A REVISION OF THE GENUS SARACA L. (LEGUM. — CAES.)

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INTRODUCTION

Saraca is one of the few genera of *Caesalpinoideae* not yet revised for Malesia. The genus extends in continental SE. Asia from India to SW. China, and in Malesia from Sumatra eastwards to Celebes (but is curiously absent from the Philippines). It was more or less revised as a whole by Prain (1897).

During the course of the work it soon became clear that for a good understanding of the Malesian species the entire genus should be revised. The variability in hairiness, in colour of the flowers, and in number of leaf pairs, appeared to be far greater than accounted for in literature. This has led in the past to a fairly large number of names based on unreliable characters and misunderstanding of taxa.

In literature 36 binomials and 7 varieties have been described; in addition 9 names were mis-applied.

Taubert (1892) assumed there were 8 closely related species.

Prain (1897) enumerated 14 species in all, of which one was later removed by him to a separate genus (see excluded species). He was well aware that the characters separating them were somewhat shaky or arbitrary, using the expression 'as species go in *Saraca*', in argumenting differences. Especially the examination of the abundant new material, assembled since Prain's work, has shed more light on the variability of characters and elucidated which of them can be used for specific delimitation.

Only 7 earlier described species have been retained in this paper, and an 8th, new species from Celebes is distinguished.

For distinction of species the indument, the shape of the leaflets and their nervation, and the colour and size of flowers are too variable to be trusted. The number of leaflet pairs and the diameter of the corymb can only be used as additional characters. It appeared that useful characters are: the number of stamens, the size, position, and degree of persistency of the bracts and bracteoles, and sometimes the length of the calyx tube.

It was well-known to Prain that *S. indica*, in the sense of Indian botanists, was not known east of the Irrawaddy. He did not realize that this name was onwards of Beddome (1869) wrongly interpreted. Its type is not from India, but from Java and is a Kleinhoff specimen. By this misinterpretation true *S. indica* from Java was redescribed under an other name, *S. minor*, in 1846.

It is of course disagreeable that the Indian species can no longer bear the epithet *indica*, but the typification leaves no alternative. It was first described as *Asjogam* by Rheede in the Hortus Malabaricus and later validly published as *Jonesia asoca* Roxb. The Indian plant must hence be called *S. asoca* (Roxb.) De Wilde.

A subdivision of the genus has only occasionally been proposed, namely by Pierre (1899), who classified *S. dives* Pierre in a new section, *Saraca* sect. *Arisaca* Pierre. If a sectional subdivision is made this would then correspond with the set of species having the 'double number' of stamens. But in that sense it cannot be used, as sect. *Arisaca* would

then include *S. indica*, the type of the genus, and consequently the type of sect. *Saraca*. As I refrain from a sectional subdivision I mention this only in passing, the more so as the number of stamens seems to me an artificial character not reflecting taxonomic affinity.

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SARACA

Linné, Mant. Pl. 1 (1767) 98; Burm. *f.*, Fl. Ind. (1768) 85, t. 25; B. & H., Gen. Pl. 1 (1867) 583; Beddome, Fl. Sylv. 1 (1869) t. 57; Taubert in E. & P., Nat. Pfl. Fam. 3, 3 (1892) 134; Prain, J. As. Soc. Beng. 66, ii (1897) 210, 489; Pierre, Fl. For. Coch. 5 (1899) t. 386—387, incl. sect. *Arisaca* Pierre; Ridl., Fl. Mal. Pen. 1 (1922) 640; Corner, Ways. Trees Mal. (1940) 399; Back. & Bakh. *f.*, Fl. Java 1 (1963) 527. — Type species: *Saraca indica* L. 1767.

Jonesia Roxb., Asiat. Res. 4 (1799) 355, *cum ic.*; DC., Prod. 2 (1825) 487; Wight, Ic. 1 (1840) t. 206. — Type species: *Jonesia asoca* Roxb. 1799.

Shrubs or medium-sized trees, 3—10 m, rarely reaching 25 m height; bark lenticellate. *Leaves* paripinnate, 1—7-jugate, coriaceous or herbaceous, young flush dangling and whitish to purplish. Stipules ½—2 cm long, acillary, connate, conical, enveloping the buds, mostly caducous. Leaflets subsessile, ovate to lanceolate, acute, mostly acuminate, *c.* 5—25(—60) cm long, uppermost leaflets mostly largest, glabrous or sometimes slightly hairy on or near the midrib beneath; margin near or at the base sometimes at either side with a small tubercle-like gland; also the apex of the leaflet is often provided with a similar pair of glands either at the tip or at the base of the acumen. *Pedicels* glabrous or hairy with 2 (sub)opposite bracteoles, and with an articulation above the bracteoles 1—5 mm below the calyx tube. Bracts and bracteoles present, persistent or fugacious, glabrous or hairy; bracteoles often showy, yellow to red, when young mostly covering the flower bud. *Flowers* bisexual, or functionally ♂ (with a reduced ovary), in mostly rather dense, ± subglobular corymbs, *c.* 3—35 cm ∅, terminal or axillary or on old nodes, sometimes cauliflorous; branches of the inflorescence glabrous or hairy. *Calyx* tubular, with 4(—6) glabrous petaloid lobes; tube cylindrical, glabrous or hairy; lobes subequal, imbricate in bud, ovate to oblong (or obovate), yellow to red, purplish in and near the throat, discolouring during anthesis. *Petals* wanting. *Stamens* (3—)4—8 (—10), inserted on a short tubular 'disc' in the throat; filaments free, long (1—4 cm), exserted, yellow to reddish, often partly abortive, glabrous; anthers oval, 1—2(—3) mm long, versatile, dorsifixed, dehiscing with slits, grey purplish; staminodes short or long, dentate to rarely subulate. *Ovary* borne on a stipe which is partly adnate to the calyx tube, or ovary rudimentary, its free part 1—6 mm; ovary oblong to lanceolate, *c.* 4—8 mm long, mostly ± hairy; style filiform, *c.* 15—20 mm; stigma terminal, minute; ovules many. *Pod* flattened, roundish to oblong-lanceolate, woody or coriaceous, 2-valved. *Seeds* 1—8 (sec. Backer, 1963), ellipsoid, often laterally compressed, *c.* 1—4 cm long, exarillate, exalbuminous.

Distribution: 8 closely related species, from India to Tonkin and SW. Yunnan, in Malesia eastwards to Celebes. Maps 1—3.

