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A MONOGRAPH OF THE GENUS SCHOUTENIA\*) Korth. (Tiliaceae)

ROEKMOWATI - HARTONO \*\*)

SUMMARY

1. The genus consists of 8 species in Siam, Indochina, the Malay Peninsula, Sumatra, Borneo, Java, and the Lesser Sunda Islands. It is here divided into 2 subgenera, the monotypic *Schoutevia* with *S. ovata* Korth. and *Chartacalyx* with *S. accrescens* (Mast.) Curtis as type species. *Chartacalyx* is divided into 2 sections, *Chartacalyx* and *A disci flora* with *S. kuiistleri* King as type species.
2. Three species, *S. curtisii*, *corneri*, and *kostermansii* are considered new.
3. *S.<sup>l</sup> hypoleuca* Pierre is reduced to synonymy of *S. ovata* Korth.
4. *S. peregrines* Craib is reduced to a subspecies of *S. glomerata* King.
5. The varieties of *S. accrescens* (Mast.) Curtis are deleted. The species is divided into 3 subspecies: *accrescens*, *stellata*, and *borneensis*. A forma **lepidota** is recognized for subspecies *accrescens*.
6. *S. buurmanii* K. et V. and *S. kunstleri* King- are considered to be different species.

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SCHOUTENIA Korth.

*Schoutenia* Korthals in Ned. Kruidk. Arch. 1: 311. 312. 1848; Walp. Ann. bot. 2: 168. 1851—1852; Mueller in id. 4: 327. 1857; Hasskarl, Retzia 1 in Natuurk. Tijdschr. Ned. Ind. 10: 135. 1856; Miquel, Fl. Ind. bat. 1(2): 193, 205. 1859; Bentham & Hooker f., Gsn. Pl. 1: 230, 237. 1862; Baillon, Hist. PL 4: 165, 185. 1872; Diet. bot. 1: 43. 1876; 4: 38. 1892; Pfeiffer, Nomencl. 2(2): 1090. 1874; Syn. Bot.,

\*) Named in commemoration of W.C. Schouten, a Dutch sea-farer, who discovered the Schouten Islands in 1616.

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New Ed. 290. 1887; Durand, Index 45. 1888; Pierre, Fl. forest. Cochinch., fasc. 9: pi. 134, 135. 1888 (in adnot.); Boerlag-e, Handl. Fl. Ned. Ind. 1(1): 136. 1890; Schumann in Engler & Prantl, Nat. Pfl. fam. 3(6): 21, 24. 1890; in Nachtrage 1 z. 2—4 Teil: £34. 1897 (as a syn. of *Aetinophora* Wall.); Kuntze, Rev. Gen. Pl. 1: 81. 1891 (in syn.); King in J. Asiat. Soc. Bengal 60(2): 96, 105, 106, 107. 1891; Koorders, Zakfl. Java: 57, 1893; Exkursionsfl. Java 2: 574. 1912; Koorders & Valetton, Bijdr. Kennis Booms. Java 1 in Meded. Lands Pl.tuin Buitenzorg 11: 210. 1894; de Dalla Torre & Harms, Gen. siphon. 306. 1901 (in syn. of *Aetinophora* Wall.); Moll & Janssonius, Mikrogr. Holz. Java 1: 483, 521. 1906; Backer, Fl. Batavia 1: Overzicht der Behandelde Hoofdgroepen IX, 204. 1907; Voorlooper Schoolfl. Java 37, 39. 1908; Schoolfl. Java 148, 156. 1911; Adelbert in Backer, Bekn. Fl. Java (emergency Ed.), Fam. 105: 1, 17. 1944; in Backer & Bakhuizen van den Brink Jr., Fl. Java 1, Fam. 91: 388, 391. 1963; Gagnepain in Lecomte, Fl. gen. Indoch. 1: 559. 1911; Koorders-Schumacher, System. Verzeichn. 1§1, Fam. 174: 3. 1912; Fries in Engl. bot. Jahrb. 51: 350, 352, 354. 1944; Hallier f. in Beih. bot. Centralbl. 39(2): 178. 1921; Ridley, Fl. Malay Pen. 1: 291, 297. 1922; Suringar in Meded. Rijks Herb. Leiden 48: 1—10. 1925; 49: 1—4. 1925; Burret in Notizbl. bot. Gart. Berlin 9: 593, 600, 625, 628. 1926; Kukachka & Rees in Techn. Bull. Minnesota Agric. Exp. Sta. 158: 9, 10, 11, 24, 57, 62. 1943; Janssonius in Blumea 6(2): 420. 1950; Metcalfe & Chalk, Anat. Dicot. 1: 257, 258, 259, 262. 1950; Erdtman, Pollen Morphology 434, 436, 437. 1952.

*Aetinophora* Wallich, Catal. 1163 (1829) in Endlicher, Gen. Pl. 999. 1840 (nomen); in Enchir. 519. 1841 (nomen) (non *Aetinophora* "Raf." Endlicher in Gen. et Enchir., Index, II. ee, quoad *Aeinophora* Raf.); in Steudel, Nomencl., ed. 2, 1: 23. 1840 (nomen); in Reichenbach, Nomencl. 202. 1841 (nomen); ex Brown in Bennett & Brown., Pl. Jav. rar. 239, 240. 1852; Lindley, Veg. Kingd., ed. 3: 364. 1853 (non *Aetinophora* "Nutt."); Benthams & Hooker f., I.e. 237 (as a syn. of *Schoutenia* Korth.); Baillon, Hist. PL. I.e. 185; Diet. bot. I.e. 43; Pfeiffer, Nomencl. 1(1): 45. 1873 (non *Aetinophora* "Turcz." de Juss.); Syn. Bot., I.e.; Pierre, I.e., pi. 135 (sectio); Schumann, II. ee. (1894: 24); Kuntze, I.e.; de Dalla Torre & Harms, I.e.; Suringar, 11. cc; Burret, I.e. 625; Kukachka & Rees, I.e. 24; Den Berger, Determinatietabel voor Houtsoorten van Malesie 72. 1949; Metcalfe & Chalk, I.e. 257, 259, 262 (as a proper genus); Erdtman, I.e. 437.

