

REVISION OF THE BURSERACEAE OF THE MALAYSIAN AREA
IN A WIDER SENSE

VIa, VII—IX¹⁾

by

C. K A L K M A N

(Rijksherbarium, Leiden)

(Issued 18. XII. 1954).

Of this series of preparations to the definite publication of the Burseraceae in "Flora Malesiana", the present part is giving an additional note on VI. *Garuga* and dealing with the genera VII. *Triomma*, VIII. *Dacryodes* and IX. *Santiria* (and a new combination in *Protium*).

The present paper gives only additions to and alterations of Lam's monograph (H. J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 12, 1932, 281—561); descriptions, synonyms, literature, specimens cited, ecological and other notes are only mentioned insofar as they are not given by Lam.

Unless the presence of flowers or fruits is mentioned, the specimens cited are sterile; month of flowering and fruiting are designated by roman numerals.

At our disposal was material from the herbaria of Berlin, Bogor, Calcutta, Dehra Dun, Florence, Geneva, Honolulu (Bern. P. Bish. Mus.), Jamaica Plain (Arnold Arb.), Kepong, Kew, Leiden, London (Brit. Mus.), Paris, Singapore, Vienna, Washington (U.S. Nat. Herb.) and Zürich. The abbreviations of these herbaria are those proposed in "Index Herbariorum", 2nd ed. 1954.

It is our pleasant duty to tender our best thanks to the keepers of these institutions for their co-operative help.

VIa. **GARUGA** Roxb.

(Additional Note)

Cf. C. KALKMAN in *Blumea* 7, 2, 1953, 459—472.

Note to p. 459.

After the above-quoted paper was printed, our attention was drawn to the fact that Adanson (*Familles des Plantes* 2, 1763, 510 & 534) has legalized the generic name *Katoukalesiam* (*Katou.Kalesiam* on p. 510), which is based on Van Rheede tot Draakenstein, Hort. Ind. Malabar. 4,

¹⁾ I—IV in *Blumea* 7, 1, 1952, 154—170, V and VI in *Blumea* 7, 2, 1953, 413—472.

1673, 69, t. 33, on which also *Garuga* Roxburgh has been based. It has been proposed to conserve *Garuga* Roxburgh over Adanson's name, which has never been used (cf. Taxon 3, 4, 1954, 124).

VII. TRIOMMA Hooker f.

Triomma Hooker f., Trans. Linn. Soc. 23, 1860, 171; Lam 1932b, 331. — *Monotypic genus.*

Triomma malaccensis Hooker f., l.c.; Lam 1932b, 332, fig. 8. — *Boswellia malaccensis* Marchand, Adansonia 8, 1867/68, 25.

Misc. inform.: Heyne 1950, 882 (sub nomine *Triomma macrocarpa* Backer); Hildebrand 1949a, b, c, d, e, f, h, 1952a, b, c, d, e; Webber 1941, 441—465.

Type specimen: *Maingay 299* in K, dupl. in L.

Distribution: Sumatra, Malay Peninsula, Bangka, Borneo.

SUMATRA. Eastcoast, Simelungun, Damakkitang: *NIFS* bb. 33060 (BO, L); Riouw and dependencies, Indragiri, Muara Serange: *NIFS* bb. 30065 (L), ♀ IX; Palembang, Lematang Ilir, Semangus: *NIFS* bb. 31985 and bb. 32157 (L); Lampung, Tarabangi: *Teysmann 4508* (L), fr., isotype of *Arytera? macrocarpa* Miq.

MALAY PENINSULA. Kedah, Guron, State Land: *unknown coll. 27479* (KEP), ♂ XI; Perak, Pondok Tanjong: *Godfrey 13217* (KEP); Behrang: *Abd. Kani 45552* (KEP); Selangor, Sungei Buloh: *Symington 44735* (KEP); Kuala Lumpur, Sungei Lalang: *Mohd Yattim 63547* and *66774* (KEP); Pahang, Bilut: *Sayid Ali 23445* (KEP); Putat: *Baba 31518* (KEP); Penting Batu (Anak Endau): *Said 31604* (KEP); Rompin, Mentas: *Debab 40155* (KEP), ♂ II; Negri Sembilan, Sungei Mengala: *Wyatt-Smith 64096* (KEP); Malacca, without loc.: *Alvins 1289* (SING), buds III; Singapore, Botanic Gardens Jungle: *Hassan 36278* (KEP), ♂ V; Bukit Timah: *Corner 34956* (KEP), ♂ IV; Malay Peninsula, without loc.: *Maingay 299* (L), fr., isotype of *Tr. malaccensis* Hk.f.; *ibid.*: *Maingay 354* (OAL), buds.

BANGKA. Lobok Besar: *NIFS* bb. 34092 = *Kostermans 158*, *Anta 337* and *Anta 880* (BO, L), ♂ IX; *ibid.*: *Anta 524* (BO, L), ♀ IX; *ibid.*: *NIFS* bb. 33967 = *Kostermans 29* and *NIFS* bb. 34153 = *Kostermans 224* (BO, L); *ibid.*, G. Pading: *Anta 973* (BO, L), ♂ IX; Perlang: *NIFS* bb. 34079 = *Kostermans 145* (BO, L), ♂ IX; *ibid.*: *NIFS* bb. 34113 = *Kostermans 179* (BO, L).

BORNEO. West Borneo, Melawi, Tjatit, watershed Sungei Gantung and Badak Buruk: *NIFS* bb. 31778 (L); British North Borneo, Sandakan, Elopura, Sepilok: *Kadir A 39* (KEP, L), ♂ IX; *ibid.*, Kabili: *Kahar 48749* = *S. II. 9962* (KEP, L), ♂ IX; *ibid.*, Kretam: *Ping Sam S. II. A 1381* (L), ♂ V; Kinabatangan Besar, Kori: *Cuadra A 2124* (KEP, L); South and East Borneo, West Kutei, Selorong: *NIFS* bb. 23993 (BO); *ibid.* (Teratak): *NIFS* bb. 23995 (BO, L); *ibid.*, Mendom (Atan Sungei Klindjan): *NIFS* bb. 29252 (L); *ibid.*, Djembajan (Sungei Kelesan): *NIFS* bb. 25124 (L); *ibid.* (Sungei Djambu): *NIFS* bb. 24678 (L); *ibid.*, Tg Langkap: *NIFS* bb. 23645 and bb. 23992 (L); Pulu Laut & Tanah Bumbu, Saring: *NIFS* bb. 27183 (L); *ibid.*, Semblimbing: *NIFS* bb. 27189 and bb. 31182 (L); Balikpapan, Sungei Tunan: *NIFS* bb. 25633 (L); *ibid.*, Sepaku: *NIFS* bb. 24639 (L); Berau, Betemu air: *NIFS* bb. 19135 and bb. 19142 (BO, L); Pasir Sungei Ongka: *NIFS* bb. 25595 (L); Loa Djanan, W. of Samarinda: *Kostermans 6530* (L), ♂ IV and *6598* (L), ♀ IV; Tdg Bangko, near Mahakam River estuary: *Kostermans 7104* (L), fr. V.

Remarks: Lofty trees, up to 45 m high, buttressed; bark scaling off, smooth or rough, greeny brown or greyish; resin little to abundant, colourless, white, light yellow or light red, combustible and with aromatic smell. *Habitat*: at low altitudes, rarely higher than 150 m alt. (210 m in Selangor, 260 m in Sum. East., 285 m in W. Born., 300 m in S. & E. Born.). *Vernac. names*: assem (Sum., Lamp.), rengas, medang ampal, sudur bajan (Bangka), lamai (S. & E. Born.), binsian, bansision, terosob, maitus

(Br. N. Born.). *Flow. and fruit. times*: In Sum. fl. in VIII—XI (Riouw, Pal.), fr. in II—III (Pal.). In Mal. Penins. fl. in II (Pah.), IV—V (Sing., Negri Semb.), VIII (Selang.), XI (Kedah). In Bangka fl. in IX. In Born. fl. in IV—V (Br. N. Born., S. & E. Born.) and in IX—X (Br. N. Born., S. & E. Born.), fr. in V (S. & E. Born.).

VIII. DACRYODES Vahl

In 1932 Lam extended the genus *Pachylobus* Don in the sense of Engler (in Engler & Prantl, Nat. Pfl. fam., 2nd ed. 19a, 1931) with some 12 species from the genus *Santiria* (in the sense of Engler) and gave the resulting genus the correct name of *Dacryodes* Vahl (cf. Lam 1932b, 335).

Lam's subdivision of the genus is as follows:

- | | | |
|-----------|--------------------------|---------------------|
| Sectio I. | Archidacryodes H. J. Lam | — American species. |
| | II. Pachylobus Don | — African species |
| | III. Curtisina Ridley | — Asiatic species. |

Some botanists reject the congenerity of the African and the Asiatic species (e.g. Exell & Mendonça in Consp. Florae Angol. 1, 2, 1951, 304) and maintain for the former a separate genus *Pachylobus* Don. Since, however, the characters of the fruits are of primary importance for the distinction of genera within the tribe *Canarieae*, I cannot see any justification for this separation, the fruits of both groups being identical; the differentiating features are: sepals free or slightly connate at base (Afr.), sepals connate (As., Am.), and: ovary 2(—3)-celled (Afr.), ovary 3—2-celled (Am.), ovary 3-celled (As.).

In my opinion, the subdivision of the genus — adapted to the present Code of Nomenclature — is as follows:

Dacryodes Vahl, Skrift. Dansk. Nat. hist. Selsk. 4, 1810, 116; Lam 1932b, 334—366; Lam 1938, 126—157 — Type species: *D. excelsa* Vahl, l.c. — Distribution: About 40 species in tropical regions.

Sectio DACRYODES — *Archidacryodes* H. J. Lam, 1932a, 202; Lam 1932b, 335 — Distribution: About 2 species in tropical America.

Sectio PACHYLOBUS (Don) H. J. Lam, 1932a, 202; Lam 1932b, 336; Don, Gen. Syst. Gard. & Bot. 2, 1832, 89 (as a genus) — Type species: *D. edulis* (Don) H. J. Lam, l.c. — Distribution: About 22 species in tropical Africa.

Sectio TENUIPYRENA Engler in DC, Mon. Phan. 4, 1883, 136 (as a section of *Canarium*, pro max. p.) — *Curtisina* Ridley, J. Roy. As. Soc. Str. Br. 82, 1920, 180 (as a genus); H. J. Lam 1932a, 202 and 1932b, 337 (as a section of *Dacryodes*) — Type species: *D. laxa* (Bennett) H. J. Lam — Distribution: 17 (prob. 18) species in Cochin China, Sumatra (1 end.), Malay Peninsula (4 end.), Riouw and Lingga Archipelago, Bangka, Billiton, Borneo (4 end.), Western Java, Philippines, Northern Celebes, New Guinea (1, prob. 2 end.).

This section is mainly restricted to the Sunda Shelf (*fig. 1*), but recently one, perhaps two species have become known from New Guinea. The genus can therefore also be expected to occur in the Moluccas.

Key to the species of the section *Tenuipyrena*

- 1a. No resiniferous ducts in medulla of branchlets, few or none in that of petioles . . . 2
- b. Some to many resiniferous ducts in medulla of branchlets and petioles . . . 14
- 2a. Inflorescences terminal, sometimes with smaller additional axillary and/or lateral ones. No terminal vegetative bud extant 3
- b. Inflorescences axillary or lateral. Terminal vegetative bud extant 6
- 3a. Stamens inserted on or near rim of disc 4
- b. Stamens inserted outside disc 5
- 4a. Branchlets, petioles and inflorescences densely pilose or sometimes glabrous; inflorescences lax, up to 140 cm long; fruits 2.5—4.5 cm long, 0.8—2 cm in diam. — Petioles 1—14 cm long, 0.2—0.8 cm thick at base, flattened or channeled; leaflets oblong-lanceolate, 7.5—30 cm long, 2—9 cm wide, lowest pair often much smaller and falling earlier; secondary nerves 10—20(—24); flowers rather large,

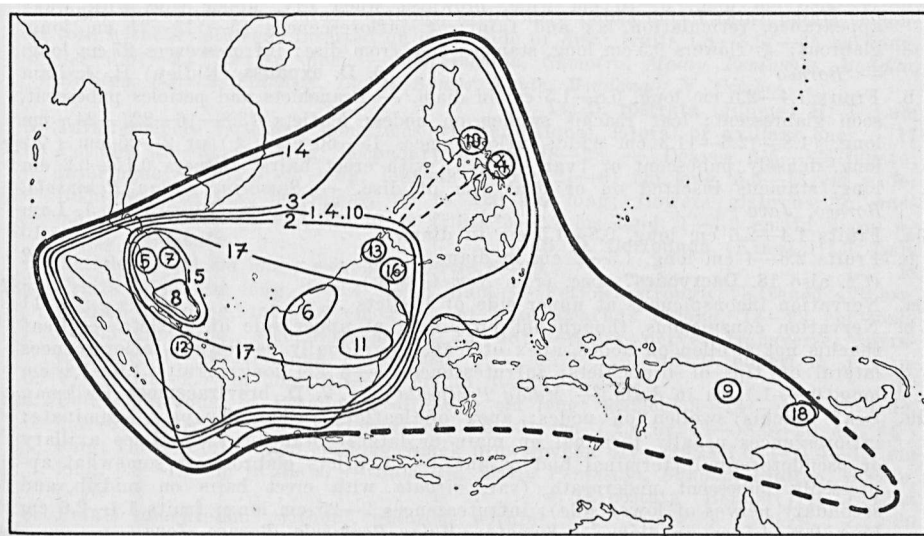


Fig. 1 — Distribution of the Malaysian species of *Dacryodes* — numbers refer to the number of the species in the present paper.

ca 0.4—0.6 cm long. — *Sumatra, Malay Peninsula, Borneo, Java?*

1. *D. laxa* (Bennett) H. J. Lam

- b. Branchlets and petioles pubescent, soon glabrescent; inflorescences 15—60 (♂) or 2—25 (♀) cm long, densely pubescent or (var. *virgata*) with erect hairs; fruits 1.4—2.6 cm long, 0.8—1.5 cm in diam. — Petioles (1.5—)3—9.5 cm long, 0.15—0.2 cm thick, round or more or less flattened at base; leaf rhachis swollen on nodes; leaflets variable in shape, elliptic, ovate or obovate to oblong or lanceolate, (3.8—)6—22(—24) cm long, (1.8—)2.5—11.3 cm wide; secondary nerves 7—12; inflorescences usually terminal on main or lateral branches, sometimes axillary or pseudoterminal (terminal bud extant); flowers 0.15—0.2 cm long. — *Sumatra, Malay Peninsula, Borneo, Java* 2. *D. rugosa* (Blume) H. J. Lam
- 5a. Flowers relatively large, 0.2—0.25 (♂) or 0.3—0.35 (♀) cm long, cinnamon-brown when dry; pedicels i. s. angular, 0.05—0.1 cm thick; tertiary nerves reticulate. — Petioles (3.5—)4.5—8.5(—15.5) cm long; base of leaflets variable, usually rounded, sometimes subcordate or acute; ♂ inflorescences 3—17 cm, ♀ ones and infrutescences 8—21 cm long; petals tomentellous without, glabrous within; fruits 1.4—2.7 cm long, 0.8—1.7 cm in diam. — *Sumatra, Malay Peninsula, Borneo, Luzon, Mindanao* 3. *D. incurvata* (Engler) H. J. Lam
- b. Flowers smaller, 0.15—0.2 (♂) or 0.2—0.25 (♀) cm long, black brown when dry; pedicels terete, very thin, usually much less than 0.05 cm thick; tertiary nerves

transverse. — Petioles 1—5(—6.5) cm long; base of leaflets acute, rarely subrounded; ♂ inflorescences 6.5—30 cm, ♀ ones (3—)8.5—20 cm, infrutescences (4—)8—18 cm long; petals glabrous; fruits (1.2—)1.4—1.9 cm long, 0.8—1.2 cm in diam. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Leyte*

4. *D. costata* (Bennett) H. J. Lam
- 6a. Leaves $3\frac{1}{2}$ — $15\frac{1}{2}$ -jugate; leaflets narrowly oblong, 3—6 times as long as wide, 6—30(—42) cm long, 2.5—8 cm wide; secondary nerves 8—14; ♂ flowers ca 0.35 cm long, stamens free around disc or slightly connate with its base; fruits 1.5—2.7 cm long, 1.2—1.5 cm in diam. — *Malay Peninsula*
5. *D. longifolia* (King) H. J. Lam
- b. Leaves $\frac{1}{2}$ — $4\frac{1}{2}$ -jugate; leaflets up to 3 times as long as wide 7
- 7a. Petioles not flattened at base 8
- b. Petioles more or less flattened at base 9
- 8a. Fruits 3.5 cm long, 3 cm in diam. — Branchlets and leaves glabrous; leaflets 17—29.5 cm long, 5—10 cm wide, brownish when dry, upper side with waxy appearance, reticulation lax and faint; ♂ inflorescences (5—)13—21 cm long, glabrous; ♂ flowers 0.5 cm long, stamens free from disc; infrutescences 27 cm long. — *Borneo* 6. *D. expansa* (Ridley) H. J. Lam
- b. Fruits 1.4—2.6 cm long, 0.8—1.5 cm in diam. — Branchlets and petioles pubescent, soon glabrescent; leaf rhachis swollen on nodes; leaflets (3.8—)6—22(—24) cm long, (1.8—)2.5—11.3 cm wide; inflorescences 15—60 cm (♂) or 2—25 cm (♀) long, densely pubescent or (var. *virgata*) with erect hairs; flowers 0.15—0.2 cm long, stamens inserted on or near rim of disc. — *Sumatra, Malay Peninsula, Borneo, Java* 2. *D. rugosa* (Blume) H. J. Lam
- 9a. Fruits 1.4—2.6 cm long, 0.8—1.5 cm in diam. 10
- b. Fruits 2.3—4 cm long, 1.3—2 cm in diam. 12
(Cf. also 18. *Dacryodes?* spec. from *New Guinea*).
- 10a. Nervation inconspicuous at upper side of leaflets 11
- b. Nervation conspicuous, though not prominent at upper side of leaflets. — Leaf rhachis not swollen on nodes, apex of leaflets gradually narrowed; inflorescences lateral on tips of branchlets; infrutescences 3—6 cm long; fruits 1.6—1.8 cm long, 0.9—1.1 cm in diam. — *Malay Peninsula* 7. *D. breviracemosa* Kalkman
- 11a. Leaf rhachis swollen on nodes; apex of leaflets rather abruptly acuminate; inflorescences usually terminal on main or lateral branches, sometimes axillary or pseudoterminal (terminal bud extant). — Leaflets glabrous or somewhat appressedly pubescent underneath (var. *virgata* with erect hairs on midrib and secondary nerves of lower side); infrutescences 2—25 cm long; fruits 1.4—2.6 cm long, 0.8—1.5 cm in diam. — *Sumatra, Malay Peninsula, Borneo, Java* 2. *D. rugosa* (Blume) H. J. Lam
- b. Leaf rhachis not swollen on nodes, apex of leaflets gradually to subabruptly narrowed, base usually very oblique; inflorescences axillary (terminal bud extant). — Leaflets puberulous on nerves below, on upper side pubescent on base of midrib; infrutescences 3—5 cm long; fruits 1.5 cm long, 0.9—1 cm in diam. — *Malay Peninsula* 8. *D. puberula* (Bennett) H. J. Lam
- 12a. Medulla of petioles without resiniferous ducts; leaflets shining, acuminate at apex, acumen 0.7—0.9 cm long; tertiary nerves laxely reticulate, not transverse. — Flowers unknown; infrutescences ca 12 cm long; fruits 2.7—3 cm long, ca 1.5 cm in diam. — *New Guinea* 9. *D. papuana* Husson
- b. Medulla of petioles with some resiniferous ducts; apex of leaflets rounded or only shortly and broadly acuminate; tertiary nerves transversely reticulate 13
- 13a. Leaves and inflorescences glabrous; midrib and secondary nerves not very prominent below. — Inflorescences and infrutescences 6—25 cm long; petals thick, with inflexed margins and strongly inflexed apiculum (less distinct in var. *merrillii*); fruits 2.3—4 cm long, 1.3—2 cm in diam. — *Sumatra, Malay Peninsula, Lingga Archipelago, Borneo, Luzon* 10. *D. macrocarpa* (King) H. J. Lam
- b. Leaf-rhachis, petiolules and infrutescences puberulous to glabrous, as is midrib on lower side of leaflets; midrib and secondary nerves very prominent below. — Infrutescences 8—10 cm long; fruits 2.8—3.2 cm long, 1.6—2 cm in diam. — *Borneo* 11. *D. kostermansii* Kalkman
- 14a. Branchlets, petioles and inflorescences densely pilose or sometimes glabrous; stamens inserted on or near rim of disc. — Petioles 1—14 cm long, 0.2—0.8 cm

- thick, flattened or channeled at base; leaflets 7.5—30 cm long, 2—9 cm wide, lowest pair often much smaller and falling earlier; flowers 0.4—0.6 cm long. — *Sumatra, Malay Peninsula, Borneo, Java?* . 1. *D. laxa* (Bennett) H. J. Lam
- b. Branchlets, petioles and inflorescences glabrous or tomentose; stamens free or slightly connate with disc 15
(Cf. also 12. *D. crassipes* Kalkman from Sumatra)
- 15a. Disc pilose, with central channel. — Petioles not flattened, 6—7.5 cm long; leaflets ovate-oblong, glabrous above, minutely pulverulent below, 7—14 cm long, 2.5—6.5 cm wide; stamens inserted outside disc, connate at the very base; scandent (always?). — *Borneo* 13. *D?*. *scandens* Husson
- b. Disc glabrous; erect tree 16
- 16a. Inflorescences lateral, conferted at tips of branchlets. — Leaves glabrous or (forma *pubescens*) leaflets pubescent below; petioles round or somewhat flattened; leaflets variable in shape, (3—)5—20(—23) cm long, (1.5—)3—8(—12) cm wide, upper side with conspicuous reticulation; inflorescences (1.5—)5—30(—35) cm long; calyx lobes tomentose without, sericeously pubescent within; petals tomentose without; stamens inserted on outer side of disc; fruits 1.8—3.5(—4) cm long, 0.8—1.8(—2.2) cm in diam. — *Cochinchina, Sumatra, Malay Peninsula, Bangka, Buiton, Borneo, Palawan, Luzon, Samar, Leyte, Mindanao, N. Celebes*
14. *D. rostrata* (Blume) H. J. Lam
- b. Inflorescences terminal, sometimes with additional, lateral or axillary ones . 17
- 17a. Petioles 19—21 cm long; secondary nerves 18—38. — Leaves 6½—8½-jugate; interjugae 8.5—12.5 cm long; leaflets oblong, 21—61 cm long, 5.5—13 cm wide; inflorescences lax, pendulous, up to 120 cm long; flowers glabrous, ♂ ones 0.3 cm, ♀ ones 0.5—0.6 cm long; fruits 2—2.7 cm long, 1—1.2 cm in diam. — *Malay Peninsula* 15. *D. floribunda* (King) H. J. Lam
- b. Petioles 1—14 cm long; secondary nerves 6—19 18
- 18a. Fruits 4—4.7 cm long, 2—2.4 cm in diam. — Petioles strongly flattened at base, 9—14.5 cm long, 0.7—0.8 cm thick at base; leaflets oblong, 12—22 cm long, 5—8.5 cm wide; secondary nerves 13—18; tertiary nerves transverse; infrutescences 17—45 cm long. — *Borneo* 16. *D. elmeri* H. J. Lam
- b. Fruits 1.2—2.5 cm long, 0.8—1.7 cm in diam. 19
- 19a. Petals glabrous. — Petioles 1—5(—6.5) cm long; leaflets 3—14(—16) cm long, 1.3—6(—7.5) cm wide; inflorescences 6.5—30 cm (♂) or (3—)8.5—20 cm (♀) long; flowers 0.15—0.25 cm long, black brown when dry; fruits (1.2—)1.4—1.9 cm long, 0.8—1.2 cm in diam. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Leyte* 4. *D. costata* (Bennett) H. J. Lam
- b. Petals tomentellous without, glabrous within 20
- 20a. Leaflets glabrous; inflorescences and infrutescences minutely tomentose. — Petioles (3.5—)4.5—8.5(—15.5) cm long, 0.2—0.6 cm wide at base; leaflets ovate-elliptic to oblong or oblong-lanceolate, base usually rounded, sometimes subcordate or one half or both halves acute; secondary nerves (6—)8—18; ♂ inflorescences 3—17 cm, ♀ ones and infrutescences 8—21 cm long; fruits 1.4—2.7 cm long, 0.8—1.7 cm in diam. — *Sumatra, Malay Peninsula, Borneo, Luzon, Mindanao* 3. *D. incurvata* (Engler) H. J. Lam
- b. Lower side of leaflets densely pubescent on midrib and stronger secondary nerves; inflorescences and infrutescences with dense fur-like tomentum. — Petioles (2.4—)3—8.5 cm long, 0.2—0.3 cm thick at base; leaflets ovate, elliptic, obovate or oblong, (4.2—)6—16(—19.5) cm long, (2.2—)3.5—6(—7) cm wide, base acute to subrounded; secondary nerves (7—)10—13; ♂ inflorescences long and lax, up to 30 cm long (f. Lam); infrutescences 7—17 cm long; fruits ca 2 cm long, ca 1.2 cm in diam. — *Malay Peninsula, Borneo*

17. *D. rubiginosa* H. J. Lam

Incompletely known: 18. *Daoryodes?* spec. (*New Guinea*)

1. *D. laxa* (Bennett) H. J. Lam, 1932a, 204 and 1932b, 355, fig. 15; Merrill 1934, 81.

Misc. inform.: Hildebrand 1949b, e, i; Husson & Lam 1952a, 166.

Type specimen and basonym: *Maingay 366* (K. dupl. in CAL, L), type of *Canarium laxum* Bennett in Hook., Fl. Brit. Ind. 1, 1875, 535.

Distribution: Sumatra (incl. Batu Isl.), Malay Peninsula, Borneo (Sarawak, Brunei, British North Borneo, one record from South and East Borneo), Java?

SUMATRA. Atjeh, Road from Kabandjaha to Katutjane: *Bangham 1096* (K, SING), buds II; East coast, Semelungun, Tanah djawa, Pengkolan: *NIFS db. 33061* (BO, L), fr. X; Palembang, R. Rawas: *Forbes 3070* (A), young fr., *isotype* of *Sant. forbesii* Bak. f., cf. Remarks.

MALAY PENINSULA. Kedah, Hulu Cherok, Peroh: ? *Meh 17393* (KEP), fr. V; Bukit Bintang: *Sharin 35179* (KEP, L), ♂ III; P. Penang, Penang Hill: *Nauen 35842* (SING), fr. VII; Perak, Kinta: *D. F. O. 54812* and *54844* (KEP); Selangor, Sungei Buloh: *Ja'amat 14922* (KEP); Pahang, Ayer Hitam Kajang: ? *Fyfe 26397* (KEP); Bilit: *Sayid Ali 23439* (KEP); Temerloh, Bukit Tok Morat: *Pawanchnu 13755* (KEP), ♂ IX; Negri Sembilan, Mengala: *Wyatt-Smith 64060* (KEP, L), fr. VI; Johore, Sedili River below Mawai: *Corner s.n.* (SING); Singapore, Bukit Timah: *Ngadiman 37037* (SING), fr. VI; Tanglin: *Ridley s.n.* (W, nr 2873), fr.; Malay Peninsula, without loc.: *Maingay 366* (CAL, L), fr., *isotype* of *Can. laxum* Benn.

BORNEO. Sarawak, Kuching: *Beccari 390* (FI, P), ♂ and fr., *type* of *Can. fragile* Engl. in P., cf. Remarks; Brunei, Kampong: *Flemmich 34406* (KEP), ♂ III; Pak Gabal: *Flemmich 34510* (KEP), young fr. IV; British North Borneo, Tawau, Jelutong river: *Orolfo 4672* (L, SING), fr. V.

JAVA? no loc.: *de Vriese and Teysmann s.n.* (L, nr 908.205—570), cf. Remarks.

Remarks: This species is rather variable as to the length of the petiole and to the indumentum of rachides, leaflets and inflorescences, but all my efforts to arrive at a reasonable subdivision of the species have failed. One could suggest to subdivide the specimens into two groups: a) with short petioles (1—3.5 cm) and b) with longer petioles (4.5—14 cm). However, *Orolfo 4672* (petioles 1.1—5 cm) is intermediate. In the Malay Peninsula only group a), in Borneo only group b) (except the above-mentioned *Orolfo*-number), in Sumatra both groups are represented, the only Java-specimen belonging to a). Though these groups partially correspond with Lam's varieties (*typica* and *forbesii* respectively), the feature does not correlate with any other (Lam mentions: indumentum and dimensions of fruits); consequently I do not favour a subdivision of this species.

The type specimen of *Santiria forbesii* Baker f. cannot represent a separate variety, *D. laxa* var. *forbesii* (Bak. f.) H. J. Lam, 1932a, 204 and 1932b, 357, as it is identical with the specific type.

The Java specimen (cited by Lam under *D. rugosa*, but on the sheet identified by him as *D. laxa*) is very doubtful: the annotations on *De Vriese and Teysmann* specimens are not always trustworthy as to the locality (island).

The type specimen of *Can. fragile* Engl. has 16—24 pairs of secondary nerves indeed and not — as Lam presumes, 1932b, 355, footnote — 24 in all. The description has therefore to be completed as to this point.