Ecology: *Saracas* are usually humble lowland forest plants without preference for

special soils, but often very common in stream valleys and along stream banks. In Malaya Corner has named a certain type of stream, with a well-defined gradient determining its inundation and flood regime 'Saraca streams', i.e. 'rocky streams which cascade in waterfalls down the hillsides and which flow in tunnels through the forest. They are the smaller tributaries and the headwaters of our rivers unless their source be at great altitudes. We call them Saraca-streams because they are bordered by Saraca-trees ....' (Wayside Trees Mal. 1940, 42).

As to climate *Saraca* occurs both under everwet and seasonal conditions; none of the Malesian species is restricted to monsoon conditions.

Uses: The wood is generally too small for use; if used, then mostly for small utensils. The greatest use of *Saraca* is made for ornamental purpose. *S. asoca* is a sacred tree planted near Hindu and Budhist shrines and temples. Pods are occasionally said to be used for fodder in Indochina. Seeds are said to be edible. Already in 1778 Koenig learned that the Siamese eat the flowers and young leaves of a *Saraca*, and Kerr has shown that *S. declinata* Miq. (= *S. thaipingensis*) is so eaten.

Notes: Each inflorescence contains mostly bisexual flowers, but besides functionally ♂ and ♀ flowers occur, the ♂ ones being often distinctly smaller. There are all kinds of transitions between these flower types. Sometimes the number of unisexual ♂ flowers gains preponderance in an inflorescence.

The number of mature pods per corymb is variable but always only a fraction of the flowers develop a pod; of several species mature pods have never been collected hitherto.

KEY TO THE SPECIES

1. Stamens 3—5(—6).
   2. Bracts large, 12—35 mm long, fugacious. Bracteoles oblong-lanceolate, acute, 6—17 mm long, fugacious. Main branches of corymb 3—10 mm ∅; corymb up to *c.* 35 cm ∅. **1. S. thaipingensis**
   2. Bracts small, less than 12 mm long, fugacious or persistent. Bracteoles ovate-oblong(-lanceolate), with rounded or acute apex, 1½—19 mm long, fugacious or persistent. Main branches of corymb up to *c.* 3 mm ∅; corymb up to *c.* 20(—25) cm ∅.
      3. Bracteoles 1—3 mm long.
         4. Bracts and bracteoles fugacious. Central Celebes . . . . . **2. S. celebica**
         4. Bracts and bracteoles persistent, clasping the pedicel. Upper Burma, W. Yunnan. **3. S. griffithiana**
      3. Bracteoles 4—19 mm long.
         5. Calyx tube short, up to *c.* 7 mm long. Fruits sub-circular to oblong, up to *c.* 8 cm. Twigs and rachis of leaves whitish; leaflets dark blackish brown when dry. Borneo. **4. S. hullettii**
         5. Calyx tube long, 7—32 mm long. Fruits oblong-lanceolate, 7—31 cm long. Twigs and rachis of leaves generally not whitish; leaves generally not dark (blackish) brown when dry. Laos, Siam, Burma, Malaya, Sumatra, Borneo, once in Java, once in Flores. . . **5. S. declinata**
1. Stamens 6—10.
   6. Bracts and bracteoles large, 12—35 and 6—17 mm long respectively, the bracts fugacious. Main branches of corymb 3—10 mm ∅; corymb (8—)15—35 cm ∅.
      7. Bracteoles fugacious. Stamens 6; anthers 2 mm long. Tonkin to S. Burma, Malaya, Java. **1. S. thaipingensis**
      7. Bracteoles persistent. Stamens 8—10; anthers 3—3½ mm long. Tonkin, Laos? . . **6. S. dives**
   6. Bracts and bracteoles small, 1—8 and 2—8 mm long respectively, the bracts mostly persistent. Main branches of corymb up to *c.* 3 mm ∅; corymb 1½—15(—20) cm ∅.
      8. Bracteoles erect, clasping the pedicel, persistent. Ceylon, India, E. Pakistan, Burma; only west of the Irrawaddy River; otherwise cultivated. . . . . **7. S. asoca**
      8. Bracteoles spreading, persistent or fugacious. Siam, Malaya, Sumatra, Java; not west of the Irrawaddy River . . . . . **8. S. indica**

1. Saraca thaipingensis Cantley *ex* Prain, J. As. Soc. Beng. 66, ii (1897) 211, 490; Ridl., Fl. Mal. Pen. 1 (1922) 640; Corner, Ways. Trees Mal. (1940) 403. — Syntypes: examined: *Derry 999, Goodenough 1875A, Kunstler 4248, Wray 2448.*

S. declinata [*non* (Jack) Miq.] Miq., Fl. Ind. Bat. 1, 1 (1855) 84, 1080, *quoad specim.*; Hassk., Retzia 1 (1855) 196; K. & V., Bijdr. Booms. Java 2 (1895) 39; Prain, J. As. Soc. Beng. 66, ii (1897) 211, 490; Back., Voorl. Schoolfl. Java (1908) 103; Schoolfl. Java (1911) 421; Koord., Atlas Baumart. Java 1 (1913) t. 25; Ridl., Fl. Mal. Pen. 1 (1922) 641; Corner, Ways. Trees Mal. (1940) 402, Atlas t. 117; Back. & Bakh. *f.*, Fl. Java 1 (1963) 527. — *Jonesia declinata* (*non* Jack) Binnendijk, Ann. Jard. Bot. Btzg 1 (1876) 167.

S. cauliflora (*non* Baker) Prain, J. As. Soc. Beng. 66, ii (1897) 212 *p.p.*, 490.

Leaves 4—8-jugate, herbaceous, 20—75 cm long, shortly (1—6 cm) petioled, glabrous, when dry mostly dark brown or blackish brown, apex of rachis without free appendage; leaflets (ovate-)oval to oblong-lanceolate, base rounded to cuneate, apex acute, mostly up to *c.* 1½ cm acuminate, 7—32 by 3—9 cm, those of the lowest pair often smallest, to half the length of the uppermost ones; petiolules (½—)1—1½ cm; marginal glands usually present, apical glands at base of the acumen sometimes present. *Corymbs* robust, fairly compact, mostly large, *c.* (8—)15—35 cm ∅; branches thick, the principle ones *c.* 3—10 mm ∅; bracts much larger than the bracteoles, fugacious (but well visible in young inflorescences), glabrous to pubescent, (ovate-)oval, 12—35 by 7—22 mm, tip rounded or acutish; bracteoles fugacious, but rarely shedding during anthesis, mostly smaller than the calyx lobes, not showy, mostly glabrous, oblong-lanceolate, acute, 6—17 by 2—5 mm. *Calyx* tube *c.* (9—)12—26 by 1—1½ mm; length of pedicel between calyx tube and bracteoles much shorter than the former, 2—5(—8) mm; lobes oval (to oblong), 5—10 by 3½—5 mm, tip acutish to blunt. *Stamens* (3—)4(—6); filaments 8½—17 mm; anthers (½—)1—2 mm long. Stipe of ovary 1½—3 mm long, mostly hairy; ovary *c.* 4—8 mm long; style *c.* 10—15 mm. *Pod* thick, woody, oblong-lanceolate, *c.* 15—40 by 3½—8 cm, up to 1½ cm thick, before maturity with thickened margin when dried; at base cuneate or obliquely rounded, apex generally ± curved, acute, up to *c.* 1½ cm long beaked; up to *c.* 5 fruits per corymb.

