

NOTES ON THE GENUS *TEIJSMANNIODENDRON*

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In view of the recent (1951) revision of the genus, the detailed monograph which I had planned to publish would be presumptuous and is also now impractical because of lack of time. It would seem, however, that the bibliographic and other notes assembled by my wife and myself over the past 51 years ought to be placed on record. This is the 57th genus so treated by me in the extensive series of papers mostly published in the present journal. The herbarium acronyms employed herein are the same as have been used in all previous installments of this series in this journal and elsewhere since 1930 and are fully explained in my "Fifth Summary of the *Verbenaceae*....." (1971), volume 2, pages 795 to 801.

TEIJSMANNIODENDRON Koord., Ann. Jard. Bot. Buitenz., ser. 2, 4: 19--32. 1904.

Synonymy: *Xerocarpa* H. J. Lam, Verbenac. Malay. Arch. 98. 1919 [not *Xerocarpa* (G. Don) Spach, 1840]. *Teysmanniodendron* Koord. apud H. Hallier, Meded. Rijks Herb. Leid. 37: 55. 1918. *Teijsmannodendron* Nicholson, Sympos. Ecol. Res. Humid Trop. Veg. 72, 76, 80, 82, & 86. 1965. *Teijsmanniodendron* Mikil, in herb.

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Trees; leaves decussate-opposite, palmately compound but often only 1-foliolate, petiolate, exstipulate (but rarely with a small leafy appendage at the petiolole-base, deciduous; petioles often with a swollen apical articulation; leaflets 1--5, mostly petiolulate, the blades mostly coriaceous or rigidly chartaceous, marginally entire, sometimes slightly revolute, sometimes impressed glandular-punctate beneath; petiolules often with a swollen basal articulation; inflorescence cymose, determinate, the cymes usually opposite, aggregated in terminal panicles, rarely subspicate; bracts small; flowers perfect, hypogynous, more or less zygomorphic; calyx inferior, gamosepalous, mostly campanulate or ovoid-campanulate, persistent beneath the fruit, the rim usually 5- (rarely 4-) toothed, the teeth usually well developed, unequal, apically acute; corolla gamopetalous, bilabiate, infundibular or hypocrateriform, the tube cylindrical, subterete, usually short, slightly incurved, villous within on the upper half, usually somewhat ampliate and urceolate-campanulate apically, the limb distinctly bilabiate, mostly pubescent on both surfaces, 5- (or rarely 4-) lobed, the upper lip 2-lobed or sometimes entire, the lower lip usually more or less 3-lobed, the median lobe largest, all the lobes imbricate in bud, usually flat or the 2 posterior ones incurved, apically acute or obtuse; stamens 4 or rarely 5, distinctly didynamous, inserted at or below the middle of the corolla-tube, alternate with the petals, exserted, subequal, a fifth reduced to a sterile staminode in most cases or even absent; filaments filiform, separate, somewhat widened basally, unappendaged; anthers 2-locular, the thecae distinct, divergent or divaricate, dorsifixed near the apex, the apex dorsally confluent, anteriorly free, connivent, the connective sometimes glandular, scarcely extending beyond the thecae; disk inconspicuous; pistil one, compound, 2-carpellary; style terminal, solitary, apically divided into 2 short, very slender, acute arms; ovary superior, sessile, entire, apically obtuse, scarcely sulcate, incompletely 2-celled, apically 1-celled, basally 2-celled, becoming imperfectly 4-celled and 4-ovulate during anthesis; ovules 1 per cell, high-lateral or submedian-lateral, pendulous, hemianatropous; micropyle inferior; fruiting-calyx accrescent, the rim obscurely dentate or subentire; fruit large, drupaceous, dry, indehiscent, the exocarp either thick with scattered sclerenchymatic cells or thin and very brittle, or intermediate, by abortion usually 1-seeded.

Type species: *Teijsmanniodendron bogoriense* Koord.

This genus of some 21 recognized taxa is found naturally from

Burma and Thailand, through Malaya and Indochina, to Indonesia, the center of distribution apparently having been in Borneo.

Although originally proposed as *Teijsmanniodendron* by Koorders (1904), some authors insist on spelling the generic name, apparently on philologic ground, "*Teysmanniodendron*", e.g. Heyne (1917, 1927), Wangerin (1930), Fedde (1932), Den Berger (1949), Van Steenis (1963, 1969), Backer & Bakhuizen van den Brink (1965), Airy Shaw (1966), Meijer (1967, 1968), Van Steenis-Kruseman (1967, 1970), and Koster (in herb.). Kostermans (1951) adopts *Teijsmanniodendron* in the text of his review, but "*Teysmanniodendron*" on the cover of the separates of his paper. In the carbon copy of a paper preserved in my personal notes, entitled "On the orthography of the name Teysman" by Dr. Kostermans, it is stated that the man for whom this genus was named actually spelled his name "Teijsman" in all official documents preserved at Djakarta, Java, although his father, H. Theismann, signed his name "Teysman". Kostermans notes that "When his name is cited in the 'Natuurkundig Tijdschrift voor Nederl.-Indië' in the years around 1850, it is always spelled Teijsmann and it is evident from the use of the y in this periodical in capital as well as common-type of letter, that the ij was not used for lack of y. M. Treub, who introduced the first volume of *Teysmannia* in 1891 with a sketch of Teijsmann, put this name down consistently with ij, although the periodical was called *Teysmannia*. From this date on authors adopted the spelling with y and so it is spelled on Teysmann's monument in the Botanical Garden of Bogor. According to my opinion, the name should be written as adopted and consistently used by J. E. Teijsmann himself, an orthography still in use up to 1891." All of which, of course, in my own opinion, is irrelevant because the correct spelling of the generic name should be the original spelling adopted when it was first published.

In Supplement 3 of the "Index Kewensis" (1908) Prain placed the genus in the *Araliaceae* although Koorders originally (1904) correctly placed it in the *Verbenaceae*.

The genus is the type genus of the Tribe *Teijsmanniodendreae* Koord. of the *Verbenaceae* and is divided into two sections, Section 1 *Plurifoliolatae* Kosterm., with 3--5-foliolate leaves, and Section 2 *Unifoliolatae* Kosterm., with 1-foliolate leaves. Junell (1934) reduces the Tribe to Subtribe rank and notes that "diese Subtribus sicher von *Viticeae* abzuleiten ist. Der Fruchtknotenbau zeigt bei den beiden Gruppen grosse Ähnlichkeiten. Die Plazentation ist allerdings bei *Teijsmanniodendron* etwas abweichend, aber auch bei einigen *Vitex*-Arten finden wir eine ähnliche, jedoch nicht so ausgeprägte Plazentation". He regards *Petraeovitex* Oliv. as the connecting link between the two tribes. He continues: "Der Fruchtknoten ist von demselben Typus wie bei *Vitex*. Der Unterschied zwischen beiden liegt eigentlich in der Plazentation der Samenanlagen. Wie sich aus dem Längsschnitt des Fruchtknotens von *T. bogoriense* (Fig. 15) ergibt, gehen die Samenanlagen ganz oben in der Fruchtknotenöhle von den Plazenten aus. Von einem Funikulus kann man nicht reden; der chalazale Teil der herab-

hängenden Samenanlagen geht direkt in die Plazenta über. In Querschnitten (Fig. 153) durch den obersten Teil des Fruchtknotens sieht es jedoch aus, als ob die Samenanlagen an einem langen, gekrümmten Funikulus hängen würden, was jedoch nicht den Tatsachen entspricht. An tiefer liegenden Schnitten kann man sehen, dass die Samenanlagen an einer grossen Fläche an den Plazenten befestigt sind. Die Übergangspartie zwischen Samenanlage und Plazenta wird nicht oben zu schmaler, was zur Folge hat, dass in Schnitten durch den obersten Teil der Plazenten und der Samenanlagen die Verbindung zwischen diesen das oblige Bild ergeben kann. In dieser obersten Verbindungspartie befindet sich kein Leitbündel.

"Die Plazenten verwachsen schon im obersten Teil des Fruchtknotens. Etwas tiefer unten (Fig. 152) sind die Fruchtblattränder vollständig miteinander verwachsen und bilden eine unvollständige Scheidewand zwischen den beiden zu einem Fruchtblatt gehörigen Samenanlagen. Koorders.....äussert sich über diese Scheidewände folgendermassen: 'Indessen kommt eine unvollständige Vierfächerigkeit dadurch zu Stande, dass aus der Mitte der Fruchtknotenscheidewand zwischen den 2 Sa. eines Fruchtknoten-faches eine Wand flügelartig bis nahe an der Innenwand der Carpiden hervorwächst.'

"Von dem Samenanlagen abortieren drei, und die Frucht wirt somit einsamig. Koorders gibt an, dass die Frucht 'weder eine echte Steinfrucht noch eine aufspringende Kapsel, sondern nur kapselartig und nicht aufspringend' ist. Nach Koorders enthält die Fruchtwand Steinzellen, die jedoch nicht in einer Endokarpschicht angeordnet sind. 'Die ganze Fruchtwand ist trocken, holzig und ziemlich gleichmässig gebaut.'

"Der Grund dafür, dass Koorders *Teijsmanniodendron* nicht zu *Viticeae* zählen wollte, lag in dem abweichenden Fruchtbau der Gattung. Man darf jedoch in diesem Falle dem Bau der Frucht nicht allzu grosse Bedeutung zumessen. *Viticeae* umfasst übrigens in dieser Arbeit einige Gattungen, die keine Steinfrucht haben. *Petraeovitex* ist eine solche Gattung, bei der ja auch die Samenanzahl reduziert ist. Da jedoch zweifelsohne die Reduktion bei *Teijsmanniodendron* bedeutend weiter gegangen ist, scheint es am besten zu sein, einstweilen die Subtribus *Teijsmanniodendreae* beizubehalten. Ihr Ursprung ist sicher innerhalb *Viticeae* zu suchen. Bei *Vitex* liegt eine deutliche Tendenz, die Samenanzahl zu reduzieren, vor, und bei einigen Arten sind die Samenanlagen sehr hoch inseriert."

The genus *Xerocarpa* H. J. Lam (Verbenac. Malay. Arch. 98. 1919) is conserved in the International Code of Botanical Nomenclature over *Xerocarpa* Spach (Hist. Nat. Vég. Phan. 9: 583. 1840) of the *Goodeniaceae* and Airy Shaw (1966) still maintained it as a valid genus, but most recent workers reduce it to the synonymy of *Teijsmanniodendron*, and its type and only published species, *X. avicenniaefoliola* H. J. Lam, to the synonymy of *T. ahernianum* (Merr.) Bakh.

It should perhaps also be noted here that the Angely (1971) work referred to in the bibliography (above) is sometimes cited by its incorrect titlepage date of "1970", and the Schumann &

Lauterbach work (1900) is sometimes incorrectly cited as "1901".

Van Royen (1960) cites his nos. 5271 & 5463 as representing an unidentified species of *Teijsmanniodendron*.

In my opinion, *Vitex bulusanensis* Elm. and *V. padangensis* H. Hallier are actually species of *Teijsmanniodendron*, but more material is needed to confirm this suspicion. On the other hand, the *Binideh* 63159 and *Pitty & Ogata* 63240, distributed as *Teijsmanniodendron*, actually are *Vitex parviflora* A. L. Juss., while *Ampuria* SAN.40383 is not verbenaceous.

Vitex urceolata C. B. Clarke is a taxon that ought also to be studied more carefully to determine whether it may possibly belong in *Teijsmanniodendron*, to which genus it bears striking habitual resemblance.

A tentative artificial key to the taxa of *Teijsmanniodendron*:

1. Leaves palmately 2--5-foliolate. Sect. *Plurifoliolatae* Kosterm.
2. Petioles conspicuously winged or basally auriculate.
 3. Petioles centrally broadly cristate, the wing there to 10 cm. wide.....*T. pteropodum* f. *juv. cristatum*.
 - 3a. Petioles not broadly cristate.
 4. Petioles conspicuously auriculate at the base.....
T. pteropodum f. *juv. auriculatum*.
 - 4a. Petioles more or less narrowly alate, the wings often ampliate apically and/or basally.....*T. pteropodum*.
 - 2a. Petioles not winged nor auriculate.
 5. Lower leaflet-surface inconspicuously pilose, glabrescent, or glabrous.
 6. Petiole-base with a parallel appendage.....*T. glabrum*.
 - 6a. Petiole-base not appendaged.
 7. Leaflet-blades only thick-chartaceous, slightly bullate above.....*T. borneense*.
 - 7a. Leaflet-blades firmly coriaceous, not bullate.
 8. Leaflet-blades only to 5 cm. long; corolla dark-violet; mature fruit only 1--1.5 cm. long, with thin exocarp.
T. coriaceum.
 - 8a. Leaflet-blades to 12 cm. long; corolla pale-pink or yellowish-cream; mature fruit 1.5--5 cm. long, with thick exocarp.
 9. Stamens 4, didynamous; corolla pink; mature fruit 4--5 cm long.
 10. Leaves 2--4-foliolate.....*T. bogoriense*.
 - 10a. Leaves 5-foliolate.*T. bogoriense* var. *pentaphyllum*.
 - 9a. Stamens 5, arranged in a whorl, subequal; corolla cream-color or yellowish.....*T. ahernianum*
 - 5a. Lower leaflet-surface plainly pubescent beneath.
 11. Lower leaflet-surface densely rusty-tomentose.*T. kostermansi*.
 - 11a. Lower leaflet-surface short-pubescent.....*T. bintulense*.
 - 1a. Leaves 1-foliolate. Sect. Kosterm.
 12. Lower leaflet-surface with numerous tiny punctate depressions.
 13. Leaflet-blades bullate.....*T. unifoliolatum*.