Small tree, usually not higher than 15 m, rarely up to 30 m; bark grey or pale green, scaling; fruits by one collector recorded as being edible, another collector says: sour, with strong smell. *Habitat:* Usually at lower altitudes, highest record 1200—1650 m (Atjeh); once collected in swampy habitat (Brunei). *Vernac. names:* andalhe batu (Sum., Eastc.), kelat hitam tarok (Mal. Penins., Pahang), telur merak (Mal. Penins., Kedah). *Flow. and fruit. time:* In Sum. fl. in II (buds, Atjeh), fr. in VIII—X (Benk., Batu Isl., Eastc.) and in I (Tapan.). In Malay Penins. fl. in III—IV

(Selang., Kedah, N. Semb.) and in IX (Selang.), fr. in V—VII (Selang., Kedah, N. Semb., Malacca, Singap., P. Penang) and in XI—XII (Selang.). In Borneo fl. in III (Brun.), VIII (Saraw.) and X (Br. N. Born.), fr. in IV—V (Brun., Br. N. Born.), VIII (Saraw., Br. N. Born.) and XII (Br. N. Born.).

2. *D. rugosa* (Blume) H. J. Lam, 1932a, 203 and 1932b, 345, fig. 12; Cretzoiu 1934, 265; Lam in Backer 1948, 3; Husson & Lam 1952a, 163—166.

Misc. inform.: Heyne 1950, 881; Hildebrand 1949a, b, c, f, h, 1950a, e, 1951d, 1952e; Pref. names 1952.

Type specimen and basonym: *Korthals s.n.* (L, nr 898.321—232), type of *Santiria rugosa* Blume, Mus. bot. Lugd.-Bat. 1, 14, 1850, 212.

Distribution: Sumatra (Southern part), Malay Peninsula, Borneo, West Java.

Remarks: Sterile specimens of this species are sometimes hardly distinguishable from *D. costata*. The petioles of *D. rugosa* are usually not so strongly flattened as those of *D. costata*; the leaf rhachis is much more distinctly swollen on the nodes in *D. rugosa*, which generally makes a more slender impression. *D. costata* has — generally spoken — shorter leaves, shorter and more slender petioles, interjugae and petiolules, and smaller leaflets. In some cases the identification of sterile specimens remains doubtful.

Small tree of 5—20 m, rarely higher, once reported as being a shrub of 6 m (*Cuadra A 1094*, Brit. N. Born.). No buttresses. Greenish, greyish or pale brown bark, smooth, flaking off, without or with little clear sap. Petioles light fawn brown (*Corner, Kostermans*), petiolules with large knobs at both ends (*Wyatt-Smith 64072*). Flowers pale yellow or white. Fruits reported in various shades between yellow and red. *Vernac. names*: kedondong (Mal. Penins.), patiu, tompulan, dayau, owas-owas, pitong kalaout, talang sai, paninasan burong (var. *rug.*, Br. N. Born.), kambayu burong (var. *virg.*, Br. N. Born.), watak (S. & E. Born.). *Flow. and fruit. times*: In Mal. Penins. fl. in IX—XI (Kedah, Perak, Selang., Pahang), fr. in VII (Perak, Kelant.) and in X—I (Kedah, Perak, Pahang). In Born. fl. in XI (Brunei, S. & E. Born.), fr. in V—VII (Br. N. Born., S. & E. Born.) and in X—XII (Saraw., Br. N. Born.). In Java fl. in IX (buds)—XII.

Var. *rugosa* — *D. rugosa* (Blume) H. J. Lam var. *genuina* H. J. Lam, 1932a, 203 and 1932b, 347 — *D. rugosa* (Blume) H. J. Lam var. *moultonii* (Ridley) H. J. Lam, 1932a, 203 and 1932b, 348 — Leaflets glabrous or more or less appressedly pubescent underneath.

Distribution: as the species.

SUMATRA: Riouw and Dependencies, Indragiri, Muara Serango: *NIFS* bb. 30079 (L); Palembang, Lematang Ilir, Semangus: *NIFS* bb. 31994 and bb. 32018 (L).

MALAY PENINSULA. P. Penang, no loc.: *Curtis 1431* (BM), ♂, cf. Remarks; Perak, Trolak: *Browne 43487* (KEP); Salama: *King's coll. 3123* (US), detached fr. VII; Larut: *King's coll. 3716* (L), fr. I; Kelantan, S. Ohalil, Sungai Lebir: *Henderson 29545* (BO), fr. VII; *ibid.*: *Browne 33489* (KEP); Selangor, Semangkok: *Wyatt-Smith 71377* (KEP); Pahang, Bukit Petai, Berjantai: *Pawanohu 13783* (KEP), ♂ IX; Endau, Sungei Mentulang: *Debab 40157* (KEP); Kemaman, B. Kajang: *Corner s.n.* (SING); *ibid.*: *Corner s.n.* (SING), ♀ XI; Kemansul: *Symington 49329* (KEP), young fr. XI; N. Sembilan, Mengala: *Wyatt-Smith 64072* (KEP), fallen fls. VI; Malay Peninsula, without loc.: *Scortechiumi s.n.* (= 1983?) (US), ♂ buds.

BORNEO. Sarawak, Gunong Gading: *Daud & Tachun 36107* (KEP), ♂ buds IX; Kuching: *Beccari 738* (FI), fr. X; Brunei, Upper Baram, Gunong Simabok: *Moulton 6767* (BM), ♀ XI, type of *Canarium moultonii* Ridley; British North Borneo, Sandakan, Elopura, Kabili: *Kadir A 633* (KEP, SING), fr. XII; *ibid.*: *Puasa 4343* (L, SING), fr. VI; *ibid.*: *Keith 38901* (= *S. H. 4525*) (KEP, L, SING), fr. V; *ibid.*, Sepilok: *Kadir A 545* (L, SING) and *A 575* (KEP, L, SING), fr. XI; *ibid.*, Segalina: *Cuadra A 1094* (KEP, SING), fr. XI; Sapagaya: *Puasa 1447* (K), fr. VII; Tawau, Umas-umas: *Maidin 4895* (SING), young fr. V; no loc.: *Creagh s.n.* (L, nr 934.238—124), young fr.; South and East Borneo, West Kutai, Kahala: *NIFS bb. 28368* (BO); Tewe river: *Korthals s.n.* (L, nr 898.321—232), fr., type of *Sant. rugosa* Bl.; Loa Djanan near Samarinda: *Kostermans 6372* (L), ♂ IV; *ibid.*: *Kostermans 6402* (L), buds IV; *ibid.*: *Kostermans 6585* (L), young fr. IV; Tandjong Bangko region, near mouth of Mahakam River: *Kostermans 7016* (L), fr. V; East Kutai, Sungei Susuk: *Kostermans 5706* (L), buds VII.

JAVA. West Java, Bogor, Djasinga, Tjurug: *Esche & Wasynt Ja 6138* (L), buds IX.

Remarks: The differences between the type specimen of var. *moultonii* H. J. Lam and the specific type are so slight, that I cannot maintain the former as a separate variety.

From Java, only two specimens are known, both from Djasinga. *De Vriese & Teysmann s.n.*, cited by Lam, appeared to belong to *D. laxa* (cf. remarks to that species). According to Hildebrand 1951d, the species is very rare in West Java.

The British Museum specimen of *Curtis 1431* does not belong to *D. laxa* (Lam, 1932b, footnote p. 347); possibly there are different species gathered under one number.

Var. *virgata* (Blume) H. J. Lam, 1932a, 203 and 1932b, 348 — Lower side of leaflets with erect hairs on midrib and secondary nerves.

Type specimen and basonym: *Korthals s.n.* (L, nr 898.321—249), type of *Santiria virgata* Blume, l.c., 1850, 213.

Distribution: Borneo.

BORNEO. West Borneo, G. Pamaton: *Korthals s.n.* (L, nr 898.321—249), ♂, type of *S. virgata* Bl.; Sarawak, Matang: *Ridley 12265* (BM, SING), ♂ VIII; *ibid.*: *Haaviland c.r.m.d.* (SING), ♂; British North Borneo, Kabili-Sepilok: *Enggoh 41435* = *S. H. 7308* (KEP, L, SING), fr. VII; South and East Borneo, Tanahbumbu, Batulitjin: *Van Slooten 2118* (L), ♂ X.

Remarks: Comparing *D. scandens* with *D. rugosa* var. *virgata*, Husson & Lam 1952a, 166, say that "in neither there is a rudiment of an ovary" in the ♂ flower. This is not correct: among the five ♂ flowers of the latter, examined by me, there was only one without an ovarial rudiment in the flower, while in the others it ranged from rather small to very minute. The anatomy of the petioles is not essentially different either (as is suggested by Husson and Lam): in nine petioles out of seven different specimens of *D. rugosa* var. *virgata* I found the number of resiniferous bundles in the medulla ranging from 1 to 4. It is possible that in the type variety they are sometimes wanting, although I have not met with such a case.

3. *D. incurvata* (Engler) H. J. Lam, 1932a, 204 and 1932b, 362, fig. 19; Quisumbing 1944, 42 (sub nomine *Hemisantiria nitida* [Merr.] H. J. Lam). — *D. angulata* (Ridley) H. J. Lam, 1932a, 204 and 1932b, 364, fig. 20.

Misc. inform.: Hildebrand 1949a, f, h, 1950a, b, 1952a, b, e; Sinia

1938, 92; Webber 1941, 441—465 (with literature references on anatomy).

Type specimen and basonym: *Beccari 2937* (P, dupl. in FI), type of *Canarium incurvatum* Engler in DC, Mon. Phan. 4, 1883, 138.

Distribution: Sumatra, Malay Peninsula, Borneo, Luzon, Mindanao.

Tree, 10—30 m high. Branchlets in siccio round or angular, tomentose to glabrous, medulla with some to many, rarely without resiniferous ducts. *Leaves* 1½—4½-jugate; petioles usually strongly flattened at base, minutely tomentose to glabrous, (3.5—)4.5—8.5(—15.5) cm long, 0.2—0.6 cm wide at base, medulla with some to many resiniferous ducts; interjugae 1.5—6 cm long; leaflets glabrous, shining above, rigidly pergamaceous, brownish or greenish when dry, (4—)6—16(—22) cm long, 2—8(—9.5) cm wide, ovate-elliptic to oblong or oblong-lanceolate, base variable, usually rounded, sometimes subcordate, or one half or both halves acute, apex usually rather abruptly acuminate, acumen 0.4—2 cm long, petiolules 0.4—2.5 cm long, terminal ones 1.5—4 cm; midrib prominent at either side; secondary nerves (6—)8—18, little prominent above, much prominent below, s-shaped in the leafbase, angle 60°—90°, in base and apex (sometimes elsewhere as well) archingly joined near the margin; tertiary nerves reticulate to irregularly transverse, not or little prominent, but conspicuous below; reticulation minute, usually rather conspicuous below. *Inflorescences* terminal, sometimes with additional axillary or lateral ones, often branched from the very base, branches minutely tomentose to glabrous, ♂ ones 3—17 cm, ♀ ones and infrutescences 8—21 cm long. *Calyx* cupular or with low-triangular lobes, 0.1—0.125 cm high, 0.25—0.3 cm in diam., densely tomentellous without, glabrous within, as are petals. *Petals* ovate, 0.3—0.4 cm long, 0.25—0.3 cm wide. *Stamens* monodynamous or slightly didynamous, free outside disc or connate with it at broadened base of filaments only, in ♂ flower-buds 0.15 cm, in ♀ flowers 0.1—0.2 (—0.25 cm in old flowers) cm long, filaments c. 0.1 cm long, anthers in ♂ buds 0.1 cm, in ♀ flowers 0.05 cm long. *Disc* cupular, 6-lobed in ♂ buds, 0.2 cm in diam. *Ovary* tomentose, with 3-lobed sessile stigma, in ♂ flowers rudiment not exsert from disc. *Fruits* ovate, sometimes more or less oblique, (1.4—)1.8—2.7 cm long, 0.8—1.7 cm in diam., lightbrown and rugose when dry, acute at apex, rounded at base; fruiting calyx 0.25—0.4 cm in diam.; fruit pedicels 0.2—0.5 cm long.

SUMATRA. Tapanuli. Sibolga c.a. Barns: *NIFS* bb. 31573 (L); Riouw and Dependencies, Indragiri, Muara Serange: *NIFS* bb. 30007 (L); *ibid.*, Belimbing: *NIFS* bb. 28553 (L); *ibid.*, Kwala Belilas: *NIFS* bb. 27642 (L); *ibid.*, Danau Menekuang: *NIFS* bb. 27519 (BO).

MALAY PENINSULA. Kedah, Kokmoi: *Awang 47883* (KEP); Perak, Piah: *Ja'amat & Tachun 39337* (KEP); Kelantan, Bukit Besi: *Browne 38480* (KEP); Selangor, Klang, Telok: *Symington 47287* (KEP); Rawang: *Ngah 32310* (KEP); Johore, Pekan Nenag: *Othman bin Lassim 70807* (KEP).

BORNEO. West Borneo, Melawi, B. Melaban Ketjit: *NIFS* bb. 28332 (L); Sarawak, Matang: *Beccari 2937* (FI, P), fr. XII, type of *Can. incurvatum* Engl.; Kuching: *Haviland 2259* (BM, L), ♀ II, type of *Can. angulatum* Ridl. in BM; Brunei, Sungai Terban: *Ba'ee & Maidin 36954* (KEP), fr. IV; Seriah Oil Fields: *Symington 35711* (KEP); Kampong Lumut: *Mohd Isa 34413* (KEP, L), ♀ III; British North Borneo, Mt Kinabalu, Gurulau: *Carr 27077* (SING), fr. IV; South and East Borneo, West Kutai, Mo Antjalung: *NIFS* bb. 16537 (L); *ibid.*, Long: *NIFS* bb. 18458 (BO); Tidung lands, Tanah merah: *NIFS* bb. 18258 (BO); *ibid.*, Banusan: *NIFS* bb. 18147 (BO).

PHILIPPINES. Luzon, Bataan: *Medina 21827* (US), fr. VI; *ibid.*, Lamao river: *Barnes 517* and *597* (US); *ibid.*, Mount Mariveles: *Borden 808* (K, US); Tayabas (Infanta): *Whitford 768* (K, US), fr. IX, *lectotypes* of *Sant. nitida* Merr.

Remarks: Now that more material has come to hand, *D. incurvata* and *D. angulata* can be identified. The two types are different indeed: *angulata* has stouter and more angular branchlets, broader leaflets with rounded or subcordate base and broad and strongly flattened petioles, while *incurvata* is more slender generally. It appears, however, that intermediate forms are not at all rare and that no natural limit can be drawn so as to establish even two varieties.

Some Luzon specimens (*Whitford 768*, *Medina 21827*) have broader fruits (ca 2 cm by ca 1.5 cm), one Brunei specimen (*Ba'ee & Maidin 36954*) has smaller ones (1.4 cm by 0.8 cm) than seems to be normal.

This species is closely related to *D. rubiginosa*; for differences see there.

Buttresses are sometimes reported; the bark is green and smooth or "light yellowish brown with green-grey patches"; the resin is white (one collector mentions: green) and usually not abundant; the flowers are green, the fruits greenish. *Habitat*: in primary forests in steep or flat land, some specimens from swampy habitats (Selangor, Brunei). Nearly always collected under 100 m alt., one record from 150 m (Sum., Palemb.), one from 475 m alt. (W.-Born.). *Vernac. names*: kedondong kidjai (Sum., Riouw), kedondong (Kedah, Johore), k. matahari (Kelantan), k. kerut (Selang.), kerantai (Selang.), kembajau, kembojou, rawai, unggit-unggit, tokul gunung, malinas (S. & E. Born.). *Flow. and fruit. time*: In Mal. Penins. fr. in III (Selang.). In Born. fl. in II—III (Saraw., Brun.), fr. in IV (Brun.), from X—III (Br. N. Born.) and in XII (Saraw.). In Luzon fl. in II—III, fr. in VI and IX. In Mindanao fr. in V—VI.

4. *D. costata* (Bennett) H. J. Lam, 1932a, 204 and 1932b, 359, fig. 17.

Misc. inform.: Hildebrand 1949a, b, d, e, f, g, h, 1950a, b, c, 1952a, b, c, e.

Type specimen and basonym: *Maingay 313/3295* (K, dupl. in CAL), type of *Santiria costata* Bennett in Hooker, Fl. Brit. Ind. 1, 1875, 537.

Distribution: Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Philippines (Leyte, f. Lam 1932b).

SUMATRA. East coast, Alur Gusta, Lower Langkat: *NIFS bb. 16617* (L); Tapanuli, Sibolga ca., Barus, Pankalan Tapus: *NIFS bb. 28443* (L); West coast, Pariaman, Pasir Lawas: *NIFS bb. 18054* (BO); Riouw and Dependencies, Indragiri, Danau Mengkuang: *NIFS bb. 27530* (BO) and *bb. 27541* (BO, L); *ibid.*, Muara Padjanki: *Buwalda 6381* (BO, L), ♀ buds IV; Kuantan districts, Sungai Rambei: *NIFS bb. 23474* (L), fr. XI; *ibid.*, Tjeremti: *NIFS bb. 25224* (L); Palembang, Lematang Ilir, Semangus: *NIFS bb. 32262* (L); Sumatra, without loc.: ? *Binnendijk 74* (L), ♂ and ♀.

MALAY PENINSULA. Kedah, Bukit Tampai: *Daros 21539* (SING), fr. V; Penang, Penang Hill: *Nauen 35343* (SING), fr. VII; Selangor, Sungei Buloh: *Desch 46110* and *46118* (KEP); Bukit Cherake: *Wyatt-Smith 71365* (KEP); Semangko: *Wyatt-Smith 71380* (KEP); Kauching: *Ngah 24854* (SING), ♀ III; Pahang, Raka Hill: *Zin 27748* and *27533* (KEP); Singapore, Bukit Timah: *Ngadiman 36477* (SING); Malay Peninsula, without loc.: *Maingay 313/3295* (CAL, K), ♂ III, type of *Sant. costata* Benn.

BANGKA. South Bangka, Perlang: *NIFS bb. 34103* = *Kostermans 169* (BO),

L), ♂ IX; *ibid.*: *NIFS* bb. 34117 = *Kostermans* 183 (BO, L), ♂ X; Lobok Besar: *NIFS* bb. 34062 = *Kostermans* 125 (BO, L, SING); *ibid.*: *NIFS* bb. 34173 = *Kostermans* 239 (BO, L), ♀ X; *ibid.*: *Anta* 1123 (BO, L, SING), ♀ X; *ibid.*, G. Pading: *Anta* 986 and 945 (BO, L, SING), ♂ IX; *ibid.*: *Anta* 1006 (BO, L, SING), ♀ IX.

BORNEO. Sarawak, Sempadi: *Buaton* 546 (KEP), ♂ VIII; Labuan, Mount Banbar: *Motley* 146 (K); South and East Borneo, Tidung c.a., Tanah Merah: *NIFS* bb. 18252 (BO); Berouw, Betemu Aer: *NIFS* bb. 18980 (BO, L); East Kutai, Tdg Bangko, S.E. of Samarinda: *Kostermans* 7238 (L), fr. VI; *ibid.*, near mouth of Mahakam river: *Kostermans* 7109 (L); Loa Djanan, W. of Samarinda: *Kostermans* 6459 (L), young fr. IV.

Remarks: For the distinction of this species from *D. rugosa* see under that species.

In *Anta* 1006 I observed 1—4 resiniferous ducts in the medulla of the branchlets, an exception in this species, which has usually none.

The description of the inflorescences must be corrected as follows: ♂ ones 6.5—30 cm long, ♀ ones (3—)8.5—18(—21) cm long, infrutescences (4—)8—18 cm long.

The flaking bark is indicated by various collectors as being brown or as whitish, silvery grey; according to one collector the flowers are fragrant; in most cases there are no buttresses, only twice have these been reported (from Bangka and Selangor). *Habitat*: usually not higher than 100 m, some records from about 200 m alt. *Vernac. names*: kening kerak (Sum.), resung (Sum., Eastc.), rasak babi (Sum., Westc.), kedondong besi (Sum., Riouw), k. matahari (Mal. Penins., Selang.), bunjou, binjau, sudur bajan (Bangka), basi-basi, kramu, limat (S. & E. Born.). *Flow. and fruit. times*: In Sum. fl. in IV (buds, Riouw) and IX (Palemb.), fr. in IV (Palemb.) and XI (Riouw). In Mal. Penins. fl. in III (Selang., Mal.), fr. in VII (P. Pen.). In Bangka fl. in IX—X. In Born. fl. in VII—VIII (W. Born., Saraw.), fr. between X—III (Br. N. Born.) and in VI (S. & E. Born.). *Uses*: In Borneo the wood is used for proahs (S. & E. Born.) and for light constructions (Saraw.).

5. *D. longifolia* (King) H. J. Lam, 1932a, 202 and 1932b, 340, fig. 9; Symington 1937, 319.

Misc. inform.: Sinia 1938, 85, 92.

Type specimen and basonym: *King's coll.* 6838 (dupl. in L), type of *Santiria longifolia* King, J. As. Soc. Beng. 62, 2, 1893, 258.

Distribution: Malay Peninsula (Perak, P. Penang), endemic.

Remarks: This species seems to be very rare; I did not see any new material. What Lam says (1932b, 342) about reducing or eliminating the varieties when more material will be available, still holds.

Var. *longifolia* — *D. longifolia* (King) H. J. Lam var. *typica* H. J. Lam, 1932a, 203 and 1932b, 340.

Distribution: Perak.

MALAY PENINSULA. Perak. Larut: *King's coll.* 6838 (L), fr. XI, *isotype* of *Sant. longifolia* King.

Var. *penangensis* (Ridley) H. J. Lam, 1932a, 203 and 1932b, 342.

Type specimen and basonym: *Curtis* 3648 (K, dupl. in SING), type of *Curtisina penangensis* Ridley, J. Str. Br. Roy. As. Soc. 82, 1920, 180.

Distribution: P. Penang.

MALAY PENINSULA. P. Penang, Government Hill: *Curtis 3648* (K, SING), ♂ V, type of *Curt. penangensis* Ridl.

6. *D. expansa* (Ridley) H. J. Lam, 1932a, 204 and 1932b, 366, fig. 21. — *Fig. 2*.

Type specimen and basonym: *Haviland 2271* (K, dupl. in SING), type of *Canarium expansum* Ridley, Kew Bull. 1930, 83.

Distribution: Borneo (Saraw., Brun.), endemic.

Descriptio aucta: Small tree. Branchlets 0.5—c. 1.5 cm thick, glabrous, medulla without resiniferous ducts. *Leaves* glabrous, c. $4\frac{1}{2}$ -jugate? (no complete leaves seen); petiole (one seen) 9.5 cm long, c. 0.4 cm thick at base, not flattened, lenticellate, medulla with some resiniferous vascular bundles; interjugae 5—6.5 cm long; leaflets coriaceous or chartaceous, ob-

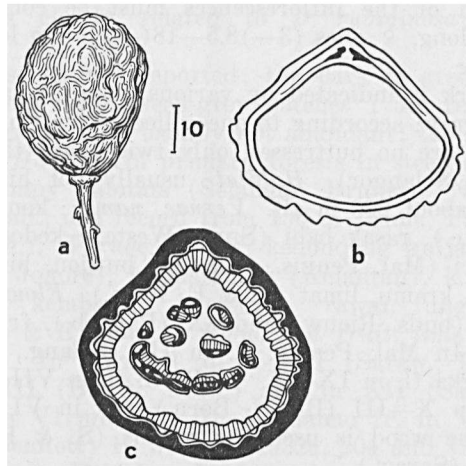


Fig. 2 — *Dacryodes expansa* (Ridley) H. J. Lam — a. fruit; b. idem, cross-section; c. petiole, cross-section. — dimensions in mm — a. and b. from *Symington 35518*, c. from *Haviland 2271*.

long to oblong-lanceolate, 17—29.5 cm long, 5.2—10 cm wide, base acute, apex rather shortly acuminate, petiolules with joints at both ends, 2.5—4 cm long, terminal ones 5—6.5 cm long, acumen 0.5—1.4 cm long; midrib not prominent above, prominent below, as are secondary nerves; secondary nerves 12—17 and some inconspicuous ones in apex, angle 50° — 60° , curved, not joined near margin; tertiary nerves irregularly transverse, not very conspicuous above, little prominent below; reticulation lax and faint. *In-florescences* (only ♂ ones known) lateral or on leafless lateral or axillary shoots with terminal buds, (5—)13—21 cm long, peduncle 0—5.5 cm long, lowest ramifications 2—11 cm long, glabrous, lax, paniculate. *Flowers* (only ♂ ones known) glabrous, 0.5 cm long. *Calyx* cupular, 0.2 cm long, segments broadly deltoid. *Petals* very thin, ovate oblong, broadly acute to subrounded and minutely inflexed at apex, 0.4—0.45 cm long. *Stamens* monodynamous, free outside the disc, 0.35 cm long, filaments subulate, anthers ovoid, somewhat shorter than filaments, 0.15 cm long. *Disc* thick and radially furrowed or more or less undulate, cupular or annular. *Ovarial rudiment* small,

slightly exsert from the disc, narrowly oblong, stigma with 3 minute lobes. *Infrutescence* (one seen) 27 cm long, glabrous, peduncle 7 cm long. *Fruit* (one seen) globoid-ellipsoid, slightly triangular in cross-section, 3.5 cm long, 3 cm in diam., style c. 45° excentric, coarsely wrinkled and pustulous when dry, pericarp 0.1—0.2 cm thick, putamen woody, 0.1—0.15 cm thick; fruit-stalk 0.5 cm long, 0.25 cm thick; fruiting calyx 0.6 cm in diam.

BORNEO. Sarawak, Kuching: *Haviland 2271* (K, SING), ♂ I, type of *Can. expansum* Ridl.; Brunei, Pengkalan Ran, Tutong River: *Symington 35518* (KEP), fr. VIII.

Remarks: The fruits are (according to Symington) "slightly oblique, purple when unripe, pericarp white, eaten". *Habitat:* Symington mentions as habitat: "Edge of rubber estate, said to be jungle tree." *Vernac. names:* sabal, sibut (Brunei). *Flow. and fruit. time:* flow. in I (Sar.), fr. in VIII (Brun.).

7. *D. breviracemosa* nov. spec. — *Fig. 3.*

Type specimen: *Carrier 53375* in KEP.

Distribution: one specimen, collected in Malay Peninsula (Tregganu).

Tree; branchlets ca 0.4 cm thick, ferruginous-tomentose at the extreme tips, as is the terminal bud, medulla without resiniferous ducts. *Leaves* 2½-jugate, glabrous; petioles flattened at base, 3—4.5 cm long, 0.15—0.2 cm wide at base, medulla with some resiniferous vascular bundles; interjugae 2—3 cm long; leaflets ovate-oblong, 7.5—11 cm long, 3.5—6 cm wide, base rounded and decurrent, apex gradually narrowed into a rather broad acumen, petiolules 1—1.6 cm long, terminal ones 2.5—3 cm long; nervation not prominent above, rather prominent below; secondary nerves 10—12, angle with midrib from ca 45° in apex to ca 75° at base, curved, not archingly joined near margin except in apex; tertiary nerves transversely reticulate. *Inflorescences* and *flowers* unknown. *Infrutescences* lateral, at the tips of branchlets, short, 3—6 cm long, peduncle 0.5—1 cm long, with 1—4 fruits. *Fruits* elliptic, stigmatic scar nearly apical, apex broadly acute, base rounded, 1.6—1.8 cm long, 0.9—1.1 cm in diam., pericarp and putamen rather thin, cotyledons palmate in the seed, contortuplicate?; fruiting calyx 0.35—0.4 cm in diam., with 3 deltoid lobes; disc under fruit annular, radially furrowed and undulated, remainders of filaments broadened at base and inserted outside disc, those of anthers lanceolate-ovate; fruit pedicel 0.3—0.4 cm long, 0.15—0.2 cm thick.

Descriptio typi: Ramuli apicem versus ferrugineo-tomentosi, medulla arecinosa. *Folia* 2½-jugata, glabra; petioli deplanati, 3—4.5 cm longi, basi 0.15—0.2 cm lati, medulla nonnullis fasciculis vasorum resiniferis suffulta; partes interjugales 2—3 cm longae; foliola ovato-oblonga, 7.5—11 cm longa, 3.5—6 cm lata, basi rotundata, apice gradatim angustata in acumen sublatum contracta, petioluli laterales 1—1.6 cm, terminales 2.5—3 cm longi; nervatio supra haud, subtus conspicue prominens; nervi secundarii 10—12, non arcuatim conjuncti, tertiarii reticulato-transversi. *Inflorescentiae* floresque ignoti. *Infrutescentiae* laterales, apice ramulorum versus confertae, breves, 3—6 cm longae, pedunculo 0.5—1 cm longo. *Fructus* ellipticus, 1.6—1.8 cm longus, 0.9—1.1 cm diam., styli rudimento vix excen-

trico, pericarpio putamineque tenuibus, cotyledones palmatae; calyx fructiger 0.35—0.4 em diam.; pedicelli 0.3—0.4 em longi, 0.15—0.2 em crassi.

MALAY PENINSULA. Tregganu, Dungun, Bukit Bauk: *Carrier 53375* (KEP), fr. X, *type*.