Distribution: Tonkin (2 collections: *W. T. Tsang 28983, 29132*), southern part of Burma and Siam, Malay Peninsula (common), Java (common). Map 1.

Ecology: From 0 to 1100 m, apparently mostly in hilly country; only once recorded from a swampy place. Flowers are mostly recorded as yellow, rarely as pink or orange; once recorded as fragrant.

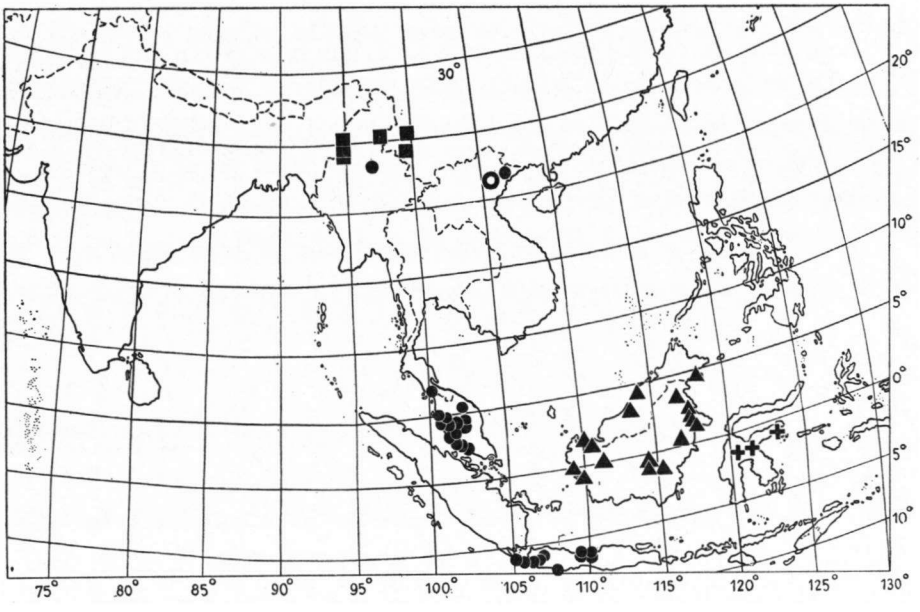
Vernaculars: Malaya: *gapis, talan.* Several other vernaculars, but all only once noted.

Uses: Not rarely used as an ornamental, according to Burkill (Dict. Econ. Prod. 2, 1935, 1964) 'the most beautiful species of the genus with large corymbs of yellow flowers among yellow bracts'.

Notes: In the bulk of the material the flowers possess 4 stamens, but there are occasional specimens (*Ridley 8921, Dilmy s.n.*, both cultivated in the botanic gardens of Singapore and Bogor respectively) with 4 stamens and 2 extremely well developed staminodes. The two collections of the Philippines (*Britton 73* and *Steiner 494*, collected in 1953 and 1954 respectively, in Laguña Province, most probably cultivated) have flowers with 4, 5, or 6 stamens.

The present species was formerly commonly known in Java as *Saraca declinata*. It appeared, however, that this name should be applied to another species. See the note under 5. *S. declinata*.

Unknown from Sumatra except a cultivated specimen from Fort de Kock.



Map. 1. Localities of 1. *Saraca thaipingensis* (●) (in Tonkin *W. F. Tsang 28983, 29132* at Taai Wong Mo Shan and Burma *Lace 4667* at Ta-u Chaung not exactly localized), 2. *S. celebica* (+), 3. *S. griffithiana* (■), 4. *S. hullettii* (▲), 6. *S. dives* (O).

2. Saraca celebica De Wilde, Blumea 15 (1968) 000. — Type: *Eyma* 3943, in L; isotypes in A, BO, K, M, P, SING, U; paratypes: *Kaudern 381*, in L, *Kjellberg 2130*, in BO, *bb 19532*, in BO.

Tree, to 20 m. *Leaves* 3—4-jugate, subcoriaceous, shortly (1—2½ cm) petioled, *c.* 15—35 cm long, glabrous, when dry dark brown or blackish brown, apex of rachis without free appendage; leaflets ovate to oblong-lanceolate to obovate, at base cuneate or rounded, at apex acute, *c.* 12—25 by 5—8½ cm, uppermost pairs generally not much larger than lower ones; petiolules 4—8 mm; both marginal and apic:l glands usually present. *Corymbs* rather compact, *c.* 5—20 cm ∅, branches glabrous or hairy, up to *c.* 2 mm ∅; bracts and bracteoles about equal in size and shape, small, fugacious, ovate to obovate, with bluntish or acute apex, *c.* 1—2 by 1—1½ mm. *Calyx* tube 10—15(—20) by ½—1½ mm; length of pedicel between calyx tube and bracteoles shorter or about as long as the tube, *c.* 8—18 mm; lobes oval-oblong 5—10 by 2—8 mm, with bluntish tip; lobes spreading during anthesis, 10—22 mm wide. *Stamens* 4; filaments *c.* 10—27 mm; anthers *c.* 2 mm long. Stipe of ovary 4—5 mm; ovary *c.* 3—5 mm long; style 10—16 mm.

Distribution: Central Celebes (4 collections). Map 1.

Ecology: Low altitude, 100 m once recorded, along stream-bank twice recorded. The flowers are twice recorded as red (once inside yellow), once as yellow, once as fragrant.

Vernaculars: Tobela lang.: *kati-kati, wongi* (Barree dial.).