- 13a. Leaflet-blades flat, not bullate.....*T. hollrungii*.
- 12a. Lower leaflet-surface without punctate depressions.
14. Secondary veins in 3, rarely 4, pairs.
15. Peduncles and branchlets slender; flowers pedicellate.
16. Petioles and branchlets always glabrous.
17. Leaflets basally acute to obtuse...*T. simplicifolium*.
- 17a. Leaflets basally cordate.....*T. simplicifolium* var. *cordifolium*.
- 16a. Petioles and branchlet-tips densely ferruginous-hirsute.....*T. simplicifolium* var. *kostermansi*.
- 15a. Peduncles and branchlets rather thick; flowers sessile.....*T. smilacifolium*.
- 14a. Secondary veins in more than 4 pairs.
18. Flowers sessile
19. Leaflet-blades rigidly coriaceous, basally rounded; secondaries 7--10 pairs, wide-spreading, sharply curved and more or less anastomosing along the margins.
20. Leaflet-blades to 39.5 cm. long and 16 cm. wide.....*T. subspicatum*.
20. Leaflet-blades 5--9 cm. long, 2.3--4.5 cm. wide.....*T. subspicatum* var. *parvifolium*.
- 19a. Leaflet-blades thinly coriaceous, basally subacute; secondaries only 5 or 6 pairs, obliquely spreading, slightly curve, not anastomosing marginally.....*T. novo-guineense*.
- 18a. Flowers pedicellate.
21. Leaflet-blades thinly chartaceous.....*T. peteloti*.
- 21a. Leaflet-blades thickly coriaceous.
22. Young fruiting-calyx urceolate, the teeth reflexed; leaflet-blades basally rounded, the younger ones pilose beneath.
23. Lower leaflet-surface not scabrous, glabrous when mature.....*T. holophyllum*.
- 23a. Lower leaflet-surface scabrous, ferruginous-pubescent even when mature.....*T. sinclairii*.
- 22a. Young fruiting-calyx campanulate, the teeth erect; leaflet-blades basally subacute, rarely subobtuse, even the young ones glabrous.
24. Leaflet-blades bullate above; Indonesia.....*T. sarawakanum*.
- 24a. Leaflet-blades flat above, not bullate; Indochina.....*T. pierrei*.

TEIJSMANNIODENDRON AHERNIANUM (Merr.) Bakh., Journ. Arnold Arb. 16: 74. 1935.

Synonymy: *Vitex aherniana* Merr., Bur. Govt. Lab. Manila Publ. 6: 18. 1904. *Xerocarpa avicenniaefoliola* H. J. Lam, Verbenac. Malay. Arch. 99. 1919. *Vitex curranii* H. J. Lam, Verbenac. Malay. Arch. 207. 1919. *Vitex bogoriensis* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 60. 1921. *Vitex bankae* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 62. 1921. *Vitex bogoiensis* H. J. Lam apud Fedde & Schust., Justs Bot. Jahresber. 53

(1): 1077, sphalm. 1932. *Xerocarpa aviceniifolia* H. J. Lam apud Green, Kew Bull. Misc. Inf. 1935: 541. 1935. *Vitex curranii* H. Lamb. ex Elm., Leafl. Philip. Bot. 10: 3799, sphalm. 1939. *Vitex bogariensis* H. J. Lam ex Mold., Alph. List Inv. Names Suppl. 1: 28, in syn. 1947. *Vitex ahernianum* Merr. ex Mold., Résumé 383, in syn. 1959. *Xerocarpa avicenniaefolia* H. J. Lam ex Mold., Résumé 393, in syn. 1959. *Teysmanniodendron ahernianum* Bakh. ex Whitmore, Guide Forests Brit. Solom. Isls. 116, 117, & 204. 1966. *Vitex ahernii* Merr. ex Mold., Résumé Suppl. 18: 15, in syn. 1969. *Teijsmanniodendron ahernianum* Bakh. ex Mold., Fifth Summ. 2: 640, in syn. 1971. *Teijsmanniodendron ahernianum* Bakh. f. ex Foreman, Div. Bot. Dept. For. N. Guinea Bot. Bull. 5: 63. 1972.

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A small, medium, or large slender tree, to 27 [perhaps to 50] m. tall; trunk round, to 60 cm. in diameter at breast height, buttressed, the clear bole straight, curved, or often crooked, to 10 m. high; buttresses thin, small, plank- or flange-like, spreading to 1 m., to 2 m. high; wood hard or even extremely so, pale-yellow, taking an excellent finish, the slash hard and brown; sapwood white or yellowish, with a density of 0.47; heartwood blackish-brown; outer bark very thin, less than 1 mm. thick, smooth or with small

flaky patches, gray or grayish to light-brown or yellowish-gray-brown; inner living bark about 6 mm. thick, colorless, pale-brown or brown to light-yellow; branchlets round, grayish, rufous-pubescent, becoming glabrescent; leaves 2--5-foliolate; petioles terete, 3--12.5 cm. long, rufous-tomentose especially at the base and apex; petiolules 0.5--4.5 cm. long, all equal, furrowed above, thickened and rufous-tomentose only basally, otherwise glabrous; leaflet-blades chartaceous when young, coriaceous and rather rigid when mature, dark-green above, pale-green beneath, oblong, 5--35 cm. long, 2--13 cm. wide, smooth and shiny or densely and rather inconspicuously areolate above, pubescent beneath (especially on the midrib) when young, gradually glabrescent in age; secondaries 8--16; veinlet reticulation very dense beneath; inflorescence paniculate, composed of reduced, axillary, many-flowered cymes, 15--30 cm. long; peduncles 1 or 2 per axil, flattened, 5--12 cm. long, greenish-pilose or rufescent-tomentose; flowers rather small, sessile, sweetly odorous; calyx green, infundibular, 4--5 mm. long, rufous-sericeous or densely fulvous-puberulent or short-pubescent when young, eventually glabrescent (especially on the upper half) after the corollas are shed, the rim obscurely 5-dentate; corolla "dirty pale-yellow" or cream-color, the tube very short, basally glabrous, otherwise sericeous, the throat and base of the lip densely villous, the tips of the 5 petals "dirty pale-violet", the upper petals slightly convex (the hollow beneath), externally appressed-pilose, the lower lip flat or concave (the hollow on top), distinctly unguiculate, the margins irregularly fringed, covering the stamens and pistil until the last phase of anthesis; stamens 5, whorled, stiffly erect, rather thick; filaments white; anthers blue or purple to black; pistil white or blue, slightly surpassing the stamens; stigma short, bifurcate, the branch-tips curved outward and downward; ovary globose, glabrous, bilocular; fruiting-calyx enlarged, cupuliform, 5 mm. long, 5--8 mm. wide, truncate; fruit oblong or elliptic to pyriform, fleshy, 1.5--2 cm. long, 1--1.5 cm. wide, 1-seeded, at first green, later turning greenish-purple, black when ripe, shiny, striate; pyrenes black, oblong, about 1 cm. long, 5--7 mm. wide; exocarp thin, coriaceous.

The species is based on *E. D. Merrill F.B.1007* from Luzon, Philippine Islands, where it is said to be abundant. Kostermans has designated *Teijsmann s.n.* from Blinjoë, Banka, deposited in the Buitenzorg herbarium as sheet number 73033 as lectotype of *Vitex bankae* although Lam (1921) cited also *Teijsmann s.n.* [Djobus], *s.n.* [Menumbing], and *Grashoff 36* in his original description. *Herb. Hort. Bot. Bogor. XI.H.37*, from Banka, deposited in the Buitenzorg herbarium as sheet number 73047, is the type of *Vitex bogoriensis* H. J. Lam.

Xerocarpa H. J. Lam (1919) unfortunately is conserved by the International Code of Botanical Nomenclature over the genus of the same name proposed and described by Spach in 1840 in the *Goodeniaceae*.

Recent collectors have encountered *T. ahernianum* on low ridges and in deep soil along the sides of ridges, in rainforests and especially lowland rainforests, on hillsides and forested hillsides

near the seashore, in lowland swamp-forests, in primary and well-drained primary forests, and "scattered but rather common in scrub on stony ferruginous soil". Foreman (1972) calls it "one of the quite common mid-story trees [on Bougainville island], some specimens reaching a fair size". Whitmore (1976) says that "in some places seedlings form extensive carpets on the forest floor and old log-extraction roads; it is the commonest tree in the middle canopy [in the British Solomon Islands]". It has been found at 10--850 m. altitude, in flower from January to June as well as October and November, in fruit from February to August.

The corollas are said to have been "yellow" on *Paie & Sie S.32062*, "yellowish" on *Canicosa 45*, "dull-yellow" on *Clemens 7489 & 16624*, and "white, the lower petal purple" on *Leach NGF.34346*. Clemens, on his *no. 7489*, notes that the plant is attacked by an as yet unidentified fungus. It affords good timber, the wood being used for railroad ties, posts, polings, and all manner of heavy construction. *Koster BW.1113* exhibits leaves with unusually thin leaflet-blades. *Brass 3441* represents a form with only 3 leaflets, but it is not known if this is a consistent character.

Common and vernacular names reported for the species are "agug", "amamahit", "asiowarris", "dalipāpa", "dañgūla", "didigkalin", "dilipāpak", "duñgūla", "felfelo", "felofelo", "galipāpa", "ĭgang", "igano", "kajoe melati", "kaju mēlati", "kalipāpa", "kolipāpa", "kulipāpa", "langola", "limalima", "luluka", "malaĭgang", "mamahit", "mamahit", "melak", "melāk", "melak", "mongpong", "pamagsen", "sasalit" [the official name], "sasulit", "seupa", "tayupuk", "tehe", and "tēhē".

Kajewski makes the remarkable statement that the tree grows to "50 m." tall on Guadalcanal island, but this seems doubtful -- perhaps the notation is a misprint for "50 ft." Kostermans (1951) comments that in Borneo and Banka the tree does "not attain great size, examples with a bole of 30 cm. [in diameter?] are exceptional".

The Foreman (1972) reference cited in the bibliography (above) is often cited as "1971", the incorrect titlepage date. Similarly, the Fedde & Schuster (1927) reference is sometimes cited as "1929".

Lam (1919) cites *Ledermann 9510, 9667, 9789, 9792, 10427, and 10828* as *Xerocarpa avicenniaefoliola* H. J. Lam from New Guinea, *Curran 17463* as *Vitex curranii*, and *Grashoff 36* as *Vitex bankae* from Bangka. For *Vitex aherniana* Merr. he cites *Curran 1143* from Negros, *Escritor 20768* from Luzon, and *Rosenbluth 12236* from Lubang, Philippine Islands. He differentiates *V. curranii* by its 3 peduncles per leaf-axil, 5-foliolate leaves, and velutinous inflorescences, petioles, and petiolules, while *V. aherniana*, he feels, has only 1 or 2 peduncles per leaf-axil, 3-foliolate leaves, and the inflorescences, petioles, and petiolules only sparsely and minutely pubescent.

Material of *T. ahernianum* has been misidentified and distributed in some herbaria as *Schefflera* sp., *Shorea squamata* Benth. & Hook. f., and *Shorea squamata* Dyer.

Citations: PHILIPPINE ISLANDS: Camiguin: *Velasco s.n.* [Herb. Philip. Forest. Bur. 26626] (W--1375170). Leyte: *M. Ramos s.n.*

[Herb. Philip. Bur. Sci. 15377] (Bz--73037); *Wenzel* 310 (W--568691, W--713918), 598 (W--714087). Luzon: *Canicosa* 45 [Herb. Philip. Forest. Bur. 30307] (Ca--321026, N); *M. S. Clemens* 7489 (Ca--285483), 16624 (Ca--285521); *H. M. Curran* s.n. [Herb. Philip. Forest. Bur. 10571] (Bi, Bz--73038); *Curran & Merritt* s.n. [Herb. Philip. Forest. Bur. 8339] (N); *Elmer* s.n. (N); *Escritor* s.n. [Herb. Philip. Bur. Sci. 20768] (W--568428); *Maule* s.n. [Herb. Philip. Forest. Bur. 372] (N, W--852187); *E. D. Merrill* 1007 (N--isotype), 1762 (N, N, W--436713), 1766 (W--436717); *Manzano* s.n. [Herb. Philip. Forest. Bur. 26881] (Ca--205443); *Oro* 251 [Herb. Philip. Forest. Bur. 30906] (N); *Ponce* s.n. [Herb. Philip. Forest. Bur. 28434] (Bz--73039), s.n. [Herb. Philip. Forest. Bur. 28437] (Bz--73040); *Sulit* s.n. [Philip. Nat. Herb. 2707] (Bz--72680, Ca--985407, Mi). Mindanao: *Foxworthy, Demesa, & Villamil* s.n. [Herb. Philip. Forest. Bur. 13536] (Bz--73042, Bz--73043); *Ramos & Convo-car* 844 [Herb. Philip. Bur. Sci. 83935] (N); *Wenzel* 3058 (Br, Bz--73026, Ca--356326, N). Negros: *H. M. Curran* 1143 (Mu--4253, Ut--29159a, W--1133044), s.n. [Herb. Philip. Forest. Bur. 17463] (N, W--709990), s.n. [Herb. Philip. Forest. Bur. 22673] (Gg--31472, W--900085); *Danao* s.n. [Herb. Philip. Forest. Bur. 12412] (Br, W--711309, W--711310), s.n. [Herb. Philip. Forest. Bur. 15027] (W--711314); *Dias* 6 [Herb. Philip. Forest. Bur. 29888] (Ca--268039, N); *A. Reyes* s.n. [Herb. Philip. Forest. Bur. 29825] (Ca--268040); *Whitford* 1617 (N, W--706695), 1623 (Br). Panay: *Cortes & Knapp* s.n. [Herb. Philip. Forest. Bur. 23938] (W--1294192). Polillo: *Salvoza* 228 [Herb. Philip. Forest. Bur. 29680] (Ca--256994). Samar: *Lesquety* s.n. [Herb. Philip. Forest. Bur. 23570] (W--1294727); *M. Ramos* s.n. [Herb. Philip. Bur. Sci. 24206] (W--1172055); *Sherfasee, Canabre, & Cortes* s.n. [Herb. Philip. Forest. Bur. 21078] (Cm, W--568678). Island undetermined: *E. D. Merrill* *Sp. Blanc* s.n. (Bz--73041). GREATER SUNDA ISLANDS: Sarawak: *Paie & Sie* S. 32062 (Z). LESSER SUNDA ISLANDS: Banka: *Anta* 706 (Bz--72749); *Grashoff* 36 (Bz--25644, Bz--73034, Bz--73035); *Teijsmann* s.n. [Bangka] (Bz--73031, Bz--73032, Er), s.n. [Blinjoe, Banka] (Bz--73027, Bz--73033, N--photo, Z--photo), s.n. [Djeboes] (Bz--73028), s.n. [Memoemieng] (Bz--73029, Bz--73030, N). MOLUCCA ISLANDS: Obi: *DeHaan* 1829 (N, Ng--18881, Ng). Ternate: *DeHaan* 296 [Boschbouwpr. BB.23798] (Bz--73045). NEW GUINEA: West Irian: *Janowsky* 72 (Bz--726518); *Koster* B.W.1113 (Ca--90475, Ng--20194); *Meijer Drees* 150 [Boschbouwpr. BB.25047] (Bz--73055). Territory of New Guinea: *Leach* NGF.34346 (Mu). NEW GUINEAN ISLANDS: Schouten: *Van Dijk* 537 [Boschbouwpr. BB.30726] (Bz--73044). SOLOMON ISLANDS: Guadalcanal: *Kajewski* 2715 (Bi, Bz--73049, Bz--73050, Bz--73051, N, N--photo, S, Si--photo, Z--photo). New Georgia: *Maenu'u* s.n. [Herb. Brit. Solom. Isl. Prot. 5964] (W--2578824). Ysabel: *Beer* Coll. s.n. [Herb. Brit. Solom. Isl. Prot. 5128] (W--2578639), s.n. [Herb. Brit. Solom. Isl. Prot. 7768] (W--2578265); *Brass* 3441 (Bi, Bz--73052, Bz--73053, Bz--73054). CULTIVATED: Java: *Herb. Hort. Bot. Bogor. XI.H.37* (Bz--73046, Bz--73047, Bz--73048, Bz, N--photo, Z--photo).