Remarks: Tree, ca 18 m high, slightly buttressed; bark mottled green and greyish-purple, smooth with numerous shallow depressions; natural

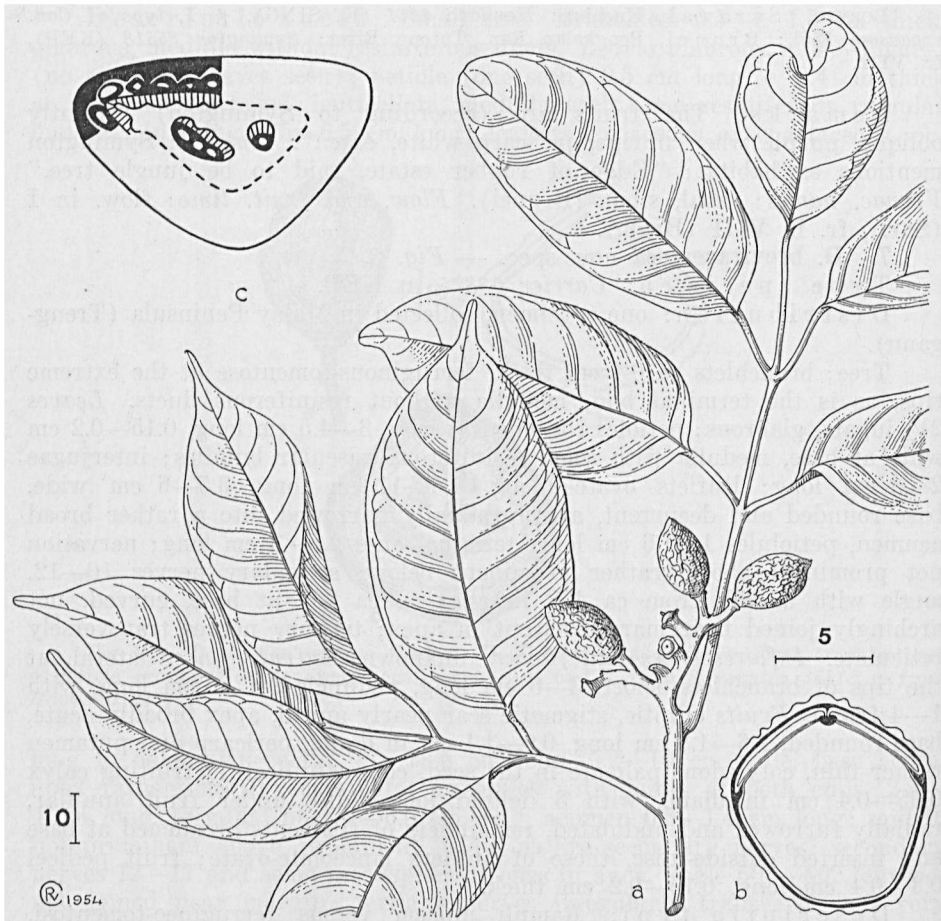


Fig. 3 — *Dacryodes brevicaemosa* Kalkman — a. branchlet with leaves and infructescences; b. fruit, cross-section; c. petiole, cross-section. — dimensions in mm — from the type.

size of fruits 2.5 by 1.2 cm, colour pinkish. *Habitat*: steep slope, alt. 30 m. *Vern. name*: kedondong (?).

8. *D. puberula* (Bennett) H. J. Lam, 1932a, 204 and 1932b, 354, fig. 14.

Type specimen and basonym: *Maingay 311/1534* (K), *type* of *Santiria puberula* Benn. in Hook., Fl. Brit. Ind. 1, 1875, 537.

Distribution: Malay Peninsula (Pahang, Negri Sembilan, Malacca, Singapore Island).

Trees. Branchlets slender, 0.2—0.3 cm thick, puberulous and glabrescent, medulla sclerenchymatic, without or with one resiniferous duct. Terminal bud rather long and narrow. *Leaves* 1½—4½-jugate; petioles slender, 2—6.5 cm long, flattened at base, striate, puberulent and glabrescent, medulla with one to some resiniferous vascular bundles; interjugae 1.5—4.5 cm long; leaflets thin, elliptic to ovate, 4.5—12.5 cm long, 2.5—6.5 cm wide, base usually very oblique, one half rounded to broadly acute, other half acute, apex gradually to subabruptly acuminate, acumen 0.2—1 cm long, petiolules 0.5—1.5 cm long, terminal ones 2.3—3.5 cm long, base of midrib somewhat pubescent on upper side, on lower side all nerves puberulous; venation hardly conspicuous above, midrib and secondary nerves prominent, tertiary nerves and reticulation conspicuous below; secondary nerves 7—11, angle 45°—80°, curved near the margin and diminishing, not joined but in the apex; tertiary nerves transversely reticulate. *Inflorescences* (only ♂ ones seen) axillary, puberulent and glabrescent, 3.5—12 cm long, peduncle 0—2.5 cm long, the few ramifications spreading and lax, 0.5—5 cm long. *Flowers* (only ♂ ones seen) 0.2 cm long and in diam., distinctly pedicelled; bracts minute, deciduous. *Calyx* pubescent without. *Petals* thin, sparsely pubescent without, with slightly thickened and inflexed apiculum, much exsert from calyx. *Stamens* inserted on or very near rim of disc, didynamous in bud, nearly monodynamous when adult, ca 0.15 cm long; filaments broadened at base, in bud shorter than anthers, longer than these when adult and then ca 0.1 cm long; anthers 0.05—0.075 cm long, elliptic. *Disc* with undulate rim. *Ovarial rudiment* small, not exsert from disc. *Infrutescences* axillary and lateral at tips of branchlets, 3—5 cm long, puberulous, peduncle 0—1.5 cm long. *Fruits* elliptic, ca 1.5 cm long and 0.9—1 cm in diam., style rudiment nearly apical, pericarp coarsely rugose when dry, putamen rather thick; fruiting pedicels 0.1—0.2 cm long, 0.1 cm thick, puberulous; fruiting calyx spreading, puberulous without.

MALAY PENINSULA. Pahang, Putat: *Baba 10800* (KEP); Negri Sembilan, Port Dickson, Sungei Mengala: *Wyatt-Smith 64498* and *64788* (KEP); Malacca, Selandar: *Alvins 529* (SING), fr. I; no loc.: *Maingay 311/1534* (K), ♂ XI, type; Singapore, Mac Ritchie Reservoir: *Corner 32536* (SING), ♂ XII.

Remarks: The specimen *Forbes 3093* from Sumatra, after which Lam's figure 14c has been drawn, belongs to *Santiria apiculata*.

Trees, 15—21 m high, with small buttresses and scaling bark, that is reported as smooth to rough, green and pale brown, orange pink under the scales (*Wyatt-Smith 64498*) or as yellowish mauve brown (*Wyatt-Smith 64788*); petioles and petiolules fawn brown; flowerbuds greenish. *Habitat*: Forest, at low altitudes. *Vern. names*: kedondong, k. krut. *Flow. and fruit. times*: Fl. in XI—XII, fr. in I. *Uses*: According to *Alvins 529* wood very hard and durable, used in house building.

9. *D. papuana* Husson in Husson & Lam, 1952b, 167, fig. 1.

Type specimen: *Brass & Versteegh 13535* (L).

Distribution: one specimen collected in West Central New Guinea.

Tree, 30 m high. Branchlets rather slender, smooth, 0.4—0.6 cm thick, medulla without resiniferous ducts. *Leaves* 2½-jugate (only one leaf seen); petioles slightly flattened at base, 5—5.5 cm long; interjugae 3.5—4 cm long, medulla without resiniferous ducts; leaflets elliptic, glabrous, sub-

coriaceous, 8.5—11.5 cm long, 4—5 cm wide, shining dark olive brown when dry, base little inequilaterally rounded, apex shortly acuminate, acumen 0.7—0.9 cm long, 0.4—0.5 cm wide, rounded, petiolules channeled, 1.5—2.2 cm long, terminal ones 1.7—3 cm long; midrib little prominent above, prominent below; secondary nerves 7—11, angle (40°—)50° (—70°), curved, not directly joined near the margin; tertiary nerves laxely reticulate, as conspicuous as the secondary ones; reticulation conspicuous. *Inflorescences* and *flowers* unknown. *Infrutescences* lateral, 11—12 cm long, with few fruits. *Fruits* ellipsoid, 2.7—3 cm long, 1.5 cm in diam., one-seeded, stigma apical, pericarp fleshy, putamen 0.03 cm thick, cotyledons contortuplicate in the seed; pedicel 0.7—1 cm long; fruiting calyx annular, 0.5 cm in diam.

NEW GUINEA. West Central New Guinea, Idenburg River, 2 km S.W. of Bernhard Camp: *Brass & Versteegh 13535* (L), fr. IV, alt. 650 m, occasional on slopes, primary forest, bark with some colourless resin, *type*.

10. *D. macrocarpa* (King) H. J. Lam, 1932a, 203 and 1932b, 342, fig. 10.

Misc. inform.: Hildebrand 1949b, f, h, 1950b; Sinia 1938, 92.

Type specimen and basonym: *King's coll. 7298* (K, dupl. in CAL, SING), *lectotype* of *Santiria macrocarpa* King, J. As. Soc. Beng. 62, 2, 1893, 256.

Distribution: Sumatra, Malay Peninsula, Lingga Archipelago, Borneo, Luzon.

Remarks: Trees of about 10—25 m high, buttressed. Flowers white to yellow, scarcely fragrant. Fruits yellowish white to pinkish. *Habitat*: at very low altitudes, sometimes in wet, swampy localities. *Vernac. names*: paoh-paoh (Brunei), madang lada, m. talsak (Brit. N. Born.). *Flow. and fruit. times*: In Sum. fr. in I (Palemb.). In Mal. Penins. fl. in IX (Joh.), fr. in XII and III (Perak.). In Born. fl. in X—XI (Sar.) and II (Brun.), fr. in X (Sar.) and II—IV (Brun., Br. N. Born., Saraw.). Var. *merrillii* fl. in III. *Uses*: wood used for sawn timber (*Cuadra A 1301*).

Var. *macrocarpa* — *D. macrocarpa* (King) H. J. Lam var. *genuina* H. J. Lam, 1932a, 203 and 1932b, 343.

Distribution: Sumatra, Malay Peninsula, Lingga Archipelago, Borneo.

SUMATRA. East coast, Selatpandjang, Penjengat: *NIFS bb. 21519* (L); Tapanuli, Sibolga District, Barus, Pondok Rotan: *NIFS bb. 29556* (L), young fr. X; *ibid.*, *NIFS bb. 29550* (L); Riouw and Dependencies, Indragiri, Belimbing: *NIFS bb. 28516*, *bb. 28544*, *bb. 28546*, *bb. 28566* (L).

MALAY PENINSULA. Perak, Larut: *King's coll. 7298* (CAL, K, SING), fr. III, *type* of *S. macrocarpa* King; Selangor, Sungai Buloh: *Synington 38128* (KEP); Johore, Mawai-Temaluang Road: *Corner 31949* (SING), ♂ IX; *ibid.*: *Corner 34910* (SING).

BORNEO. Sarawak, near Kuching: *Haviland & Ulat 1904* (K), ♀ & fr. X; Stampin: *Sow 368* (KEP), buds IX; Brunei, Seria-Penaga Road: *Flemmich 32613* (KEP), ♀ buds & fr. II; Anduki: *Abot 37143* (KEP), fr. IV; British North Borneo, Sandakan, Beaufort Lumat: *Cuadra A 1301* (KEP, L, SING), fr. III; *ibid.*: *Cuadra A 1303* (KEP, L), fr. III; South and East Borneo, Balikpapan, Sungai Wain: *Kostermans 4099* (L).

Var. *merrillii* H. J. Lam, 1932a, 203 and 1932b, 344.

Type specimen: *Alambra 27097* (US).

Distribution: one specimen collected in Luzon.

PHILIPPINES. Luzon, Camarines, Paracale: *Alambra 27097* (US), ♂ III, *type*.

11. *D. kostermansii* nov. spec. — Fig. 4.

Type specimen: *Kostermans 6725* in L.

Distribution: S. & E. Borneo.

Tree; branchlets 0.5–0.7 cm thick, glabrous, with rather large and prominent lenticels, medulla without resiniferous ducts. Leaves 2½–3½-jugate; petioles flattened at base, 4.5–7.5 cm long, 0.3–0.5 cm wide at base, glabrous, medulla with some resiniferous vascular bundles; interjugae puberulous to glabrous, 2.5–5 cm long; leaflets ovate to broadly ovate (apical leaflet often obovate), (7–)11–16 cm long, (5–)6–8.5(–12) cm

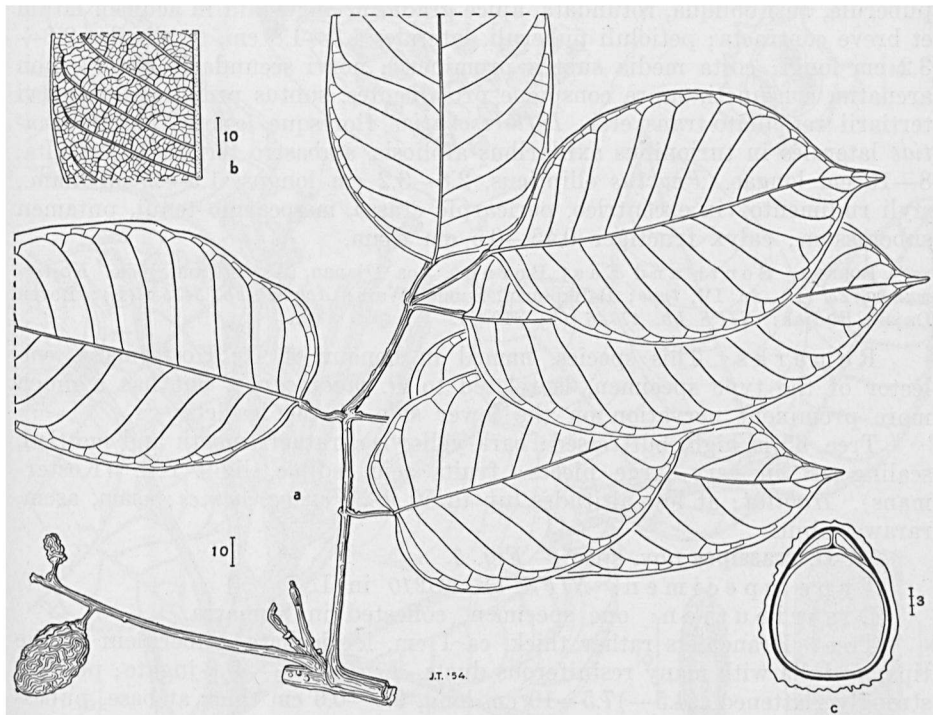


Fig. 4 — *Dacryodes kostermansii* Kalkman — a. branchlet showing leaf and infructescence; b. part of leaflet; c. fruit, cross-section. — dimensions in mm — from the type.

wide, glabrous save sometimes a very slight pubescence on midrib below, base oblique, rounded and decurrent, one half sometimes broadly acute, apex gradually narrowed into a broad and short acumen; petioles puberulous to glabrous, 0.8–1.8 cm long, terminal ones 2.2–4 cm long; midrib prominent, especially below; secondary nerves (8–)10–14, conspicuous above, prominent below, angle with midrib from ca 75° at base to ca 60° in apex, curved near margin, not directly archingly joined except in apex; tertiary nerves transversely reticulate near margin, parallel with secondary nerves near midrib, conspicuous above, rather prominent below. *Inflorescences* and *flowers* unknown. *Infrutescences* lateral on leafless axillary shoots (with terminal bud), 8–10 cm long, puberulous to glabrous. *Fruits* elliptic,

2.8—3.2 cm long, 1.6—2 cm in diam., stigmatic scar nearly apical, base rounded, apex acute, pericarp thick, mesocarpal layer thin, putamen rather thick, embryo unknown; fruiting calyx truncate, 0.45—0.5 cm in diam., glabrous.

Descriptio typi: Arbor; ramuli glabri, medulla aresinosa. *Folia* 3½-jugata; petioli valde deplanati, 5—7.5 cm longi, basi 0.4—0.5 cm lati, glabri, medulla nonnullis fasciculis vasorum resiniferis suffulta; partes interjugales 2.5—5 cm longae, puberulentes vel glabrae; foliola ovata, (9—) 13—16 cm longa, (5—) 6—8.5 cm lata, supra glabra, subtus costa media puberula, basi obliqua, rotundata, apice gradatim angustata in acumen latum et breve contracta; petioluli puberuli, laterales 1.3—1.8 cm, terminales 2.8—3.2 cm longi; costa media subtus prominens; nervi secundarii 10—14, non arcuatim conjuncti, supra conspicue prominentes, subtus prominentes; nervi tertiarii reticulato-transversi. *Inflorescentiae* floresque ignoti. *Infrutescentiae* laterales in turionibus axillaribus afoliosis, alabastro terminale suffulta, 8—10 cm longae. *Fructus* ellipticus, 2.8—3.2 cm longus, 1.6—2 cm diam., styli rudimento vix excentrico, pericarpio crasso, mesocarpio tenui, putamen suberassum; calyx fructiger 0.45—0.5 cm diam.

BORNEO. South and East Borneo, Loa Djanan, W. of Samarinda: *Kostermans 6725* (L), fr. IV, type; Balikpapan, Sungai Wain: *Achmat bb. 34358* (L); Boven Dajak, Rudjak: *NIFS bb. 27746* (L, SING).

Remarks: This species, named in honour of Dr Kostermans, collector of the type specimen, is related to *D. macrocarpa*, but has a much more prominent nervation on the lower side of the leaflets.

Tree, 35 m high, buttressed; bark yellowish, rather smooth and mottled, scaling off in very large pieces; fruits acid, edible, light red. (Kostermans). *Habitat:* at low altitudes, up to 50 m. *Vernac. names:* asam, asem, rarawa pipit.

12. *D. crassipes* nov. spec — Fig. 5.

Type specimen: *NIFS bb. 25210* in L.

Distribution: one specimen, collected in Sumatra.

Tree? Branchlets rather thick, ca 1 cm, lenticellate, puberulent at the tips, medulla with many resiniferous ducts. *Leaves* 3½—4½-jugate; petioles strongly flattened, (4.5—) 7.5—10 cm long, 0.5—0.6 cm thick at base, pubescent, medulla with many resiniferous vascular bundles; interjugae 2—3.7 cm long; leaflets ovate, 5—12.5 cm long, 3—6.3 cm wide, glabrous, thick coriaceous, olive green when dry, base rounded to subcordate (terminal leaflet broadly acute), apex rather abruptly acuminate, acumen 0.3—1 cm long, petiolules pubescent, 0.4—1 cm, terminal ones 1.5—2.4 cm long; midrib not very prominent above, prominent below; secondary nerves 10—13, hardly prominent above, prominent below, straight almost up to margin, then curved and not archingly joined but by strong tertiary nerves; tertiary nerves reticulate, usually a stronger and parallel one between two secondary nerves, reaching halfway up margin or more, conspicuous above, rather prominent below, as is reticulation. *Inflorescences* and *flowers* unknown. *Infrutescences* lateral, conferted at tips of branchlets (terminal bud extant), stout, 7.5—10 cm long, peduncle about half the length of the whole infrutescence, hardly branched, pubescent, angular when dry. *Fruits* only known with galls or sterile; fruiting calyx cupular with three faint lobes,

hardly broader than the pedicel, c. 0.5 cm in diam.; fruit stalks 0.4—0.5 cm long, 0.4 cm thick, pubescent; *disc* under the fruit cupular; remainders of the six *stamens* inserted outside the disc, filaments broadened; *petals* (only one seen under the fruit) pubescent without.

Descriptio typi: Arbor? Ramuli subcrassi (1 cm), medulla multis ductis resiniferis percursa. *Folia* 3½—4½-jugata; petioli valde deplanati, (4.5—)7.5—10 cm longi, medulla multis ductis resiniferis percursa;

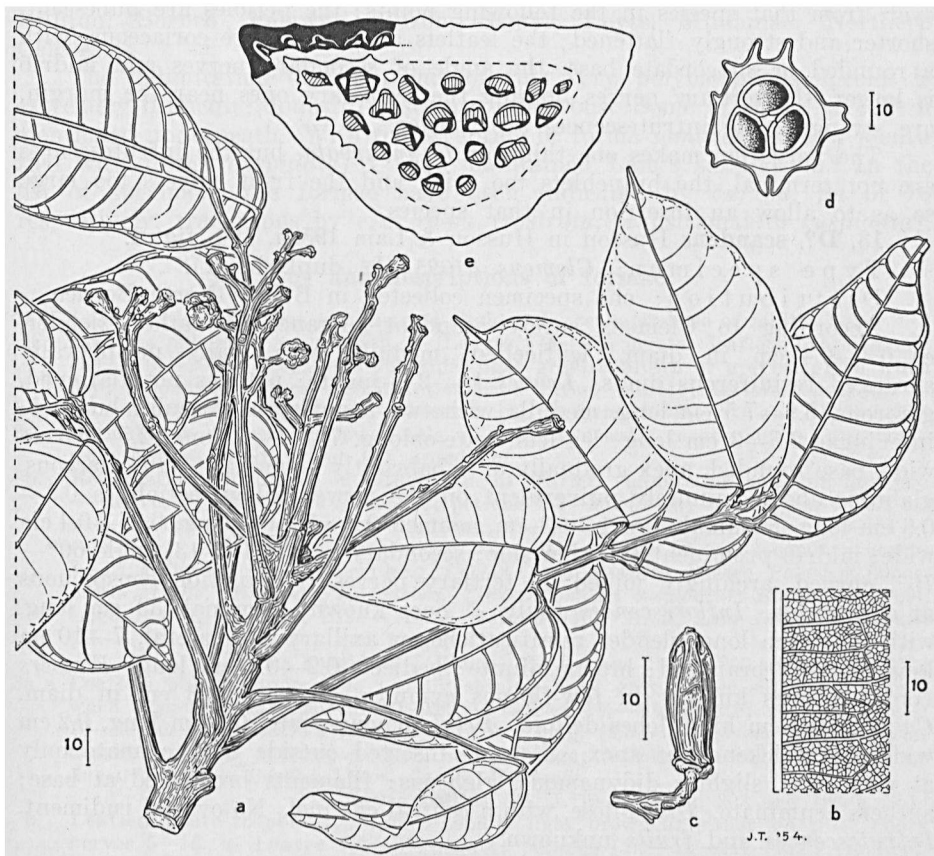


Fig. 5 — *Dacryodes crassipes* Kalkman — a. branchlet with leaves and infructescences (with galls); b. part of a leaflet, showing venation; c. fruit; d. idem, cross-section; e. petiole, cross-section. — dimensions in mm — from the type.

partes interjugales 2—3.7 cm longae; foliola ovata, 5—12.5 × 3—6.3 cm, glabra, rigido-coriacea, basi rotundata ad subcordata (in foliolo terminali acuta), apice subabrupte acuminata; petioluli pubescentes, laterales 0.4—1, terminales 1.5—2.4 cm longi; costa supra paulo, subtus conspicue prominens; nervi secundarii 10—13 subtus prominentes, tertiarii reticulati. *Inflorescentiae* floresque ignoti. *Infrutescentiae* laterales, apices ramulorum versus confertae (gemma vegetativa terminale conspicua), robustae, 7.5—10 cm longae, pedunculo circiter dimidio brevior vix ramosae. *Fructus* (sterilis

vel deformati) calyx subtrilobatus, circ. 0.5 cm diam., pedicelli 0.4—0.5 cm longi, discus cupularis, staminum 6 rudimenta extra discum inserta.

SUMATRA. Riouw and Dependencies, Kuantan Districts, Tjerenti: *NIFS* bb. 25210 (L), fr. VIII, alt. 50 m, *type*.

Remarks: Though this specimen possesses only sterile fruits, it is probably to be identified as a *Dacryodes*. The infrutescences are exactly like those of *D. rostrata*, particularly forma *cuspidata*. It differs, however, from that species in the following points: the petioles are pubescent, shorter and strongly flattened; the leaflets are much more coriaceous, with a rounded or subcordate base, the angle of secondary nerves and midrib is larger, the tertiary nerves, joining the secondary ones near the margin, are stronger; the infrutescences are shorter.

The nervation makes one think of *D. incurvata*, but the infrutescences are not terminal, the branchlets too thick and the fruit calyces too large so as to allow an insertion in that species.

13. *D?*. *scandens* Husson in Husson & Lam 1952a, 164, fig. 1.

Type specimen: *Clemens 31095* (L, dupl. in K).

Distribution: one specimen collected in British North Borneo.

According to Clemens surely scandent. Branchlets rather slender, c. 0.3—0.4 cm in diam., lenticelled, medulla with many peripherally arranged resiniferous ducts. Leaves $\frac{1}{2}$ — $2\frac{1}{2}$ -jugate; petioles not flattened, glabrous, 5.9—7.5 cm long, medulla with two resiniferous vascular bundles; interjugae 2.5—3 cm long; leaflets ovate-oblong, 7—14 cm long, 2.5—6.5 cm wide, base rounded, apex gradually or subabruptly acuminate, subcoriaceous, glabrous above, minutely pulverulent on the nerves below, petiolules 0.3—0.6 cm long, terminal ones 1.3—3 cm, acumen 0.5—1.2 cm long, 0.15—0.4 cm wide; midrib prominent at either side; secondary nerves 10—13, angle 60° — 70° , curved, archingly joined by tertiary nerves; reticulation conspicuous at either side. Inflorescences (only σ ones known) terminal, 33 cm long, with 8—15 cm long, slender ramifications, or axillary and lateral, 7—10 cm long and not branched; bracts minute; pedicels 0.2—0.5 cm long. Flowers (only σ ones known) in few-florous cymules, glabrous, 0.3 cm in diam. Calyx c. 0.2 cm high, lobes deltoid. Petals oblong-ovate, 0.3 cm long, 0.2 cm wide, not thickened at apex. Stamens inserted outside disc, connate only at very base, slightly didynamous, glabrous; filaments broadened at base; anthers acuminate. Disc pilose, with a central channel. No ovarial rudiment. Infrutescences and fruits unknown.

BORNEO. British North Borneo, Mount Kinabalu, Penibukan: *Clemens 31095* (K, L), σ I, alt. 1200—1500 m, by trail, on ridge, *type*.

Remarks: Although my opinion could not be based on fruit-characters, I am inclined to believe that this specimen is not a *Dacryodes*, but a *Canarium* (group of *C. pilosum*). The flower is not *Dacryodes*-like: pilose disc with central channel, slightly connate filaments (Husson's description mentions "stamina libra", the figure is correct). A decision must be postponed until the intended revision of *Canarium* has been completed.

For the comparison with *D. rugosa* var. *virgata* in Husson & Lam 1952a, 165, see the remarks to that variety.

14. *D. rostrata* (Blume) H. J. Lam, 1932a, 203 and 1932b, 349, fig. 13; Cretzoiu 1934, 265; Lam 1938, 156; Lam 1945, 610.

Misc. inform.: Burkill 1935, 430 (sub *Canarium kadondon* Benn.); Hildebrand 1949a, b, c, e, f, g, h, i, 1950a, b, 1951a, 1952a, b, c, e; Pref. names 1952; Sinia 1938, 69—102; Webber 1941, 441—465.

Type specimen and basonym: *Korthals s.n.* (L, nr 898.321—228), type of *Santiria rostrata* Blume, Mus. bot. Lugd.-Bat. 1, 14, 1850, 213.

Distribution: Cochin China, Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Palawan, Luzon, Samar, Leyte, Mindanao, Northern Celebes.

The delimitation of the forms of this very polymorphous species is extremely difficult: doubtful cases are numerous. Some of these have been mentioned underneath. With the exception of forma *samarensis* (now identified with forma *cuspidata*) I have maintained Lam's subdivision. In the list of specimens the formae have been indicated by *cu*, *pa*, *pu* or *ro* respectively, transitions by e. g. *ro-cu* (*rostrata*, transitional to *cuspidata*).

Key and descriptions of formae:

- 1a. Leaflets glabrous, save sometimes a slight pubescence at base of midrib below 2
 b. Leaflets pubescent underneath. — Leaves $7\frac{1}{2}$ — $9\frac{1}{2}$ -jugate; leaflets ovate-oblong, (5.5—)10—20 cm long, 3—8 cm wide, light greyish brown or greyish green when dry; secondary nerves 8—15; reticulation rather minute; inflorescences up to 33 cm long. *Borneo* forma *pubescens* [H. J. Lam, 1932a, 203 and 1932b, 351]
- 2a. Reticulation minute, on lower side of leaflets usually inconspicuous, sometimes more or less distinct, but not prominent 3
 b. Reticulation prominent on either side of leaflets, minute or more or less lax. — Leaves $3\frac{1}{2}$ — $8\frac{1}{2}$ (— $10\frac{1}{2}$)-jugate; petioles 8.5—20.5(—26) cm long, up to 0.8 cm wide at base; leaflets ovate to oblong, (7—)10—20(—22) cm long, (2.5—)4—7(—8.5) cm wide, brownish when dry, sometimes greyish above; secondary nerves 8—15; inflorescences 9—26 cm long. *Cochin China, Sumatra, Borneo, Palawan, Luzon, Samar, Leyte, Mindanao, N. Celebes.* (*Dracontomelon cuspidatum* Blume, Mus. bot. Lugd.-Bat. I, 14, 1850, 232 — *Dacr. rostrata* (Bl.) H. J. Lam forma *samarensis* [H. J. Lam, 1932a, 203 and 1932b, 351])
 forma *cuspidata* [(Blume) H. J. Lam, 1932a, 203 and 1932b, 351]
- 3a. Leaflets oblong, upper side usually shining light grey, lower side light brown when dry; secondary nerves 10—20. — Leaves $4\frac{1}{2}$ — $9\frac{1}{2}$ -jugate; petioles (8.5—)10—20 cm long; leaflets (5.5—)7—17.5 cm long, (2.5—)3—6.5 cm wide, margins usually reflexed, forming a stiff, narrow ridge; inflorescences 15—30 cm long. *Sumatra, Banka, Borneo, Luzon, Samar, Mindanao*
 forma *pallida* [H. J. Lam, 1932a, 203 and 1932b, 351]
- b. Leaflets ovate to oblong, in sicco usually light brown at either side; secondary nerves 5—12. — Leaves $2\frac{1}{2}$ — $6\frac{1}{2}$ -jugate; petioles (2.5—)4—14(—18.5) cm long; leaflets (3.5—)5—15(—21) cm long, (1.5—)2.5—7(—9) cm wide; inflorescences (1.5—)5—20(—35) cm long. *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo.* (*D. rostrata* (Blume) H. J. Lam forma *genuina* [H. J. Lam, 1932a, 203 and 1932b, 351])
 forma *rostrata*

COCHIN CHINA. Bienhoa, Trang-Bom: *Fleury 30085* (P), fr. III, *cu*; Southern Cochinchina, Chiaoohan: *Pierre 4260* (P), *cu*.