3. Saraca griffithiana Prain, J. As. Soc. Beng. 66, ii (1897) 491. — Type: *J. Anderson s.n.*, Upper Burma, not seen.

Tree 4—18 m. *Leaves* 4—7-jugate, coriaceous, subsessile (petiole less than 5 mm), 20—60 cm long, when dry greenish brown, rachis glabrous or finely pubescent, apex without free appendage; leaflets oblong-lanceolate, at base rounded or cuneate, tip rounded, up to *c.* 2—3 mm acuminate, 10—30 by 3½—12 cm; lowest leaflets not distinctly smaller than the uppermost ones; petiolules very short, 2—5 mm; both marginal and apical glands usually present. *Corymbs* dense, 5—25 cm ∅, branches up to *c.* 2 mm ∅; bracts and bracteoles of about the same size and shape, persistent, small, oval, with acute apex, 1½—2½ by 1—2 mm; bracteoles distinctly clasping the pedicel, not showy. *Calyx* tube 12—15 by 1—2 mm, length of pedicel between calyx tube and bracteoles *c.* 10—14 mm, distinctly articulate; lobes oval, blunt to acutish, 7—10 by 5—7 mm. *Stamens* (3—)4(—5, sec. Prain); filaments 20—40 mm; anthers *c.* 1—1½ mm long. Stipe of ovary 2—4 mm long, hairy; ovary pubescent, 4½—7 mm long; style 20—25 mm.

Distribution: Upper Burma and W. Yunnan. Map 1.

Ecology: In shady, open jungle or thickets by streams, at 300—1200 m. Flowers fragrant.

Vernacular: *Thaw ka* (*Rogers 814*).

Notes: In a sheet of *Forrest 9799* (in E) a flower with 6 equally developed calyx lobes was found; 5 or 6 calyx lobes seem to be the rule in the Tonkin species, *S. dives*.

In this species the pedicel is more distinctly articulate than in all others.

The flower colour has been noted ruddy crimson, flame red crimson at base, orange-pink, yellow on opening turning red, deep flame-orange; twice they are noted as fragrant.

4. Saraca hullettii Prain, J. As. Soc. Beng. 66, ii (1897) 492; Ridl., Kew Bull. (1938) 278. — Syntypes: *Hullett 312* and *Haviland s.n.*, not seen; paratype: *Beccari 916*.

Smaller twigs and leaf-rachis usually whitish. *Leaves* 2—3-jugate, herbaceous, *c.* 10—35 cm long, subsessile (petiole up to *c.* 15 mm), glabrous, when dry mostly dark brown or blackish-brown, apex of rachis without free appendage; leaflets ovate to oblong-lanceolate to obovate, at base cuneate or rounded, at apex acute, up to *c.* 2 cm long acuminate, *c.* 5½—28 by 2—10 cm; apical leaflets generally largest; petiolules 5—10 mm; basal glands usually present, apical ones apparently absent. *Corymbs* dense or rather loose, 5—20 cm ∅; main branches up to *c.* 2½ mm ∅; bracts generally ± smaller than or as large as the bracteoles, fugacious or persistent; bracts glabrous, ovate to oval with bluntish or acutish tip, 5—10 by 4—8 mm; bracteoles persistent, ovate to oval, glabrous, showy, 5—10 by 4½—8 cm. *Calyx* tube short, 3—7 by 1—2 mm, length of the pedicel between calyx tube and bracteoles often as long as or longer than the tube, *c.* (5—)6—10 mm; lobes ovate, oval, or obovate, apex subacute or blunt, 3—7 by 2—5½ mm. *Stamens* (3—)4; filaments 15—20 mm; anthers *c.* ¾ mm long. Stipe of ovary 1½—5 mm, often hairy; ovary *c.* 2—4 mm long; style *c.* 8—12 mm. *Pod* thinly woody, subcircular to oval with obliquely rounded base and tip, at apex slenderly (up to 4 mm) beaked; 4—8 by 3—4 cm, up to *c.* 5 mm thick; up to *c.* 12 fruits developing from a corymb.

Distribution: Borneo. Map 1.

Ecology: Often along riverbanks, on sand- and clay-soil, limestone, once reported on peat, 0—300 m. The flowers are yellow, turning red; the bracteoles are often recorded as red.

Vernaculars: Iban: *bi-n*; Běkoempai: *mahasodjo*; Dayak (dial. Bassap): *betae*; Dayak (Sarawak): *dabahai bukit*; Běran (Mal.): *kasundai*; Mal.: *boju*.

5. Saraca declinata (Jack) Miq., Fl. Ind. Bat. 1, 1 (1855) 84, 1080, *quoad basion.* — *Jonesia declinata* Jack, Mal. Misc. 2 (7) (1822) 74; reimpr. Hook. Comp. Bot. Mag. 1 (1836) 223; Walp., Rep. 1 (1842) 844. — Type: *Jack s.n.*, in G.

S. macroptera Miq., Fl. Ind. Bat. 1, 1 (1855) 1080; Prain, J. As. Soc. Beng. 66, ii (1897) 215, 492; Ridl., Fl. Mal. Pen. 1 (1922) 642. — Type: *Teysmann 863*, in L.

S. zollingeriana Miq., Fl. Ind. Bat. 1, 1 (1855) 84. — *S. indica* var. *zollingeriana* (Miq.) Gagn., Fl. Gén. I.-C. 2 (1913) 210, *quoad nomen.* — Type: ? *Zollinger*, 'Java, in de bosschen bij Gondang', E. Java.

S. obtusifolia Miq., Fl. Ind. Bat. 1, 1 (1855) 85. — Type: *Horsfield s.n.*, Java, not seen.

S. indica (*non* L.) Miq., Fl. Ind. Bat. 1, 1 (1855) 83, p.p. (based on a specimen from Java, Branbanan).

Jonesia palembanica Miq., Fl. Ind. Bat. Suppl. (1860) 291. — *S. palembanica* (Miq.) Baker, Fl. Br. Ind. 2 (1879) 272; Prain, J. As. Soc. Beng. 66, ii (1897) 216, 492; Ridl., Fl. Mal. Pen. 1 (1922) 642; Corner, Gard. Bull. Str. Settl. 10 (1939) 272; Ways. Trees Mal. (1940) 402. — Type: *Teysmann s.n.*, Sumatra, Palembang, pr. Muara Enim, in BO, L.

S. cauliflora Baker, Fl. Br. Ind. 2 (1879) 272; Ridl., Fl. Mal. Pen. 1 (1922) 641, p.p., the Wray-specimen apparently being *S. indica* L. — Syntypes: *Griffith s.n.*, *Maingay s.n.*, Malacca.

