanco's death and therefore does not represent original material. This plate, however, is the type of *C. blancoi* Rolfe. Unfortunately, it is ambiguous as the depicted parts of the plant do not sufficiently show diagnostic characters. In the article by Dressler & Hoffmann (1998) it is proposed to reject the comparatively early combination *C. orgyalis* in order to prevent possible undesirable nomenclatural changes. For a detailed discussion see the cited paper.

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IDENTIFICATION LIST

Cleistanthus
1. *angustifolius*
2. *bridelifolius*
3. *decurrens*
4. *erycibifolius*
5. *everettii*
6. *glaber*
7. *isabellinus*
8. *megacarpus*
9. *myrianthus*
10. *pedicellatus*
11. *pilosus*
12. *robinsonii*
13. *rufescens*
14. *sumatranus*
15. *venosus*
16. *vestitus*
17. *spec. A*

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