SUMATRA. Tapanuli, Sibolga, Kualagarigi, P. Punei: *NIFS bb. 19286* (BO), *cu*; *ibid.*; Sibung-Sibung: *NIFS bb. 19351* (BO, L), *cu*; *ibid.*, P. Punei: *NIFS bb. 19656* (BO, L), *cu*; Westcoast, Mentawai Islands, P. Siberut, Sibaguana: *NIFS bb. 17465* (L), *cu*; Riouw and Dependencies, Indragiri, Muara Serangge: *NIFS bb. 30099* (L), *ro*; Palembang, Lematang Ilir: *NIFS T 352* (L), § X, lectotype of forma *pallida* H. J. Lam; *ibid.*, Semangus: *NIFS bb. 31695* (L), *bb. 32061* (L) and *bb. 32135* (BO), *pa*; *ibid.*: *NIFS bb. 31993* (L), *pa-cu*; no loc.: *Praetorius s.n.* (L, nr 897.363—272), *cu*, cf. Remarks; Sumatra, without loc.: *Korthals s.n.* (L, nr 897.363—271), *cu*,

cf. Remarks; *ibid.*: *Teysmann s.n.* = 4278? (W), fr., ro; *ibid.*: *Praetorius s.n.* (L, nr 898.321—210), ro.

MALAY PENINSULA. Langkawi Isl., Gunung Raya: *Rahim 12368* (KEP), young fr. IV, ro; Kedah, Baling, Lubok Che Mann: *Meh 17754* (KEP), ro; Bukit Malut: *Rahim 12428* (KEP), fr. IV, ro; Peranginan: *Awang 31321* (KEP), ro; P. Penang, Penang Hill: *Nauen 35846* (SING), fr. VII, ro; *ibid.*: *Nauen s.n.* (SING), fr. IX, ro; Ayer Etam: *Curtis 495* (CAL), young fr. XI, ro; Waterfall: *Curtis 1433* (SING), ro; no loc.: *Cantleys coll. 2585* (SING), young fr., ro; Perak, Larut: *King's coll. 6707* (CAL, FI), ro; *ibid.*: *King's coll. 7577* (A, CAL, DD, E, FI, G), young fr. V, ro; *ibid.*: *King's coll. 7611* (CAL, DD, MEL), fr. V, ro; Banks of Bernam river: *King's coll. 8801* (CAL, G, L, Z), IV, ro; Upper Perak: *Wray 3392* (CAL), cu-ro; Pahang, Rotan Tunggal: *Brown 29377* (KEP), ro; Putat: *Baba 10788* (KEP), ro; Kemaman, Bukit Kajang: *Corner s.n.* (SING), sapling, ro; Malacca, Bukit Minyak: *J. S. G(oodenough) 1469* (BM, CAL, G), fr. ro; Johore, Sedili river below Mawai: *Corner 36970* (KEP), fr. VII, ro; Sungei Sedili: *Ngadiman 36858* (K, SING) and *36867* (SING), fr. VII, ro; Singapore Isl., Bukit Mandi: *Langlassé 136* (G, P), fr. VIII, ro; Bukit Timah: *Ngadiman 37038* (KEP), fr. VI, ro; *ibid.*: *Ngadiman 37704* (K, SING), fr. V, ro; *ibid.*: *Ngadiman 34686, 36458* and *36484* (SING), ro; *ibid.*: *Sinclair s.n.* (L), young stage, form doubtful; Mandai road: *Liew 37743* (K, SING), fr. VIII, ro; Tanglin: *Ridley 6360a* (W), fr., ro-cu.

BANGKA. Lobok Besar: *Anta 844* (BO, L, SING) and *497* (BO, L), ♂ IX, ro; *ibid.*, G. Pading: *Anta 988* (BO, L, SING), ♂ IX, pa; Perlang: *NIFS bb. 34033* (BO, L), ♂ IX, ro; *ibid.*: *NIFS bb. 34118* (BO, L), pa.

BORNEO. West Borneo, Melawi, Klepuk, B. Djangung: *NIFS bb. 29080* (L), ♂ VIII, pa; Melawi, B. Wata, Emang: *NIFS bb. 26861* (L), pa; Melawi, Bora, B. Guris: *NIFS bb. 29035* (L), pa; Brunei, B. Ratan: *Flemmich 43125* (KEP), fr. VII, cu; *ibid.*: *Flemmich 34438* (KEP), ♂ IV, cu; Ulu Belait: *Smith 30431* (KEP), fr. VIII, ro; B. Sawat: *Flemmich 34504* (KEP), young fr. V, ro; Berakas, Lambak: *Olds s.n.* (SING), ♂ and fr. V, pu; Labuan: *Apostol 44236* = *S. H. 7684* (KEP, L, SING), fr. VII, cu; British North Borneo, Sandakan, Elopura, Kabili-Sepilok: *Enggoh 10551* (KEP, L), fr. VIII, ro; *ibid.*: *Matusop 41546* = *S. H. 7429* (KEP, L, SING), fr. VII, ro; *ibid.*: *Puasa 7034* (K, SING), fr. III, ro; *ibid.*, Kretam: *Ping Sam S. H. 4 1878* (L), ♂ V, cu; Eastcoast: *Creagh s.n.* (K), young fr., ro; Tawau, Penayas: *Otik 5238* (SING), fr. VII, ro; South and East Borneo, Tidung e.a., Nunukan: *NIFS bb. 19784* (K, L), young fr. V, ro; Upper Mahakan, Lumpoko: *NIFS bb. 20662* (BO, L), pa; G. Sakumbang: *Korthals s.n.* (L, nr. 898.321—228), ro, type of *S. rostrata* Bl.; East Kutai: *NIFS bb. 14783* (L), pa-cu; *ibid.*: *NIFS bb. 15178* (L), lectotype of forma pubescens H. J. Lam; Balikpapan, Selimbang: *NIFS bb. 26379* (L, SING), ro-pa; *ibid.*, S. Nikai: *NIFS bb. 25631* (L), cu; *ibid.*, Pemaluan: *NIFS bb. 24737* (L), pa; Berouw, Betemu aer: *NIFS bb. 18928* (BO, L), cu; Tdg Bangko, near mouth of Mahakam river: *Kostermans 7127* (L), fr. VI, pa; *ibid.*, *Kostermans 7113* (L), fr. V, ro; Loa Djanan, W. of Samarinda: *Kostermans 6526* (L), young fr. IV, pa; Pulu Laut & Tanah Bumbu, Sehlimbangan: *NIFS bb. 31192* (L), cu-pa; Borneo, without loc.: *Korthals s.n.* (L, nr 897.363—270), type of *Dracontomelon cuspidatum* Blume, cf. Remarks.

PHILIPPINES. Samar, Concord, Bagacay: *Sulit 6339* (L), pa; Mindanao, Surigao: *Ponce 22327* (K, US), fr. VIII, cu; Davao: *De Mesa 27463* (A, P, US), young fr. III—VI, pa.

Remarks: The type of *Dracontomelon cuspidatum* Bl. bears on one sheet the locality "Borneo" (897.263—270), on the other "Sumatra" (897.363—271). Probably both are from Sumatra, Palembang, collected by Praetorius and belonging to *Praetorius s.n.* (897.363—272), on the label of which the printed words "Borneo" and "Korthals" are scratched out and substituted by "Sumatra" and "Praetorius"; it is assumed that on the two other specimens application of the same procedure was neglected.

The petioles and petiolules are brown (*Corner s.n.*, *Ngadiman 34686*). Vernac. names: simalang (Sum., Tapan.), mansipot (Langkawi Isl.), epie, dumar bekam (Mal. Penins., Kedah), rengas burung, r. putih (Bangka), kebyan burong, k. ayer (Brun.), salong banggi (Labuan), peninasan,

piramuh, kumabang (Br. N. Born.), njihah (S. & E. Born.). *Flow. and fruit. times*: In Sum. fl. in II (Eastc.) and VII—VIII (Simalur, Palemb.), fr. in I—III (Palemb.). In Mal. Penins. fl. in IV (Perak, Malacca), fr. in IV—VIII. In Bangka fl. in IX. In Born. fl. in IV—V (Brun., Br. N. Born.), VII (Saraw.), X (S. & E. Born.), between X—III (Br. N. Born.), fr. in VII—VIII (Br. N. Born., Brun., Labuan), XII—II (Saraw.), III (Br. N. Born.). In Palawan fr. in IV. In Samar fl. in IV. In Mindanao fr. in VIII. In Celebes fr. in VI. *Uses*: fruits edible; wood used for planks, for paddy-pounders; resin used for making torches (Labuan).

15. **D. floribunda** (King) H. J. Lam, 1932a, 204 and 1932b, 357, fig. 16.

Misc. inform.: Henderson 1939, 39; Husson & Lam 1952a, 167.

Type specimen and basonym: *King's coll. 7510* (dupl. in L), lectotype of *Santiria floribunda* King, J. As. Soc. Beng. 62, 2, 1893, 254.

Distribution: Malay Peninsula (endemic).

MALAY PENINSULA. Perak, Larut, G. Pondok: *King's coll. 7510* (L), ♂ IV, isotype of *S. floribunda* King; *ibid.*: Henderson 23300 (SING) young fr. VI; Ulu Sungei Kinta: *Sow 47268* (KEP), fr. VI; Kelantan, Lebir, *Browne 38485* (KEP).

Remarks: Leaves said to be used for atap (roofing).

16. **D. elmeri** H. J. Lam, 1932a, 203 and 1932b, 344, fig. 11.

Type specimen: *Elmer 21573* (L, dupl. in A, BISH, BM).

Distribution: one specimen collected in British North Borneo.

Tree, trunk 0.75 m in diameter. Branchlets rather thick, c. 1 cm, sulcate, densely minutely villose, medulla with many resiniferous ducts. Terminal bud densely pubescent, 1.5 cm long, 1 cm in diameter. *Leaves* 3½—4½-jugate; petioles strongly flattened at base, 9—14.5 cm long, 0.7—0.8 cm thick at base, puberulent and glabrescent, medulla with many resiniferous vascular bundles; interjugae 4.5—6 cm long; leaflets oblong, 12—22 cm long, 5—8.5 cm wide, base inaequilateral, acute or one half rounded, apex abruptly acuminate, petiolules 0.9—1.9 cm long, terminal ones 3.4—4.3 cm long, acumen 0.7—1.5 cm long, 0.15—0.25 cm wide; midrib prominent at either side, especially below; secondary nerves 13—18, not prominent above, prominent below, angle 60°—75°, curved, diminishing, archingly joined near margin in base and apex only; tertiary nerves transverse, prominent below, conspicuous above, as is the lax reticulation. *In-florescences* and *flowers* unknown. *Infrutescences* puberulent, axillary, paniculate, 17—45 cm long, peduncle 0.7—2 cm long, 0.3—0.4 cm thick (deser. infrut. and peduncle, f. Lam). *Fruits* ovoid, glabrous, 4.1—4.7 cm long, 2—2.4 cm in diam., base rounded, apex subrounded, pericarp thin, putamen crustaceous, c. 0.05 cm thick, cotyledons palmatifid, contortuplicate; fruiting calyx 0.55—0.6 cm in diam., annular; fruit stalks 0.5—1.6 cm long, 0.3—0.45 cm thick.

BORNEO. British North Borneo, Tawao, prov. Elphinstone: *Elmer 21573* (A, BISH, BM, L), fr. X—III, type.

17. **D. rubiginosa** H. J. Lam, 1932a, 204 and 1932b, 361, fig. 18. — *Canarium rubiginosum* Bennett in Hooker f., Fl. Brit. Ind. 1, 1875, 535 (illeg. name), non *Canarium rubiginosum* (Blume) Miquel, Fl. Ned. Ind. 1, 2, 1859, 651.

Misc. inform.: Hildebrand 1949b, 1952a, b, e.

Type specimen: *Maingay 309* in K, dupl. in CAL and L.

Distribution: Malay Peninsula, Borneo (West Born., S. & E. Born.).

MALAY PENINSULA. Perak, Kinta: *D. F. O. 54680* and *54842* (KEP); Pahang, Kemansul: *Ahamed 40410* (KEP, L), young fr. X; Malacca, no loc.: *Maingay 309* (CAL, L), ♂ and fr., *isotypes*; Johore, North Kelunag: *Jalil bin Rahman 73001* (KEP).

BORNEO. West Borneo, Melawi, Watas Emang, near Betung: *NIFS bb. 26870* (L); Smitau, Na. Bungkung, B. Saguk: *NIFS bb. 32290* (A, L, SING), young fr. V; South and East Borneo, Berouw, Betemu aer: *NIFS bb. 18947* (A, BO, L); Loa Djanan, W. of Samarinda: *Kostermans 6384* (L), ♂ IV; Balikpapan, Sungei Wain: *Achmat bb. 34364* (L).

Remarks: This species is closely related to *D. incurvata*, the differences being the dense pubescence of branchlets, inflorescences and infrutescences, the pubescence of the lower side of the leaflets, and the broader and less slender infrutescences in *D. rubiginosa*.

The name *Canarium rubiginosum* Bennett being illegitimate, the author of the species is "H. J. Lam", not "(Bennett) H. J. Lam" (Int. Code of Bot. Nomencl. 1952, art. 81).

Habitat: at low altitudes, highest record 175 m (W. Born.).

Doubtful species.

18. *Dacryodes?* spec. — Husson & Lam 1952b, 168.

I did not see the specimen [*Clemens 1837* from North East New Guinea (A, B)], upon which Husson & Lam based their description.

IX. SANTIRIA Blume (and a new combination in PROTIUM).

Santiria Blume, Mus. bot. Lugd.-Bat. I, 14, 1850, 209; Lam 1932b, 367—404; Lam 1938, 126—157. — Type species: *S. oblongifolia* Blume — Distribution: About 23 species in tropical Africa and Asia.

Section SANTIRIA — *Eusantiria* Engler in DC, Mon. Phan. 4, 1883, 157; Lam 1932b, 368. — Distribution: 14 species in Sumatra, Malay Peninsula (1 end.), Bangka, Billiton, Borneo (5 end.), Luzon, Celebes, Morotai, Ceram and Ambon. — Fig. 6.

Section ICICOPSIS Bennett in Hooker f., Fl. Brit. Ind. I, 1875, 536 — *Trigonochlamys* Hooker f., Trans. Linn. Soc. 23, 1, 1860, 170 (as a genus); Lam 1932a, 206; Lam 1932b, 368 (as a section). — Type species: *S. rubiginosa* Blume — Distribution: 3 species in Sumatra, Malay Peninsula, Bangka, Billiton, Borneo and New Guinea. — Fig. 6.

Section SANTIRIOPSIS (Engler) H. J. Lam, 1932a, 204; Engler, Bot. Jahrb. 11, 1890, Beibl. 26, 6 (as a genus); Lam 1932b, 368. — Type species: *S. balsamifera* Oliver ex Engler — Distribution: About 6 species in tropical West Africa.

Key to the species of the sections Santiria and Icicopsis.

- 1a. Anthers basi- to dorsifix. — Tertiary nerves usually transversely reticulate; inflorescences pedunculate or branched from base; calyx sometimes deeply lobed, but usually with short lobes, sometimes more or less truncate; stamens inserted outside or on rim of disc, always 6; receptacle none; stigmatic scar on fruits from near apex to near base (Section **Santiria**) 2
- b. Anthers adnate. — Tertiary nerves more or less longitudinally reticulate; inflorescences branched from base or with short peduncle; calyx-lobes nearly free; stamens inserted on margin of disc, 6 (*griffithii*) or 3 episepalous (*nana*,

rubiginosa), sometimes with rudiments of epipetalous ones (*rubiginosa*); receptacle sometimes developed; stigma of fruits less than 90° excentric
(Sectio *Icicopsis*) 23

- 2a. Lower side of adult leaflets densely woolly pubescent 3
- b. Lower side of adult leaflets glabrous, or slightly pubescent on midrib or nerves only 9
- 3a. Petioles flattened or channeled at base; terminal bud long and narrow, (0.5—) 1—3 cm long 4
- b. Petioles not or hardly flattened; terminal bud small, 0.3—1 cm long, narrow or broad 6
- 4a. Flowers (♀) 0.45 cm long, with deeply indented calyx, sepals 0.25—0.3 cm long; petals 0.3—0.35 cm long. — Petioles deeply channeled, rims of groove curved inward. — *Borneo* 1. *S. grandiflora* Kalkman
- b. Flowers smaller, 0.2—0.4 cm long; calyx subtruncate, lobes not longer than 0.1 cm; petals 0.2—0.25 cm long. — Petioles sharply flattened or channeled 5

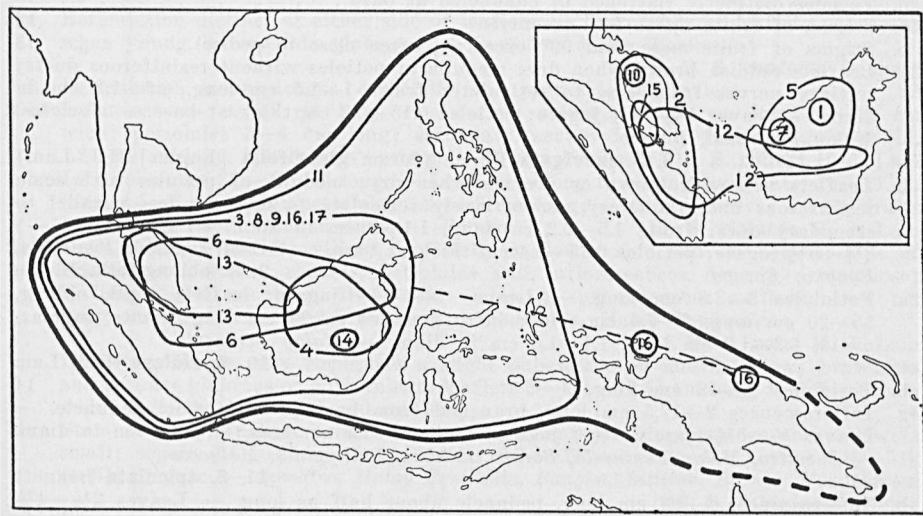


Fig. 6 — Distribution of the Malaysian species of *Santiria* — numbers refer to the number of the species in the present paper.

- 5a. Stigma of fruit very excentric, near pedicel. — Leaflets shining and with lax and very distinct reticulation on upper side, lower side densely ferruginously pubescent when young, hairs branched or fascicled, afterwards glabrate. — *Sumatra, Malay Peninsula* 2. *S. conferta* Bennett
- b. Stigma of fruit slightly excentric, less than 90°. — Leaflets with minute, conspicuous but not prominent reticulation above, lower side densely woolly pubescent, hairs simple. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo* 3. *S. tomentosa* Blume
- 6a. Branchlets with many prominent, ferruginous lenticels and many resiniferous ducts in medulla; sepals nearly free, densely tomentose on either side, 0.15—0.25 cm long. — Petioles 5.5—8 cm long; leaflets oblong to ovate, 5.5—14.5 cm long, 3—4.5 cm wide; ♂ inflorescences (♀ ones unknown) lateral, conferted at tips of branchlets, up to 23 cm long. — *Borneo* 4. *S. mollis* Engler
- b. Branchlets without resiniferous ducts in medulla, lenticels not very prominent, not ferruginous; calyx truncate or subtruncate 7
- 7a. Stigma of fruit near pedicel; leaflets gradually narrowing into a relatively broad acumen. — Petioles 2.5—9.5 cm long; leaflets 7—19.5 cm long, 2.5—9.5 cm wide; inflorescences axillary, 5—20 cm long; ♂ flowers 0.25 cm long, glabrous but for some hairs on sepals and keel of petals; petals deltoid with narrowed base. — *Borneo* 5. *S. pilosa* Engler

- b. Stigma of fruits less than 90° excentric; leaflets rather abruptly acuminate, acumen relatively narrow 8
- 8a. Branchlets 0.25—0.6 cm thick; leaves ½—2½-jugate; fruits oblong. — *Sumatra, Malay Peninsula, Borneo* 6. *S. mollissima* Ridley
- b. Branchlets 0.7—1.5 cm thick; leaves (2½—)3½—4½(—5½)-jugate; fruits irregularly globular or angular. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo* 3. *S. tomentosa* Blume
- (For further differences between these two species, see under *S. mollissima*).
- 9a. Leaves very large, ca 135 cm long; petioles 26—35 cm long, ca 2.5 cm broad at base; leaflets elliptic, 25.5—46.5 cm long, 13.5—17.5 cm wide. — Infrutescences 30—38 cm long; fruits ovoid, 1.5—1.8 cm long, 1—1.2 cm in diam., stigma near pedicel. — *Borneo* 7. *S. megaphylla* Kalkman
- b. Leaves smaller; petioles rarely longer than 20 cm, up to 1.2 cm broad at base (unknown in *S. ridleyi*) 10
- 10a. Petioles not or hardly flattened at base 11
- b. Petioles distinctly flattened or channeled at base 15
- 11a. Stigma of fruits up to 90° excentric 12
- b. Stigma of fruits more than 90° excentric, often close to pedicel 13
- 12a. Leaflets reddish brown when dry; medulla of petioles without resiniferous ducts; tertiary nerves transverse to reticulate; fruits 1—1.5 cm long, 0.9—1.2 cm in diam. — Leaves 1½—3½-jugate; petioles 0.15—0.2 cm thick at base. — *Sumatra, Malay Peninsula, Borneo* 8. *S. laevigata* Blume (forma *glabrifolia* [Engler] H.J. Lam)
- b. Leaflets yellowish brown or greyish when dry; medulla of petioles with some resiniferous ducts; tertiary nerves laxely reticulate to more or less parallel to secondary ones; fruits 1.5—2.2 cm long, 1.1—2 cm in diam. — Leaves (2½—)3½—5½-jugate; petioles 0.25—0.4 cm thick at base. — *Sumatra, Malay Peninsula, Bangka, Borneo* 9. *S. oblongifolia* Blume
- 13a. Petiolules 3—3.8 cm long. — Leaves ?—4½-?jugate; leaflets rigid, oblong, 15—20 cm long, 6—7.5 cm wide; infrutescences ca 25 cm long; fruits angular-ovoid, 1.2—1.9 cm long, 1.1—1.5 cm in diam. — *Malay Peninsula* 10. *S. ridleyi* H. J. Lam
- b. Petiolules 0.5—2 cm long 14
- 14a. Inflorescences 2—17.5 cm long, branched from base or with short peduncle. — Leaves ½—3½-(rarely 4½-) jugate; fruits 1—1.8 cm long, 0.7—1.3 cm in diam. — *Sumatra, Malay Peninsula, Borneo, Celebes, Philippines, Moluccas* 11. *S. apiculata* Bennett
- b. Inflorescences 5—23 cm long, peduncle about half as long. — Leaves 2½—4½(—5½)-jugate; fruits 1.2—1.4 cm long, 1.5—1.8 cm in diam. — *Borneo* 4. *S. mollis* Engler
- 15a. Tertiary nerves distinctly transverse 16
- b. Tertiary nerves not distinctly transverse 18
- 16a. Inflorescences branched from base or peduncle up to 2 cm long; leaflets with very distinct reticulation above. — Fruits 1—1.3 cm long, 0.7—1.5 cm in diam., style rudiment more than 90° excentric; stamens inserted on or under rim of disc. — *Sumatra, Malay Peninsula* 2. *S. conferta* Bennett
- b. Peduncle 1.5—12.5 cm long; leaflets with conspicuous, but not prominent reticulation above 17
- 17a. Inflorescences 6.5—37 cm long; stamens inserted on or under rim of disc. — Fruits 1.2—2 cm long, (1—)1.4—1.8 cm in diam., style rudiment less than 90° excentric; leaflets usually darkbrown when dry. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Celebes* 8. *S. laevigata* Blume (forma *laevigata*)
- b. Inflorescences 1.5—5.5 cm long; stamens free around disc. — Fruits unknown; upper side of leaflets greyish green when dry, lower side light brown. — *Sumatra, Malay Peninsula, Bangka, Borneo* 12. *S. nervosa* H. J. Lam
- 18a. Inflorescences 6.5—37 cm long; peduncle 1.5—12.5 cm long; style of fruits less than 90° excentric. — Leaflets (5—)12.5—26(—35.5) cm long, 2—8(—11) cm wide. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Celebes* 8. *S. laevigata* Blume (forma *laevigata*)
- b. Inflorescences branched from the base or peduncle up to 3 cm long; style of fruits more than 90° excentric 19

- 19a. Inflorescences slender, rhachis at base not thicker than ca 0.2—0.3 cm . . . 20
 b. Inflorescences stout, rhachis more than 0.3 cm thick at base 21
 20a. Petioles slightly flattened at base, 2—9 cm long; leaflets light-coloured when dry, greenish or brownish; flowers yellowish. — Leaflets ovate to elliptic, 5.5—16(—20) cm long, 2—6.5(—9) cm wide, chartaceous to submembranous; inflorescences and infrutescences 2—17.5 cm long, branched from base or with short peduncle; stamens inserted on outer side of disc; fruits 1—1.8 cm long, 0.7—1.3 cm in diam. — *Sumatra, Malay Peninsula, Borneo, Celebes, Philippines, Moluccas* 11. *S. apiculata* Bennett
 b. Petioles much flattened at base, 4.5—13.5 cm long; leaflets dark-coloured when dry, dark brown below, greyish or brown above; flowers red (also when dried and boiled in water). — Leaflets ovate to oblong, chartaceous to subcoriaceous; ♂ inflorescences 1.5—13 cm long, ♀ inflorescences and infrutescences 2—5.5 cm long, branched from very base; stamens inserted on or near rim of disc; fruits 0.6—0.9 cm long, 0.6—1 cm in diam. — *Malay Peninsula, Borneo* 13. *S. rubra* Ridley
 21a. Reticulation distinct at either side of leaflets. — Lower side of leaflets pubescent when young, afterwards glabrous. — *Sumatra, Malay Peninsula* 2. *S. conferta* Bennett
 b. Reticulation inconspicuous, especially on upper side of leaflets 22
 22a. Infrutescences ca 25 cm long. — Leaflets oblong, 15—20 cm long, 6—7.5 cm wide; petiolules 3—4 cm long; secondary nerves 10—13; fruits angular-ovoid, 1.2—1.9 cm long, 1.1—1.5 cm in diam. — *Malay Peninsula* 10. *S. ridleyi* H. J. Lam
 b. Infrutescences 2.5—4.5 cm long. — Leaflets oblong to oblong-lanceolate, 10—16 cm long, 4.5—5 cm wide; petiolules 1.2—1.5 cm long; secondary nerves 8—11; fruits subglobose, 1.5—1.6 cm in diam. — *Borneo* 14. *S. violacea* H. J. Lam
 23a. Both sides of leaflets villous, especially at lower side and on nerves; tips of branchlets, petioles, rhachis, petiolules and inflorescences densely erect-pilose; leaflets 2—7.5 cm long, 1—3.5 cm wide; ♂ inflorescences axillary, 4—9 cm long; infrutescences 1—1.5 cm long. — *Sumatra, Malay Peninsula* 15. *S. nana* H. J. Lam
 b. Leaflets glabrous, save sometimes a slight pubescence on midrib below; branchlets and petioles glabrous or pulverulent; leaflets 3—11(—17.5) cm long, 1—5.5(—7) cm wide; inflorescences up to 20 cm long 24
 24a. Stamens 3, episepalous, sometimes with rudiments of 3 epipetalous ones; flowers small; sepals 0.1—0.25 cm long; petals 0.2—0.25 cm long. — Leaves 1½—5½ (—6½)-jugate. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, New Guinea* 16. *S. rubiginosa* Blume
 b. Stamens always 6; flowers relatively large; sepals 0.3—0.6 cm long in ♀ flowers, under the fruit up to 0.7 cm long, in ♂ flowers 0.3—0.45 cm long; petals in ♀ flowers 0.25—0.7 cm long, in ♂ flowers 0.35—0.5 cm. — Leaves (3½—)5½--10½-jugate. — *Sumatra, Malay Peninsula, Bangka, Borneo* 17. *S. griffithii* (Hooker f.) Engler

Sectio SANTIRIA

1. *S. grandiflora* nov. spec. — *Fig. 7.*

Type specimen: *Richards 1278* in L, dupl. in K, SING.

Distribution: one specimen collected in Borneo (Sarawak).