S. triandra [*non* (Roxb.) Baker] Baker, Fl. Br. Ind. 2 (1879) 272, *quoad specim.*; Prain, J. As. Soc. Beng. 66, ii (1897) 216, 492; Ridl., Fl. Mal. Pen. 1 (1922) 642; Merr., Univ. Cal. Publ. Bot. 15 (1929) 100.

S. macroptera var. *parviflora* Prain, J. As. Soc. Beng. 66, ii (1897) 492. — Type: *Kunstler 5511*, not seen.

S. biglandulosa Pierre, Fl. For. Coch. 5 (1899) t. 387, A; Gagn., Fl. Gén. I.-C. 2 (1913) 208. — Type: *Pierre 545*, Cambodia, in P, not seen; isotype in E.

S. thorelii Gagn., Not. Syst. 2 (1911) 236; Fl. Gén. I.-C. 2 (1913) 208, f. 20. — Type: *Thorel s.n.*, Laos, in P, not seen.

S. lanceolata Merr., Univ. Cal. Publ. Bot. 15 (1929) 100. — Type: *Elmer 21718*, Borneo, in L, SING, U.

S. crassifolia Ridl., Kew Bull. (1933) 491. — Type: *Haviland 1825*, in K; isotypes in BO, CGE, G, L, SING.

S. elmeri Ridl., Kew Bull. (1933) 492. — Type: *Elmer 20707*, N. Borneo; isotypes in L, SING, U.

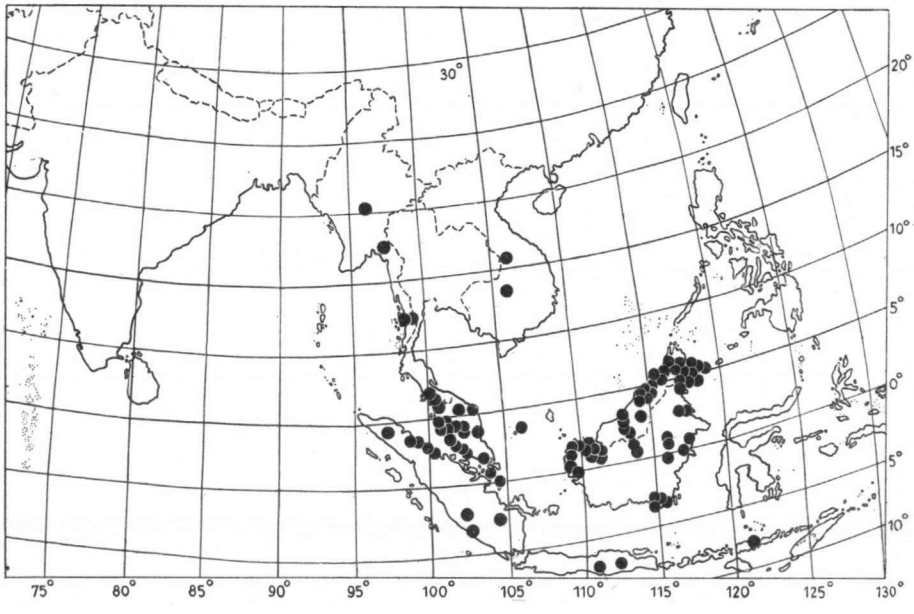
S. elegans Ridl., Kew Bull. (1938) 278. — Type: *Haviland 2905*, Sarawak, in K, not seen; paratypes: *Moulton 39*, in SING, *Henderson 20125*, in BO.

S. longistyla Ridl., Kew Bull. (1938) 279. — Type: *J. W. Anderson 130*, Borneo, in SING; paratypes: *Haviland 620*, in K, L, *879*.

Leaves (2—)3—7-jugate, herbaceous to strongly coriaceous, subsessile, *c.* 10—75 cm long, apex of rachis without free appendage, when dry pale or greenish brown, rarely blackish brown; leaflets oval to ovate or obovate or lanceolate, base cuneate or rounded, apex rounded to long-acuminate (up to 3 cm), *c.* 4—50 by 1½—20 cm; uppermost leaflets generally largest; petiolules *c.* 3—10 mm; basal and apical glands usually present. *Corymbs* variable, compact or loose, generally rather small, *c.* 1½—25 cm ∅, branches up to *c.* 3 mm ∅; bracts much smaller to somewhat larger than the bracteoles, persistent or fugacious, glabrous or pubescent, oval to (ob)ovate, acute, *c.* 3—12 by 1½—7 mm; bracteoles during anthesis persistent or very rarely fugacious, showy, spreading, oval to obovate, bluntish to subacute tipped, *c.* 4—19 by 3—10 mm. *Calyx* tube *c.* 7—32 by ½—1½ mm, length of pedicel between calyx tube and bracteoles much shorter than

tube, *c.* 1—6 mm; lobes ovate to oval, bluntish, *c.* 6—14 by 3—6 mm. *Stamens* (3—)4 (—5); filaments 16—38 mm; anthers *c.* ¾ mm long. Stipe of ovary 1½—4 mm; ovary *c.* 2½—7 mm long; style 7—20 mm. *Pod* more or less woody, oblong to lanceolate, *c.* 7—31 by 3—6 cm, with a somewhat thickened margin when dry, when fully mature slightly swollen up to *c.* 12 mm thick, apex straight or curved, shortly (up to *c.* 1 cm) beaked; base either cuneate or obliquely rounded; up to *c.* 9 pods developing from a corymb.

Distribution: Laos, Siam, and Burma east of the Irrawaddy River, Malay Peninsula, Sumatra, Riouw, Lingga, and Anambas Is. (Siantan), Borneo, twice in E. Java (Gondang, Brambanan), once from the Lesser Sunda Islands: Flores (*Verheyen 1298/1299*). Map 2.



Map. 2. Localities of 5. *Saraca declinata* (locality in 'Laos' not exactly localized).

Ecology: A wide range of habitats: primary forest, swamp forests, often along rivers, on clay soil, rich soil, sand, also on limestone, 0—600 m. The flower is extremely variably in colour (yellow to red) but is often reported as pink; it is mostly reported as having a faint scent. Fl. and fr. throughout the year. The bark (inside) is mostly reported as (reddish) brown, the sapwood as whitish.