TEIJSMANNIODENDRON BINTULENSE Mold., *Phytologia* 26: 355--356. 1973.

Bibliography: Mold., *Phytologia* 26: 355--356 & 366. 1973; Hock-

ing, Excerpt. Bot. A.25: 378. 1975.

This recently described species is based on *Chai S.31713* collected in a mixed dipterocarp forest on a low ridge in the Segan Forest Reserve, Bintulu, 4th Division, Sarawak, on September 17, 1972, deposited in my personal herbarium. The collector reports the vernacular name, "entaempulch".

Material of this species has been misidentified and distributed in some herbaria as *T. sinclairii* Kosterm., a unifoliolate species. Thus far the species is known only from the original collection.

Citations: GREATER SUNDA ISLANDS: Sarawak: *Chai S.31713* (Ld--isotype, Z--type).

TEIJSMANNIODENDRON BOGORIENSE Koord., Ann. Jard. Bot. Buitenz. 19: 20--30, pl. 2 & 3. 1904.

Synonymy: *Vitex longifolia* Merr., Philip. Journ. Sci. Bot. 5: 227. 1910. *Vitex flabelliflora* H. Hallier, Meded. Rijks Herb. Leid. 27: 50. 1918. *Teysmanniodendron bogoriense* Koord. apud H. Hallier, Meded. Rijks. Herb. Leid. 37: 55. 1918. *Vitex merrillii* H. J. Lam, Verbenac. Malay. Arch. 212--213. 1919. *Vitex euphlebica* Merr. ex H. J. Lam, Verbenac. Malay. Arch. 212, in syn. 1919. *Vitex flabellifolia* Hall. f. apud E. D. Merr., Enum. Born. Pl. 514. 1921. *Teijsmanniodendron longifolia* (Merr.) Beer & Lam, Blumea 2: 228. 1936. *Teysmanniodendron longifolium* (Merr.) Merr. ex Mold., Suppl. List Inv. Names 7, in syn. 1941. *Teysmanniodendron bogoriense* Koord. ex Mold., Alph. List Inv. Names 43, in syn. 1942. *Teijsmanniodendron bogoriense* Koord. ex Mold., Résumé 353, in syn. 1959. *Teijsmanniodendron bogoriensis* [Koord.] apud Kosterm., Reinwardtia 6: 166, in textu. 1962. *Vitex longifolium* Merr. ex Mold., Résumé Suppl. 15: 25, in syn. 1967.

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Verbenac., ed. 1, 63--67, 74, & 100. 1942; Mold., Phytologia 2: 114. 1944; H. N. & A. L. Mold., Pl. Life 2: 72. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 142, 146--149, 163, & 196. 1949; Kosterm., Reinwardtia 1: 75--77. 79, 80, 84--93, & 106. 1951; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Mold., Résumé 185, 191--195, 199, 202, 222, 353, 354, 383, 385, 386, & 470. 1959; Maun, Philip. Journ. Forest. 16: 108. 1960; Kosterm., Reinwardtia 6: 166. 1962; Backer & Bakh., Fl. Java 2: 602. 1965; Mold., Résumé Suppl. 15: 12 & 25. 1967; Mold., Fifth Summ. 1: 318, 327, 337, 339, & 369 (1971) and 2: 640, 641, 717, 721, 722, & 911. 1971; Versteegh, Meded. Landbouwhoges. Wagen. 71-19: 15 & 59. 1971; Mold., Phytologia 44: 222. 1979.

Illustrations: Koord., Ann. Jard. Bot. Buitenz., ser. 2, 4: pl. 2 & 3. 1904; Junell, Symb. Bot. Upsal. 1 (4): 99, fig. 151--153. 1934.

A slender, often tall, tree, usually glabrous throughout (except for the inflorescence); crown small; clear bole to 18 m. high, to 75 cm. in diameter at breast height, girth to 1.6 m., slightly channelled to 1 m., often fluted and buttressed, the buttresses rounded, to 2 m. high, narrow at ground level, 2.5--5 cm. thick, parallel to the bole, extending outwards for 1 m., basally concave; branches grayish or gray-brown, the ultimate ones somewhat compressed, glabrous; branchlets gray or ochraceous-cinereous in color, striate, the youngest sometimes rufescent-subvelutinous but eventually glabrescent, lenticellate and subverrucose with paler longitudinally elongate lenticels, compressed, marked between the opposite petiole-bases with a pair of opposite, transverse, elevated, stipular lines; bark varying from gray, grayish-brown, purplish-green, or beige to light-brown or yellowish-brown, very thin, hard, lenticellate, varying from smooth to rough, papery and somewhat peeling to scaly, flaky, or dippled, sometimes "patchy cream-brown and brown-green", greenish when cut, "the slash of dead bark resembling palm wood"; outer bark soft, brittle, about 1.6 mm. thick, thin, white or green to light- or pale-brown, grayish, or brown, forming thick, soft, papery scales; under bark dark-brown or green; inner bark very hard, 8--10 mm. thick, mottled, bright- or pale-yellow or yellowish to green with darker yellow streaks, white near the cambium, often pale-brown or greenish and yellow-brown on the back, within pale yellow-brown with coarse brownish longitudinal flecks or streaks, darkening rapidly on exposure, or cream-orange and granular or the "inner side of the living bark yellowish with orange-colored ridges"; wood soft or moderately hard, rather tough, pale-yellowish, straw-color, or pale-straw color to "dark-cream", "dirty-white". whitish, or light-brown; sapwood not well defined, white to yellowish or "creamy-brown", with a density of 0.43--0.49, with low durability; cambium brownish; heartwood rarely present, dark-yellow; sap not milky; twigs greenish-brown; leaves decussate-opposite, large, 2--4 (mostly 3)-foliolate; petioles terete or subterete, 1.5--10 cm. long, robust, narrowly sulcate above, more broadly grooved on the basal half, glabrous or sometimes subpulverulent-puberulent or rufescent-subvelutinous when young, eventually glabrescent, not alate nor shiny,

light-green; petiolules subterete, those of the lateral leaflets less than 1 cm. long, those of the middle leaflet(s) nearly 2 cm. long, light-green, not shiny, articulate, each basally pulvinate-thickened with a strong, brown or gray-brown, transversely ridged joint, glabrous or sometimes subpulverulent-puberulent or rufous-subvelutinous but eventually glabrescent; leaflet-blades subcoriaceous, oblong-lanceolate to broadly lanceolate or ovate-lanceolate, 8--25 cm. long, 4.3--11 cm. wide, the middle one (or ones) larger than the lateral ones, apically long-acuminate (the acumen slender), marginally entire, basally acute or acuminate and somewhat inequilaterally, dark-green above and with lighter colored venation, brownish in drying, somewhat shiny above, paler green beneath; midrib darker beneath; secondaries 7--10 per side, prominent and darker beneath, curvate-ascending, rather distant, anastomosing near the margins, the primary reticulation loose, the secondary reticulation abundant, clathrate-reticulate, thickly netted, darker and subprominent-puberulent beneath; inflorescence terminal, paniculate, solitary, to 30 cm. long and 20 cm. wide, equaling the leaves, rather few-flowered, sometimes subglabrate; peduncle and rachis to 15 cm. long, sometimes with a single branch from the base or with 7--9 branches issuing in flabelliform fashion, most of the branches issuing from above the middle, usually 2--4 in flabelliform fashion at each rachis node, yellowish-green or cream-color, the ultimate branches and branchlets usually more or less brown-pubescent, the peduncles, pedicels, and calyx often whitish or whitish-green; bracts greenish-white; flowers small, fragrant, fasciculate on the ultimate inflorescence-branchlets, usually in groups of 7, comprising a central short (to 1 mm.)-pedicellate one and 2 lateral shortly stalked groups of 3 each; bractlets small, deltoid or spatulate, 2--3 mm. long or less, 1--1.5 mm. wide, rather conspicuous, rufous-pubescent; calyx cupuliform or cyathiform, 1.5--2 mm. long and wide, usually with a small circular nectar-gland below its base, externally sparsely rufous-pubescent or sometimes subglabrate, the rim shortly 5-toothed, the teeth less than 0.5 mm. long and apically acute; corolla lilac or lavender to violet, externally and internally rufous-pubescent, bilabiate, the tube cylindric, 5--6 mm. long, very shortly puberulent or glabrescent, the throat villous, the limb 5-lobed, hairy on both surfaces, the upper (anterior) lip bifid, 5--7 mm. long, broadly spatulate, with narrowly obovate apically rounded lobes, barbate-villous, the lower lip trifid, 3 mm. long, with oblong apically acute or obtuse lobes; stamens didynamous, somewhat exerted; filaments somewhat pubescent, the longer pair about 8 mm. long, the shorter pair about 6 mm. long; anthers divergent in horseshoe fashion, deep-purple; pistil somewhat exerted; ovary obconic, glabrous, somewhat ribbed; fruiting-peduncles yellow-green or the older parts gray-brown, dull, finely and shortly gray-pilose, with lighter elongate lenticels; fruiting-calyx persistent, small, woody; fruit shiny, light-green or greenish to glaucous-green when young and with irregular darker stripes just above the fruiting-calyx, later yellowish-green with brown stripes, finally greenish-red, pale-red, or reddish-purple to black when ripe, round, 2--2.5

cm. long, fetid, bitter, smooth, with broad longitudinal grooves, apically somewhat flattened, with a central mucro, sometimes also with an annular ridge 6 mm. from the apical mucro; endocarp 2--4 mm. thick; seed attached apically; cotyledons thick, collateral; endosperm absent.

Collectors have found this plant growing in freshwater swamps, in primary, secondary, disturbed primary, and dipterocarp forests, primeval alluvial lowland, and tall rainforests, in forest undergrowth, on hillsides, lowland area slopes, low sandy ridges, and in flat or low undulating country, along creeks, and on sandstone, from sealevel to 700 m. altitude, in flower in every month of the year and in fruit from January to October.

Hoogland encountered it in tall secondary forests on sandy soil over boulders about 50--100 cm. above the watertable in Papua. Chai refers to it as "riparian plant among boulders on riverbanks and overhanging streams" in Sarawak. Hoogland, Brass, and Schramm report it as "common" or "rather common" in tall rainforests in New Guinea, where Koster also reports it as a "rather common tree". In Borneo Kostermans likewise reports it as "common". Its wood is reportedly used for timber, especially to make planks. Mair refers to the fruit as a "nut".

The corollas are said to have been "lavender" on Brass 723, "light-violet" or "pale-purple" on Kornassi 743, "mauve" on Foreman & Stocker LAE.60385 and Schodde 2651, "pale-purple" on Hoogland 5061 "violet" on Brass 3837 and Meijer SAN.22592, "blue" on Geneve s.n. and Kornassi 497, "light-blue and white" on Sinanggul SAN.39106, "blue-white" on Rutten 1898, "pale-whitish and blue" on Cudra A.1474, "yellow-purple" on Woerjantoro 67, "light-violet or pale-violet with a blue underlip" on Kjellberg 2746, "whitish-green" on Matusop 7417, "rose-red" on Ramlie 6, "purplish-white" on Semeroe 17, "white to blue-white, upper lip pale-blue" on Rutten 2066, "very pale purple-white, lower lip purple except for much paler margins" on Hoogland 3275, "central lobe yellow and purple, the others dark-purple" on Sutriano 33, "yellow" on Schramm BW.1653, and "pale-white" on Keith 7122.

Vernacular names reported for this species are: "ampinoi", "aniai", "aticoco", "atikoka", "atikoko", "ballebal", "besoh", "boeloenasoe", "bulunasu", "etak", "gandarosa putih", "gading batu" [=ivory-stone], "gragai", "gugba", "gundaroe sapoetih", "insuni", "kamadin", "kaoeba", "kauba", "keram", "kesoi", "koemang", "kokar", "kossij", "kossijdaj", "kossijt", "kotar", "kumang", "lansat behuang", "ludri", "madang paus", "mamanau", "manamu", "manuk-manuk", "mara belioeng", "mara beliung", "medang", "menaru", "mumuni", "pangajen asai", "parrapik", "pirok", "polajopo", "polojopo", "pongoli", "porako", "pudjo", "raenggapi", "rakas rakas", "saluang", "salunapid", "sikukok", "tikoko", "timiri", "tompira molaba" [=white tompira], "tompira poeti", "tompira puti", "wanoe", "wanu", and "wena dahita".