Tree. Branchlets terete, ca 1 cm thick, puberulent towards the tips, distinctly lenticellate, medulla without resiniferous ducts. Terminal bud acute, 2—3 cm long, pubescent. *Leaves* 4½—5½-jugate, lowest pairs of leaflets not strictly opposite; petioles deeply channeled at base, rims of the groove curved inward, 11.5—16.5 cm long, 0.5—0.8 cm broad at base, striate, puberulent, medulla with ca 12 resiniferous vascular bundles; interjugae 4.2—6.5 cm long; leaflets oblong or oblong-lanceolate, 11—27 cm long, 4.3—7.3 cm wide, base rounded, apex acuminate, acumen rather narrow, 0.6—1.5 cm long, petiolules 1.1—1.6 cm long, terminal ones 3—

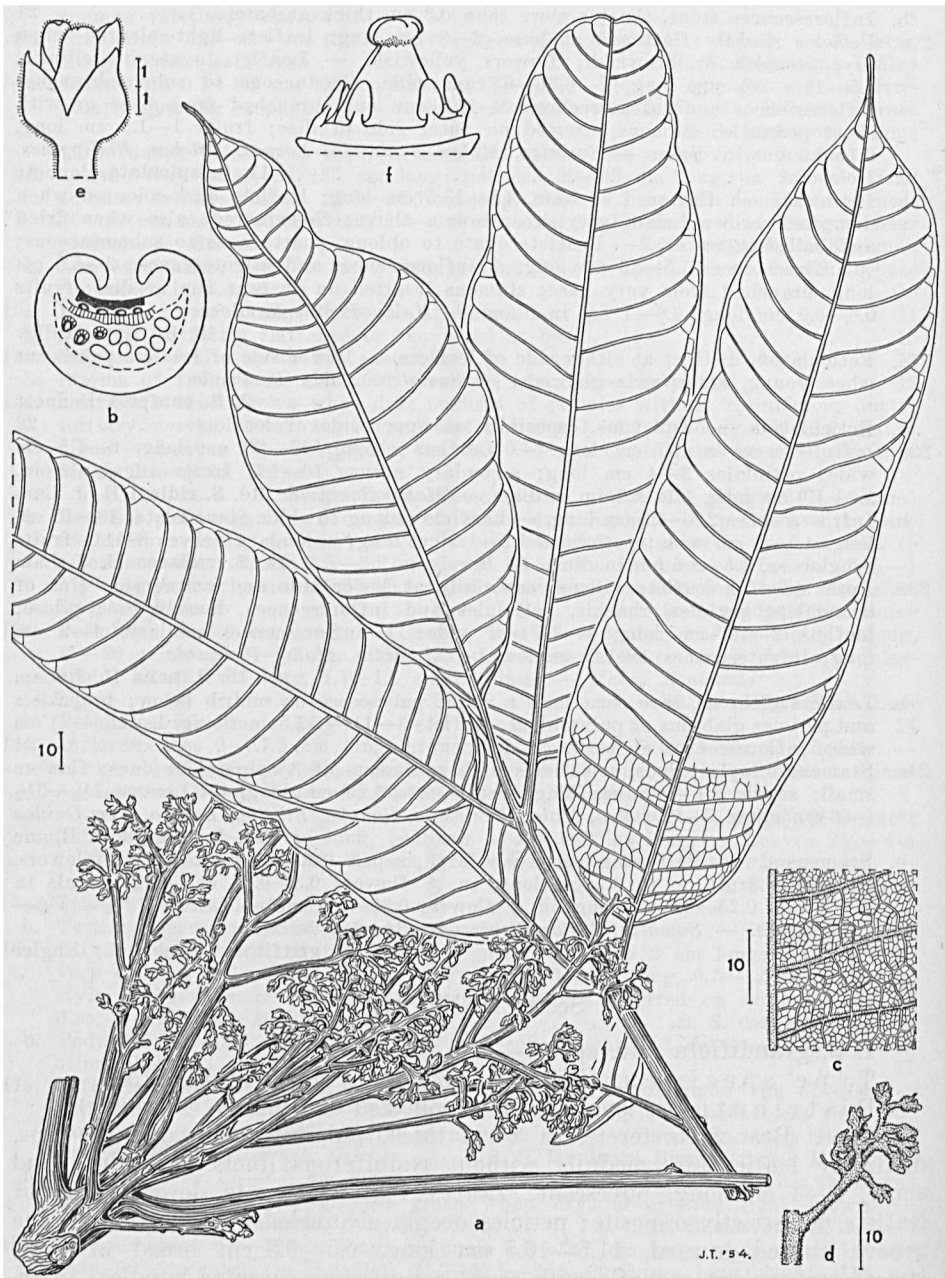


Fig. 7 — *Santiria grandiflora* Kalkman — a. branchlet with leaf and inflorescences; b. petiole, cross-section; c. detail leaflet, showing venation and indumentum; d. part of the ♀ inflorescence; e. ♀ flower; f. idem, calyx and corolla removed. — dimensions in mm — from the type.

3.7 cm long, leaflets glabrous above except the minutely pubescent base of the midrib, the lower side pubescent on nerves; midrib not prominent above, strongly prominent below; secondary nerves 15—24, hardly conspicuous above, prominent below, nearly straight up to near margin, then curved and often directly archingly joined, for the rest by strong tertiary nerves; tertiary nerves transverse, near midrib perpendicular to it, hardly conspicuous above, rather prominent below; reticulation not very conspicuous. *Inflorescences* (only ♀ ones known) paniculate, axillary, near tips of branchlets, 10—16 cm long, densely pubescent; peduncle 0.5—4.5 cm long; bracts deltoid, 0.2—0.3 cm wide, often persistent; bracteoles linear, 0.15—0.2 cm long. *Flowers* (only ♀ ones known) 0.45 cm long, 0.4 cm diam., pedicels densely pubescent, 0.15—0.3 cm long. *Calyx* deeply incised, lobes deltoid, acute, pubescent without, 0.3—0.35 cm wide, 0.25—0.3 cm long. *Petals* ovate, pubescent without, 0.3—0.35 cm long, 0.25—0.3 cm wide, with inflexed apiculum. *Stamens* 6, 0.075—0.1 cm long, filaments ca 0.025 cm long, inserted on rim of disc, anthers basifix, ca 0.05 cm long. *Disc* annular. *Ovary* ovate, glabrous, 0.2 cm long, 0.15 cm in diam., stigma sessile. *Infrutescences* and *fruits* unknown.

Descriptio typi: Arbor. Ramuli teretes, apicem versus puberuli, lenticellati, medulla arecinosa; alabastrum terminale acutum, 2—3 cm longum. *Folia* 4½—5½-jugata; petioli sulcati, 11.5—16.5 cm longi, basi 0.5—0.8 cm lati, striati, puberuli, medulla circiter 12 fasciculis vasorum resiniferis suffulta; partes interjugales 4.2—6.5 cm longae; foliola oblonga vel oblongo-lanceolata, 11—27 cm longa, 4.3—7.3 cm lata, basi rotundata, apice tenuiter acuminata, petioluli laterales 1.1—1.6 cm longi, terminales 3—3.7 cm longus, costa media supra, basi excepta, glabra, subtus prominens; nervi secundarii 15—24, supra vix conspicui, subtus prominentes pubescentes, arcuatim conjuncti; nervi tertiarum transversa, supra vix conspicui, subtus subprominentes; reticulatione paulo conspicua. *Inflorescentiae* (♀) axillares, 10—16 cm longae, paniculatae, dense pubescentes; pedunculi 0.5—4.5 cm longi; bractae deltoideae; bracteolae lineares. *Flores* (♀) 0.45 cm longi, 0.4 cm diametro, pedicelli dense pubescentes, 0.15—0.3 cm longi. *Calyx* profunde tripartita, lobi deltoidei, acuti, extus pubescentes. *Petala* ovata, extus pubescentia, 0.3—0.35 cm longa, 0.25—0.3 cm lata. *Stamina* 6, minuta, 0.075—0.1 cm longa, in disci margine inserta, antheris basifixis. *Discus* annularis. *Ovarium* glabrum, ovatum, stigmate sessili.

BORNEO. Sarawak, Mount Dulit (Ulu Tinjar), near Long Kapa: *Richards 1278* (K, L, SING), ♀ VIII, in primary forest on steep slope, alt. under 300 m, tree 27.5 m high, bark rather rough, dark red, soft, scaling in flakes, latex very copious, fruit said to be edible, *type*.

Remarks: Although no fruits are known, I consider this specimen belonging to *Santiria*, closely related to *S. laevigata* and *S. tomentosa*. It mainly differs in the following points:

	<i>laevigata</i>	<i>grandiflora</i>	<i>tomentosa</i>
petiole	sharply edged at base	deeply channeled, rims curved inward	slightly channeled or flattened and sharply edged
leaflets	glabrous	pubescent on midrib above and on nerves below	densely tomentose below and on midrib above
flowers	glabrous	pubescent	pubescent
calyx	subtruncate	deeply indented	shallowly cupular
petals	0.15—0.2 cm long	0.3—0.35 cm long	0.2—0.25 cm long

2. *S. conferta* Bennett in Hooker, Fl. Brit. Ind. 1, 1875, 537; Lam 1932b, 380, fig. 27 (incl. var. *wrayi* [King] H. J. Lam). — Fig. 8 (♀ fl.).

Misc. inform.: Hildebrand 1949f, h.

Type specimen: *Griffith 1150* in K, dupl. in P.

Distribution: Sumatra (southern part), Malay Peninsula.

Descriptio aucta et emendata: Small to moderate-sized trees. Branchlets 0.6—1.5 cm thick, glabrous or pubescent, medulla without resiniferous ducts. Terminal bud long and narrow. *Leaves* 2½—7½-jugate; petioles strongly channeled at base, (4.5—)7.5—28.5 cm long, 0.3—1.2 cm broad at base, striate, pubescent or glabrous, medulla with many resiniferous vascular bundles; interjugae 2.5—8 cm long; leaflets ovate-oblong to lanceolate or oblong, (6.5—)8.5—26 cm long, 3.2—10 cm wide, base rounded, sometimes one half subacute, apex gradually and rather shortly acuminate, shining above and glabrous, lower side densely pubescent when young, afterwards glabrate, petiolules 1—2.5 cm long, terminal ones 2.5—7 cm long; midrib not or little prominent above, very prominent below; secondary nerves (9—)11—19, little prominent above, very prominent below, angle 60°—80°, nearly straight near midrib, then curved and especially at base and apex archingly joined; tertiary nerves laxely reticulate, conspicuous at both sides, at lower side sometimes inconspicuous by indumentum. *Inflorescences* lateral or axillary, pubescent to glabrous, panicles short, contracted, many-florous, 3.5—13 cm long, branched from the base or peduncle up to 2 cm long; pedicels pubescent. *Calyx* cupular, lobes deltoid, 0.15—0.2 cm wide, 0.05—0.075 cm long, pubescent without, glabrous within, as are petals. *Petals* elliptic to ovate, 0.2 cm long, 0.175—0.2 cm wide, with inflexed apiculum. *Stamens* monodynamous, inserted on or under rim on outer side of disc, in ♂ flowers 0.075—0.125 cm long, filaments 0.05—0.1 cm long, anthers ca 0.05 cm long, in ♀ flowers stamens 0.05—0.075 cm long, with very short filaments. *Disc* cupular. *Ovary* in ♀ flowers more or less circular, glabrous, with short thick style and 3-lobed stigma, in ♂ flowers the ovary only represented by a very small rudiment. *Infrutescences* pubescent, 4.5—19 cm long. *Fruits* 1—1.3 cm long, 0.7—1.5 cm in diam., style more than 135° excentric; fruiting calyx 0.25 cm in diam., pedicel 0.15—0.7 cm long; pericarp and putamen very thin.

SUMATRA. Riouw and Dependencies, Indragiri, Danau Mengkuang: NIFS bb. 27518 (BO).

MALAY PENINSULA. Perak, Trolak: *Ja'amat & Tachun 43421* (KEP), ♂ II;

Larut: *King's coll. 3689* (L, US), fr. XII, *isotypes* of *Sant. wrayi* King; no loc.: *Scortechini 2095* (FI), fr.; Cameron Highland, Mengtigi: *Md ? Ali 34117* (KEP); Dindings, Bruas: *Unknown coll. 69405* (KEP), buds XI; Trengganu, Gunong Padang: *Moysey & Kiah 33934* (KEP), fr. VI; Selangor, Selangor Road: *Sabik 66202* (KEP); Klang: *Kehding 178* (FI), buds I; Sungei Buloh Subang: *Ja'amat & Tachun 37984* (KEP), ♀ I; Negri Sembilan, Sungei Mengala: *?Obid & Jidin 13414* (KEP), buds VIII; Johore, Kota Tinggi—Mawai Road: *Corner 28708* (BO, KEP), fr. II; Kulai: *Corner 29952* (BO), buds IX; Malay Peninsula, without loc.: *Griffith 1150* (P), ♂ & fr., *isotype* of *S. conferta* Benn.

Remarks: Lam (1932a, 205 and 1932b, 381) subdivides this species into two varieties, var. *typica* and var. *wrayi*, differing insofar as the latter is stouter and less pubescent than the former. It is, however, my impression, that the two types are to be found on the same tree and that these differences are only a matter of age.

Small to moderate-sized tree, 6—24 m high, with small buttresses and smooth, yellow-brownish and grey bark; resin pale and sticky, becoming black when older; wood fragrant (*Kehding 178*), the cut smells faintly

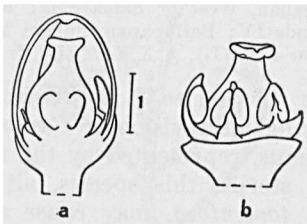


Fig. 8 — *Santiria conferta* Bennett — female flower, a. length section; b. androecium and gynaecium. — dimensions in mm — from *Ja'amat & Tachun 37984*.

of raspberries (*Ja'amat & Tachun 37984*). Flowers red, fruits white to blueish black. *Habitat*: In forests on level or hilly localities, at low altitudes, usually under 100 m alt., once from 240—300 m (Perak), once from 1150 m (Trengganu). *Vernac. names*: lalan (Sum., Riouw). *Flow. and fruit. times*: In Malay Penins. fl. in I—II (Per., Sel.) and VIII—IX (Per., Joh.), fr. in II—III (Joh., Sel.), in VI (Trengg.) and XII (Per.).

3. *S. tomentosa* Blume, Mus. bot. Lugd.-Bat. 1, 14, 1850, 211; Lam 1932b, 391, fig. 33; Cretzoiu 1934, 265.

Misc. inform.: Heyne 1950, 881; Hildebrand 1949a, b, c, d, e, f, g, h, 1950a, 1952a, b, c, d, e; Sinia 1938, 69—102; Webber 1941, 441—465.

Type specimen: *Korthals (1168)*, (L, nr 898.321—245).

Distribution: Sumatra, Malay Peninsula, Bangka, Billiton (f. Lam), Borneo.

SUMATRA. Atjeh, Gajo Luëus, Gn Agosan: *NIFS bb. 22445* (L); Eastcoast, Kuala, Lundut concession, near Aek Kanopan: *Bartlett 6872* (US), ♂ III; Asahan, Masihi: *Krukoff 4051* (A, L, SING), young fr. X—XI; Lower Langkat, Alur Gusta: *NIFS bb. 16386* (L); Westcoast, Mentawai isl., P. Siberut: *NIFS bb. 17445* (L); *ibid.*, Semararakoeha (sic!), Saibi: *NIFS bb. 17481* (L); Riouw and Dependencies, Kuantan Districts, Muara Pantei: *NIFS bb. 23365* (L); Indragiri, Muara Serange: *NIFS bb. 30061* (L); Palembang, Lematang Ilir, Gunung Megang: *NIFS bb. 32318* (L); *ibid.*, Br Tjuban: *NIFS bb. 28746* (L); Sumatra, without loc.: *Korthals (1168)* (L, nr 898.321—245), fr., type of *S. tomentosa* Bl.

MALAY PENINSULA. Kedah, Kuah Muda, Bukit Singkup: *Din bin Hashim* 59606 (KEP), fr. XII; Jeniang: *Syid Haron* 20786 (KEP), young fr. VII; Perak, Kinta: *D. F. O.* 54827 and 54830 (KEP); *ibid.*, Tualang: *unknown coll.* 63251 (KEP); *ibid.*, Parit: *Tingan* 54674 (KEP); Trengganu, Kemaman, Bukit Kajang: *Corner* 30498 (KEP, L), ♂ XI; Selangor, Sungei Buloh: *Symington* 29787 and 44703 and *Ja'amat* 14950 (KEP); *ibid.*, Subang: *Ja'amat & Tachun* 37986 (KEP), fr. I; Pahang, Kamayan State land *Mahamud* 40303 (KEP), ♀ XI; Putat, *Baba* 10773 (KEP); Johore, Mawai: *Ngadiman* 34753 (KEP), fr. I; Pontian, Pengkalan Raja: *Ngadiman* 36755 (KEP), buds VII; East Mersing, G. Arong: *Sulaiman bin Manja* 74153 (KEP), ♂ X; Singapore, South side of Mac Ritchie Reservoir: *Simolair s.n.* (L).

BANGKA. Lobok Besar: *Anta* 1129 (BO, L), fr. X; *ibid.*: *NIFS* bb. 34174 = *Kostermans* 240 (B, L), young fr. X; *ibid.*: *Anta* 394 (BO, L), ♂ IX; *ibid.*: *Anta* 530 (BO, L), ♀ & fr. IX; *ibid.*, Bakung: *Anta* 1070 (BO, L); *ibid.*: *NIFS* bb. 34141 = *Kostermans* 207 (BO, L); *ibid.*, G. Mangkol: *Anta* 323 (BO, L), fr. IX.

BORNEO. West Borneo, Melawi, B. Ulu Bora Sepan: *NIFS* bb. 29040 (L); Melawi, Tjatit, B. Gontuk: *NIFS* bb. 27007 (L), fr. III; Sarawak, Dulit: *Richards* 1399 (L), buds VIII; Hutan Merit: *David & Tachun* 35703 (KEP), ♂ buds VIII; Praran: *E. S. M.* 520 (KEP), ♂ buds VIII; Sipang, Sabu: ? *Abdulmajid* 64103 (KEP); British North Borneo, Sandakan, Tawan, Apaswustijn (sic!), Japanese track: *Simbut A* 1633 (KEP), buds X; South and East Borneo, West Kutei, Mujup: *NIFS* bb. 16382 (L); Loa Djanan, West of Samarinda: *Kostermans* 6741 (L), ♂ IV; *ibid.*: *Kostermans* 6408 (L), buds IV; Balikpapan, Sungei Wain: *Achmat* bb. 34368 (L), bb. 34399 (L), ♂ X, *Kostermans* 4086 (L), ♂ X, 4401 (L), fr. X, 4516 (L), ♂ and fr. IX.

Remarks: For the relation to *S. mollissima* see under that species.

Mr Leenhouts, preparing his revision of *Canarium*, draws my attention to a new species of that genus, represented by the fruiting specimen *Beccari* s.n. from Celebes. When sterile, this species, although coming from outside the area of *Santiria tomentosa*, may cause some confusion, since on first sight it resembles the latter. The differences are:

Canarium spec.: Branchlets with prominent lenticels; terminal bud small, ca 0.6 cm long; petioles slightly flattened at base, medulla with some few resiniferous ducts; secondary nerves 10—17, angle with midrib 70° (at base)—50° (in apex).

S. tomentosa: Branchlets without such prominent lenticels; midrib 0.5—1.8 cm long; petioles sharply flattened or channeled at base, medulla with many resiniferous ducts; secondary nerves 15—26, angle with midrib 90° (at base)—70° (in apex); nervation as a whole less distinct at upper side of leaflets, especially secondary and tertiary nerves.

A tree, not higher than 30 m, twice reported with buttresses (Bangka, Borneo); bark greyish or brownish, flaking. Flowers green to yellow, fruits green, turning to greyish blue or blackbrown, sour. *Habitat*: forests, usually at low altitudes, up to 250 m, once from 475 m (W. Born.), once from 1800 m (Sum., Atj.). *Vernac. names*: ta-tahu (Mal. Penins., Pah.), kumbol mjiior (Kedah), panggong (Selang.), asem-asem, ranggong, mengkabu (Bangka), kambaloh (Saraw.), kembajau (S. & E. Born.). *Flow. and fruit. times*: In Sum. fl. in III (Easte.), VII and IX (Palemb.), fr. in VIII—XI (Palemb.). In Mal. Penins. fl. in VI—XI, fr. in VII (Per., Ked.), X (Per., Mal.), XII—I (Ked., Sel., Joh.). In Bangka fl. in IX, fr. in IX—X. In Born. flowerbuds in VII—X (Sar., Br. N. Born.), fr. in III (W. Born.).

4. *S. mollis* Engler in DC, Mon. Phan. 4, 1883, 156; Lam 1932a, 206 (excl. var. *sessilis* H. J. Lam, l. c.); Lam 1932b, 388, fig. 30. — *Fig. 9.*

Type specimen: *Beccari* 3497, dupl. in FI.

Distribution: Borneo (W.-Born., Sarawak, S. & E. Born.).

Additions to the description: ♂ *inflorescences* lateral, at tips of branchlets, 5—23 cm long, tomentose; peduncle about half as long. *Infrutescences* 9—19 cm long, with ferruginous lenticels, shortly tomentose up to the pedicels; peduncle 3.5—9 cm long. *Fruits* ± globose, 1.2—1.4 cm long, 1.5—1.8 cm in diam., style rudiment 90° or more excentric; pedicels 0.2—0.3 cm thick; calyx lobes deciduous; pericarp rather thin, putamen ca 0.05 cm thick, embryo unknown.

BORNEO. West Borneo, Melawi, Ng Betung, B. Bedjuwar: *NIFS* bb. 26346 (L), buds I; Sarawak, Kuching: *Beccari* 1215 (FI), buds XII; Matang: *Beccari* 3497 (FI), ♂ II, isotype of *S. mollis* Engl.; South and East Borneo, Loa Djanan, W. of Samarinda: *Kostermans* 6404 (L), buds IV, 6563 (L), fr. IV, 6728 (L), ♂ IV and 6753 (L), ♂ IV; Balikpapan, Sungei Wain: *Achmat* bb. 34316 (L).

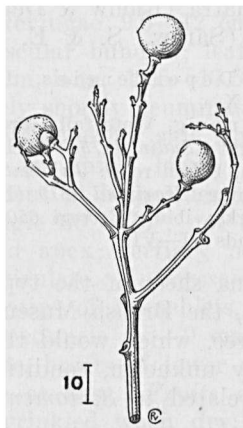


Fig. 9 — *Santiria mollis* Engler — part of the infrutescence — dimensions in mm — from *Kostermans* 6563.

Remarks: The specimens, recently collected by Kostermans, are much less tomentose as the type specimen and *Beccari* 1215 are: branchlets and petioles of the former specimens are shortly tomentose to glabrous, leaflets are glabrous. Inflorescences and flowers are tomentose in all specimens known.

The filaments are not free from the disc — as stated in Lam, 1932b, 389 and fig. 30 — but connate with it.

Var. *sessilis* H. J. Lam, 1932a, 206, must be excluded, since it has proved to belong to *Parishia* (Anacard.); cf. note in Lam 1932a, 220.

Trees, 25—40 m high, buttressed. Bark yellowish brown, scaling off, lenticellate. Upper leaf-surface leadgreen (*Kostermans* 6404). Flowers white, fruits green. *Habitat*: Forests, at low altitudes, highest record 250 m (W. Born.). *Vernac. name*: kumbajau burung (S. & E. Born.). *Flow. & fruit. times*: Fl. in II—IV, fr. in IV.

5. *S. pilosa* Engler in DC, Mon. Phan. 4, 1883, 159; Lam 1932b, 389, fig. 31; Lam 1938, 139, 140.

Type specimen: *Beccari* 2559 in P, dupl. in FI.

Distribution: Borneo.

BORNEO. Sarawak, Matang: *Beccari 2559* (FI), fr. IX, *isotype* of *S. pilosa* Engl.; Brunei, Pak Anduki: *Flemmich 34563* (KEP), young fr. V.

Remarks: Engler (in DC, Mon. Phan. 4, 1883, 158) mentions two specimens: *Beccari 2559* and *650*; the latter belongs, however, to *S. mollissima*.

The Brunei specimen deviates from the type by having more ovate leaflets with shorter acumen and less conspicuous tertiary nerves and reticulation above. I have placed it here mainly because of the infrutescences, the strongly excentric fruits and the anatomy of the petioles.

6. *S. mollissima* Ridley, Kew Bull. 1930, 85; Lam 1932b, 390, fig. 32.

Misc. inform.: Hildebrand 1952b, e.

Type specimen: *Haviland 1819* in BM, dupl. in SING, W.

Distribution: Sumatra (Riouw & Dep.), Malay Penins. (Penang, Selangor, Pahang), Borneo (Saraw., S. & E. Born. f. Lam).

SUMATRA. Riouw and Dependencies, Indragiri, Pagarumbei, Tjenako river: *NIFS bb. 25769* (L), fr. X.

MALAY PENINSULA. P. Penang, Waterfall Gardens: *Curtis s.n.* (SING), buds; Selangor, Klang, Kuala Langat: *Sudin 41754* (KEP); *ibid.*, Telok: *Sinclair 4011?* (L), ♂ XI; Pahang, Kuantan, Pekan road: *Ja'amat & Sow 43197* (KEP).

BORNEO. Sarawak, Kuching: *Haviland 1819* (BM, SING, W), ♂ & ♀ X, *type* of *S. mollissima* Ridl., see Remarks; *ibid.*: *Beccari 650* (FI), fr. IX, see Remarks; no loc.: *Native coll. 2708* (US), buds II—VI.

Remarks: The Vienna sheet of the type specimen has ♂ flowers, the Singapore sheet ♀ ones, the British Museum sheet has both. Possibly they come from the same tree, which would thus be monoecious, a rather unusual, though not entirely unknown, condition in Burseraceae.

The species is closely related to *S. tomentosa*, the differences being:

	<i>mollissima</i> :	<i>tomentosa</i> :
Branchlets	0.25—0.6 cm thick	0.7—1.5 cm thick
Terminal bud	0.3—0.6 cm long	0.5—1.8 cm long
Leaves	1/2—2 1/2 (—3 1/2)-jugate	(2 1/2—)3 1/2—4 1/2 (—5 1/2)-jugate
Petioles	(1.5—)3—7.7 cm long	6.5—24.5 cm long
Leaflets	elliptic, elliptic-oblong or ovate, 5.5—16.5 cm by 3—8 cm	oblong, elliptic-oblong or oblong-lanceolate, (6.5)—8—28 (—34) cm by 2.5—9 (—12.5) cm
Sec. nerves	(9—)11—15 (—18)	(13—)15—26 (—29)
Inflorescences	4—15 (—20) cm long	6—38 cm long
Fruits	oblong, 1.1—1.5 cm long, 0.8—1 cm in diam.	irregularly globular or polygonous, 1.5—2.1 cm long, 1.4—2 cm in diam.

In all, *S. mollissima* makes a more slender impression than *S. tomentosa*. Sterile specimens with elliptic-oblong leaflets present sometimes difficulties in identification.

Beccari 650 was placed by Engler under *S. pilosa* (see there).

A tree, 15—18 m high. *Vernac. names*: terantai (Selang.), kedondong (Pahang). *Flow. and fruit. times*: In Sum. fr. in X. In Malay Penins. fr. in IV—V. In Sarawak fl. in X, fr. in IX and XII.

7. *S. megaphylla* nov. spec. — *Fig. 10.*

Type specimen: *Beccari 3059* in FI.

Distribution: one specimen collected in Sarawak.

Tree? Branchlets thick, ca 3 cm in diam., bark light greyish brown when dry, glabrous, lenticels conspicuous, circular to elliptic, medulla without resiniferous ducts; next to normal leaves there are undeveloped leaf-bases, 4—5 cm long, 0.5 cm wide, similar to those which serve as bracts to the inflorescences. Terminal bud ca 1.5 cm long, 1.2 cm in diam., densely tomentose. *Leaves* 5½-jugate (only one seen complete), perfectly glabrous, very large, ca 135 cm long; petioles 26—35 cm long, ca 2.5 cm broad at base, channeled and somewhat auriculate at base, striate, with many elliptic lenticels; interjugae 9.5—12 cm long, medulla with many circumvasal resiniferous vascular bundles; leaflets elliptic, elliptic-ovate or elliptic-oblong, 25.5—46.5 cm long, 13.5—17.5 cm wide, base rounded to broadly acute, apex relatively shortly acuminate, acumen blunt, 0.5—1.3 cm long, leaflets shiningly brown at either side when dry, coriaceous, petiolules 2.2—3.8 cm long, 0.3—0.4 cm thick, lowest ones shortest, terminal ones 10 cm long; midrib prominent at both sides, as are the secondary nerves; secondary nerves 8—14, angle 60°—70°, not directly archingly joined except sometimes in base and apex; tertiary nerves prominent below, conspicuous above, laxely reticulate. *Inflorescences* and *flowers* unknown. *Infrutescences* conferted at tips of branchlets, paniculate, 30—38 cm long, shortly pubescent, striate, peduncle 4.5—9 cm long, bracts subulate, 1.5—2 cm long, 0.5—0.7 cm wide, bracts of lower order semicircular to deltoid, persistent, ca 0.2 cm wide at base. *Fruits* ovoid, 1.5—1.8 cm long, 1—1.2 cm in diam., faintly wrinkled when dry, stigma very excentric, near the pedicel, pericarp and putamen thin, cotyledons palmatifid; fruiting pedicel 0.1—0.3 cm long, 0.15—0.2 cm thick, pubescent; fruiting calyx 0.3 cm in diam., glabrous, disc cupular, rudiments of the 6 stamens inserted on its outer side.