Vernaculars: On the labels a great number of vernacular names are mentioned, of which only the following appeared more than one time: Malacca: *talan*; Malaya: *gapis*, *kapis*; Sarawak (Iban): *babai*; SE. Borneo: *bajuan*, *karundai*; N. Borneo (Dusun Kinabatangan): *bakis* (*bokis*), *balamut*, *marang parang*.

Uses: Occasionally used as an ornamental. Sometimes used for parang (knife) handles. The flowers are sometimes used in the preparation of soups (*Abdoel Rasjid bb 2134*, in BO). The seeds are edible.

Notes: This species has been described under many different names. It occurs in a great variety of habitats. Especially in the present species the flowers (flower-parts, e.g.

bracteoles, calyx tube, calyx lobes) show a great variability in size and colour. Various parts of the plant, e.g. the rachis of the leaves, the midrib and the veins on the lower surface of the leaflets, the pedicel, the bracts and bracteoles, the ovary and the disk, may be glabrous or hairy to various degree.

At first it seemed possible to segregate the larger part of the material into some different 'forms', but it proved impossible to keep them apart because of the great number of transitional specimens; also differences in fruits (with cuneate or more rounded base), shape of the leaflets, or shape of corymbs could not be employed for a sufficiently sharp distinction on infraspecific level.

In most of the dried specimens the lower surface of the leaflets is distinctly ribbed by the prominent lateral veins.

Nomenclature: *Jonesia declinata* Jack was described from Sumatra; an (?) isotype, *Jack s.n.*, 'Kayu Siturum', I saw in the Geneva Herbarium. In 1855 Miquel transferred this to *Saraca*, as *S. declinata* (Jack) Miq., but Miquel's material belonged to a different species, described by Prain in 1897 as *S. thaipingensis*. Owing to Miquel's misinterpretation of Jack's name, *S. thaipingensis* Prain, common in the Malay Archipelago, was hitherto erroneously known under the name of the present species.

According to the description *S. zollingeriana* Miq. doubtless belongs to *S. declinata*; the type is not in the herbaria consulted.

Baker described *S. cauliflora* as having about 7 stamens. I examined, however, duplicates of both the Griffith and Maingay collections from Malacca, and found them with having 4 stamens.

6. Saraca dives Pierre, Fl. For. Coch. 5 (1899) t. 386, B; Gagn., Fl. Gén. I.-C. 2 (1913) 211. — Type: *Balansa 2142*, Tonkin, Mt Bari, vallée de Lankok, seen from G.

Leaves 5—6-jugate, subcoriaceous, 30—60 cm long, on short petioles (1½—2 cm), glabrous, when dry generally dark brown or blackish brown, apex of rachis without free appendage; leaflets ovate to oblong-lanceolate, base rounded to cuneate, apex acute, (up to *c.* 1½ cm) acuminate, 15—35 by 7—11 cm, leaflets of lowest pair distinctly smaller; petiolules 5—10 mm, marginal and apical glands apparently absent. *Corymbs* robust, *c.* 20—30 cm ∅, branches thick, main ones 4—7 mm ∅; bracts much larger than bracteoles, fugacious (but well visible in young inflorescences), thinly pubescent, ovate-oblong with acutish tip, 25—30 by 10—15 mm; bracteoles persistent (always?), slightly longer than calyx lobes, not particularly showy, subglabrous or glabrous, oblong lanceolate with acutish tip, 10—15 by 5—7 mm. *Calyx* tube 20—25 by 1½—2 mm, length of pedicel between calyx tube and bracteoles much shorter than calyx tube, *c.* 5—7 mm; lobes 4—6, oval to oblong, apex rounded, 10—13 by 4—6 mm. *Stamens* 8—9(—10); filaments *c.* 25 mm; anthers *c.* 3—3½ mm long. Stipe of ovary *c.* 2½ mm, hairy, ovary hairy, *c.* 6—7 mm long; style *c.* 15 mm. *Pods* thick woody, (oblong-) lanceolate, 28—32 by 5—5½ cm, up to *c.* 2 cm thick.

Distribution: Tonkin, Laos (according to Gagnepain). Map 1.

Vernaculars: Laos (according to Gagnepain): *dok mà, là mà, wang ank.*

Uses: The pods make a very good forage for cattle (cf. Crevost & Lemarié, Cat. Prod. Indoch., 1917, 410).

Note: This species closely resembles *S. thaipingensis* in habit. It is, however, among others, distinguished by the presence of 8—9 stamens, larger anthers (3—3½ mm long), by having 4—5(—6) calyx lobes, and by the bracteoles being apparently persistent. The flowers are remarkably large, yellow ('jaune de chrome').

7. Saraca asoca (Roxb.) De Wilde, Blumea 15 (1968) 000. — *Asjogam* Rheede, Hort. Malab. 5 (1685) 117, t. 59. — *Jonesia asoca* Roxb., Asiat. Res. 4 (1799) 355, tab.; Wight, Ic. 1 (1840) t. 206; DC., Prod. 2 (1825) 487. — *Jonesia pinnata* Willd., Sp. Pl. 2, 1 (1799) 287, *nom. illeg.* — Type: Roxburgh's figure; specimens at BR in herb. Martius.

Jonesia confusa Hassk., Retzia 1 (1855) 194; Miq., Fl. Ind. Bat. 1, 1 (1855) 1080. — *S. confusa* (Hassk.) Back., Voorl. Schoolfl. Java (1908) 103; Schoolfl. Java (1911) 421; Back. & Bakh. *f.*, Fl. Java 1 (1963) 527. — Type: specimen not designated, name based on a living specimen from Hortus Bogoriensis.

S. indica (*non* L.) Beddome, Fl. Sylv. 1 (1869) 57, t. 57; Baker, Fl. Br. Ind. 2 (1879) 271; Prain, J. As. Soc. Beng. 66, ii (1897) 213, 489, incl. var. *puberula* et var. *latifolia*; Krishnamurti, J. Ind. Bot. Soc. 10 (1932) 159; Blatter & Millard, J. Bomb. Nat. Hist. Soc. 36 (1933) 353, t. 19—20; Corner, Ways. Trees Mal. (1940) 402; Randhawa, J. Bomb. Nat. Hist. Soc. 45 (1945) 558; Blatter & Millard, Some Beautiful Indian Trees ed. 2 (1954) 130, t. 27.