The species is based on *Herb. Hort. Bot. Bogor. IX.D.78* and *IX.D.78a* from a tree cultivated in the Botanical Garden at Buitenzorg, Java; *Koorders 42754b* & *42759b* [*Herb. Hort. Bot. Bogor XL.G.82* & *XL.G.82a*] are said to be spermatophytes. *Vitex merrillii* H. J. Lam is

based on *Fénix s.n.* [Herb. Philip. Bur. Sci. 15906] from Bataan, Mindanao, Philippine Islands, collected in August of 1912, and this is also the type collection of *V. euphlebica* Merr. *Vitex longifolia* Merr. is based on *Hutchinson s.n.* [Herb. Philip. Forest. Bur. 7574] from well-drained flatland forests on the Gibon River, 55 m. altitude, in the province of Surigao, Mindanao, collected in June of 1907. *Vitex flabelliflora* H. Hallier is based on *Jaheri 1539* from Sungei Talut, Penihier, in eastern Borneo, deposited in the Buitenzorg herbarium, and represents the more rufescent-subvelutinous form of the species, perhaps worthy of form rank. The *Teijsmanniodendron glabrum* Merr., often included in the synonymy of *T. bogoriense*, is actually a distinct and valid separate species.

Among the bibliographic errors in the literature of *T. bogoriense* may be mentioned that Bakhuizen (1929) cites the original publication as "sér. 3", page "19, & iv. fig. 2-3". The Fedde & Schuster (1929) reference is mistakenly cited by some authors as "1927", and the Bakhuizen (1922) reference is actually cited by him (1929) as "1921".

Beer & Lam (1936) cite Hallier 3032 and Herb. For. Res. Inst. BB.10504 & 13944 from Borneo, Herb. For. Res. Inst. BB.14274 from Amboina, Rutten 497, 1898, & 2066 from Ceram, and Brass 3837 and Herb. For. Res. Inst. BB.14560 & 15905 from New Guinea. Lam (1922) cites Boschpr. BB.2105 and *Semeroe 17* from Borneo, where, he says, the species grows "vor allem auf nassen Grund und längs Flüssen; kleiner Baum, Blüten violet-weiss, angenehm duftend; Holz wertlos."

Hallier (1918), citing his no. 3032, describes the species as: "Zweige braungrau. Blattstiel und Stiele der 3 Foliola glanzlos hellgrün, am Grunde mit je 1 starken braunen querrissigen Kniegelenk. Blätter glänzend dunkelgrün, mit heller Aderung, unterseits glanzlos hellgrün, mit dunkleren Mittel- und Fiedernerven und dickervigem, engmaschigem dunklerem Nervennetz. Fruchstiele glanzlos gelbgrün, fein und kurzgrau behhart, die älteren Theile braungrau, mit helleren langen Lentizellen. Frucht glänzend hellgrün, am Grunde über dem Kelch unregelmässig dunkelgrün längs gestreift."

Kanehira (1942) cites *Kanehira & Hatusima 12405*, which, he says, "Agrees well with the original description excepting that [it] has glabrous branchlets and petioles, oblong leaves with less numerous lateral nerves and smaller flowers (stamens not didynamous) and fruits". He lists it from Borneo, Amboina, and Ceram.

Backer & Bakhuizen (1965) describe the species as having the "Young branchlets obtusely quadrangular, more or less densely hairy; petiole 1.5--10 cm, wingless; leaflets 2--4, usually 3, elliptic-oblong-lanceolate from a cuneate base, acuminate, coriaceous or papyraceous, shining dark green above, pale green beneath, glabrous on both surfaces, finely gland-dotted, 18--30 cm by 5.5--9 cm; petiolules 0.75--2.5 cm....Panicles lax, more or less densely pubescent, 18--30 cm long; calyx pubescent, c. 3.5 cm long, teeth acute; corolla violet, tube 5--7 mm; upper lip c 3 mm; median lobe of lower lip obovate, 10--11 mm long, lateral ones c. 3 mm; filaments

pubescent; anther-cells divaricating downwards; top of ovary vil-
lous; style c. 4 mm long; fruiting-calyx patent, c. 1.5 cm across;
fruit obovoid, 4--5 mm long." It seems obvious that the calyx
(during anthesis) dimension given in this description is erroneous
-- probably a clerical error for "mm" instead of "cm", a mistake
all too easily made when the metric system is used.

Koorders' (1904) illustrations of this species are excellent
and detailed, including a habit sketch, inflorescence, foliage,
flowers and their parts, seedlings, ovary section, and fruit.

Lam (1921) cites only *Teijsmann* 11785 from Celebes. Merrill
(1923) cites *Cortez & Hernandez* 24394, *Fénix* 15906, *Hutchinson*
7574, *Miranda* 20583, *Miras & Oliveiros* 24525, and *Rafael & Ponce*
20752 from Mindanao, Philippine Islands. Hallier (1918) cites
only *Hallier* B.3032 and the type collection. Lam (1919) cites
only an unnumbered Hallier collection and *Herb. Lugd.-Bat.* 914196
-88, 89, 90, & 91.

Kostermans (1951) cites the following collections: BORNEO:
Kalimantan: *Abdulhamid* 70, *Atjil* 85, *Pankeij* 41, *Ramlie* 6, *Semeroe*
17, *Van der Zwaan* 772 & 1085. Northeast Borneo: *Elmer* 21320 &
21616, *Matusop* 7417. Sabah: *Hallier* B.3032, *Jaheri* 1539, *Teijs-*
mann s.n. Sarawak: *Richards* 2570. MOLUCCA ISLANDS: Amboina:
Huka 18. Ceram: *Kornassi* 743 & 797, *Rutten* 1898 & 2066. Celebes:
Kjellberg 2746, *Laleno* 39 [Boschpr. BB.19434], *Monoarfa* 1 [Bosch-
pr. BB.13677], *Teijsmann* HB.11785, *Waturandung* 260 [Cel.V.244] &
323 [Cel.V.244]. NEW GUINEA: Papua: *Brass* 723 & 3837. West Iri-
an: *Ilham* 6, *Kanehira & Hatusima* 12405, *Kostermans* 180, 215, 312,
& 2724, *Malessy* 1, *Soehanda & Ilham* 38, *Tetelepta* 21, *Van Eechoud*
10 & 62. NEW GUINEAN ISLANDS: Biak: *Van Dijk* 563. Japen: *Van*
Dijk 11, 69, 210, 277, 290, 308, 314, 325, & 464. CULTIVATED:
Java: *Koorders* 42754♂.

Material of *T. bogoriense* has been misidentified and distribu-
ted in some herbaria as *T. bogoriense* f. *glabrum* (Merr.) Bakh.,
T. glabrum Merr., *T. pteropodum* (Miq.) Bakh., *Vitex pteropoda* Miq.,
Turpinia rotundifolia, and *Sterculiaceae* sp. On the other hand,
the *Lasan* SAN.65646, *Rundi* SAN.43049, *Sam* SAN.61572, *Singh* SAN.
27456, and *Wing* SAN.32581, distributed as typical *T. bogoriense*,
actually represent var. *pentaphyllum* Mold. and *Elmer* 21320 & 21616
are *T. glabrum* Merr.

Citations: PHILIPPINE ISLANDS: Mindanao: *Fénix s.n.* [Herb. Phil-
ip. Bur. Sci. 15906] (W--900332); *Genove s.n.* [Herb. Philip. For-
est. Bur. 30452] (Ca--324532, N); *D. R. Mendoza* 598 [Philip. Nat.
Herb. 42425] (W--2450089, W--2450094); *D. P. Miranda s.n.* [Herb.
Philip. Forest. Bur. 20583] (W--901639); *Miros & Oliveros s.n.*
[Herb. Philip. Forest. Bur. 24525] (W--1293393); *Rafael & Ponce s.*
n. [Herb. Philip. Forest. Bur. 20752] (W--902704). Palawan: *Edaño*
1039 [Herb. Philip. Bur. Sci. 77401] (Ba, Ba, Mi, N). GREATER SUN-
DA ISLANDS: Celebes: *Kjellberg* 2746 (Bz--73167, Bz--73168, N, S);
Laleno 39 [Boschbouwr. BB.19434] (Bz--73166); *Monoarfa* 1 [BB.
13677] (Bz--73165); *Teijsmann* 11785 (Bz--73169, Bz--73170), *H.B.*
11785 (Bz--73171); *Tobing* E.264 [BB.24197] (Bz--73172); *Waturandung*
260 [Cel.V.244] (Bz--25641, Bz--73174), 323 [Cel.V.244] (Bz--
73173). Kalimantan: *Atjil* 85 [3395; BB.10504] (Bz--73157); *H.*
Hallier B.3032 (Bz--73151, Bz--73152, N, N); *Hamid* 70 [BB.12586]

(Bz--73161); *Jaheri 1539* (Bz--73154, Bz--73155, Bz--73156, N--photo, Z--photo); *Kostermans 7555* (Ng--16863), 7577 (N, Ng--16864), 10001 (N), 13886 (N); *Pangkeij 41* [BB.25135] (Bz--73160, Vi); *Ramalie 6* [BB.13944] (Bz--73163, Bz--73164, N); *Semaroo 17* [2505; BB.2105] (Bz--73162); *Zwaan 772* [BB.18518] (Bz--73159), 1085 [BB.19044] (Bz--73158). Sabah: *Binideh NT.94* [SAN.59762] (Ld); *Charington SAN.22285* (Sn--40877); *Cuadra A.1474* (W--2187112); *Keith 7122* (W--2187496); *Meijer SAN.22592* (Z); *Muliadi A.843* (W--2210828); *Patrick NT.702* [SAN.39454] (Z); *Sinanggul SAN.39106* (Ld), *SAN.57074* (Sn); *J. Singh SAN.31123* (Z); *Talip & Terimiji SAN.68359* (Kl--18428, N). Sarawak: *Chai S.34096* (W--2901359); *Pickles 3731* (W--2377113); *Richards 2570* (Bz--73144); *Soepadmo & Smith S.28200* (Kl--13897). MOLUCCA ISLANDS: Amboina: *Dolleschul s.n.* [Amboina] (V); *Huka 18* [BB.14274] (Bz--73175). Ceram: *Kornassi 497* (Bz--73181, Bz--73182, N, Ut--81116), 743 (Bz--73183); *Rutten 1898* (Bz--73179, Bz--73180), 2066 (Bz--73176, Bz--73177, Bz--73178). Ternate: *Tetelepta 21* [BB.15905] (Bz--73128). NEW GUINEA: North East New Guinea: *Herb. N. G. F. 506* (Ng--6584); *Hoogland 5061* (Ng--8327, W--2214220); *Mair 1801* (Ng--6586); *L. S. Smith 1205* (Ng--6585). Papua: *Brass 723* (Bz--73123), 3837 (Bz--73124, N); *Foreman & Stocker LAE.60385* (Mu); *Hoogland 3275* (A, Ng--16883); *Schodde 2651* (Ba). West Irian: *Eechoud 10* [BB.31074] (Bz--73126), 63 [BB.31125] (Bz--73127); *Ilham 6* [BB.33255] (Bz--73088); *Kanehira & Hatusima 11498* (Bz--73129); *Koster BW.1356* (Ca--90457); *Kostermans 180* [BB.33398] (Bz--73082, Bz--73083), 215 [BB.33423] (Bz--73253), 312 [BB.33499] (Bz--73084), 2724 [BB.33671] (Bz--73089, Bz--73090); *Lundquist 108* [BB.32827] (Bz--72626); *Malesij 1* [BB.14560] (Bz--73125); *Schram BW.1653* (Ng--20217), *BW.1816* (Ng--20105), *BW.1833* (Ng--20212), *BW.1866* (Ng--20197), *BW.2760* (Ng--20216); *Soehanda 6* [BB.33255] (Bz--73087); *Soehanda & Ilham 38* [BB.33285] (Bz--73085, Bz--73086). NEW GUINEAN ISLANDS: Biak: *Van Dijk 563* [BB.30749] (Bz--73130, E--1239959). Japen: *Van Dijk 11* [BB.30237] (Bz--73131), 69 [BB.20294] (Bz--73132), 210 [BB.30431] (Bz--73139, Vi), 277 [BB--30498] (Bz--73133), 290 [BB.30511] (Bz--73134, Um--21118), 308 [BB.30529] (Bz--73135), 314 [BB.30535] (Bz--73136), 325 [BB.30545] (Bz--37137), 464 [BB.30662] (Bz--73138). CULTIVATED: Java: *Bakhuizen 2222* (Ut--24923); *Herb. Hort. Bot. Bogor. IX.D.78* (Bz--26567--cotype, Bz--26568--cotype, N--cotype), *IX.D.78a* (Bz--26569--cotype, N--cotype), *XI.G.82* (Bz--26571--spermatype, Bz--26579--spermatype), *XI.G.82a* (Bz--26572--spermatype); *Herb. Mus. Bot. Upsal. s.n.* [Hort. bot. XI.G.82] (S--spermatype, S--spermatype); *Koorders 42192b* (Bz--25642), 42754b [Herb. Bot. Bogor. XI.G.82] (Bz--73140--spermatype, Bz--73141--spermatype, Bz--73142--spermatype, N--photo of spermatype, Z--photo of spermatype), 42759b [Herb. Hort. Bogor. XI.G.82a] (Bz--73143--spermatype), *s.n.* [Herb. Hort. Bogor. 78.IX.D] (Ca--235860--cotype); *Sutriano 33* [Herb. Hort. Bogor. XI.G.82] (Ba--spermatype, N--spermatype); *Woerjantoro 67* [Herb. Hort. Bogor. XI.G.82] (Ba--spermatype).

TEIJSMANNIODENDRON BOGORIENSE var. *PENTAPHYLLUM* Mold., *Phytologia* 14: 400. 1967.

Bibliography: Hocking, *Excerpt. Bot. A*, 12: 425. 1967; Mold., *Phy-*

tologia 14: 400. 1967; Mold., *Résumé Suppl.* 15: 12. 1967; Mold., *Biol. Abstr.* 49: 2290. 1968; Mold., *Fifth Summ.* 1: 327 (1971) and 2: 911. 1971.

This variety differs from the typical form of the species in having at least most of its leaves 5-foliolate.

It is based on *Cuadra s.n.* [North Borneo Forest Dept. A.877] from rolling land, Compt. 13, Kabili-Sepilok Forest Reserve, Elopura Forest District, Sandakan, Sabah, collected on August 5, 1948, and deposited in the United States National Herbarium at Washington.