Descriptio typi: Arbor? Ramuli 3 cm crassi, glabri, lenticellati, medulla aresinosa; alabastra terminalia tomentosa, 1.5 cm longa, 1.2 cm diam. *Folia* 5½-jugata, glabra, ca 135 cm longa; petioli 26—35 cm longi; basi 2.5 cm crassi, sulcati et plusminusve auriculati, striati, lenticellati; rhachidis partes interjugales 9.5—12 cm longae, medulla multis fasciulis vasorum resiniferis suffulta; foliola coriacea, elliptica, elliptico-ovata vel elliptico-oblonga, 25.5—46.5 cm longa, 13.5—17.5 cm lata, basi rotundata vel late acuta, apice breviter acuminata, petioluli laterales 2.2—3.8 cm longi, 0.3—0.4 cm crassi, terminales 10 cm longi, acumine 0.5—1.3 cm longo, obtuso; costa media et nervi secundarii prominentes; nervi secundarii 8—14, angulo 60°—70° de costa adscendentes, basi et apice exceptis haud areuatim conjuncti; nervi tertiarii reticulati, reticulatione laxa subtus prominentes, supra conspicui. *Inflorescentiae* floresque ignoti. *Infrutescentiae* paniculatae, 30—38 cm longae, pubescentes, striatae, pedunculo 4.5—9 cm longo, bractee subulatae. *Fructus* ovatus, 1.5—1.8 cm longus, 1—1.2 cm diam., styli rudimento valde excentrico; pedicelli 0.1—0.3 cm longi, 0.15—



Fig. 10 — *Santiria megaphylla* Kalkman — a. lower part of a leaf; b. leaflet from the central part of a leaf; c. infructescence, fruits detached; d. fruit. — dimensions in mm — from the type.

0.2 cm crassi, pubescentes; calyx fructiger 0.3 cm diam., glaber, discus cupuliformis, staminum rudimentis 6 extus discum insertis.

BORNEO. Sarawak, Gunong Sidgingdgiang (Italian transcription): *Beccari 3059* (FI), fr. I, *type*.

8. *S. laevigata* Blume, Mus. bot. Lugd.-Bat. 1, 14, 1850, 211; Lam 1932b, 382, fig. 28; Cretzoiu 1934, 265; Lam 1938, 145; Lam 1945, 610, 630.

Misc. inform.: Heyne 1950, 881; Hildebrand 1949a, b, d, e, f, g, h, i, 1950a, b, c, 1952a, b, c, d, e; Sinia 1938, 69—102; Webber 1941, 441—465.

Type specimen: *Korthals s.n.* (L, nr 898.321—201).

Distribution: Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Central Celebes.

I here distinguish two formae (indicated in the list by *lae* and *gl* respectively), the differences of which are as follows:

Forma *laevigata* — *S. laevigata* Bl. var. *applanata* Blume, l. c. — *S. laevigata* Bl. forma *typica* H. J. Lam, 1932a, 205 and 1932b, 384 — *S. laevigata* Bl. forma *rufescens* (Bl.) H. J. Lam, 1932a, 205 and 1932b, 384. — Branchlets stout to rather stout, 0.45—1.1 cm thick, medulla usually without, rarely with 7—20 resiniferous ducts, sometimes sclerenchymatic. *Leaves* 2½—5½-jugate; petioles channeled or at least sharply flattened at base, rarely nearly terete, 4.5—18(—22.5) cm long, (0.15—)0.3—0.8 cm wide at base; leaflets large to rather large, (5—)12.5—26(—35.5) cm long, 2—8(—11) cm wide, oblong to elliptic; midrib prominent below, reticulation usually not very conspicuous below, less conspicuous than the tertiary nerves. *Inflorescences* 6.5—37 cm long, ♀ ones smaller than ♂ ones. *Fruits* 1.2—2 cm long, (1—)1.4—1.8 cm in diam. — *Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, Central Celebes.*

Forma *glabrifolia* (Engler) H. J. Lam, 1932a, 205 and 1932b, 384. — Branchlets slender, 0.3—0.6 cm thick, medulla without resiniferous ducts, usually sclerenchymatic. *Leaves* 1½—3½-jugate; petioles terete or hardly flattened, 3—8.5(—11) cm long, 0.15—0.2 cm wide at base; leaflets small, (4.5—)6—15.5 cm long, 2.5—7 cm wide, ovate to elliptic; midrib not prominent below, reticulation conspicuous below, as conspicuous as tertiary nerves. *Inflorescences* 4—27 cm long. *Fruits* 1—1.4 cm long, 0.9—1.2 cm in diam. — *Sumatra, Malay Peninsula, Borneo.*

The types of *S. rufescens* Blume and *S. laevigata* Blume var. *applanata* Blume (especially the latter) seem to be transitional between the two forms as described above, rather than representing a separate form, as was accepted by Lam. The greater part of the specimens, identified by Lam as forma *rufescens*, in my opinion belong to forma *laevigata*.

SUMATRA. East coast, Asahan, Masihi: *Krukoff 4229* (BO, L), buds X—XI, *lae*; *ibid.*, Lumban Ria: *Rahmat Si Buea 8036* (US), buds II—IV, *lae*; Tapanuli, Angkola & Sipirok, Panobasan: *NIFS bb. 26337* (L), fr. XI, *lae*; Sibolga c. a., Barus, Sambung: *NIFS bb. 29571* (L), *lae*; West coast, Bangkinang, Katur: *NIFS bb. 23397* (L), *lae*; Sariaman, Salibutan, Lb Alung: *NIFS bb. 19616* (BO, L), *lae*; Padang, Lb Minturun: *NIFS bb. 17697* & *bb. 17698* (L), *lae*; Biouw and Dependencies, Kuantan Districts, Sungei Besar: *NIFS bb. 24030* & *bb. 24038* (L), *lae*; *ibid.*, Djake: *NIFS bb. 26468* (L), young fr. XII, *lae*; *ibid.*, Pulau Kedondong: *NIFS bb. 24794* (L), *lae*; *ibid.*, Tjerenti: *NIFS bb. 25217* (L), *lae*; Indragiri, Belimbing: *NIFS bb. 23469* (L), young fr. VI, *lae*; *ibid.*, Kw. Keritang: *NIFS bb. 23706* (BO), ♂ VIII,

gl; Benkulu, Redjang, Tebat Monok: *NIFS* bb. 31054 (L), fr. XII, *lae*; Palembang, Lematang Ilir, Semangus: *NIFS* bb. 31938, bb. 32160 & bb. 32195 (L), *lae*; *ibid.*, Gunung Megang: *NIFS* bb. 31560 (L), bb. 31561 (BO) & bb. 31562 (BO), *lae*; *ibid.*: *NIFS* bb. 32316 (L), ♂ VIII, *lae*; no loc.: *Praetorius* s.n. (L, nr 898.321—230), *lae*, type of *S. rufescens* Bl.; Sumatra, without loc.: *Korthals* s.n. (L, nr 898.321—201), fr., type of *S. laevigata* Bl.; *ibid.*: *Praetorius* s.n. (L, nr 898.321—207), ♂, *lae*, type of *S. laevigata* var. *applanata* Bl.

MALAY PENINSULA. Kedah, Kulim, Inas: *Syed Hasan* 55773 (KEP), ♀ IX, *lae*; Sik, Telai, Batu Besar: *Salleh bin Yusoff* 60475 (KEP), *lae*; Perangin: *Awang* 42385 (KEP), *lae*; Bongsu, Bukit Bintang: *Yunus* 50001 (KEP), *lae*; Muyol: *Mch* 42288 (KEP), fr. XI, *lae*; K. Muda, Sungkop: *Ah* 73791 (KEP), fr. III, *lae*; Perak, Trolak: *Browne* 43451 & 43615 (KEP), *lae*; Kroh: *Luwee* 28601 (KEP), fr. III, *lae*; Plus: *Suoh* 16769 (KEP), *lae*; Kinta, Gopeng: *King's coll.* 4438 (L), fr. VI, *lae*; no loc.: *Scortechini* s.n. (FI), fr., *lae*; Kelantan, Nibong: *Nik Yusoff Omar* 65206 (KEP), *lae*; Trengganu, Kemaman, Bukit Kajang: *Corner* 30334 (KEP), ♀ XI, *lae*; *ibid.*: *Corner* 30474 (KEP), ♂ XI, *lae*; Selangor, Subang, Sungai Buloh: *Walton* 29733 (KEP), fr. III, *lae*; *ibid.*: *Ja'amat & Tachun* 37989 (KEP), *lae*; *ibid.*: *Sidik* 44906 (KEP), *lae*; *ibid.*: *Saris* 39765 (KEP), *lae*; Kajang, Bangi, Dinkil State Land: *Osman & Tachun* 23661 (KEP), fr. XII, *lae*; Klang: *Kehding* 21 (FI), fr. XII, *lae*; *ibid.*, Bukit Cheraka: *D.F.O.* 18711 & 38182 (KEP), *lae*; *ibid.*: *unknown coll.* 66214 (KEP), *lae*; *ibid.*, Channgang: *Mohd Nur* 34010 (L), ♀ & fr. X, *gl*; Batang Berjuntai: *Osman & Sow* 28300 (KEP), ♀ & fr. XII, *gl*; Rawang: *Ngah* 32312 (KEP), *lae*; *ibid.*, Rantau Panjang: *Ngah* 32302 (KEP), *lae*; *ibid.*: *Jusus* 28940 (KEP), *lae*; Batu Arang, Bukit Djok: *Jusus* 28945 (KEP), *lae*; Pahang, Putat: *Baba* 31504 & 31508 (KEP), *lae*; Raka: *Zin* 27538 (KEP), *lae*; Gunong Tahan: *Woolley* 8234 (KEP), *lae*; Negri Sembilan, Port Dickson: *Sow-Lindong* 66518 (KEP), fr. XII, *lae*; *ibid.*, Cape Rachado: *Wyatt-Smith* 71342 (KEP), *lae*; Johore, Sungai Sedili: *Ngadiman* 36364 (KEP), young fr. VII, *lae*; *ibid.*, below Mawai: *Corner* 36804 (KEP), young fr. VII, *lae*; *ibid.*, Bukit Naga Mengulor: *Ngadiman* 36895 (KEP), fr. VII, *lae*; Mawai: *Ngadiman* 36798 (KEP), ♂ VII, *gl*; Kulai: *Corner* 29957 (BO, KEP), buds IX, *lae*; Pontian: *Yasmi bin Atoo* 70904 (KEP), fr. II, *lae*; *ibid.*: *Bdin bin Samad* 70259 (KEP), *gl*; *ibid.*, Pengkalan Raja: *Ngadiman* 36648 (KEP), fr. VI, *gl*; Singapore, Bukit Timah: *Ngadiman* 34772 (KEP, L), young fr. VIII, *lae*; *ibid.*: *Ngadiman* 36130 (KEP), fr. IX, *lae*; Turong: *Corner* 26046 (KEP), fr. XII, *gl*; Garden Jungle: *Ridley* s.n. (BM), fr., *lae*; Malay Peninsula, without loc.: *unknown coll.* 16338 (KEP), fr., *lae*.

BANGKA. Lobok Besar: *Anta* 284 (BO, L), ♂ IX, *lae*; *ibid.*: *Anta* 185 and *NIFS* bb. 33964 = *Kostermans* 26 (BO, L), ♂ VIII, *lae*; *ibid.*: *Anta* 825 and *NIFS* bb. 34076 = *Kostermans* 139 (BO, L), young fr. IX, *lae*; *ibid.*: *NIFS* bb. 34213 (BO, L), *lae*.

BORNEO. West Borneo, Melawi Tjajit B. Bansa: *NIFS* bb. 26032 (L), *lae*; Sarawak, Boards of Bintulu: *Beccari* 3756 (FI), ♀ IX, isotype of *S. glabrifolia* Engler; Brunai, Seria: *Flemmich* 32632 (KEP, L), fr. III, *gl*; *ibid.*: *Flemmich* 37198 (KEP), fr. II, *lae*; *ibid.*: *Flemmich* 48224 (KEP), ♂ XI, *gl*; *ibid.*, Badas road: *Abot & Suhaig* 37138 (KEP), fr. II, *gl*; British North Borneo, Sandakan, Kabili-Sepilok: *Keith* 4632 (L), fr. V, *lae*; Mount Kinabalu, Penibukan: *Clemens* s.n. (B, L), fr. I, *lae*; South and East Borneo, West Kutai, Kahala: *NIFS* bb. 23369 (BO), young fr. VII, *lae*; *ibid.*, Mujup: *NIFS* bb. 16737 (BO), *gl*; *ibid.*: *NIFS* bb. 16834 (L), *lae*; Sampit: *Buwalda* 7754 (BO, L), 7755 (BO, L) & 7834 (BO), ♂ IX, *gl*; *ibid.*: *NIFS* bb. 32402 = *Buwalda* 25 (BO, L), *gl*; Tidung Districts, Tanah Merah: *NIFS* bb. 18235 (BO), *gl*; Upper Mahakam, D. Parei: *NIFS* bb. 20729 (BO) & bb. 20742 (BO, L), *lae*; Loa Djanan, W. of Samarinda: *Kostermans* 6694 (L), fr. IV, *lae*; Balikpapan, Sungai Wain: *Achmat* bb. 34318 (L), *lae*; *ibid.*: *Kostermans* 4059 (L), buds X, *gl*, and 4350 (L), young fr. X, *lae*; *ibid.*, Muan region near Sungai Riko: *Kostermans* 4363 (L), young fr. XI, *lae*; Borneo, without loc.: *Hallier* 3125 (L), *lae*, see Remarks.

Celebes. Malili, Usu: *NIFS* bb. 32470 (BO, L), *lae*; *ibid.*: *NIFS* Cel/II-216 (BO), fr. I, *lae*; *ibid.*, Margosuko: *NIFS* bb. 32451 (BO, L), ♂ IX, *lae*; *ibid.*, Lawoli: *NIFS* bb. 23252 (L), *lae*.

Remarks: Lam (1932b, 386) mentions *Hallier* 2125 from Borneo; this is probably a printing-error for 3125.

A tree, usually not higher than 30 m, rarely up to 45 m. Buttresses

often recorded. Bark flaking, greyish to brownish, with little to much sap of various colours: colourless, white, yellow, red, black. The wood has a strong, aromatic smell (*Wyatt-Smith 71342*). Flowers fragrant, green to white with brown stamens; fruits green when young, turning yellow and red, finally black. *Habitat*: Forest, from low altitudes up to 1200—1500 m. Forma *glabrifolia* has repeatedly been collected in peat forests, forma *laevigata* usually in dry, rarely in swampy localities. *Vernac. names*: amparah (Sum., Palemb.), kaju kalas (Easte.), katuko lagau (Westc.), kumbooi nyior (Mal. Penins., Kedah), panjong bruang (Sel.), ranggung, gerunggang (Bangka), pusan, pasan, merasam, gandis, merambang (S. & E. Born.), bakata pute (Cel.). *Flow. and fruit. times*: In Sum. fl. in IV, VI, VIII—IX, XI, I, fr. in VI, VIII, XI—III. In Mal. Penins. fl. in VII—XII, fr. in VI—IV. In Bangka fl. in VIII—IX. In Born. fl. in VIII—XI, fr. in VII—II. In Cel. fl. in IX, fr. in I. *Uses*: Fruits are edible, according to several collectors. The wood is used for posts and planks (Sum., Westc.) and for parang (chopping knife)-handles (Mal. Penins., Sel.).

9. *S. oblongifolia* Blume, Mus. bot. Lugd.-Bat. 1, 14, 1850, 211; Lam 1932b, 372, fig. 22; Cretzoiu 1934, 265.

Misc. inform.: Hildebrand 1949a, e, f, h, i, 1950a, b, c, 1952a, c, d, e; Sinia 1938, 69—102; Webber 1941, 441—465.

Type specimen: *Praetorius s.n.* (L, nr 898.321—221).

Distribution: Sumatra, Malay Peninsula, Bangka, Borneo.

SUMATRA. Eastcoast, Asahan, Masihi: *Krukoff 4219* (BO, L), fr. X—XI; Tapanuli, Sibolga, Sihorbo: *NIFS bb. 26564* (L); Riouw and Dependencies, Indragiri, Danau Mengkuang: *Buwalda 6624* (BO, L), fr. IV; *ibid.*: *NIFS bb. 27495* (L), fr. IV; *ibid.*, Kwala Belilas: *NIFS bb. 27617* (L); Palembang, Lematang Ilir, Semangus: *NIFS bb. 31693* (L), buds IV; *ibid.*: *NIFS bb. 32134* (L), ♂ VI; *ibid.*: *NIFS bb. 32001* (L), *bb. 32047* (L), *bb. 32210* (L), *bb. 32220* (BO), *bb. 32223* (BO) & *bb. 32233* (BO); *ibid.*, near Muara Enim: *Buwalda 7629* (BO, L), buds IV; Sumatra, without loc.: *Praetorius s.n.* (L, nr 898.321—221), ♂, type of *S. oblongifolia* Bl., see Remarks.

MALAY PENINSULA. Kedah, Bongsu: *Abdullah 33049* (KEP), fr. VIII; Selangor, Sungai Buloh: *Sidik 44907* (KEP); Pahang, Kuantan, Bukit Beserah: *unknown coll. (illegible) 65682* (KEP); *ibid.*, Kembar Ulu Endau: *Awang 17280* (KEP); Negeri Sembilan, Sungai Mengala: *Wyatt-Smith 64094* (KEP); *ibid.*: ? *Obid & Jidin 18414* (KEP), buds VIII; Johore, Pontian: *Mustapha bin Sidch 69807* (KEP).

BANGKA. Lobok Besar: *NIFS bb. 34127* = *Kostermans 193* (BO, L).

BORNEO. British North Borneo, Sandakan, Sepitang, Seungau: *Cuadra A 3295* (KEP, L, SING), ♂ VI; Lumat, Beaufort: *Cuadra A 1300* (KEP, L); South and East Borneo, Hayup: *Winkler 2478* (L), ♂; East Kutai, Sangkulirang, Sungai Susuk region: *Kostermans 5526* (L), ♂ VI; N. of Balikpapan, Sg. Wain region: *Kostermans 4314* (L), young fr. X; Borneo, without loc.: *Müller s.n.* (L), ♂.

Remarks: In the Rijksherbarium there are four specimens, probably representing isotypes; two of them (L, nrs 898.321—219 and —220) bear the name of Korthals, of the two others the collector is not mentioned. The first of these is from Sumatra (L, nr 898.321—223, ♂ & fr.), the second one gives Java as place of origin (L, nr 925.250—479, ♂ & fr.), but this must be a mystification. Hildebrand does not mention the species from Java.

A tree, up to 30 m, rarely higher, without or with small buttresses; flowers green to yellowish, fruits green, turning blue when ripe. *Habitat*: Forest, preferably at low altitudes, under 300 m, some records from ca 1500 m. *Vernac. names*: lalan (Sum., Riouw & Dep.), kedongdong pergam,

kabu-kabu (Sum., Palemb.), kedondong (Mal. Penins.). *Flow. and fruit. times*: In Mal. Penins. fl. in VI (Per.), fr. in VIII (Ked.) and I—II (Per.). In Sum. fl. in V—VIII, fr. in X—XI (Easte.) and IV (Riouw & Dep.). In Born. fl. in VI—VII (Br. N. Born., S. & E. Born.), X (S. & E. Born.), fr. in VII, X, XII (S. & E. Born.).

10. *S. ridleyi* H. J. Lam, 1932a, 205 and 1932b, 379, fig. 25.

Type specimen: *Ridley 9653* in K, dupl. in SING.

Distribution: one specimen collected in the Malay Peninsula (Perak).

Small tree, branchlets unknown. *Leaves* ca $4\frac{1}{2}$ -jugate, glabrous; petioles unknown; interjugae terete, ?—7—8 cm long, medulla with some resiniferous ducts; leaflets subcoriaceous, not always strictly opposite, oblong, 15—20 cm long, 6—7.5 cm wide, base subrotundate, apex more or less abruptly acuminate, petiolules 3—3.8 cm long, terminal ones unknown; midrib not prominent above, strongly prominent below; secondary nerves 10—13, hardly conspicuous above, prominent below, straight or curved, irregular, angle 60° — 80° , soon diminishing, not or inconspicuously joined; tertiary nerves laxely reticulate, inconspicuous. *Inflorescences* and *flowers* unknown. *Infrutescences* (detached ones) glabrous, broadly paniculate, strongly angular, branched from base, up to 23 cm long, lowest ramifications up to 17 cm long. Pedicels 0.5—0.7 cm long. Fruiting calyx cupular or infundibuliform, 0.35 cm in diam., with acute triangular lobes; disc spreading; stamens inserted outside the disc or at base faintly connate with it. *Fruits* angular-ovoid, 1.2—1.9 cm long, 1.1—1.5 cm in diam., style strongly excentric; pericarp and putamen rather thin, embryo unknown.

MALAY PENINSULA. Perak, Gunong Keledang: *Ridley 9653* (SING), fr. and young fr. IX, *isotype* of *S. ridleyi* H. J. Lam.

Remarks: This incompletely known species resembles in many respects *S. oblongifolia* and I should certainly have identified the specimen as such, were it not for the fruits: in *S. ridleyi* the stigma is much more excentric than in *oblongifolia*.

11. *S. apiculata* Bennett in Hooker, Fl. Brit. Ind. 1, 1875, 537; Lam 1932b, 375, fig. 23; Cretzoid 1934, 265; Lam 1938, 126—157; Lam 1945, 611. — *Canarium spec.* Merrill 1916, 278.

Misc. inform.: Heyne 1950, 881; Hildebrand 1949h, 1950a, b; Sinia 1938, 69—102; Webber 1941, 441—465.

Type specimen: *Maingay 303* (*lectotype*) in K, dupl. in L.

Distribution: Sumatra, Malay Peninsula, Borneo, Central and South Celebes, Philippines (Luzon), Moluccas (Morotai, Ambon, Ceram).

SUMATRA. Eastcoast, Asahan, Masihi: *Krukoff 4089, 4119* and *4141* (BO, L, US), fr. X—XI; Sumatra, without loc.: *Forbes 3093* (FI, L), ♀.

MALAY PENINSULA. Selangor, Kuala Lumpur, Weld Hills: *Soh 40979* (KEP), fr. XI; Sungei Buloh: *Sidik 44909* (KEP); Malacca, Merlimau: *Alvins s.n.* (SING), ♂ IV; Johore, Mawai-Jemulang Road: *Corner 29029* (BO), buds II; *ibid.*: *Corner 29031* (BO, KEP), ♂ II; *ibid.*: *Corner 29440* (BO, KEP), fr. V; Tebrau: *Ridley 13512* (BM), detached fr. VIII; Singapore, Tanglin: *Ridley 6208* (BM), ♀; Bukit Timah: *Yassin 36413* (KEP), ♂ V; *ibid.*: *Sinclair s.n.* (L), fr. XI; Tanjong Gul: *Sinclair s.n.* (L); Malay Peninsula, without loc.: *Maingay 303* (L), fr., *isotype* of *S. apiculata* Benn.

BORNEO. Sarawak, Matang: *Beccari 1602* (FI), ♂ V; Matang Road: *Ridley s.n.* (BM), fr. I; no loc.: *Native coll. 1849* (US), fr.; Brunei: Pak Gabah: *Hlemmich 34514* (KEP), ♂ IV; British North Borneo, Upper Kinabalu, Gurulau

Spur: *Clemens* 50441 and 50563 (L), ♂ II; Borneo, without loc.: *Teysmann s.n.* (FI), fr.; South and East Borneo, Loa Djanan, W. of Samarinda: *Kostermans* 6692 (L), young fr. IV.

CELEBES. Central Celebes, Masamba, Patila: *NIFS bb.* 24503 (L).

MOLUCCAS. Morotai: *Main & Aden* 1103 (BO, L), fr. V; *ibid.*, G. Sangawo: *Main & Aden* 995 (BO, L), fr. V; Ceram, no loc.: *De Vriese s.n.* (L).

Remarks: Trees, 6—20 m, rarely up to 25 m high. Flowers white or yellowish, with yellow anthers. Fruits green, turning yellowish, red and ultimately purplish black. *Habitat:* Forest, collected at altitudes from 10 m to 1500 m, usually on dry grounds, rarely in swampy forests. *Flow. and fruit. times:* In Sum. fl. in VIII—IX (Palemb.), fr. in X—XI (Easte., Palemb.). In Mal. Penins. fl. in IX—XI (Pah., Selang.) and in II—V (Perak, Selang., Joh., Sing.), fr. in X—I (Selang., Per., Pah., Sing.) and in V—VI (Selang., Joh., Malacca). In Born. fl. in IV—V (Brun., Sar.) and in X—XI (Sar., Br. N. Born.), fr. in X and I (Sar., S. & E. Born.). In Luzon fl. in V, fr. in V and X. In Morotai fr. in V, in Ceram fl. in XI, in Ambon fl. between VII—XI.

12. *S. nervosa* H. J. Lam, 1932a, 206; Lam 1932b, 387, fig. 29.

Misc. inform.: Hildebrand 1949d, f, g, h, 1952d.

Type specimen: *Grashoff* 960 (*lectotype*) in L.

Distribution: Sumatra (Riouw, Djambi, Palembang), Malay Peninsula (Perak), Bangka, Borneo (W. and S. & E. Born.).

Branchlets 0.4—0.8 cm thick, ferruginous-tomentose at tips, medulla without resiniferous ducts. *Leaves* 1½—3½, mostly 2½-jugate; petioles slightly to strongly flattened at base, 4—9(—13.5) cm long, 0.25—0.4 (—0.6) cm wide at base, medulla with one to some resiniferous vascular bundles; interjugae 1.3—3.5(—4.5) cm long; leaflets oblong to ovate or rarely subrotundate, 5.5—17(—22) cm long, 3—7.5(—10.5) cm wide, base broadly acute to rounded, apex acuminate, acumen 0.5—1 cm long, indumentum variable, tomentose when young, afterwards glabrate, petioles 0.5—1.5(—2) cm long, terminal ones 1.3—2.5(—5) cm long; midrib hardly prominent above, prominent below, at both sides or only at lower side, the secondary nerves only below, with small, i. s. ferruginous, fasciculate to dendriform hairs, sometimes mixed with simple ones; secondary nerves 10—15(—18), not prominent above, prominent below, angle with midrib 80°—90° at base, 65°—80° for the rest, more or less curved, diminishing, in base and apex — rarely also elsewhere — archingly joined near margin; tertiary nerves transverse, conspicuous, especially below. *In-florescences* axillary or lateral, ferruginous-tomentose, often being short, leafless, axillary or lateral shoots with terminal bud, narrowly paniculate, 1.5—5.5 cm long; bracts deltoid, tomentose without, glabrous within; pedicels tomentose. *Flowers* glabrous, sessile, ca 0.2 cm long. *Calyx* lobes acutely deltoid. *Petals* ovate or orbicular, with hardly inflexed apiculum. *Stamens* inserted outside disc, mono- or slightly didynamous, 0.125—0.15 cm long in ♂ flowers, smaller in ♀ ones; filaments broadened at base; anthers ovate to lanceolate. *Disc* thick-annular or (in ♀ flowers) cupular, radially furrowed and with undulate rim. *Ovary* ellipsoid, stigma subrotundate, subsessile, in ♂ flowers ovarial rudiment little exsert from disc. *Infrutescences* and *fruits* unknown.

SUMATRA. Riouw and Dependencies, Indragiri, Kuala Belilas: *NIFS* bb. 27621 (L); *ibid.*, Danau Mengkuang: *NIFS* bb. 27494 (L); Kuantan Districts, Tjerenti: *NIFS* bb. 25220 (L); Palembang, Banjuasin and Kubu Districts: *Grashoff* 960 (L), ♂ II, *lectotype* of *S. nervosa* H. J. Lam.

MALAY PENINSULA. Perak, Trolak: *Ja'amat & Tachun* 43404 (KEP, L), ♂ II.
BORNEO. West Borneo, Melawi, Melaban ketjit: *NIFS* bb. 28349 (L); South and East Borneo, West Kutei, Mujup: *NIFS* bb. 16802 (L).

Remarks: *Habitat*: collected at low altitudes (up to 60 m), in West Borneo once at 345 m. *Vernac. names*: kedudong (Mal. Penins.). *Flow. time*: In Sum. (Palemb.) and Malay Penins. (Perak) fl. in II.

13. *S. rubra* Ridley, Kew Bull. 1930, 86; Lam 1932b, 378, fig. 24.

Type specimen: *Haviland* 2269 in BM, dupl. in L.

Distribution: Malay Peninsula, Borneo (Sarawak).

MALAY PENINSULA. Perak, Trolak: *Ja'amat & Tachun* 43423 (KEP), ♀ II; *ibid.*: *Ja'amat* 43500 (KEP); Selangor, Sungei Buloh: *Symington* 44727 (KEP); Buloh Subang: *Ja'amat & Tachun* 37985 (KEP), young fr. I; Negri Sembilan, Seremban, Sungei Mengala: *Wyatt-Smith* 70334 (KEP); Pahang, Kemansul: *Browne* 40867 (KEP).

BORNEO. Sarawak, near Kuching: *Haviland* 2269 (BM, L), ♂ I, *type* of *S. rubra* Ridl.

Remarks: Medium-sized tree, up to 20 m (type specimen recorded as a "large tree"), buttressed, bark "smooth greenish yellow lenticellate scaly" (*Wyatt-Smith* 70334). Petals red, fruits pink to red. *Vernac. names*: kedondong (Mal. Penins.). *Flow. and fruit. times*: In Mal. Penins. fl. in II, fr. in II—III. In Sarawak fl. in I.

14. *S. violacea* H. J. Lam, 1932a, 205 and 1932b, 379, fig. 26.

Misc. inform.: Hildebrand 1949c.

Type specimen: *NIFS* bb. 13040 in BO, dupl. in L.

Distribution: one specimen collected in Borneo (S. & E. Born.).