Leaves (1—)4—6(—7?)-jugate, (sub)coriaceous, subsessile, *c.* 7—30 cm long, when dry never dark, blackish brown, apex of rachis rarely ending in a small, subulate, free appendage; leaflets oblong to lanceolate, base cuneate, rounded, or rarely (in the basal leaflets) cordate, apex acute or up to *c.* 2 cm acuminate, 3½—25 by 1—9 cm, uppermost ones generally not the largest; petiolules *c.* 5 mm, basal glands apparently absent. *Corymbs* generally tufted, compact, small, *c.* 1½—15(—20) cm ∅, branches mostly glabrous; bracts small, usually smaller than bracteoles, persistent or fugacious, ovate to obovate, blunt, 1—6 by 1—3½ mm; bracteoles during anthesis persistent, erect, embracing the pedical, never spreading more than 45° from the pedicel, oval to obovate, blunt or acutish, 2—7 by 1½—4 mm. *Calyx* tube 10—17 by 1—2 mm; lobes 7—10 by 5—9 mm, oval to obovate, apex rounded. *Stamens* (5—)6—8(—10); filaments *c.* 17—25 mm; anthers 1½—2 mm long. Stipe of ovary 2—4 mm; ovary 4—5 mm long; style 15—20 mm. *Pods* oval to oblong, 4½—15 by 2—4½ cm, flat to mostly swollen, up to 1½(—2) cm thick, when flat (and young) with thickened margin, apex shortly beaked; base rounded or cuneate; only up to 1(—2) fruits developing from an inflorescence.

Distribution: Ceylon, India, E. Pakistan, Burma west of the Irrawaddy River. Map 3.

There is one doubtful, apparently wild, specimen from Siam, Bang Keng Liang (*Larsen 9296*).

In Malaya, Sumatra, and Java cultivated; both inside its natural range and outside it is frequently planted near shrines.

Ecology: From sea-level up to *c.* 500 m altitude, but there are several records from Khasia. Flowering and fruiting occurs apparently throughout the year, but in India flowering is mainly from March till June.

According to Roxburgh (1799) flowering occurs here in the beginning of the hot season, fruiting during the rains.

The flowers are fragrant during the night.

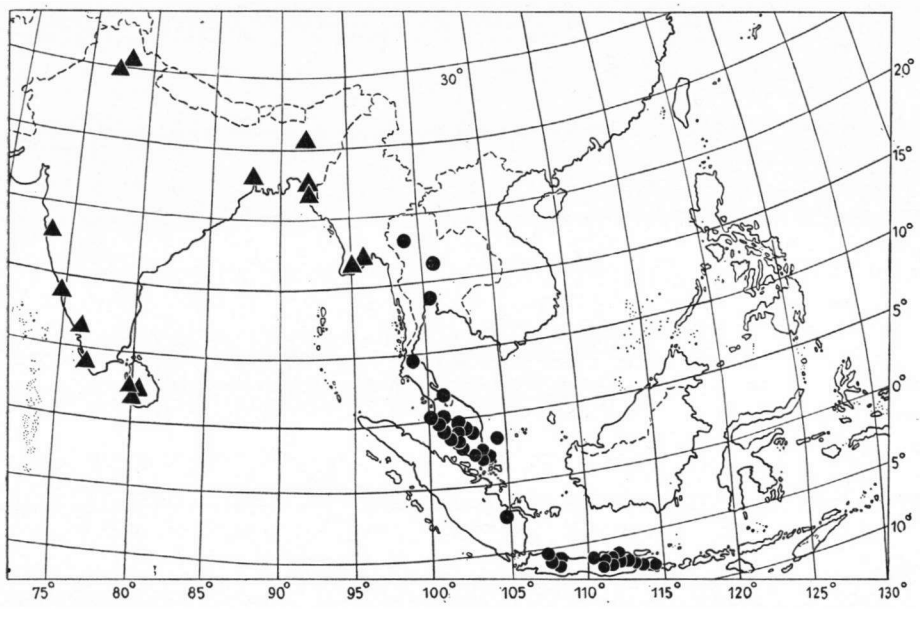
Vernaculars: Hind.: *asoc*; Beng.: *asoka*; Cuttack: *aseka, ati*; Singh.: *diyera tĕmbala*; Kanara: *ashunkar*; Bombay: *jassundi*; Burma: *thaiw-ka-hpo*. A more extensive account is given by Blatter & Millard, l.c. (1937; ed. 2, 1954) 133.

Popular beliefs: According to Blatter & Millard, and others, for the Hindus *S. asoca* is a sacred tree which they are ordered to worship on the 27th of December. Among the Burmese the tree is held sacred because under it Gautama Buddha is assumed to be born.

Uses: The above mentioned authors gave an enumeration of medical properties, uses, and economic value of the wood. The species is commonly used as an ornamental.

Notes: According to a note on a herbarium sheet of Dr. Furtado (in SING) the pods are reddish when young, black when mature.

There has been a considerable confusion in literature about the name of this plant which was almost always referred to as *S. indica* L. It appeared, however, that the type specimen of *S. indica* L., collected by Kleynhoff in Java, belongs to a different species. The present species, in its original area confined to India and Burma west of the Irrawaddy River, is typified by a plant described by Roxburgh in 1799 from the botanical garden at Calcutta. In a note he observed that this plant has been introduced here from the interior. The holotype specimen, the description, and the accompanying figure leave no doubt about its proper identity.



Map. 3. Localities of 7. *Saraca asoca* (▲) and 8. *S. indica* (●).

Krishnamurti (1932) reported the occasional occurrence of two ovaries per flower. The same I found in a specimen at Edinburgh (col. Madden's coll.); in this the two ovaries are inserted on apex of the joined stipe. A similar teratology is found in several other *Leguminosae* (cf. van Steenis, Fl. Mal. I, 4, 1948, xxvi b).

8. Saraca indica Linné, Mant. Pl. 1 (1767) 98; Baker, Fl. Br. Ind. 2 (1879) 271, p.p.; Miq., Fl. Ind. Bat. 1, 1 (1855) 83, 1080, p.p.; K. & V., Bijdr. Booms. Java 2 (1895) 36; Gagn., Fl. Gén. I.-C. 2 (1913) 210; Merr., Philip. J. Sc. 19 (1921) 353; Back. & Bakh. *f.*, Fl. Java 1 (1963) 528. — Type: *Kleynhoff*, Java; photograph seen.

S. arborescens Burm. *f.*, Fl. Ind. (1768) 85, t. 25, f. 2. — Type: *Kleynhoff*, Java, in G, probably same type as of *S. indica*.