Collectors describe the plant as a tree, 40--180 feet tall, the clear bole straight, 15--40 feet high, 1 1/2 to 7 feet in girth, to 35 cm. in diameter at breast height, fluted; crown about 25 feet; outer bark gray or reddish-brown to brown-white, gray-brown, light-black or blackish-brown, or greenish, smooth or scaly, thin, not fissured or only slightly so; inner bark yellow, yellowish, or ochre to red-brown or pale-brown, about 1 cm. thick; cambium brown to light-green; sapwood yellow, pale-yellow, or yellowish to brown or white (or "pale-white"); buttresses to 6 feet long; leaflets shiny dark-green above, dull and paler beneath; flowers fragrant; fruit (immature) yellowish-green. They have found the tree growing in yellow or black soil of secondary forests on hillsides, in sandstone soil of primary forests on riverbanks, in logged-over areas, and on the sides of ridges, at 50--700 feet altitude, flowering in August, and fruiting in May and September.

The corollas are said to have been "whitish" on *Lasan SAN.65646*, "pinkish" on *Sam SAN.61572*, and "green" [error for fruit?] on *Wing SAN.32581*.

Material of this variety has been misidentified and distributed in some herbaria as typical *T. bogoriense* Koord., *T. glabrum* Merr., and *T. pteropodum* (Miq.) Bakh.

Citations: GREATER SUNDA ISLANDS: Sabah: *Cuadra s.n.* [North Borneo Forest Dept. A.877] (W--2187094--type); *Lasan SAN.65646* (Z); *Rundi SAN.43049* [NT.4] (Sn--40876, Z); *Sam SAN.61572* [NT.900] (Z); *Shea & Minjulu SAN.76176* (Sn); *J. Singh SAN.27456* (Ld, Sn); *Termiji SAN.72867* (Sn--47485); *Wing SAN.32581* (Ld).

TEIJSMANNIODENDRON BORNEËNSE Mold., *Phytologia* 26: 366, nom. nud. 1973; sp. nov.

Bibliography: Mold., *Phytologia* 26: 366. 1973.

Arbor; foliis plurifoliolatis longipetiolaris; laminis foliolorum distincte petiolulatis ellipticis coriaceis 30--40 cm. longis 11--15 cm. latis basaliter cuneatis marginaliter integris utrinque glabris supra subbullatis subtus pallidioribus; petiolis crassiusculis 7.5--10 cm. longis glabris lenticellatis; petiolulis 2.5--3.5 cm. longis glabris lenticellatis; inflorescentiis axillaribus vel supra-axillaribus erectis ubique dense minuteque puberulis; pedunculis ca 12 cm. longis complanatis minute puberulis apicaliter ampliatis; inflorescentiae ramis erectis 8--9 cm. longis, ramulis paucis parvis plerumque bifructiferis divergentibus vel adscendentibus; fructis pedicellatis, pedicellis ca. 2 mm. longis.

Tree, 20 m. tall; clear bole to 10 m. high, 40 cm. in diameter at breast height; buttresses to 2 m. high, 0.5 m. long, narrow over the ground; bark beige or yellowish, papery, 0.5 m. thick, smooth; living bark dark-yellow, 1 cm. thick; wood pale-yellowish, rather tough; branchlets gray; leaves 3-foliolate, decussate-opposite; petioles stout, 7.5--10 cm. long, glabrous, rather prominently lenticellate, apically and basally ampliate, subterete, somewhat flattened above; petiolules rather stout, 1.5--3.5 cm. long, glabrous, flattened above, rather prominently but sparsely lenticellate; leaflet-blades thickly chartaceous, pale beneath, elliptic, 19--40 cm. long, 7--15 cm. wide, apically acute or short-acuminate, marginally entire, basally cuneately acute, slightly bullate above, glabrous on both surfaces, their articulations gray-brown; inflorescence "whitish-green", terminal on short 2-leaved branchlets about 15 cm. long, long-pedunculate; peduncles flattened, 10--12 cm. long, very finely and obscurely puberulent, apically ampliate like the petioles and there bearing several (3) erect branches, each 8--9 cm. long and densely but minutely puberulent throughout, each branch with a few pairs of short divergent or ascending branchlets, each usually 2-fruited after anthesis; fruits pedicellate, the pedicels about 2 mm. long, green (when immature).

The species is based on *Kostermans* 7555, collected on sandstone on Balikpapan peak (G. Beratus), Borneo, at 640 m. altitude, on July 16, 1953, and is deposited in the Britton Herbarium at the New York Botanical Garden. Thus far it is known to me only from the type collection.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Kostermans* 7555 (Ba--isotype, N--type).

TEIJSMANNIODENDRON CORIACEUM (C. B. Clarke) Kosterm., *Reinwardtia* 1: 80--84, fig. 2 & 3. 1951.

Synonymy: *Vitex coriacea* C. B. Clarke in Hook. fl. Fl. Brit. India 4: 586. 1885. *Vitex n. 13* Hook. f. & Thoms. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 586, in syn. 1885. *Vitex venosa* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 61. 1921. *Teijsmanniodendron coriaceum* Kosterm. apud Ashton, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 188. 1965. *Vitex quinata* var. *fructu majoribus* Ramas, in herb.

Bibliography: C. B. Clarke in Hook. f., Fl. Brit. India 4: 586. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1213. 1895; Brandis, Indian Trees, imp. 1, 504. 1906; Gamble in King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 846. 1908; H. Hallier, Meded. Rijks Herb. Leid. 37: 50. 1918; H. J. Lam, Verbenac. Malay. Arch. 200--201 & 369. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 58 & 61. 1921; Ridl., Fl. Malay Penins. 2: 630--632. 1923; Heyne, Nutt. Plant. Nederl. Ind., ed. 2, 2: 1320. 1927; A. W. Hill, Ind. Kew. Suppl. 7: 252. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1077. 1932; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 431, & 434. 1938; Mold., Suppl. List Comm. Vern. Names 3, 6, 11, 14, 15, 18, & 23. 1940; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 60, 61, 63, & 103. 1942;

Mold., *Phytologia* 2: 118 & 123. 1944; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 1213. 1946; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 129, 138--140, 143, 200, & 203. 1949; *Kosterm., Reinwardtia* 1: 75, 79--84, & 106, fig. 2 & 3. 1951; *Anon., Kew Bull. Gen. Ind.* 293. 1959; Mold., *Résumé* 166, 177, 178, 181, 185, 188, 192, 194, 195, 382, 390, & 460. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 1213. 1960; Ashton, *Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg.* 188. 1965; Mold., *Phytologia* 17: 32. 1968; Poore, *Journ. Ecol. Brit.* 56: 171 & 196. 1968; Corner & Watanabe, *Illustr. Guide Trop. Pl.* 769. 1969; Brandis, *Indian Trees*, imp. 2, 504. 1971; Mold., *Fifth Summ.* 1: 284, 298, 303, 306, 318, 327, & 331 (1971) and 2: 640, 716, 731, & 911. 1971; Mold., *Phytologia* 44: 221--223. 1979.

Illustrations: *Kosterm., Reinwardtia* 1: 81 & 83, fig. 2 & 3. 1951; Corner & Watanabe, *Illustr. Guide Trop. Pl.* 769. 1969.

A treelet, 8--10 m. tall, or medium-sized tree, to 30 m. tall; trunk erect, slender, round in cross-section, to 60 cm. in diameter at breast height; bole to 16 m. high, seldom exceeding 30 cm. in diameter; crown much-branched, very wide-spreading, to 5 m. high; branchlets terete, slender, curvate, the youngest parts puberulous; bark gray to pale-brown or brown, smooth or fissured; inner bark "dirty-blackish" or "pale dirty-ochre"; wood light- or pale-brown; sapwood orange-ochre; heartwood rather durable (durability class II/III) and comparatively strong (strength class II), with a density of 0.73--0.87; leaves 3-foliolate or 1-foliolate on young (to 1 m. tall) specimens; petioles 2.5--5 cm. long, semi-lunate in cross-section, sulcate above, apically and basally incrassate, not alate, glabrous; petiolules usually with distinctly swollen articulations; leaflets oblong or oblong-lanceolate, rigidly coriaceous, apically acute or obtuse, basally acute, marginally entire, glabrous on both surfaces, not glanduliferous or only minutely so beneath, in drying usually gray above and more or less bullate, conspicuously reticulate on both surfaces with the veinlet reticulum thick and prominently elevated beneath, the terminal leaflet 7.7--20 cm. long, 2.7--9 cm. wide, and on petiolules 6.2--13 mm. long, the lateral leaflets 5.3--6.3 cm. long, 2--2.6 cm. wide, and on petiolules 5--6 mm. long; inflorescence axillary (penultimate) or terminal, panicle, the upper ones solitary, the lower ones binary in each leaf-axil, sparsely ferruginous- or fulvous-pubescent, in all 4--15 cm. long, 1.5--7.5 cm. wide, strict, the branches elongate and ascending; peduncles 2.3--6 cm. long; cymules small, opposite, few-flowered, clustered on the elongate panicle-branches, condensed almost to clusters, the lower ones 4 per node (the 2 upper ones larger, 5--12-flowered, 1.5--3 cm. long, on peduncles 0.7--1.8 cm. long, the 2 lower ones smaller, 2--4-flowered, on peduncles 5--7 mm. long), the upper ones binary at each node, small, 1--5-flowered, on peduncles 5--10 mm. long; bracts linear to oblong, 2--4 mm. long, fulvous-pubescent, deciduous; flowers about 8 or 9 mm. long, slightly fragrant or with a not very agreeable scent; calyx subsessile, campanulate or broadly infundibular, 1.5 mm. long, externally sparsely pubescent or subglabrate, the rim

during anthesis conspicuously 5- (rarely 6-) dentate, the teeth deltoid, about 0.5 mm. long, apically obtuse; corolla somewhat zygomorphic and bilabiate, mostly violet or dark-violet with a bright-yellow hairy spot on the inner side of the lower lip, 6--9 mm. long, externally fulvous-pubescent or densely and minutely puberulent except for the lower part, the tube narrowly infundibular, 5--5.5 mm. long, internally glabrous but with a ring of hairs at the stamen insertion, the limb 5-lobed, the upper 4 lobes small, deltoid, 1.5--2 mm. long and wide, apically subacute, pubescent on both surfaces, the lower lobe larger, rigidly barbulate at the middle, 2.5--4 mm. long, 2.5--3.5 mm. wide, venose, marginally irregularly sinuate-undulate; stamens didynamous, 5 and 6 mm. long, inserted about 2 mm. from the base of the corollatube, exerted; filaments laterally compressed basally, sparsely fulvous-pubescent; style purple, 1 cm. long, long-exserted; stigma pale-purple, shortly bifid, the lobes horizontally divergent or slightly recurved; ovary cream-color, glabrous; fruiting-calyx enlarged, cupuliform, its rim subtruncate; fruit drupaceous, teretely ellipsoid, about 12 mm. long and 6 mm. wide, yellow or orange-yellow to orange or yellow-brown when immature, black when ripe, glabrous, 1-seeded, the exocarp and pericarp thin.

Collectors have found this plant growing in forests, especially virgin or primary and evergreen forests on mountain slopes, on low sandy hills or sandy ridges, in red, sandy, clay, or granitic-sandy soil, at 5--500 m. altitude, in anthesis and fruit from July to December, as well as in March and April.

The species is based on *Griffith 6065* and *Maingay 1203* from the Malay Peninsula, deposited in the Kew herbarium. The type of *Vitex venosa* is *Grashoff 890* from the Banjuasin and Kubu countries, Palembang, at 20 m. altitude, collected in flower on December 24, 1915.

Kostermans (1951) reports the species common in the higher parts of Banka and Borneo, avoiding "the lower moister parts, as well as the valleys". Seedlings are seen on *Zwaan 172*. The corollas are said to have been "heliotrope-color" on *Grashoff 890*, "purple, base of lower lip yellow inside" on *Zwaan T.411*, and "pale-purple with a dark-yellow spot at base of inside of lower lip" on *Kostermans 10181*. Clarke (1885) asserts that the pistil is "fulvous-pubescent". Burkill (1961) reports the species used to make "a protective medicine after childbirth" and the wood used in Malacca for house construction. He notes that the species is found naturally from Dedah to Singapore in Malaya.

Vernacular names reported for the species are "bantou" [applied also to *Symplocos*], "boehoenei", "connaropsis laurel", "jali batu", "gading", "kajoe kahomboek gaeling", "kaju gading", "kaju krasak", "kerintjing daoen", "kerintjing daun", "krasag", "krindjing daun talang", "leban", "medang pupoi", "melabumbong", "meryan batu", "rock meryan", "tinjau bloekau", "tindjau blukau", and "urat rusa" [applied also to *Millettia*].

Fletcher (1938) cites *Kerr 7100* from Thailand and gives the species' general distribution as "Burma, Malay Peninsula (type -- Malacca), Sumatra." Lam (1921) gives the distribution only as

"Malay Peninsula". Clarke (1885) cites *Griffith 6065* both under this species and under *Vitex gamosepala* W. Griff., probably indicating a mixture having been distributed under the one number.