Tree, ca 40 m high. Branchlets thick, 1—1.2 cm thick, glabrous, medulla without resiniferous ducts. *Leaves* glabrous, 3½—5½-jugate; petioles 7.5—14.5 cm long, strongly flattened at base, ca 1 cm broad, striate, transversely rugose when dry, medulla with many resiniferous vascular bundles; interjugae 2—4 cm long, lowest ones shortest; leaflets oblong to oblong-lanceolate, 10—16 cm long, 4.3—5 cm wide, base rounded to broadly acute, apex gradually narrowed, not or hardly acuminate, petioles 1.2—1.5 cm long, terminal ones 2—3.5 cm; midrib not prominent above, very prominent below, as are secondary nerves; secondary nerves 8—11, angle with midrib 70° (in base)—30° (in apex), not joined near margin; tertiary nerves laxely reticulate, hardly conspicuous at both sides. *Inflorescences* and *flowers* unknown. *Infrutescences* axillary, paniculate, glabrous, branched from the base, 2.5—4.5 cm long. Pedicels ca 0.5 cm long, 0.3—0.4 cm in diam. Fruiting calyx and disc under the fruit annular, calyx more or less trigonous; remainders of stamens inserted on rim of disc. *Fruits* (descr. f. Lam) subglobose, 1.5—1.6 cm diam., style strongly excentric, near pedicel; putamen 0.07 cm thick, cotyledons pinnate?, plicate in the seed.

BORNEO. South and East Borneo, Tanah Bumbu, Kamp. Baru: *NIFS* bb. 13040 (L), infrut. without fr. XII, *isotype* of *S. violacea* H. J. L.

Remarks: In many respects resembling *S. laevigata*, but differing by having fewer secondary nerves, much smaller and stouter infrutescences and thicker fruit pedicels.

Sectio ICICOPSIS

15. *S. nana* H. J. Lam, 1932a, 207 and 1932b, 403, fig. 39. — *Fig. 11*.
 Type specimen: *Beguin 585* in L.
 Distribution: Sumatra (Eastcoast), Malay Peninsula (Selangor).
 Tree. Branchlets thin, terete, 0.2—0.4 cm thick, tips densely erect-pilose

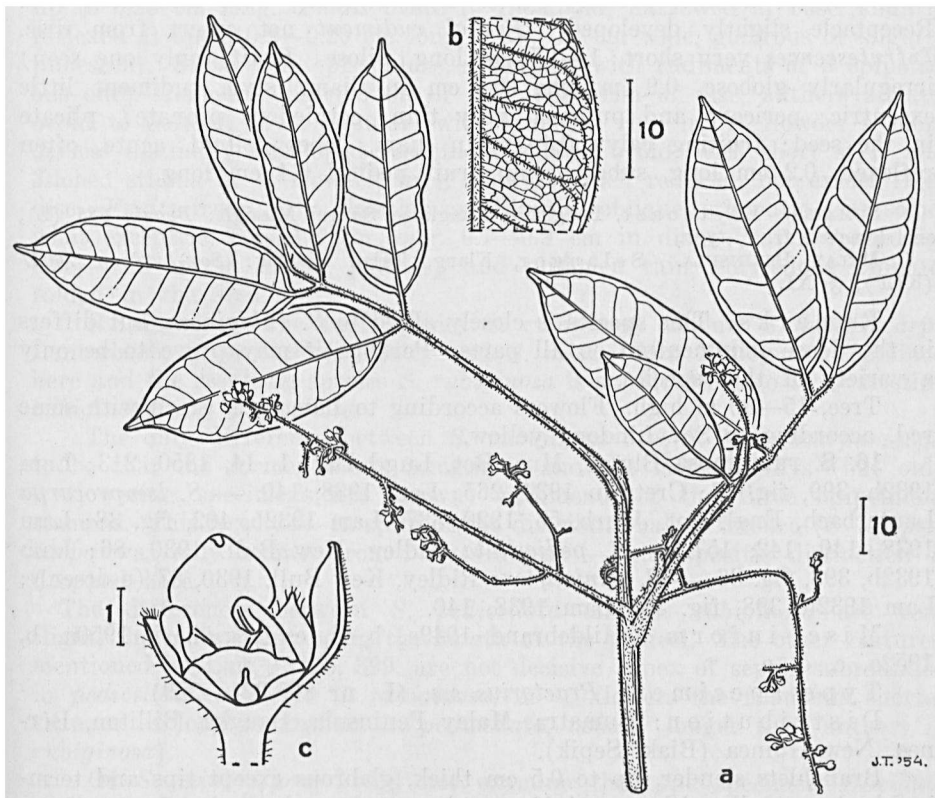


Fig. 11 — *Santiria nana* H. J. Lam — a. branchlet showing leaves and ♂ inflorescence; b. part of leaflet showing venation and indumentum; c. ♂ flower, longitudinal section. — dimensions in mm — from *Sow-Lindong 76027*.

as are petioles, rhachis, petiolules and inflorescences, medulla without resiniferous ducts. *Leaves* 1½—4½-jugate; petioles terete, 1.5—4 cm long, medulla with some to rather many resiniferous ducts; interjugae 1—3.3 cm long; leaflets ovate-lanceolate to (especially the apical ones) obovate, 2—7.5 cm long, 1—3.5 cm wide, base broadly acute to more or less rounded, often oblique, apex shortly and bluntly acuminate, petiolules 0.15—0.6 cm long, terminal ones 0.5—1.5 cm long; both sides of leaflets pilose, especially on lower side and on nerves; midrib prominent at either side, especially below;

secondary nerves 8—12, conspicuous at either side, angle with midrib 65°—80°, more or less distinctly archingly joined near margin; tertiary nerves reticulate, a stronger one between and parallel with every two secondary nerves. ♂ *Inflorescences* (♀ unknown) axillary, 4—9 cm long, branched from base, all branches up to pedicels densely pilose; pedicels 0.05—0.15 cm long. ♂ *Flowers* ca 0.15 cm long in bud. *Sepals* deltoid, ca 0.1 cm long and wide, pilose without, glabrous within. *Petals* rhomboid, ca 0.2 cm long and wide, pilose without, inner side with some hairs, apiculum slightly inflexed. *Stamens* 3, episepalous, inserted under rim of disc, ca 0.15 cm long, anthers adnate, broadly ovate. *Disc* cupular, with undulated rim. Receptacle slightly developed. *Ovarial rudiment* not exert from disc. *Infrutescences* very short, 1—1.5 cm long, pilose. *Fruit* (only one seen) irregularly globose, 0.9 cm long, 0.7 cm in diam., style rudiment little excentric; pericarp and putamen very thin; cotyledons pinnate?, plicate in the seed; fruiting calyx 0.4 cm in diam., lobes deltoid, acute, often reflexed, 0.2 cm long, subglabrous; fruit pedicel 0.4 cm long.

SUMATRA. East coast, Bengkalis, Panglang, Sungei Missigit: *Beguin 585* (L), one detached fr. I, *type*.

MALAY PENINSULA. Selangor, Klang, Talan Binting: *Sow-Lindong 76027* (KEP), ♂ XI.

Remarks: This species is closely allied to *S. rubiginosa*, but differs in the dense indumentum on all parts. Perhaps it may prove to be only a variety of that species.

Tree, 15—30 m high. Flowers according to Lam, l. c., green with some red, according to Sow-Lindong yellow.

16. *S. rubiginosa* Blume, Mus. Bot. Lugd.-Bat. 1, 14, 1850, 213; Lam 1932b, 399, fig. 37; Cretzoiu 1934, 265; Lam 1938, 140. — *S. lamprocarpa* Lauterbach, Engl. Bot. Jahrb. 56, 1920, 337; Lam 1932b, 402, fig. 38; Lam 1938, 140, 142; 157. — *S. pedicellata* Ridley, Kew Bull. 1930, 86; Lam 1932b, 398, fig. 36. — *S. minimiflora* Ridley, Kew Bull. 1930, 87 (e deser.); Lam 1932b, 398, fig. 35; Lam 1938, 140.

Misc. inform.: Hildebrand 1949a, b, d, e, f, g, h, i, 1950a, b, 1952a, c, d, e.

Type specimen: *Praetorius s.n.* (L, nr 898.321—229).

Distribution: Sumatra, Malay Peninsula, Bangka, Billiton, Borneo, New Guinea (Biak, Sepik).

Branchlets slender, up to 0.5 cm thick, glabrous except tips and terminal buds, medulla without resiniferous ducts, sclerenchymatic. *Leaves* 1½—5½(—6½)-jugate; petioles not or hardly flattened at base, 1.5—7.5 cm long, glabrous or more or less densely and minutely tomentose, medulla with one or some few resiniferous vascular bundles; interjugae 1.2—5.2 cm long; leaflets elliptic or ovate to lanceolate or lanceolate-oblong, not always strictly opposite, terminal leaflet often wanting, 3—11(—14.5) cm long, 1—5.5(—7) cm wide, base more or less broadly acute, sometimes more or less abruptly narrowed, apex usually acuminate, sometimes bluntly acute, acumen up to 1.5 cm long, petiolules 0.3—1(—1.5) cm long, terminal ones 0.8—3.2(—4) cm, leaflets glabrous except sometimes on midrib below; midrib and secondary nerves hardly prominent below; secondary nerves 9—15 and some more in apex, angle 60°—80°, furcate near margin and more or less

distinctly archingly joined, very slender; tertiary nerves laxely reticulate, very slender, often a stronger one between every two secondary ones, reaching halfway the margin. *Inflorescences* axillary or lateral, glabrous or minutely pulverulent, branched from base or (especially ♀ ones) with short peduncle, paniculate, (1—)4—16.5 cm long, lowest ramifications up to 10 cm long; bracts minute, narrowly deltoid, deciduous or subpersistent; pedicels very slender, 0.05—0.6 cm long. *Flowers* 0.15—0.2 cm long in bud. *Calyx* with 3 nearly free, ovate to deltoid, subacute segments, glabrous or slightly pubescent, especially at margins, in ♂ flowers 0.1—0.15 cm, in ♀ flowers up to 0.25 cm long. *Petals* ovate to rhomboid, narrowed at base, slightly inflexed at apex, 0.2—0.25 cm long, 0.15—0.2 cm wide, glabrous or slightly pubescent. *Stamens* 3, episepalous, sometimes with rudiments of 3 epipetalous ones, filaments inserted on or very near rim of disc, anthers adnate, ovoid to deltoid. *Disc* cupular, with truncate rim, in ♀ flowers a more or less distinctly developed receptacle. *Ovary* ovoid, with short style and 3-lobed stigma in ♀ flowers, in ♂ flowers much reduced, not exsert from disc. *Fruits* irregularly globular or ellipsoid, oblique, stigmatic scar somewhat excentric, 0.8—1.3 cm long, 0.7—0.9 cm in diam.; calyx spreading, 0.35—0.45 cm in diam.; pericarp and putamen thin, cotyledons pinnate, folded in the seed.

Remarks: The four species *S. rubiginosa* Blume, *S. lamprocarpa* Lauterbach, *S. pedicellata* Ridley and *S. minimiflora* Ridley are combined here and the resulting species *S. rubiginosa* is subdivided into two varieties, *rubiginosa* and *pedicellata*.

The only difference between *S. rubiginosa* and *S. lamprocarpa* seems to be that the former shows sometimes and the latter always (but only 2 flowering specimens are known) rudiments of the three epipetalous stamens. This is why — in spite of the distributional difference (*S. lamprocarpa* was only known from New Guinea) — the specific distinction is dropped here.

The differences between *S. pedicellata* and *S. rubiginosa* are very slight, the main point being the length of the pedicel. The other features, mentioned by Lam 1932b, 399, are not decisive (apex of sepals subrounded in *pedicellata*, subacute in *rubiginosa*, in ♀ flowers the filaments shorter than or as long as anthers in *pedicellata*, usually longer than anthers in *rubiginosa*).

Of *S. minimiflora* I did not examine the type specimen *Haviland 1783* (1703 according to Ridley, l. c.), but the description shows that the only difference with *S. rubiginosa* lies in the somewhat smaller dimensions of the leaves. The length of the pedicels gives it a place in var. *pedicellata*.

Sterile specimens are sometimes hardly to be distinguished from *S. griffithii* and the identification of such specimens is therefore not always sure. *S. rubiginosa* has usually fewer pairs of leaflets, which are, however, larger.

The type variety and var. *pedicellata* are only distinguishable when fertile material is at hand. The sterile material is here mentioned under the type variety (except *Becking 77*, which possibly belongs to var. *pedicellata*).

Var. *rubiginosa* — *S. rubiginosa* Blume — *S. lamprocarpa* Lauterbach.
— Pedicels 0.1—0.3 cm long, shorter than or as long as the flowers.

Distribution: as the species.

SUMATRA. East coast, Lower Langkat, Alur Gusta: *NIFS* bb. 16416, bb. 16420, bb. 16421 and bb. 16597 (L); Tapanuli, Barus, Kobun, M. Tapus: *NIFS* bb. 31020 (L); West coast, Bangkinang, Sungai Durian: *NIFS* bb. 23387 (L); Riouw and Dependencies, Kuantan Districts, Pulau Kedondong: *NIFS* bb. 24802 and bb. 24829 (L); *ibid.*, Djake: *NIFS* bb. 26479 (L); Indragiri, Muara Padjangki: *NIFS* bb. 27492 (L); *ibid.*, Kwala Belilas: *NIFS* bb. 27595 and bb. 27634 (L); *ibid.*, Pagarumbei, Tjenako river: *NIFS* bb. 25796 and bb. 26105 (L); *ibid.*, Danau Mengkuang: *NIFS* bb. 27496 (BO); *ibid.*, Kw. Keritang: *NIFS* bb. 23704 (BO); Palembang, Lematang Iir, Semangus: *NIFS* bb. 31701 (L); Sumatra, without loc.: *Forbes* 2773 (BM, CAL), ♂; *ibid.*: *Practorius* s.n. (L, nr 898.321—229), type of *S. rubiginosa* Bl.

MALAY PENINSULA. Perak, Larut: *King's coll.* 5573 (A, CAL, E, FI, MEL, W), young fr. II; *ibid.*: *King's coll.* 5545 (CAL, DD, G), young fr. II; Batang Padang Districts: *Kunstler* 7997 (CAL, DD, P, Z), young fr. VIII; *Gopeng: King's coll.* 5937 (CAL, FI, G, L), fr. IV; Trolak: *Speldewinde* 5379 (KEP); Bubu: *Symington* 29881 (KEP); *ibid.*: *Wray* 3865 (CAL), ♂ III; no loc.: *Scortechani* s.n. (CAL), ♂; Solangor, Rantau Panjang: *Zain* 24900 (KEP); Gombak: *Hamid & Ja'amat* 10916 (KEP), fr. XI; Bukit Cherake: *Wyatt-Smith* 70355 (KEP), young fr. III; Kuang: *Symington* 22133 (KEP), young fr. I; Ulu Langat, Sungai Puteh: *unknown coll.* 50422 (KEP); Kuala Lumpur, Public Gardens: *Meh* 10323 (KEP), fr. VI; *ibid.*, Ayer Hitam: *Omar & Ja'amat* 10901 (KEP), young fr. XI; *ibid.*, Weld Hills: *Abd. Rahman* 2311 (KEP), ♂ III; no loc.: *Boswell* 49914 (KEP); Pahang, Rotan Tunggal: *Kalong* 23401 and *Osman* 28510 (KEP); Kuantan, Pekan Road: *Ja'amat & Sow* 43187 (KEP); Tras: *Strugnell* 20235 (KEP), fr. IV; Johore, Kluang, Rengam: *Cousens* 69788 (KEP); Malay Reservation, Pekan Nenas: *Yasin bin Abu* 70908 (KEP); West Muar, Lenga, Ma'okil: *Sulaiman bin Manja* 70207 (KEP); Pontian: *Ywans bin Ismail* 70361 (KEP); Singapore, Bukit Timah: *Corner* 34953 (L), young fr. III; Changie: *Ridley* 1853 (BM), fr. XII.

BANGKA. South Bangka, Rindik-Toboali: *NIFS* bb. 29216 (L).

BILLITON. no loc.: *Herb. Biliton (coll. unknown)* 78 (L).

BORNEO. West Borneo, Melawi, B. Ulu Bora ketit: *NIFS* bb. 29048 (L); *ibid.*, B. Kelawaideras: *NIFS* bb. 28120 (BO); South and East Borneo, Upper Mahakam, D. Parei: *NIFS* bb. 20689 (BO, L); Sampit: *NIFS* bb. 32335 = *Buwaida* 8 (BO, L); West Kutei, Mujup: *NIFS* bb. 16837, bb. 16844 and bb. 16867 (L).

NEW GUINEA. Biak: *NIFS* bb. 30775 and bb. 30866 (L); North East New Guinea, Sepik region: *Ledermann* 9668 (L), ♀, type of *S. lamprocarpa* Laut.; *ibid.*: *Ledermann* 9695 (L), young fr.; *ibid.*: *Ledermann* 9812 (L), ♂.

Remarks: Trees, rarely higher than 30 m, sometimes buttressed, bark greyish, smooth and flaking. Once reported as a "creeper" (*Ridley* 1858). Resin white. Flowers green, disc yellow, bracts nearly white. Fruits green when young, turning red, finally blue. *Habitat*: From sea level up to 500—600 m, one record (Pahang) from 1200—1300 m. *Vernac. names*: resung, paha rusa (Sum., East.), maradjalai (Sum., Riouw), kedondong, k. matahari (Malay Penins.), k. bukit, seruyan batu (Joh.), kilat (Selang.), babi kurus (Perak), palai (W. Born.), salak gading (Saraw.), kauwtjulie, batu (S. & E. Born.). *Flow. and fruit. times*: In Sum. fl. in III & IX (Pal.), fr. in IV—V, VIII (Pal.), X—XI (Pal., Riouw). In Mal. Penins. fl. in I (Mal.), III (Sel.), VII (Perak), fr. in XI—VI. In Born. (Sar.) fl. in VIII—X, fr. in III.

Var. *pedicellata* (Ridley) nov. comb. — *S. pedicellata* Ridley — *S. minimiflora* Ridley (e descr.). — Pedicels 0.2—0.6 cm long, longer than flowers.

Type specimen: *Haviland* 1866.

Distribution: Borneo (Sarawak, W. Borneo).

BORNEO. West Borneo, Paloh: *Becking* 77 (L); Sarawak, Sixth Mile:

Egon 559 (KEP), fr. XI; Rejang, Sibul: *Haviland 1866* (SING), ♀ X, type of *S. pedicellata* Ridl.; no loc.: *Beccari 3319* (FI), fr., see Remarks.

Remarks: The Florence sheet of *Beccari 3319* bears the correct number on the slip of paper, which is fixed to the plant, but on the sheet the wrong number *3165* has been written.

17. *S. griffithii* (Hooker f.) Engler in DC, Mon. Phan. 4, 1883, 155; Lam 1932b, 394, fig. 34; Lam 1938, 140.

Misc. inform.: Heyne 1950, 881; Hildebrand 1949a, b, e, f, g, h, 1950 b, 1952a, b, c, d, e; Sinia 1938, 80, 85, 92; Webber 1941, 441—465.

Type specimen and basonym: *Griffith 1148* (K, dupl. in L), type of *Trigonochlamys griffithii* Hooker f.; Trans. Linn. Soc. 23, 1, 1860, 170.

Distribution: Sumatra, Malay Peninsula, Bangka, Borneo.

SUMATRA. Tapanuli, Sibolga c. a., Barus: *NIFS bb. 23441* (L); Riouw and Dependencies, Indragiri, Muara Padjamki: *Buwalda 6409* (BO, L), fr. IV; ibid., Muara Serange: *NIFS bb. 30051* (L); Kuantan Districts, Sungei Rambei: *NIFS bb. 23477* (L); ibid., Muara Pantei: *NIFS bb. 23852* (L); ibid., Djake: *NIFS bb. 26464* (L); Palembang, Lematang Iir, Semangus: *NIFS bb. 32221* (L) and *bb. 32236* (BO); Musi Ulu, Semangus: *NIFS bb. 23568* (BO); no loc.: *Boswezen T. O. 2* (L), fr. III.

MALAY PENINSULA. Perak, Larut: *King's coll. 10221* (L), fr. I; ibid., Gopeng: *King's coll. 4625* (L), fr. VII; Trolak: *Browne 43495* (KEP); Selangor, Rantau Panjang: *Zain 24899* (KEP); Kuala Belata: *Hamid 32393* (KEP); Sungei Bulang Subang: *Ja'amat & Tachun 37991* (KEP); Sungei Buloh: *Ja'amat 15324*, *Symington 38126*, *Symington 44705* and *Sidik 44908* (KEP); Pahang, Petoh, Sungei Rompin: *Dolman 6772* (KEP), ♀ IV; Raka Hill: *Zin 27509* (KEP); Mentas: *Bidun 15689* (KEP), fr. V; Malacca, Bukit Sedanan: *Mat Pol 18259* (KEP); Batang Malaka: *Ridley s.n.* (BM); Bukit Senggeh: *unknown coll. 9297* (KEP); Johore, Mersing: *Latiff bin Dimal 70091* (KEP); Singapore, Bukit Timah: *Corner 34872* (KEP, L), ♂ IV; Malay Peninsula, without loc.: *Griffith 1148* (L), young fr., isotype of *Tr. griffithii* Hook.f.

BANGKA. North Bangka, Sungei Buluh: *NIFS bb. 20574* (BO, L), buds XII; Perlang: *NIFS bb. 34082* = *Kostermans 143* (BO, L); ibid.: *NIFS bb. 34114* = *Kostermans 180* (BO, L), fr. IX; South Bangka, Rindik Toboali: *NIFS bb. 29214* (L); ibid.: *NIFS bb. 29215* (L), buds IX; Lobok Besar: *Anta 556* and *NIFS bb. 34031* = *Kostermans 94* (BO, L), ♂ IX; ibid.: *Anta 214* and *NIFS bb. 33973* = *Kostermans 35* (BO, L), ♀ VIII; ibid.: *Anta 570* (BO, L), ♀ IX; ibid.: *Anta 1105* (BO, L), fr. X; ibid.: *Anta 846* and *NIFS bb. 33999* = *Kostermans 61* (BO, L); ibid., G. Pading: *Anta 979* (BO, L), fr. IX; G. Mangkol: *Anta 758* (BO, L).

BORNEO. Sarawak, Sipang, Sabu: ? *Abdulmajid 64105* (KEP); Kuching: *Beccari 417* (FI), ♂ VIII; ? Semengoh: *unknown coll. 377* (KEP), gall fl. X; no loc.: *Beccari 2692* (FI), ♂, isotype of *S. bornensis* Engler; British North Borneo, Tawau, Umas-Umas: *Maidin 36910* = *S. H. 4132* (BO, KEP), young fr. XI; South and East Borneo, Tidung c. a.: *NIFS bb. 18347* (BO); ibid., Tanah merah: *NIFS bb. 18134* (BO), fr. XII; ibid.: *NIFS bb. 18243* (BO); West Kutei, Mujup: *NIFS bb. 16794*, *bb. 16863*, *bb. 16869* and *bb. 16896* (L); Bulungan, Nunukan: *NIFS bb. 26210* (L); Loa Djanan, West of Samarinda: *Kostermans 6405* (L), fr. IV; ibid.: *Kostermans 6581* (L), ♂ IV; Tdg Bangko, near Mahakam River estuary: *Kostermans 7106* (L), young fr. V; Balikpapan, Sungei Wain: *Kostermans 4045* (L), ♂ X, *4055* (L), fr. X and *4300* (L); ibid., Mentawir: *Kostermans 4417* (L), ♂ X.

Remarks: Lam, 1932a, 206 and 1932b, 395, distinguishes three forms: *genuina* (small leaflets, large flowers and fruits), *bornensis* (small leaflets, smaller flowers and fruits) and *macrophylla* (larger leaflets). It is true that there is much variability in the flower dimensions, but the transitions are so gradual, that any subdivision must remain arbitrary

and unnatural. The variability is at least partly due to the growth of the calyx as the fruit ripens and is, consequently, much less pronounced in ♂ than in ♀ flowers.

I only saw one specimen of the two, cited by Lam as forma *macrophylla* (*Othaman* 529 with the leaflets 9—13 cm long) and I am inclined not to make a separate form of it.

For the distinction of this species from *S. rubiginosa*, see there.

Moderate-sized trees, 12—35 m high, buttressed, with scaling, greyish or yellowish bark that exudes a sticky, yellowish or black resin (perhaps light coloured when fresh, blackening when older). Flowers recorded as being brownish, orange or greenish (calyx green and brown pubescent, according to Lam), with white petals. Fruits green, turning red and finally blue or purple. *Habitat*: Forest, from sea level up to 300 m. Once collected in swampy country (Bangka). *Vernac. names*: bebeka, kedungdung (Sum., Palemb.), kasai bukit, kedundong (Mal. Penins.), rengas, r. merah, mesanit, menjantung (Bangka), pamutalun (Br. N. Born.), tampiras, ampiras, buno, bumbun gunung, kumbajau burung (S. & E. Born.). *Flow. and fruit. times*: In Sum. fl. in VI—VIII, fr. in II—IV (Pal., Riouw) and VII—IX (Pal.). In Malay Penins. fl. in II—IV, fr. in I and VII (Per.). In Bangka fl. in VIII—IX, fr. in IX—X. In Born. fl. in VI (S. & E. Born.), VIII (Sar.), XI (S. & E. Born.), fr. in XI—XII (Br. N. Born., S. & E. Born.) and in IV—V (S. & E. Born.).

Excluded species.

Santiria boemiensis Kanehira & Hatusima, nomen nudum based on *Kanehira & Hatusima 12790* from Bumi, Nabire, New Guinea
= *Meliaceae* spec.

Santiria yunnanensis Hu, Bull. Fan Mem. Inst., Bot. ser. 10, 3, 1940, 129
= *Protium yunnanense* (Hu) Kalkman, nov. comb.

Examination of the type specimen of *S. yunnanensis* (*Wang 78977*) learned that this does not belong to *Santiria*, but certainly to the genus *Protium*. It is related to *P. serratum* (Wall. ex Colebr.) Engl., differing by having glabrous leaves and larger fruits.

Bibliography.

- BURKILL, J. H., Dictionary of the Economic Products of the Malay Peninsula 1, 1935.
 CRETZIOU, P., Miscellanea systematica et phytogeographica III. 1. Burseraceae malayanac — Fedde, Rep. 36, 1934.
 HENDERSON, M. R., The flora of the Limestone Hills of the Malay Peninsula — J. Mal. Branch Roy. As. Soc. 17, 1, 1939.
 HEYNE, K., De nuttige planten van Indonesië, 3rd ed., The Hague/Bandung 1950.
 HELDEBRAND, F. H., Series lists of tree names — Rep. For. Res. Inst. Bogor
 1949a: E. Borneo, Samarinda — Rep. F.R.I. nr 2;
 1949b: S. Borneo, Kapuas-Barito — ibid. nr 3;
 1949c: S. & E. Borneo, Bandjermasin & Hulu Sungei — ibid. nr 5;
 1949d: Sumatra, Djambi — ibid. nr 8;
 1949e: Sumatra, Eastcoast — ibid. nr 9;
 1949f: Sumatra, Bengkalis & Indragiri — ibid. nr 11;
 1949g: Bangka & Billiton — ibid. nr 12;
 1949h: Sumatra, Palembang — ibid. nr 19;
 1949i: Sumatra, Benkulen — ibid. nr 22;

- 1950a: Sumatra, Westcoast — *ibid.* nr 26;
 1950b: Sumatra, Tapanuli — *ibid.* nr 29;
 1950c: Sumatra, Atjeh-Simalur — *ibid.* nr 32;
 1950e: Java, Madura — *ibid.* nr 35;
 1951a: Celebes, Manado — *ibid.* nr 44;
 1951d: Java, Madura (revised) — *ibid.* nr 50;
 1952a: W. Borneo (revised) — *ibid.* nr 54;
 1952b: E. Borneo, Bulungan & Berau (revised) — *ibid.* nr 55;
 1952c: Sumatra, Eastcoast (revised) — *ibid.* nr 56;
 1952d: Bangka & Billiton (revised) — *ibid.* nr 57;
 1952e: E. Borneo, Samarinda (revised) — *ibid.* nr 58.
 HUSSON, A. M. & LAM, H. J., Scandent Burseraceae — *Blumea* 7, 1, 1952a.
 —, Dacryodes in New Guinea — *Blumea* 7, 1, 1952b.
 LAM, H. J., Beiträge zur Morphologie der Burseraceae II — *Ann. Jard. Bot. Buitenzorg* 42, 1932a.
 —, The Burseraceae of the Malay Archipelago and Peninsula — *Bull. Jard. Bot. Buitenzorg, Sér. 3*, 12, 1932b.
 —, On the phylogeny of the Malaysian Burseraceae—Canarieae — *Blumea* 3, 1, 1938.
 —, Notes on the historical phytogeography of Celebes — *Blumea* 5, 3, 1945.
 — in C. A. Backer, *Flora van Java VI B*, 1948.
 MERRILL, E. D., Reliquiae Robinsonianae — *Phil. J. Sc.* 11, 1916.
 —, An enumeration of plants collected in Sumatra by W. N. & C. M. Bangham — *Contr. Arnold Arb.* 8, 1934.
 PREFERENTIAL NAMES for important tree species in Indonesia — *Spec. Publ. For. Res. Inst. Bogor*, 6, 1952.
 QUESUMBING, E., New or interesting Philippine plants II — *Phil. J. Sc.* 76, 3, 1944.
 SINIA, H. R., Zur Phylogenie der Fiederblätter der Burseraceen und verwandter Familien — *Ann. Jard. Bot. Buitenzorg* 48, 1938.
 SYMINGTON, C. F., Imperfectly known species, misplaced in the Flora of the Malay Peninsula — *Kew Bull.* 1937.
 WEBBER, I. E., Systematic anatomy of the woods of the Burseraceae — *Lilloa* 6, 1941.