Jonesia asoca (*non* Roxb.) Zoll. & Mor., Nat. Gen. Arch. Neerl. Ind. 3 (1846) 80, 70; Hassk., Retzia 1 (1855) 192.

Jonesia minor Zoll. & Mor., Nat. Gen. Arch. Neerl. Ind. 3 (1846) 80, 70. — *S. minor*

(Zoll. & Mor.) Miq., Fl. Ind. Bat. 1, 1 (1855) 84; Back., Voorl. Schoolfl. Java (1908) 103; Schoolfl. Java (1911) 422; Back. & Bakh. *f.*, Fl. Java 1 (1963) 528. — *S. minor* (Zoll. & Mor.) Miq. var. *typica* Prain, J. As. Soc. Beng. 66, ii (1897) 489. — Type: not indicated, probably *Zollinger 3445*, in L.

? *S. lobbiana* Baker, Fl. Br. Ind. 2 (1879) 272; Prain, J. As. Soc. Beng. 66, ii (1897) 490. — Type: *Lobb s.n.*, Moulmain, Martaban.

S. bijuga Prain, J. As. Soc. Beng. 66, ii (1897) 214; Ridl., Fl. Mal. Pen. 1 (1922) 641; Corner, Ways. Trees Mal. (1940) 401, Atlas t. 134, 135. — *S. minor* (Zoll. & Mor.) Miq. var. *bijuga* Prain, J. As. Soc. Beng. 66, ii (1897) 489. — *S. indica* var. *bijuga* (Prain) Gagn., Fl. Gén. I.-C. 2 (1913) 211. — Syntypes: *Kunstler 2749, 2382, 4059, 7221, Wray 2152*; *Scortechini 1503* (not seen).

? *S. kunstleri* Prain, J. As. Soc. Beng. 66, ii (1897) 213, 491; Ridl., Fl. Mal. Pen. 1 (1922) 641; Corner, Ways. Trees Mal. (1940) 402, p.p. — Type: *Kunstler 8048*, not seen.

S. zollingeriana (*non* Miq.) Prain, J. As. Soc. Beng. 66, ii (1897) 491.

? *S. harmandiana* Pierre, Fl. For. Coch. 5 (1899) t. 387, B; Gagn., Fl. Gén. I.-C. 2 (1913) 210. — Type: *Harmand 1067*, in P, not seen.

S. indica var. *zollingeriana* (*non* Miq.) Gagn., Fl. Gén. I.-C. 2 (1913) 211, excl. basion., *quoad specim.*

S. pierreana Craib, Kew Bull. (1928) 64. — Type: *Kerr 12376.*

Leaves 1—7-jugate, sessile, subcoriaceous to chartaceous, 10—50 cm long, when dry brownish, only very rarely blackish brown, with whitish rachis, apex of rachis sometimes ending in a free, subulate appendage *c.* 2—4 mm long; leaflets oval-ovate to lanceolate, 5—30 by 1½—10 cm; basal glands absent or rarely present, up to *c.* 0.2 mm ∅. *Corymbs* *c.* 3—15(—20) cm ∅; bracts small, fugacious or persistent, ovate to elliptic with acute tip, 2—8 by 1½—4½ mm; bracteoles just before or during anthesis fugacious or persistent, erecto-patent to spreading, not embracing the pedicel, ovate-elliptic to elliptic-oblong with acute or blunt tip, 3—8 by 1½—4 mm [1]). *Calyx* tube (5—)7—16 by ½—1½ mm; lobes ovate-oblong to oblong-obovate, 5—12 by 2—7 mm, with bluntish or rounded apex. *Stamens* (5—)6—8(—10); filaments *c.* 10—30 mm; anthers ¾—1½(—2) mm long. Stipe of ovary 2—5 mm; ovary (3—)4—5 mm long; style *c.* 15—20 mm. *Pods* variable in shape, oval to oblong-lanceolate with beaked apex and cuneate or obliquely-cuneate or rounded base, the margin thickened, 6—25 by 2—6 cm, up to *c.* 12(—15) mm thick; 2(—3) fruits developing per corymb.

Distribution: Lower Siam, Malay Peninsula, Sumatra, and Java, all localities east of the Irrawaddy River. Map 3.

Ecology: In (open) forests, on rocky ground, occasionally on limestone, often along streams, also in swamp forests, common in the teak forest of central Java, from sea-level up to 900 m. Flowering and fruiting occurs apparently throughout the year.

Vernaculars: Java: *soka, soko* (Javanese), *kembang dèdès* (Sundanese); Malaya: *bĕkapas, gapis, santan hutan, tudong periok* (all recorded only once).

Uses: Commonly cultivated in gardens as an ornamental. Flowers are scented, sometimes recorded as of sweet scent, scent of ripe pears etc., or musc-like; one time the absence of scent was mentioned.

Notes: Owing to the remarkable variability this species has been described under several binomials. As to the leaves all transitions occur between leaves with 1—2 pairs of leaflets and those having 5—7 pairs; the same can be said about the degree of hairiness of inflorescences and leaves. The shape of the leaflets is variable, but there is a tendency

[1]) Some specimens hitherto referred to '*S. kunstleri*' not included.

that the bases of the lowest pairs are more rounded or even cordate, while those of the uppermost pairs are mostly cuneate. As probably is the case with all species of *Saraca*, the flowers in entirely male corymbs (flowers with a reduced ovary) are smaller than those of bisexual ones. Commonly both bisexual flowers and male ones (with an abortive ovary) are found in one corymb.

For the range, specific identity, and typification see under *S. asoca*.

The type material of *S. lobbiana*, *S. kunstleri*, and *S. harmandiana* is either in a bad condition, or not yet examined. Together, they may represent a separate infraspecific form, with large bracteoles.

EXCLUDED SPECIES

Jonesia monopetala Hassk., Retzia 1 (1855) 199 = **Intsia bijuga** (Colebr.) O.K.

Jonesia scandens Roxb., Fl. Ind. ed. Carey 2 (1832) 220.

Sterile, a native of Sumatra, probably not a *Saraca* (Prain, J. As. Soc. Beng. 66, ii, 1897, 217).

Jonesia triandra Roxb., Fl. Ind. ed. Carey 2 (1832) 220. — *Saraca triandra* (Roxb.) Baker, Fl. Br. Ind. 2 (1879) 272, *quoad nomen* ? **Intsia bijuga** (Colebr.) O.K.

Saraca latistipulata Prain, J. As. Soc. Beng. 66, ii (1897) 217, 493 = **Leucostegane latistipulata** (Prain) Prain.