A letter to me from Dr. A. Kostermans, dated September 10, 1951, says in part that "*T. coriaceum* was discovered as far as Sangkulirang up north [in eastern Borneo]. It seems to be distributed all along the belt of Quaternary sands, which extends along the east coast of Borneo. Furthermore inland, where this sandy soil is replaced by limestone, it is absent. But it is here where *T. pteropodium* grows, the latter species is absent on the sandy soils." In his 1951 work he cites the following collections: MALAYSIA: Johore: *Derry 1029*. Kedah: *Ridley 5555*. Malacca: *Derry s.n.*; *Goodenough 1285*; *Holmberg 861*. Pahang: *Hamid 5727*. Penang: *Burkill 3287*; *Curtis s.n.*; *Haniff 3735, s.n.*; *Nauen S.F.35847*; *Strugnell S.F.11176*; *Symington S.F.28013*. State undetermined: *Wray s.n.* GREATER SUNDA ISLANDS: Borneo: *Kostermans 4411*. Sumatra: *Batten-Poole s.n.*; *Dorst s.n.* [172.T.I.P.706]; *Grashoff 890*; *Van der Zwaan s.n.* [T.3.P.529, T.411, T.576]; *Verduyn Lunel 8* [T.B.1072]; *Versteegh & Noer Kamal 308* [BB.32232]. LESSER SUNDA ISLANDS: Banka: *Kostermans 756*; *Kostermans & Anta 1337, 1350*; *Oetoei 77* [BB.8060]; *Teijsmann s.n.*

Material of *T. coriaceum* has been misidentified and distributed in some herbaria as *T. hollrungii* (Warb.) Kosterm., *Vitex celebica* Koord., *V. glabrata* R. Br., *V. heterophylla* Roxb., *V. heterophylla* var. *undulata* C. B. Clarke, *V. holophylla* Baker, *V. quinata* (Lour.) F. N. Will., *V. sp.*, and even *Glycosmis* sp. On the other hand, the *Talip SAN.65886*, distributed as *Teijsmanniodendron coriaceum*, actually represents *T. pendulum* Kosterm., while *Pierre 37* is *T. pierreii* Mold., *Corner 31625* and *Elmer 11602* are *Vitex quinata* var. *puberula* (H. J. Lam) Mold., and *Krukoff 4244 & 4339* and *Yates 1609* are *V. urceolata* C. B. Clarke.

Citations: MALAYA: Malacca: *W. Griffith 6065/1* (Cp--cotype, E--photo of cotype, Mu--693--cotype, N--photo of cotype, Pd--cotype, S--cotype, Ut--11512--cotype, Z--cotype, Z--photo of cotype), *s.n.* [Malacca, 1845] (Br). Pahang: *Soepadmo 843* (Ac, Kl--14455). Penang: *Burkill 3287* (Ca--219523); *Haniff 3735* (Bz--73077). Perak: *Scortechini 2082* (N). Singapore: *T. Anderson 183* (Br, Pd). GREATER SUNDA ISLANDS: Celebes: *Heyne 2455* (Bz--23838); *Teijsmann 22* (Bz--23842), *23* (Bz--23843). Kalimantan: *Kostermans 10181* (Ba, N. W--2335694); *Oehoep 3532* [Boschproefst. BB.10912] (Bz--23811, Bz--23812). Sabah: *Meijer SAN.43828* (Ld), *SAN.53314* (Z); *M. Ramos 1869* (Bz--23813, S). Sumatra: *Dorst s.n.* [Boschproefst. 172.T.I.P.706] (Bz--73056, Bz--73057, Bz--73058, Bz--73059, Bz--73060, Bz--73061, Bz--73062); *Grashoff 890* (Bz--73066, Bz--73067, N--photo, Z--photo); *Verduyn Lunel 8* [Boschproefst. TB,1072] (Bz--73063, Bz--73064, Bz--73065); *Versteegh & Noerkamal 308* [Boschproefst. BB.32232] (Bz--73068); *Voogd 502* (Bz--24222); *Zwaan 172* [T.3.P.529] (Bz--73075, Bz--73076), *529* [Thorenaar 3.P.529] (Bz--73071, Bz--73072, Bz--73073, Bz--73074), *576* (Bz--73070), *T.411* (Bz--73069, N). LESSER SUNDA ISLANDS: Banka: *Anta 756* (Bz--72633), *1337* (Bz--72750, Bz--72751),

1350 (Bz--72752, N); *Kostermans & Anta* 1337 (Bz--73184, Bz--73185), 1350 (Bz--73186, Bz--73187); *Oetoei* 76 [Boschproefst. BB. 8060] (Bz--73080); *Teijsmann* 22 (Bz--23865), *s.n.* [Muntok] (Bz--73079), *s.n.* [Soengei-lest] (Bz--73078). LOCALITY OF COLLECTION UNDETERMINED: *Herb. Martius s.n.* (Br).

TEIJSMANNIODENDRON GLABRUM Merr., Univ. Calif. Publ. Bot. 15: 263. 1929.

Synonymy: *Teysmanniodendron glabrum* Merr. ex Kosterm., Reinwardtia 6: 183, fig. 10. 1962. *Teijsmanniodendron bogoriense* f. *glabrum* (Merr.) Bakh. ex Mold., Résumé Suppl. 15: 23, in syn. 1967.

Bibliography: E. D. Merr., Univ. Calif. Publ. Bot. 15: 263. 1929; A. W. Hill, Ind. Kew. Suppl. 8: 234. 1933; Junell, Symb. Bot. Upsal. 1 (4): 98. 1934; Fedde & Schust., Justs Bot. Jahresber. 59 (2): 417. 1939; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 65 (1942) abd ed. 2, 145, 146, & 196. 1949; Kosterm., Reinwardtia 1: 88--90 & 106 (1951) and 6: 166--167 & 183, fig. 10. 1962; Mold., Fifth Summ. 2: 640 & 641. 1971.

Illustrations: Kosterm., Reinwardtia 6: 183, fig. 10. 1962.

A small to large glabrous or subglabrous tree, often burly, to 32 m. tall; trunk straight or crooked, often gnarled, to about 15 cm. in diameter at breast height, girth to 2.3 m.; clear bole to 19 m. high; crown to 10 m.; buttresses to about 1 m. high; bark smooth or scaly to flaky, often excrecently roughened, whitish, grayish, or gray to pale-yellow, brownish-yellow, greenish-brown, or even chocolate, 1.2--2.5 cm. thick; outer bark thin, smooth, white or grayish to pale yellow-gray, pale-brown, pale-yellow, or pale-ochre; inner bark brittle, whitish or yellowish to yellow or yellowish-brown; wood soft, yellowish-tinged or yellowish-white; slash yellow; sapwood white to yellow or brownish; cambium yellow; sap "dirty-blackish"; central pith often rotting away in age; main branches terete, pale, similar to the trunk; ultimate branchlets more or less compressed, 3--5 mm. in diameter, freely re-branched; leaves 3-foliolate, "descending"; petioles terete, 2--6 cm. long, not at all winged; petiolules 1--3 cm. long; leaflets coriaceous, oblong to oblong-elliptic or ellipsoid, often sharply folded or conduplicate, 9--15 cm. long, 4--7 cm. wide, subequally narrowed at both ends, apically distinctly acuminate (the tip often strongly recurved), basally acute, more or less shiny above, much paler or yellowish-green beneath, not glanduliferous, often obscurely pustulate, brown or olive-brown in drying; secondaries 6 or 7 per side, curvate, conspicuous beneath; more or less conspicuous, erect, obtusely oblong stipular appendages at the petiole-base; inflorescence paniculate, the panicles terminal and penultimately axillary in the upper leaf-axils, erect, about 20 cm. long, pedunculate, many-flowered, "pale yellowish-green", their primary branches few (usually 4), to 7 cm. long, flabellate-ly arranged, the younger parts sparsely pubescent; flowers mostly in triads, the 2 lateral ones pedicellate, the central one sessile; terminal peduncles usually 4, as long as the inflorescence itself;

bracts and bractlets lanceolate, about 3 mm. long, apically acuminate, glabrous or subglabrous; calyx cupuliform, about 2.5 mm. long, externally glabrous or subglabrous, the rim dentate, the teeth triangular-ovate, about 0.5 mm. long, apically acute; fruiting-peduncles green and erect; fruit ellipsoid or ovoid-ellipsoid, green or pale-green when immature, later pale-gray to brown or chestnut-color, 2.5--3 cm. long, smooth, glabrous, shiny, apically obtuse, about 2 cm. in diameter, the pericarp about 2.5 mm. thick, subcrustaceous; seed solitary.

This species is based on *Elmer 21320* from near Tawao, Sabah, Borneo. Merrill (1929) notes that "Although the petioles are not at all winged, this, from its fruit characters, is clearly a *Teijsmanniodendron*, and is manifestly closely allied to the type of the genus, *T. bogoriense* Koord. It is distinguished from that species chiefly by its smaller fruits and its glabrous or nearly glabrous inflorescences. It is not impossible that it has been previously considered in *Vitex*; by Lam's arrangement of the species it keys out to *Vitex flabelliflora* Hallier f." Actually, it is most closely related to *T. coriaceum* (C. B. Clarke) Kosterm., from which its stipular appendages at the petiole-bases at once distinguish it. Kostermans (1962) says that "It may be differentiated from *T. bogoriensis* by the smoother leaves (smooth to touch) and also by the wing-like appendages at the petiole base, which are attached only at the base and [are] ligulate in outline. These were overlooked by Merrill and by me." in his 1951 work Kostermans regarded *T. glabrum* as conspecific with *T. coriaceum*. In his 1962 work he cites for *T. glabrum* the following collections: Sabah: *Elmer 21616*; *Herb. Brit. N. Borneo Forest Dept. 7122, A.810, SAN.19226, SAN.21419*. Sarawak: *Richards 2570*. He mistakenly regards *Elmer 21616* as the type collection, when Merrill clearly designated *21320* as the nomenclatural type in his original publication, although, admittedly, the labels accompanying *21616* are inscribed "n. sp."

Collectors have found this species growing in red-brown or dark-black soil, sandy loam, or blackish soil on hillsides, on wooded plains, flat land, and undulating country, in primary forests, at dry forest edges, and on hillside ridges, at 6.5--116 m. altitude, in anthesis in February, May, June, and October, and in fruit in June, August, and October. Brass reports it "common" in rainforests in Papua. Nicholson & Sam report finding a tree of this species with "29 ft. girth breast height", but this hardly seems possible. The corollas are said to have been "white-gray" on *Sinanggul SAN.56228* and "white-green" on *Saikeh & Tuyak SAN.83422*. The stipular appendages at the petiole-base, so characteristic of this species, are not apparent on *Sinanggul SAN.56228* or *Nicholson & Sam SAN.16103*.

The holotype specimen is mixed with at least one leaf of a *Strychnos* species or of something menispermaceous, judging from the leaf venation.

Kostermans (1951, 1962) asserts that Bakhuizen considered this taxon to be a "variety" of *T. bogoriense* Koord., but as yet I have

been able to find evidence only of his regarding it as a "form" of that species.

Material of *T. glabrum* has been misidentified and distributed in some herbaria as *T. bogoriense* Koord., *T. coriaceum* (C. B. Clarke) Kosterm., *T. pteropodum* (Miq.) Bakh., and even as *Blumeodendron tokbrai* Kurz. On the other hand, the *Binidoh* NT.94 [SAN. 59762], *Sinanggul* SAN.39106, and *Singh* SAN.31123, distributed as *T. glabrum*, seem actually to be *T. bogoriense* Koord., *Rundi* SAN. 4304 and *Wing* SAN.32581 are *T. bogoriense* var. *pentaphyllum* Mold., and *Talip* SAN.65886 is *T. pendulum* Kosterm.

Citations: GREATER SUNDA ISLANDS: Sabah: *Aban* SAN.71549 [NT. 235] (Sn--42133); *Arshid* SAN.81284 (Sn--41535), *SAN.82741* (Sn--51167), *SAN.87629* (Sn--55182); *Binson & Bongsu* NT.494 (Sn--63006); *Charington* SAN.24426 (Ld); *Elmer* 21320 (Bi--isotype, Bz--73145--isotype, Ca--312129--type, Du--165427--isotype, Mu--isotype, N--isotype, N--photo of isotype, S--isotype, Ut--86045--isotype, Z--photo of isotype), 21616 (Bi, Bz--73146, Ca--312137, Du--165353, Mi, Mu, N, S, Ut--86141, W--2605907, Z); *Madani* SAN.51670 (Ld); *Meijer* SAN.47231 (Ld); *Nicholason* SAN.21788 (Z); *Nicholson & Bobong* SAN.29859 [NT.1024; Herb. Forest Dept. 40758] (Z); *Nicholson & Sam* SAN.16103 [NT.27; Herb. Forest Dept. 40753] (Ld); *Patrick* NT.814 [SAN.39713] (Z); *Saikhe & Tuyok* SAN.83422 (Sn--51194); *Sinanggul* SAN.56228 (Ld), *SAN.57016* (Z); *Talip & Lakising* SAN.73082 (Sn--52326).

TEIJSMANNIODENDRON HOLLRUNGII (Warb.) Kosterm., *Reinwardtia* 1: 103--105. 1951.

Synonymy: *Vitex simplicifolia* C. B. Clarke in Hook. f., Fl. Brit. India 4: 586. 1885 [not *V. simplicifolia* Oliv., 1875]. *Vitex hollrungii* Warb., Engl. Bot. Jahrb. 18: 208. 1894. *Vitex clarkeana* Gamble in Ging & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra); 845. 1908. *Vitex punctata* Merr. apud H. Hallier, Meded. Rijks Herb. Leid. 37: 51. 1918 [not *V. punctata* Schau., 1847, nor Vahl, 1955]. *Vitex hollrungii* Warb. apud Dop in Lecomte, Fl. Gén. Indo-chine 4: 825. 1935. *Teijsmanniodendron monophyllum* Kurata, Bull. Tokyo Univ. Forests 35: 203, textpl. 2. 1947. *Vitex hollrungii* K. Schum. ex Mold., Résumé Suppl. 3: 42, in syn. 1962. *Teijsmanniodendron hollrungii* Kosterm. apud Whitmore, Guide Forests Brit. Solom. Isls. 204. 1966.