List of collectors' numbers.

The number in parentheses indicates the number of the species in the present paper. VII = Triomma, VIII = Dacryodes, IX = Santiria.

- Abdullah 33049 (IX, 9); Abdulmajid 64103 (IX, 3), 64105 (IX, 17); Abot 37143 (VIII, 10); Abot & Suhaig 37138 (IX, 8); Achmat bb. 34316 (IX, 4), bb. 34318 (IX, 8), bb. 34358 (VIII, 11), bb. 34364 (VIII, 17), bb. 34368 (IX, 3), bb. 34399 (IX, 3); Aden, see Main & Aden; Ahamed 40410 (VIII, 17); Alambra 27097 (VIII, 10); Ali 34117 (IX, 2), 73791 (IX, 8); Alvins 529 (VIII, 8), 1289 (VII), s.n. (IX, 11); Anta 185 (IX, 8), 214 (IX, 17), 284 (IX, 8), 394 (IX, 3), 497 (VIII, 14), 524 (VII), 530 (IX, 3), 556 (IX, 17), 570 (IX, 17), 758 (IX, 17), 823 (IX, 3), 825 (IX, 8), 837 (VII), 844 (VIII, 14), 846 (IX, 17), 880 (VII), 945 (VIII, 4), 973 (VII), 979 (IX, 17), 986 (VIII, 4), 988 (VIII, 14), 1006 (VIII, 4), 1070 (IX, 3), 1105 (IX, 17), 1128 (VIII, 4), 1129 (IX, 3); Apostol SH 7684 (VIII, 14), 44236 (VIII, 14); Awang 17280 (IX, 9), 31321 (VIII, 14), 42385 (IX, 8), 47883 (VIII, 3).
 Baba 10773 (IX, 3), 10788 (VIII, 14), 10800 (VIII, 8), 31504 (IX, 8), 31508 (IX, 8), 31518 (VII); Ba'ee & Maidin 36954 (VIII, 3); Bangham 1096 (VIII, 1); Barnes 517 (VIII, 3), 597 (VIII, 3); Bartlett 6872 (IX, 3); Beccari 390 (VIII, 1), 417 (IX, 17), 650 (IX, 6), 738 (VIII, 2), 1215 (IX, 4), 1602 (IX, 11), 2559 (IX, 5), 2692 (IX, 17), 2937 (VIII, 3), 3059 (IX, 7), 3319 (IX, 16), 3497 (IX, 4), 3756 (IX, 8); Becking 77 (IX, 16); Beguin 585 (IX, 15); Bidin bin Samad 70259 (IX, 8); Bidun 15689 (IX, 17); Biliton 78 (IX, 16); † Binnendijk 74 (VIII, 4); Borden 808 (VIII, 3); Boswell 49914 (IX, 16); Boswezen T. O. 2 (IX, 17); Brass & Versteegh 13535 (VIII, 9); Brown 29377 (VIII, 14); Browne 38480 (VIII, 3), 38485 (VIII, 15), 38489 (VIII, 2), 40867 (IX, 13), 43451 (IX, 8), 43487 (VIII, 2), 43495 (IX, 17), 43615 (IX, 8); Buwalda 8 (IX, 16), 25 (IX, 8), 6381 (VIII, 4), 6409 (IX, 17), 6624 (IX, 9), 7629 (IX, 9), 7754 (IX, 8), 7755 (IX, 8), 7834 (IX, 8); Buxton 546 (VIII, 4).
 Cantleys coll. 2585 (VIII, 14); Carr 27077 (VIII, 3); Carrier 53375 (VIII, 7);

- Clemens 1837 (VIII, 18), 31095 (VIII, 13), 50441 (IX, 11), 50563 (IX, 11), s.n. (IX, 8); Corner 26046 (IX, 8), 28708 (IX, 2), 29029 (IX, 11), 29031 (IX, 11), 29440 (IX, 11), 29952 (IX, 2), 29957 (IX, 8), 30334 (IX, 8), 30474 (IX, 8), 30498 (IX, 3), 31949 (VIII, 10), 32536 (VIII, 8), 34872 (IX, 17), 34910 (VIII, 10), 34953 (IX, 16), 34956 (VII, 3), 36804 (IX, 8), 36970 (VIII, 14), s.n. (VIII, 1; VIII, 2; VIII, 14); Cousens 69788 (IX, 16); Creagh s.n. (VIII, 2; VIII, 14); Cuadra A 1094 (VIII, 2), A 1300 (IX, 9), A 1301 (VIII, 10), A 1303 (VIII, 10), A 2124 (VII, 4), A 3295 (IX, 9); Curtis 495 (VIII, 14), 1431 (VIII, 2), 1433 (VIII, 14), 3648 (VIII, 5), s.n. (IX, 6).
- Daros 21539 (VIII, 4); Daud & Tachun 35703 (IX, 3), 36107 (VIII, 2); Debab 40155 (VII, 4), 40157 (VIII, 2); Desch 46110 (VIII, 4), 46118 (VIII, 4); D.F.O. 18711 (IX, 8), 38182 (IX, 8), 54812 (VIII, 1), 54827 (IX, 3), 54830 (IX, 3), 54842 (VIII, 17), 54844 (VIII, 1); Din bin Hashim 59606 (IX, 3); Dolman 6772 (IX, 17).
- Egon 559 (IX, 16); Elmer 21573 (VIII, 16); Enggoh SH 7303 (VIII, 2), 10551 (VIII, 14), 41435 (VIII, 2); Esche & Wasynt Ja 6138 (VIII, 2); E.S.M. 520 (IX, 3).
- Flemmich 32613 (VIII, 10), 32632 (IX, 8), 34406 (VIII, 1), 34438 (VIII, 14), 34504 (VIII, 14), 34510 (VIII, 1), 34514 (IX, 11), 34563 (IX, 5), 37198 (IX, 8), 48125 (VIII, 14), 48224 (IX, 8); Fleury 30085 (VIII, 14); Forbes 2773 (IX, 16), 3070 (VIII, 1), 3093 (IX, 11); †Fyfe 26397 (VIII, 1).
- Godfrey 13217 (VII, 4); Goodenough 1469 (VIII, 14); Grashoff 960 (IX, 12); Griffith 1148 (IX, 17), 1150 (IX, 2).
- Hallier 3125 (IX, 8); Hamid 32393 (IX, 17); Hamid & Ja'amat 10916 (IX, 16); Hassan 36278 (VII, 4); Hatusima, see Kanehira & Hatusima; Haviland 1819 (IX, 6), 1866 (IX, 16), 2259 (VIII, 3), 2269 (IX, 13), 2271 (VIII, 6), c.r.m.d. (VIII, 2); Haviland & Ulak 1904 (VIII, 10); Henderson 23800 (VIII, 15), 29545 (VIII, 2).
- Isa 34413 (VIII, 3).
- Ja'amat 14922 (VIII, 1), 14950 (IX, 3), 15324 (IX, 17), 43500 (IX, 13), see also Hamid & Ja'amat and Omar & Ja'amat; Ja'amat & Sow 43187 (IX, 16), 43197 (IX, 6); Ja'amat & Tachun 37984 (IX, 2), 37985 (IX, 13), 37986 (IX, 3), 37989 (IX, 8), 37991 (IX, 17), 39337 (VIII, 3), 43404 (IX, 12), 43421 (IX, 2), 43423 (IX, 13); Jalil bin Rahman 73001 (VIII, 17); Jidin, see Obid & Jidin; Jusus 28940 (IX, 8), 28945 (IX, 8).
- Kadir A 39 (VII, 4), A 545 (VIII, 2), A 575 (VIII, 2), A 633 (VIII, 2); Kahar SH 9962 (VII, 4), 48749 (VII, 4); Kalong 23401 (IX, 16); Kanehira & Hatusima 12790 (IX, excl. spp.); Kehding 21 (IX, 8), 178 (IX, 2); Keith SH 4525 (VIII, 2), 4682 (IX, 8), 38901 (VIII, 2); Kiah, see Moisey & Kiah; King's coll. 3123 (VIII, 2), 3689 (IX, 2), 3716 (VIII, 2), 4438 (IX, 8), 4625 (IX, 17), 5545 (IX, 16), 5573 (IX, 16), 5937 (IX, 16), 6707 (VIII, 14), 6838 (VIII, 5), 7298 (VIII, 10), 7510 (VIII, 15), 7577 (VIII, 14), 7611 (VIII, 14), 8801 (VIII, 14), 10221 (IX, 17), see also Kunstler; Korhals (1168) (IX, 3), s.n. (VIII, 2; VIII, 14; IX, 8); Kostermans 26 (IX, 8), 29 (VII, 4), 35 (IX, 17), 61 (IX, 17), 94 (IX, 17), 125 (VIII, 4), 139 (IX, 8), 145 (VII, 4), 148 (IX, 17), 153 (VII, 4), 169 (VIII, 4), 179 (VII, 4), 180 (IX, 17), 183 (VIII, 4), 193 (IX, 9), 207 (IX, 3), 224 (VII, 4), 239 (VIII, 4), 240 (IX, 3), 4045 (IX, 17), 4055 (IX, 17), 4059 (IX, 8), 4086 (IX, 3), 4099 (VIII, 10), 4300 (IX, 17), 4314 (IX, 9), 4350 (IX, 8), 4363 (IX, 8), 4401 (IX, 3), 4417 (IX, 17), 4516 (IX, 3), 5526 (IX, 9), 5706 (VIII, 2), 6372 (VIII, 2), 6384 (VIII, 17), 6402 (VIII, 2), 6404 (IX, 4), 6405 (IX, 17), 6408 (IX, 3), 6459 (VIII, 4), 6526 (VIII, 14), 6563 (IX, 4), 6580 (VII, 4), 6581 (IX, 17), 6585 (VIII, 2), 6598 (VII, 4), 6692 (IX, 11), 6694 (IX, 8), 6725 (VIII, 11), 6728 (IX, 4), 6741 (IX, 3), 6753 (IX, 4), 7016 (VIII, 2), 7104 (VII, 4), 7106 (IX, 17), 7109 (VIII, 4), 7113 (VIII, 14), 7127 (VIII, 14), 7238 (VIII, 4); Krukoff 4051 (IX, 3), 4089 (IX, 11), 4119 (IX, 11), 4141 (IX, 11), 4219 (IX, 9), 4229 (IX, 8); Kunstler 7997 (IX, 16), 8801 (VIII, 14), see also King's coll.
- Langlassé 136 (VIII, 14); Latiff bin Dimall 70091 (IX, 17); Ledermann 9668 (IX, 16), 9695 (IX, 16), 9812 (IX, 16); Liew 37743 (VIII, 14); Lindong, see Sow-Lindong; Luwee 28601 (IX, 8).
- Mahamud 40303 (IX, 3); Maidin SH 4132 (IX, 17), 4895 (VIII, 2), 36910 (IX, 17), see also Ba'ee & Maidin; Main & Aden 995 (IX, 11), 1103 (IX, 11); Maingay 299 (VII, 4), 303 (IX, 11), 309 (VIII, 17), 311/1534 (VIII, 8), 313/3295 (VIII, 4), 354 (VII, 4), 366 (VIII, 1); Mat Pol 18259 (IX, 17); Matusoh SH 7429 (VIII, 14), 41546 (VIII, 14); Medina 21827 (VIII, 3); Meh 10323 (IX, 16), 17754 (VIII, 14), 17893 (VIII, 1), 42288 (IX, 8); De Mesa 27463 (VIII, 14); Motley 146 (VIII, 4); Moulton 6767 (VIII, 2); Moisey & Kiah 33934 (IX, 2); Müller s.n. (IX, 9); Mustapha bin Sideh 69807 (IX, 9).

Native coll. 1849 (IX, 11), 2708 (IX, 6); Nauen 35842 (VIII, 1), 35843 (VIII, 4), 35846 (VIII, 14), s.n. (VIII, 14); Ngadiman 34686 (VIII, 14), 34753 (IX, 3), 34772 (IX, 8), 36130 (IX, 8), 36458 (VIII, 14), 36477 (VIII, 4), 36484 (VIII, 44), 36648 (IX, 8), 36755 (IX, 3), 36798 (IX, 8), 36858 (VIII, 14), 36864 (IX, 8), 36867 (VIII, 14), 36895 (IX, 8), 37037 (VIII, 1), 37038 (VIII, 14), 37704 (VIII, 14); Ngah 24854 (VIII, 4), 32302 (IX, 8), 32310 (VIII, 3), 32312 (IX, 8); N.I.F.S. (bb. numbers) 13040 (IX, 14), 14783 (VIII, 14), 15178 (VIII, 14), 16386 (IX, 3), 16416 (IX, 16), 16420 (IX, 16), 16421 (IX, 16), 16537 (VIII, 3), 16597 (IX, 16), 16617 (VIII, 4), 16737 (IX, 8), 16794 (IX, 17), 16802 (IX, 12), 16837 (IX, 16), 16844 (IX, 16), 16863 (IX, 17), 16867 (IX, 16), 16869 (IX, 17), 16882 (IX, 3), 16884 (IX, 8), 16896 (IX, 17), 17445 (IX, 3), 17465 (VIII, 14), 17481 (IX, 3), 17697 (IX, 8), 17698 (IX, 8), 18054 (VIII, 4), 18134 (IX, 17), 18147 (VIII, 3), 18235 (IX, 8), 18243 (IX, 17), 18252 (VIII, 4), 18258 (VIII, 3), 18347 (IX, 17), 18458 (VIII, 3), 18928 (VIII, 14), 18947 (VIII, 17), 18980 (VIII, 4), 19135 (VII), 19142 (VII), 19286 (VIII, 14), 19351 (VIII, 14), 19616 (IX, 8), 19656 (VIII, 14), 19784 (VIII, 14), 20574 (IX, 17), 20662 (VIII, 14), 20689 (IX, 16), 20729 (IX, 8), 20742 (IX, 8), 21519 (VIII, 10), 22445 (IX, 3), 23252 (IX, 8), 23387 (IX, 16), 23397 (IX, 8), 23474 (VIII, 4), 23477 (IX, 17), 23568 (IX, 17), 23645 (VII), 23852 (IX, 17), 23865 (IX, 3), 23992 (VII), 23993 (VII), 23995 (VII), 24030 (IX, 8), 24038 (IX, 8), 24503 (IX, 11), 24639 (VII), 24678 (VII), 24737 (VIII, 14), 24794 (IX, 8), 24802 (IX, 16), 24829 (IX, 16), 25124 (VII), 25210 (VIII, 12), 25217 (IX, 8), 25220 (IX, 12), 25224 (VIII, 4), 25595 (VII), 25631 (VIII, 14), 25633 (VII), 25769 (IX, 6), 25796 (IX, 16), 26032 (IX, 8), 26105 (IX, 16), 26210 (IX, 17), 26379 (VIII, 14), 26387 (IX, 8), 26464 (IX, 17), 26468 (IX, 8), 26479 (IX, 16), 26564 (IX, 9), 26846 (IX, 4), 26861 (VIII, 14), 26870 (VIII, 17), 27007 (IX, 3), 27183 (VII), 27189 (VII), 27492 (IX, 16), 27494 (IX, 12), 27495 (IX, 9), 27496 (IX, 16), 27518 (IX, 2), 27519 (VIII, 3), 27530 (VIII, 4), 27541 (VIII, 4), 27595 (IX, 16), 27617 (IX, 9), 27621 (IX, 12), 27634 (IX, 16), 27642 (VIII, 3), 27746 (VIII, 11), 28120 (IX, 16), 28332 (VIII, 3), 28349 (IX, 12), 28368 (VIII, 2), 28369 (IX, 8), 28441 (IX, 17), 28443 (VIII, 4), 28469 (IX, 8), 28516 (VIII, 10), 28544 (VIII, 10), 28546 (VIII, 10), 28553 (VIII, 3), 28566 (VIII, 10), 28704 (IX, 16), 28706 (IX, 8), 28746 (IX, 3), 29035 (VIII, 14), 29040 (IX, 3), 29048 (IX, 16), 29080 (VIII, 14), 29214 (IX, 17), 29215 (IX, 17), 29216 (IX, 16), 29252 (VII), 29550 (VIII, 10), 29556 (VIII, 10), 29571 (IX, 8), 30007 (VIII, 3), 30051 (IX, 17), 30061 (IX, 3), 30065 (VII), 30079 (VIII, 2), 30099 (VIII, 14), 30775 (IX, 16), 30866 (IX, 16), 31020 (IX, 16), 31054 (IX, 8), 31182 (VII), 31192 (VIII, 14), 31560 (IX, 8), 31561 (IX, 8), 31562 (IX, 8), 31573 (VIII, 3), 31693 (IX, 9), 31695 (VIII, 14), 31701 (IX, 16), 31778 (VII), 31933 (IX, 8), 31985 (VII), 31993 (VIII, 14), 31994 (VIII, 2), 32001 (IX, 9), 32018 (VIII, 2), 32047 (IX, 9), 32061 (VIII, 14), 32134 (IX, 9), 32135 (VIII, 14), 32157 (VII), 32160 (IX, 8), 32195 (IX, 8), 32210 (IX, 9), 32220 (IX, 9), 32221 (IX, 17), 32228 (IX, 9), 32236 (IX, 17), 32238 (IX, 9), 32262 (VIII, 4), 32290 (VIII, 17), 32316 (IX, 8), 32318 (IX, 3), 32385 (IX, 16), 32402 (IX, 8), 32451 (IX, 8), 32470 (IX, 8), 33060 (VII), 33061 (VIII, 1), 33964 (IX, 8), 33967 (VII), 33973 (IX, 17), 33999 (IX, 17), 34031 (IX, 17), 34062 (VIII, 4), 34076 (IX, 8), 34079 (VII), 34082 (IX, 17), 34083 (VIII, 14), 34092 (VII), 34103 (VIII, 4), 34113 (VII), 34114 (IX, 17), 34117 (VIII, 4), 34118 (VIII, 14), 34127 (IX, 9), 34141 (IX, 3), 34158 (VII), 34173 (VIII, 4), 34174 (IX, 3), 34213 (IX, 8), 34316 (IX, 4), 34318 (IX, 8), 34358 (VIII, 11), 34364 (VIII, 17), 34368 (IX, 3), 34399 (IX, 3); N.I.F.S. Cel./II-216 (IX, 8); N.I.F.S. T 352 (VIII, 14); Nik Yusoff Omar 65206 (IX, 8); Nur 34010 (IX, 8).

Obid & Jidin 18414 (IX, 9); Olds s.n. (VIII, 14); Omar & Ja'amat 10901 (IX, 16); Orolfo 4672 (VIII, 1); Osman 28510 (IX, 16); Osman & Sow 28300 (IX, 8); Osman & Tachun 23661 (IX, 8); Othman bin Lassim 70807 (VIII, 3); Otik 5238 (VIII, 14).

Pawanchu 13755 (VIII, 1), 13783 (VIII, 2); Pierre 4260 (VIII, 14); Ping Sam SH A 1878 (VIII, 14), A 1881 (VII); Ponce 22827 (VIII, 14); Praetorius s.n. (VIII, 14); IX, 8; IX, 9; IX, 16); Puasa 1447 (VIII, 2), 4843 (VIII, 2), 7034 (VIII, 14).

Rahim 12368 (VIII, 14), 12428 (VIII, 14); Rahman 2811 (IX, 16); Rahmat Si Buea 8036 (IX, 8); Rani 45552 (VII); Richards 1278 (IX, 1), 1399 (IX, 3); Ridley 1858 (IX, 16), 6208 (IX, 11), 6360a (VIII, 14), 9653 (IX, 10), 12265 (VIII, 2), 13512 (IX, 11), s.n. (VIII, 1); IX, 8; IX, 11; IX, 17).

Sabik 66202 (IX, 2); Said 31604 (VII); Salleh bin Yusoff 60475 (IX, 8); Saris

39765 (IX, 8); Sayid Ali 23439 (VIII, 1), 23445 (VII); Scortechini 2095 (IX, 2), s.n. (VIII, 2; IX, 8; IX, 16); S. H. A 1878 (VIII, 14), A 1881 (VII), 4132 (IX, 17), 4525 (VIII, 2), 7303 (VIII, 2), 7429 (VIII, 14), 7684 (VIII, 14), 9962 (VII); Sharin 35179 (VIII, 1); Sidik 44906 (IX, 8), 44907 (IX, 9), 44908 (IX, 17), 44909 (IX, 11); Simbut A 1633 (IX, 3); Sinclair 40117 (IX, 6), s.n. (VIII, 14; IX, 3; IX, 11); Van Slooten 2118 (VIII, 2); Smith 30481 (VIII, 14); Soh 40979 (IX, 11); Sow 368 (VIII, 10), 47268 (VIII, 15), see also Ja'amat & Sow and Osman & Sow; Sow-Lindong 66518 (IX, 8), 76027 (IX, 15); Speldewinde 5379 (IX, 16); Strugnell 20235 (IX, 16); Sudin 41754 (IX, 6); Suhaig, see Abot & Suhaig; Sulaiman bin Manja 70207 (IX, 16), 74153 (IX, 3); Sulit 6339 (VIII, 14); Suoh 16769 (IX, 8); Syed Hasan 55773 (IX, 8); Syid Haron 20786 (IX, 3); Symington 22133 (IX, 16), 29787 (IX, 3), 29881 (IX, 16), 35518 (VIII, 16), 35711 (VIII, 3), 38126 (IX, 17), 38128 (VIII, 10), 44703 (IX, 3), 44705 (IX, 17), 44727 (IX, 13), 44735 (VII), 47287 (VIII, 3), 49829 (VIII, 2).

Tachun, see Daud & Tachun, Ja'amat & Tachun and Osman & Tachun; Teysmann 4508 (VII), s.n. (VIII, 14; IX, 11), see also De Vriese & Teysmann; Tingan 54674 (IX, 3).
Ulak, see Haviland & Ulak.

Versteegh, see Brass & Versteegh; De Vriese s.n. (IX, 11); De Vriese & Teysmann s.n. (VIII, 1).

Walton 29733 (IX, 8); Wang 78977 (IX, excl. spp.); Wasynt, see Esche & Wasynt; Whitford 768 (VIII, 3); Winkler 2478 (IX, 9); Woolley 8234 (IX, 8); Wray 3392 (VIII, 14), 3865 (IX, 16); Wyatt-Smith 64060 (VIII, 1), 64072 (VIII, 2), 64094 (IX, 9), 64096 (VII), 64498 (VIII, 8), 64788 (VIII, 8), 70334 (IX, 13), 70355 (IX, 16), 71342 (IX, 8), 71365 (VIII, 4), 71377 (VIII, 2), 71380 (VIII, 4).

Yasin bin Abu 70908 (IX, 16); Yasmi bin Atoo 70904 (IX, 8); Yassin 36413 (IX, 11); Yattim 63547 (VII), 66774 (VII); Yunus 50001 (IX, 8); Ywans bin Ismail 70861 (IX, 16).

Zain 24899 (IX, 17), 24900 (IX, 16); Zin 27509 (IX, 17), 27533 (VIII, 4), 27538 (IX, 8), 27748 (VIII, 4).

Unknown collectors: 377 (IX, 17), 9297 (IX, 17), 16338 (IX, 8), 27479 (VII), 50422 (IX, 16), 63251 (IX, 3), 65682 (IX, 9), 66214 (IX, 8), 69405 (IX, 2).

Index.

Accepted taxa in roman, synonyms in italics. New taxa etc. marked with *. The number in parentheses indicates the number of the genus, species etc. in the present paper. VII = Triomma, VIII = Dacryodes, IX = Santiria.

- Archidacryodes* H. J. Lam (sectio) (VIII)
Boswellia malaccensis March. (VII)
Canarium expansum Ridl. (VIII, 6)
 — *fragile* Engl. (VIII, 1)
 — *incurvatum* Engl. (VIII, 3)
 — *lacum* Benn. (VIII, 1)
 — *rubiginosum* Benn. (VIII, 17)
 — *spec.* Merr. (IX, 11)
Curtisina Ridl. (genus and sectio) (VIII)
 — *penangensis* Ridl. (VIII, 5)
Dacryodes Vahl (VIII)
 — *angulata* (Ridl.) H. J. Lam (VIII, 3)
 — **breviracemosa* Kalkm. (VIII, 7)
 — *costata* (Benn.) H. J. Lam (VIII, 4)
 — **crassipes* Kalkm. (VIII, 12)
 — *elmeri* H. J. Lam (VIII, 16)
 — *expansa* (Ridl.) H. J. Lam (VIII, 6)
 — *floribunda* (King) H. J. Lam (VIII, 15)
 — *incurvata* (Engl.) H. J. Lam (VIII, 3)
 — **kostermansii* Kalkm. (VIII, 11)
 — *laxa* (Benn.) H. J. Lam (VIII, 1)
 — — var. *forbesii* (Bak.f.) H. J. Lam (VIII, 1)
 — — var. *typica* H. J. Lam (VIII, 1)
 — *longifolia* (King) H. J. Lam (VIII, 5)

- Dacryodes longifolia* (King) H. J. Lam var. *longifolia* (VIII, 5)
 — — — var. *penangensis* (Ridl.) H. J. Lam (VIII, 5)
 — — — var. *typica* H. J. Lam (VIII, 5)
 — *macrocarpa* (King) H. J. Lam (VIII, 10)
 — — — var. *genuina* H. J. Lam (VIII, 10)
 — — — var. *macrocarpa* (VIII, 10)
 — — — var. *merrillii* H. J. Lam (VIII, 10)
 — *papuana* Husson (VIII, 9)
 — *puberula* (Benn.) H. J. Lam (VIII, 8)
 — *rostrata* (Bl.) H. J. Lam (VIII, 14)
 — — — forma *cuspidata* (Bl.) H. J. Lam (VIII, 14)
 — — — forma *genuina* H. J. Lam (VIII, 14)
 — — — forma *pallida* H. J. Lam (VIII, 14)
 — — — forma *pubescens* H. J. Lam (VIII, 14)
 — — — forma *rostrata* (VIII, 14)
 — — — forma *samarensis* H. J. Lam (VIII, 14)
 — *rubiginosa* H. J. Lam (VIII, 17)
 — *rugosa* (Bl.) H. J. Lam (VIII, 2)
 — — — var. *genuina* H. J. Lam (VIII, 2)
 — — — var. *moultonii* (Ridl.) H. J. Lam (VIII, 2)
 — — — var. *rugosa* (VIII, 2)
 — — — var. *virgata* (Bl.) H. J. Lam (VIII, 2)
 — *scandens* Husson (VIII, 13)
 — † spec. (VIII, 18)
Dracoentomon cuspidatum Bl. (VIII, 14)
Eusantiria Engl. (sectio) (IX)
Hemisantiria nitida (Merr.) H. J. Lam (VIII, 3)
Icicopsis Benn. (sectio) (IX)
Pachylobus (Don) H. J. Lam (sectio) (VIII)
Protium yunnanense (Hu) Kalkman (IX, excl. spp.)
Santiria Bl. (IX)
 — *apiculata* Benn. (IX, 11)
 — *boemiensis* Kan. & Mat. n.n. (IX, excl. spp.)
 — *conferta* Benn. (IX, 2)
 — — — var. *typica* H. J. Lam (IX, 2)
 — — — var. *wrayi* (King) H. J. Lam (IX, 2)
 — *costata* Benn. (VIII, 4)
 — *floribunda* King (VIII, 15)
 — *forbesii* Bak.f. (VIII, 1)
 — **grandiflora* Kalkm. (IX, 1)
 — *griffithii* (Hk.f.) Engl. (IX, 17)
 — — — forma *bornensis* (Engl.) H. J. Lam (IX, 17)
 — — — forma *genuina* H. J. Lam (IX, 17)
 — — — forma *macrophylla* H. J. Lam (IX, 17)
 — *laevigata* Bl. (IX, 8)
 — — — var. *applanata* Bl. (IX, 8)
 — — — forma *glabrifolia* (Engl.) H. J. Lam (IX, 8)
 — — — forma *laevigata* (IX, 8)
 — — — forma *rufescens* (Bl.) H. J. Lam (IX, 8)
 — — — forma *typica* H. J. Lam (IX, 8)
 — *lamprocarpa* Laut. (IX, 16)
 — *longifolia* King (VIII, 5)
 — *macrocarpa* King (VIII, 10)
 — **megaphylla* Kalkm. (IX, 7)
 — *minimiflora* Ridl. (IX, 16)
 — *mollis* Engl. (IX, 4)
 — *mollissima* Ridl. (IX, 6)
 — *nana* H. J. Lam (IX, 15)
 — *nervosa* H. J. Lam (IX, 12)
 — *oblongifolia* Bl. (IX, 9)
 — *pedicellata* Ridl. (IX, 16)

- Santiria pilosa* Engl. (IX, 5)
 — *puberula* Benn. (VIII, 8)
 — *ridleyi* H. J. Lam (IX, 10)
 — *rostrata* Bl. (VIII, 14)
 — *rubiginosa* Bl. (IX, 16)
 — — var. **pedicellata* (Ridl.) Kalkm. (IX, 16)
 — — var. *rubiginosa* (IX, 16)
 — *rubra* Ridl. (IX, 13)
 — *rufescens* Bl. (IX, 8)
 — *tomentosa* Bl. (IX, 3)
 — *violacea* H. J. Lam (IX, 14)
 — *yunnanensis* Hu (IX, excl. spp.)
Santiriopsis (Engl.) H. J. Lam (sectio) (IX)
Tenuipyrena Engl. (sectio) (VIII)
Trigonochlamys Hk.f. (genus and section) (IX)
 — *griffithii* Hk.f. (IX, 17)
Triomma Hk.f. (VII)
 — *macrocarpa* Backer (VII)
 — *malaccensis* Hk.f. (VII)