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H. J. Lam in Bakh. & Lam, Nova Guinea 14, Bot. 1: 168. 1924; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1926; Fedde, Justs Bot. Jahresber. 47 (2): 423. 1929; Dop in Lecomte, Fl. Gén. Indochine 4: 825--826. 1935; Mold., Geogr. Distrib. Avicenn. 40. 1939; Mold., Prelim. List Inv. Names 52. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 457. 1941; Mold., Suppl. List Inv. Names 11. 1941; Kanehira & Hatusima, Bot. Mag. Tokyo 56: 116. 1942; Mold., Alph. List Inv. Names 53 & 55. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 1214. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59, 61, 63--67, 75, & 103. 1942; Kurata, Bull. Tokyo Univ. Forests 35: 293. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129, 138--140, 143, 146, 200, & 203. 1949; C. T. White, Journ. Arnold Arb. 31: 113. 1950; Kosterm., Reinwardtia 1: 75--77, 79, 95, 97, 99, 100, & 103--106. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 250. 1953; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 457. 1959; Mold., Résumé 177, 181, 186, 192--195, 198, 199, 202--204, 353, 382, 384, 385, 389, & 470. 1959; G. Taylor, Ind. Kew. Suppl. 12: 141. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1214. 1960; Mold., Résumé Suppl. 3: 42. 1962; Burkill, Dict. Econ. Prod. Malay Penins. 2: 2278. 1966; Whitmore, Guide Forests Brit. Solom. Isls. 142, 148, & 204. 1966; Mold., Résumé Suppl. 17: 13. 1968; Mold., Fifth Summ. 1: 303, 306, 328, 331, 337, 339, & 340 (1971) and 2: 640, 641, 715, 719, 726, 727, & 911. 1971; Hartley, Dunstone, Fitzgerald, Johns, & Lamberton, Lloydia 36: 294. 1973; Farnsworth, Pharmacog. Titles 9 (1): xxvi. 1974; Mold., Phytologia 44: 222 & 223. 1979.

A tree, usually rather small, to 25 m. tall, or shrub-like, to 3 m. tall, or even somewhat scandent, when arborescent with a clear, cylindrical, straight (occasionally crooked) bole to 10 m. high, with thick, steep buttresses to 2 feet long often present; crown usually small and irregular; trunk 6--35 cm. in diameter at breast height, with a girth to 75 cm.; bark smooth or scaly, white or whitish to grayish or gray, soft, concolorous, peeling off in large irregular flakes; outer bark pale- or light-gray; inner bark light-green or yellowish to pale-red or brown; cambium yellow or gray; sapwood white or grayish to yellow; branchlets rather stout, round to rather sharply tetragonal, dark-brown (in drying), the youngest parts usually also deeply sulcate in drying, plainly lenticellate with numerous, very small, elongate, light-colored lenticels, puberulous or minutely pulverulent-puberulent to glabrate; pith large, solid, tetragonal, white; nodes somewhat swollen, very distinctly annulate; principal internodes 3.5--4.5 cm. long; leaves decussate-opposite, 1-foliolate; petioles rather slender, black in drying, mostly about 1.2 cm. long, subglabrate or very obscurely pulverulent, apically plainly articulate; petioles obsolete; leaflets sessile or practically so, the blades firmly chartaceous or coriaceous, dull dark-green or bright-green above, lighter beneath, lanceolate, 15--25 cm. long, 5--13 cm. wide, apically long-acuminate, marginally entire, basally acute or obtuse, glabrous on both surfaces or very obscurely and minutely pulverulent-dotted beneath, conspicuously impressed-punctate or

glandular-dotted beneath, the punctations usually surrounded by a slightly elevated margin; midrib rather slender, flat or slightly subimpressed above, rounded-prominent beneath, nigrescent in drying; secondaries very slender, 15--20 per side, close together, rather straight and ascending or slightly arcuate, rather indistinctly arcuate-joined in many irregular loops near the margins; vein and veinlet reticulation very abundant, all but the finest parts more or less subprominent above, all subprominent beneath; inflorescence axillary (in the uppermost pair of leaf-axils) and terminal, paniculate; peduncles rather stout, 4.5--7.5 cm. long, sharply tetragonal or flattened, brunnescent or nigrescent in drying, rather densely rusty-puberulent or -pubescent, the sympodia similar in all respects but more slender; terminal panicles compound, to 37 cm. long and 4 cm. wide, the branches elongate, with about 4 distant lateral and central cymes, each 13--21 cm. long, ascending, many-flowered, the axillary panicles confined to the uppermost pair of leaf-axils and simple or compound, usually equaling the terminal ones in length; bractlets few, inconspicuous, caducous, linear, 3--5 mm. long, puberulent; prophylla obsolete or very tiny and setaceous; pedicels obsolete or to 1 mm. long and puberulent; flowers fragrant; calyx pale-green to "greenish-black" or "dirty yellowish-green with a pale-yellow tube", fulvous- or rusty-hairy, scaly, dark-brown in age; corolla 2.5 mm. long, bilabiate, with 4 smaller lanceolate lobes and a much larger spatulate one, white to blue or purple, ochraceous-tomentose, the middle lobe of the lower lip usually purple-lilac, basally yellow; stamens didynamous, one pair much longer than the other, yellow; anthers dark-brown; pollen yellowish-white; stigma yellowish-white; fruit spherical or ovoid, to 2 cm. long and wide, at first green, greenish, or bluish-green to dark-green, eventually bluish-black or black when ripe, ochraceous brown or dark-gray in drying, apically depressed, spongy, covered with a yellowish-brown powder.

The corollas are said to have been "white" on Aet 730 and Aet & Idjan 351, "violet and white" on Robinson 1867, "purple" on Bartlett 7160, Dewol & Talip SAN.80369, Native collector 2268, and Pleyte 839, "pink" on Madani SAN.33190, "lilac" on Salverda 30 and Wyatt-Smith s.n., "blue" on Goklin 20, Sales 3731, and Wood 2163, "yellowish" on Ridley 2151, "light-purple" on Yates 2135, "white, basal lobe lilac" on Floyd 6481, "white, lip purplish with a yellow spot" on Leeuwen 11260, "white, lip yellowish with a central lilac spot" on Lam 1224, "creamy-white with pinkish tinge at base of petals" on Royen 3095, "mauve with a pale-yellow spot in the throat" on Corner s.n., "lip blue with whitish hairs, lobes pale-purple" on Versteeg 1025, "lobes pale-cream, throat yellow, lip lilac with a yellow base and pale-lilac center" on Lam 617, "yellowish, with blue lip" on Gjellerup 312a-d, "yellow, lip blue" on Moszkowski 22 & 142, "cream-color, mid-lobe of large lip suffused with mauve" on Walker & White 153, and "lobes greenish outside, cream inside, lip lilac with a yellow base" on Maxwell 78-247.

The species is based on Hollrung 377 from on the banks of the

Daigun River at Hatzfeldhafen, in the former Kaiser Wilhelmsland [Australian New Guinea], collected in fruit in October of 1886, and deposited in the Buitenzorg herbarium. It is the type species of Section *Unifoliolatae* Kosterm., characterized by unifoliolate leaves.

Lauterbach (1900) cites only the type collection and regarded the species as endemic to New Guinea. Actually it is very widely distributed throughout the Malay Peninsula, through Indonesia, to New Guinea and the Solomon Islands. Kostermans (1951) remarks that "The most conspicuous character is the presence of numerous tiny holes (glands) in the lower leaf-surface. These holes are usually surrounded by a slightly elevated margin. In leaf-shape and leaf-texture the species is very close to *T. subspicatum* (Hall. f.) Kosterm, but besides the differences in pilosity of the inflorescence, the gland-holes of the lower leaf-surface are not present in the latter species." He cites the following collections for *T. hollrungii*: MALAYA: Johore: Corner SF.28642, SF.33693, & s.n.; Lake & Kelsall 4059; Ngadiman SF.34711. Pahang: Evans SF.13174; Mohamad SF.17132; Ridley SF.11325. Penang: Ridley 2151. Perak: Curtis 1611 & s.n.; Ridley 7990 & s.n.; Spare SF.36010. GREATER SUNDA ISLANDS: Celebes: Rachmat 792. Kalimantan: Hallier B.134, B.1138; Teijsmann HB.8372, HB.11596, HB.11629; Van Wijk 3; Winkler 3436. Sabah: Sales 3731. Sarawak: Daud & Tachun SF.36085. LESSER SUNDA ISLANDS: Banka: Teijsmann s.n. MOLUCCA ISLANDS: Amboina: C. B. Robinson 1867. Buru: Teijsmann HB.1831. Ceram: Kornassi 878. Sula: Hulstijn 32. NEW GUINEA: Papua: Hollrung 377. West Irian: Janowsky 491; Kostermans 258 [BB.33457]; Lam 617, 1224; Matatula 150 [BB.21941]; Sal-verda 30 [BB.22105]; Teijsmann HB.17470, HB.17471; Versteeg 1025. NEW GUINEAN ISLANDS: Japen: Van Dijk 351. Misool: Teijsmann s.n.

Sparre reports the species as "a common riverside shrub" in Perak, while Corner found it to be frequent in the brackish tidal zone of rivers in Johore. Hartley and his associates (1973) refer to it as a bushy tree in the scrub back of ocean beaches. Whitmore (1966) calls it an "ill-formed tree in well-drained lowland forests" and refers to it as an "uncommon small tree in coastal swamps" in the Solomon Islands.

The *Vitex punctata* of Schauer and that attributed to Vahl, referred to in the synonymy (above), are synonyms of *Vitex cofassus* Reinw. The *V. holophylla* Baker and *V. subspicata* Hall. f., often included in the synonymy of *T. hollrungii*, actually belong to that of *T. holophyllum* (J. G. Baker) Kosterm. and *T. subspicatum* (H. Hallier) Kosterm. respectively.

The King & Gamble (1908) citation in the bibliography of *T. hollrungii* (above) is often cited as "1909" and that of Schumann & Lauterbach (1900) and "1901", apparently in error.

Collectors have encountered *T. hollrungii* in black, brownish, sandy, and swampy soil in freshwater or brackish swamps, albatross rookeries, coastal swamp forests, primary and secondary forests, open places in mixed dipterocarp forests, on plains and flatlands,

in riverside thickets,, on freshwater or tidal to brackish riverbanks, and "near beaches, almost among the mangroves", at altitudes of from sealevel to 335 m., in anthesis from October to February and April to August, in fruit from May to March. Floyd mistakenly describes the fruit as a "pome" and reports the species "not used" by the natives of New Britain.

Vernacular names recorded for the species are "bundo", "entabuloh", "fufufu", "kaju(ta)kolok ampit", "kaporan", "kapor kaporan", "kapur kapur-ran", "kolok ampib" [=head of ricebird], "luhampit", "lulu", "luluka", "matatari", "mempisang", "metatari", "pokok rusa", "sagotby", "sĕmantoh", and "tjĕndĕnĕkĕrĕ".

Clarke (1885) comments that "Wight supposed this to be *Vitex macrophylla* R. Br. (now removed to *Gmelina* by Bentham); and it is so very like it, except in having narrow leaves, that it appears unnatural to refer the two plants to different genera." White (1950) says "I would regard it as intermediate between *Gmelina* and *Vitex* as it has the single leaves of the former and the flower of the latter genus. The fruits are also very distinctive. I hesitate to make a new genus, however, as Lam (.....1919) and later Lam and Bakhuizen van den Brink (.....1921) who have seen much material are content to leave it in *Vitex*. [In their] conception of the species it has a wide range from Malacca through the Malay Archipelago to New Guinea and the Solomon Islands."

Hallier (1918) avers that the fruit is "kugelig, 2 cm dick, am Grunde kurz birnförmig verjüngt, von gelbbraunen Mehl bedeckt." He cites Hallier B.134 & B.1138, DeVriese s.n., and Teijsmann 11429 from West Borneo, Korthals s.n. and Winkler 3436 from Southeast Borneo, DeVriese s.n. from Buru, and Hollrung 377 and Versteeg 1025 from New Guinea.

Hartley and his associates (1973) cite for *T. hollrungii* their nos. 10433 & 11074. White (1950) cites only Walker & White B.S.I.R. 153 from the Solomon Islands. King & Gamble (1908) cite King's Collector 8788, Ridley 7990, and Scortechini 1383 from Perak, Griffith 6046 from Malacca, Lake & Kelsall s.n. from Johore, Beccari 166, Haviland 1580, and Motley 1269 from Borneo, and Curtis 1611 from Pangkore Island (in the Dinding Islands).

Lam (1919) cites only Teijsmann 1831 from Buru and Gjellerup 312 and Moszkowski 22 & 143 and Riggerbach 22 from New Guinea. He distinguishes *Vitex clarkeana* and *V. hollrungii* as follows:

1. Midlobe of lower corolla-lip twice as long as the lateral lobes, undulate.....*V. clarkeana*.
- 1a. Midlobe of lower corolla-lip five times as long as the lateral lobes, entire..... *V. hollrungii*.

Dop (1935) cites only Pierre s.n. from Cochinchina, but gives the species' overall distribution as Malacca, Sumatra, Banka, Borneo, Celebes, the Molucca Islands, and New Guinea. Ridley (1923) cites the species from "Riverbanks, Johor, Sungei, Sembrong (Kelsall), Pahang, Pekan, Pianggu, Endau (Evans), Muar, Sungei Pauh (Fox). Dindings, Pangkor (Curtis); Bruas; Telok Sera. Perak, Bernham River (Kunstler).

Lam (1921) cites Teijsmann s.n. from Banka, Jaheri s.n. and Teijsmann 8372 from Borneo, Vuuren 792 from Celebes, Robinson 1867

from Amboina, and *Jaheri s.n.* & *Teijsmann s.n.* from New Guinea. He notes that "The synonymy still seems somewhat doubtful as regards to *V. subspicata* and *V. holophylla* [especially the former species has leaves which do not exactly conform with those of *V. Hollr.*, being more gradually acuminate. It seems, however, rather probable that all these forms belong to a single species with a large extension; it may be that it is rather polymorphic, but in the materials extant at present, we could not separate any distinctly distinguishable forms, the extremes (as e.g. *V. subspicata* and the type of *V. Hollrungii*) being joined by a uninterrupted series of transition forms." In spite of this, I agree with Kostermans in maintaining three separate species here.

Material of *T. hollrungii* has been misidentified and distributed in some herbaria as *T. holophyllum* (J. G. Baker) Kosterm., *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Vitex holophylla* Baker, *V. punctata* Schau., *Lagerstroemia flos-reginae* Retz., *Lagerstroemia* sp., *Anacardiaceae*, and *Terebinthaceae*. On the other hand, the *Beccari llll*, distributed as *T. hollrungii*, actually is *T. holophyllum* (J. G. Baker) Kosterm., *Pierre 37* is *T. pierrei* Mold., *Chai & al. s.n.* [Herb. Sarawak Forest Dept. S.33142] is *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Chai S.34719* is *T. subspicata* (H. Hallier) Kosterm., *Hoogland 3405* and *Hoogland & Macdonald 3422* are *Gmelina dalrympleana* var. *schlechteri* (H. J. Lam) Mold., and *Bourne & Bourne 2328* is *Vitex cofassus* Reinw.

Citations: MALAYA: Johore: *Corner 28187* (Mi), *28642* (Bz--73230), *33693* (Bz--73231); *Maxwell 78-247* (Ac). Perak: *Sparre 36010* (Bz--73232). GREATER SUNDA ISLANDS: Celebes: *Rachmat 792* (Bz--73103, Bz--73104, Bz--73105). Kalimantan: *Endert 1431* (Bz--72631); *H. Hallier B.134* (Bz--25707, Bz--73111), *B.1138* (Bz--73112); *Herb. Bogor. 73106* (Bz); *Matatula 157* [BB.21948] (Bz); *Salverda 30* [BB.22105] (Bz); *Teijsmann 11596* (Bz--73115, Bz--73116), *11629* [Herb. Hort. Bot. Bogor. 1798 b & c] (Bz--73110), *HB.8372* (Bz--73113); *Van Dijk 3* (Bz--73107, Bz--73108); *Winkler 3436* (Bz--73109). Sabah: *Ampuria SAN.36492* (Sn--40879); *Apostol s.n.* [D. D. Wood 2163] (Ca--268910); *Banang SAN.52006* [NT.39] (Sn--40884); *Brand SAN.25286* (Z); *Dewol & Talib SAN.80369* (Sn--50441); *Goklin 20* [D. D. Wood 1845] (Ca--244290); *Madani SAN.33190* (Sn, Z); *Meijer SAN.22620* [Herb. Forest Dept. 40765] (Z), *SAN.25148* (Ld); *Sales 3731* (Bz--73117, Ca--347007); *Sinanggul SAN.57450* (Z); *Taha 3897* [field no. 487] (Ca--347183, Pd); *Wyatt-Smith s.n.* [Kepong field no. 80278] (W--2210608). Sarawak: *Beccari 166* (Mu--1535, N--drawing, S. V); *Chai S.34719* (Z); *Hose 331* (N--photo, Ph, Z--photo); *Native collector 359* (N--photo, Ph, W--1290519, Z--photo), *2668* (Ph, W--1290870). Sumatra: *H. H. Bartlett 7160* (Mi, Mi, N, W--1552136); *Teijsmann 11629* [1798a] (Bz--73114, N); *Yates 2133* (Bz--73120, Ca--300516, Mi, N). LES-SER SUNDA ISLANDS: Banka: *Teijsmann s.n.* (Bz--73118, Bz--73119). MOLUCCA ISLANDS: Amboina: *C. B. Robinson 1867* (Bz--73097, N, W--775253, W--1294191). Buru: *Teijsmann HB.1831* (Bz--73098, Ut--11561, Ut--11562). Ceram: *Kornassi 878* (Bz--73099, Ut--80736). Mangole: *Hulstijn 32* (Bz--73100, Bz--73101, Bz--73102). NEW GUI-

NEA: North East New Guinea: *Hollrung* 377 (Bz--73196--type, Mb--isotype, N--photo of isotype, N--photo of type, Z--photo of isotype, Z--photo of type). Papua: *Jaheri s.n.* [11/4/1901] (Bz--73188, Bz--73189, Ut--58723). West Irian: *Aet* 730 (Ba, Bz--72753, Ng--16949); *Feuilletau de Bruyn* 866 (Ut--80738); *Janowsky* 491 (Bz--73191, Bz--73192, Bz--73193, Bz--73194, Bz--73195); *Kostermans* 258 [BB.33459] (Bz--73204, Bz--73205); *H. J. Lam* 617 (Bz--73198, Bz--73199, Bz--73200, Bz--73201, Bz--73202, Bz--73203, Ca--234900, Ut--80739), 1224 (Bz--25660, Bz--73197, N, Ut--80737); *Leeuwen* 11260 (Ng--16928); *Matatula* 150 [BB.21941] (Bz--73211); *Pleyte* 839 (Ng--16948); *Royen* 3095 (Ng--16940); *Teijsmann* 17470 (Bz--73206, Bz--73207, Bz--73208), 17471 (Bz--73209, Bz--73210); *Versteeg* 1025 (Bz--25661, Bz--73190, Ut--13191). NEW GUINEAN ISLANDS: Japen: *Aet & Idjan* 351 (Bz--72629, Bz--72630), 705 (Bz--72627, Bz--72628). Misool: *Pleyte* 839 (Bz--72632, Er, N); *Teijsmann s.n.* (Bz--73293, Bz--73294). BISMARK ARCHIPELAGO: New Britain: *Floyd* 6481 (Ng, Ng--16919). SOLOMON ISLANDS: New Georgia: *Maenu'u s.n.* [Herb. Brit. Solom. Isls. Prot. 6454] (W--2578871). CULTIVATED: India: *Herb. Madras* 2328 (N).

TEIJSMANNIODENDRON HOLOPHYLLUM (J. G. Baker) Kosterm., *Reinwardtia* 1: 97--99, fig. 4. 1951.

Synonymy: *Vitex holophylla* J. G. Baker, *Kew Bull. Misc. Inf.* 1896: 25--26. 1896. *Teijsmanniodendron holophyllum* Kosterm., *Gard. Bull. Singapore* 17: 8. 1958. *Teijsmanniodendron holophyllum* Mikil, in herb.

Bibliography: J. G. Baker, *Kew Bull. Misc. Inf.* 1896: 25--26. 1896; Thiselt.-Dyer, *Ind. Kew. Suppl.* 2: 194. 1904; Gamble in *King & Gamble, Journ. Asiatic Soc. Beng.* 74 (2 extra): 844--845. 1908; H. J. Lam, *Verbenac. Malay. Arch.* 176--177. 1919; H. J. Lam in *Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3*, 3: 52. 1921; *Ridl., Fl. Malay Penins.* 2: 631--632. 1923; Kosterm., *Reinwardtia* 1: 75, 80, 96--99, & 106, fig. 4. 1951; *Mold., Résumé* 181, 191, 194, 384, & 470. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959; *Mold., Résumé Suppl.* 3: 24 (1962) and 18: 8. 1969; *Mold., Fifth Summ.* 1: 306 & 328 (1971) and 2: 719 & 911. 1971; *Mold., Phytologia* 44: 222. 1979.

Illustrations: Kosterm., *Reinwardtia* 1: 98, fig. 4. 1951.

A tree, 8--26 m. tall; clear bole straight, to 19 m. high; crown 5.5--10 m.; trunk to 43 cm. in diameter at breast height; girth 1--2 m.; bark smooth or somewhat scaly, corky, brittle, about 1.25 cm thick, mostly dark-green or the outer bark gray, grayish, or whitish to pale-yellow or pinkish-brown, smooth or flaky; inner bark green or greenish to yellowish, yellow, or pale-brownish; wood medium-hard; sapwood white to pale-yellow or yellow; branchlets slightly pubescent or hirsute to glabrous (in age); leaves unifoliolate; petioles 2--6 cm. long; leaflet-blades usually slightly bullate, not pitted beneath, basally rounded, pilose-tomentose beneath when young, glabrous in age; secondaries 6--10; inflorescence usually with 2 lateral and subopposite

spreading branches near the base, hirsute to subglabrous; flowers pedicellate; fruiting-calyx urceolate, the rim dentate, the teeth reflexed; corolla usually beautifully deep-purple or white, velvety; fruit dark-green or greenish-brown when young, dark-brown or bluish when mature, 2--2.2 cm. in diameter.

This species is based on *Greagh s.n.* and *Low s.n.* from Sandakan, Borneo, deposited in the herbarium of the British Museum (Natural History) in London.

Collectors have found the species growing in primary or secondary forests, on hillsides or ridge-tops, along the sides of rivers, and in virgin jungles, in sandy, dark-brown, blackish, or black, sometimes ultrabasic, stony soil, at altitudes of 70--265 m., in anthesis in February, March, June, and September and in fruit in June, July, and September.

The corollas are said to have been "white" on *Ambullah SAN. 36054*, "whitish" on *Gibot NT.431*, and "purplish" on *Sundaling SAN. 78454*.

The Gamble (1908) reference in the bibliography (above) is often cited as "1909". *Teijsmanniodendron holophyllum* var. *pubescens* Mold. is a synonym of *T. sinclairii* Kosterm.

On the Buitenzorg sheet of *Henderson 20408* Kostermans has noted "If this specimen is indeed conspecific with *Vitex holophylla* Baker, it should be called *Teijsmanniodendron holophyllum* (Baker) Kosterm., nov. comb. It is distinct from *Vitex subspicata* Hallier [= *Teijsmanniodendron subspicatum* Kosterm.] because: 1. branchlets pilose, 2. flower stalked, 3. calyx urceolate and teeth reflexed."

Gamble (1908) cites, besides the type collection, *Ridley 4031* from Johore and *Beccari llll* from Sarawak. Lam (1921) includes *Vitex holophylla* in the synonymy of *T. hollrungii*, although in his 1919 work he kept it distinct. Kostermans (1951) cites the following collections: MALAYA: Johore: *Lake & Kelsall SF.4031*. GREATER SUNDA ISLANDS: Anambas: *Henderson SF.20408*. Kalimantan: *Jaheri s.n.*; *Zwaan 609* [BB.12144].

Material of *T. holophyllum* has been misidentified and distributed in some herbaria as *T. hollrungii* (Warb.) Kosterm. and *Vitex subspicata* H. Hallier. On the other hand, the *Banang SAN.52006*, distributed as *T. holophyllum*, actually is *T. hollrungii* (Warb.) Kosterm., *Meijer 37424* and *Talip SAN.52795* are *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Chai SAN.21641*, *26651*, *29346*, *29798*, & *29799*, *Martyn SAN.21619*, and *Mikil SAN.28097* are *T. simplicifolium* Merr., *Leopold & Henry SAN.48580* [TN.253], *Mikil SAN.46647* [Herb. Forest Dept. 40847], *Nicholson SAN.28829*, *Sam SAN.28834*, and *J. Singh SAN.34721* [NT.332] are *T. simplicifolium* var. *kostermansi* Mold., *Sinanggul SAN.39981* is *T. smilacifolium* (H. H. W. Pearson) Kosterm., and *Meijer SAN.39328* is the type collection of *T. subspicatum* var. *parvifolium* Mold.

Citations: GREATER SUNDA ISLANDS: Anambas: *M. R. Henderson 20408* (Bz--73229, N). Kalimantan: *Beccari llll* (Bz--73225, Bz--73226, Mu--1533, N--drawing, N--photo, S, V, Z, Z--photo). Sabah: *Ambullah SAN.36054* (Ld), *SAN.36086* (Z); *Beneng NT.39* [Herb. Forest Dept. 52006] (N); *Dewol S. & Alexius M. SAN.88377* (Sn--56282);

Donggop & Gombio SAN.81759 (Sn--47886); *Gibot NT.431* [Herb. Forest Dept. Sandakan 61846] (Z); *Mujin SAN.39226* (Ld); *Sin SAN.58106* (Ld); *Sinanggul 58105* [SAN.41654] (Z); *Sundaling SAN.78454* (Sn--47936); *Talip 52795* (N), *SAN.54780* (Sn); *Talip & Termiji SAN.62427* (Sn--40785).

TEIJSMANNIODENDRON KOSTERMANSI Mold., *Phytologia* 4: 57. 1952.

Bibliography: Kosterm., *Reinwardtia* 1: 95. 1951; Mold., *Phytologia* 4: 57. 1952; Mold., *Résumé* 194 & 470. 1959; G. Taylor, Ind. Kew, *Suppl.* 12: 141. 1959; Mold., *Fifth Summ.* 1: 328 (1971) and 2: 911. 1971.

A tree; branchlets slender, rusty-pubescent when young, glabrous in age; dead bark smooth, gray, about 0.5 mm. thick; living bark about 7 mm. thick, yellow in cross-section; sapwood white; heartwood lacking; principal internodes 6--10 cm. long; nodes swollen, annulate, very distinctly articulate; leaves 3--5-foliate; petioles medium-stoutish, 3--5.5 cm. long, rusty-pubescent, deeply carinate or canaliculate above; petiolules stout, 1--2 cm. long, rusty-pubescent, basally amplate, canaliculate above; leaflet-blades subcoriaceous, light-green on both surfaces, obovate-oblong, 8--20 cm. long, 3--10 cm. wide, apically short-acute or short-acuminate (the tip itself obtuse), marginally entire, basally acute or cuneate, smooth and glabrous (except for the midrib) above, drying dull-gray, very densely rusty-pilose or -pubescent beneath; midrib flat above, strongly prominent beneath; secondaries slender, 4--7 per side, flat and obscure above, prominent beneath and arcuate-ascending, not anastomosing; tertiaries rather few, loosely reticulate, the reticulation indiscernible above, the larger portions prominulous beneath, abundant; flowers and fruit unknown.

The above description is taken, in large part, from Kostermans (1951) who recognized the new species but refrained from formally naming it because of the lack of flowering and/or fruiting material. It is fitting and proper that it be named in his honor. He comments that the species "Differs from the other species of this section [*Plurifoliolatae* Kosterm.] in the dense rusty tomentum of the lower leaf-surface".

The species is based on *Lot Obi 75* [BB.10495] from near Matara Djañ, at 100 m. altitude, in the Puruktjañ Subdivision, southern Kalimantan, Borneo, deposited in the Buitenzorg herbarium. The collector notes that it is a rare tree at the type locality, the local vernacular name for it being "kohokontak". The species is thus far known only from the original collection.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Obi 75* [3386; BB.10495] (Bz--73271--type, Bz--73272--isotype, N--isotype, N--photo of type, Z--photo of type).

TEIJSMANNIODENDRON NOVO-GUINEENSE (Kaneh. & Hatus.) Kosterm., *Reinwardtia* 1: 103 [as "*novoguineense*"]. 1951.

Synonymy: *Vitex novo-guineensis* Kaneh. & Hatus., *Bot. Mag. Tokyo* 56: 116--117, fig. 8. 1942. *Vitex novoguineensis* Kaneh. & Hatus. ex Kosterm., *Reinwardtii* 1: 103, in syn. 1951. [to be continued]