*Chartacalyx* Maingay ex Masters in Hooker f., Fl. Brit. India 1: 380, 382. 1874; Pierre, I.e. (*Chartocalyx*); Boerlage, I.e. 134; Schumann, II. ee. 1895: 15, 16 (*Chartocalyx* Mast.); 1897: 233 (*Chartocalyx*) (non *Chartocalyx* „Regel"); King, I.e. 106 (in adnot., as a syn. of *Schoutenia* Korth.); Valetton in Icon. Bog. 1(4): 18, 19. 1901 (in adnot.); de Dalla Torre & Harms, I.e. 305 (*Chartocalyx* & *Chartacalyx*); Burret, I.e. 625 (as a syn. of *Schoutenia* Korth.); Kukachka & Rees, I.e. 9, 11, 23, 57, 62, 64 (*Chartocalyx* & *Chartacalyx*) (as a proper genus); Metcalfe & Chalk, I.e. 257, 260, 261 (*Chartocalyx*); Erdtman, I.e. 434, 436, 437 (*Chartocalyx*).

Trees, sometimes with buttresses; sometimes shrublike; young branchlets, lower leaf surface, petioles, inflorescences and pedicels generally densely rusty stellate pilose or scaly or both, older branchlets rather rough, dark, slightly sulcate, minutely lenticellate; stipules lateral, caducous or persistent; leaves distichous, simple, chartaceous to coriaceous, in most species entire, triplinerved; base usually oblique, secondary nerves starting from the midrib, horizontal, parallel, lax, at margin anastomosing arcuately; upper surface glabrescent. Petiole stout, terete.

Panicles or racemes terminal and axillary, shortly peduncled, usually few-flowered; pedicels terete, articulate, upper part longer than lower part, filiform; bracts below the articulation, caducous or persistent. Calyx synsepalous, membraneous, usually rusty stellate pilose and scaly or stellate pilose only, white to yellow, usually campanulate, sometimes explanate (*S. ovata*), usually 5-lobed, rarely 4—6-lobed; lobes valvate, accrescent, reticulate, with 3—7 conspicuous longitudinal veins; disc usually present as a densely rusty stellate pilose, small, circular strip, adnate to the calyx base. Corolla of 5 free petals only present in *S. ovata*; a short, thick, rusty stellate pilose or scaly or glabrous androgynophore sometimes present; stamens ca 15—125, patent-erect, hypogynous, uni- or multiseriate, as a rule connate at the base into 5 phalanges, alternating with the calyx lobes; filaments filiform, usually glabrous; anthers basifix, usually subextrorse, rarely subintrorse (*S. ovata*), linear, base cordate, usually glabrous, connective broad (lanceolate in bud), rarely with apical appendages (*S. buurmanii*), pollen-sacs 2, parallel (confluent at the top in bud), longitudinally dehiscent; pollen usually globular, as a rule 3—4 (mostly 3)-porate (-copate)\*), hispidulous (glabrous in *S. buurmanii*), yellow; ovary 5-carpellate (in *S. ovata* 3—5; usually 3-carpellate), usually globular, usually very densely rather coarsely rusty stellate pilose (branches of the hairs long, thin, with transparent walls), 5-celled, in *S. ovata* incompletely 3—5-celled, as the 3 (rarely 4 or 5) partitions are fused only at the base; placentation axillary; ovules basal, sessile, 2 in each cell, collateral, ascending, anatropous, micropyle extrorse, inferior; styles consolidate, stout, cylindrical, entirely or partly stellate pilose (sometimes scaly) or glabrous; stigmas 5 (in *S. ovata* 3—4, usually 3), as a rule linear, semiterete, fleshy, grooved on lower surface, usually recurved, almost erect in *S. ovata* and in *S. curtisii*, conspicuously papillose on the upper surface.

Fruit in most species globular, 5-celled (in *S. ovata*, incompletely 3—5-celled, usually incompletely 3-celled), septa thin; usually 1-seeded (in *S. ovata* very rarely more than 1 seed), densely rusty stellate pilose, glabrescent, sometimes stalked, with persistent style and stigmas or with remnant of style only; stamens persistent; calyx persistent, enlarged, campanulate, sometimes explanate (*S. ovata*), brown papery (in *S. ovata* the shrivelled petals often also persistent), usually loculicidally dehiscent into 5 parts (in *S. ovata* indehiscent), pericarp thin, pergamentaceous-crustaceous, brittle; seed sessile, ascending, more or less globular, obscurely to conspicuously lobed, white, becoming black, seedcoat thin, membraneous (in *S. ovata* relatively thick and crustaceous), the outer (dark coloured) one as thick as the inner (light coloured) one (in *S. ovata* thicker and harder), glabrous; albumen little, surrounding the embryo, white, becoming oily; cotyledons very large (in *S. ovata* about as broad as long, in *S. accrescens* much broader than long in the seedling), thin, foliaceous, convolute, irregularly plicate on the upper margins, sometimes involute, sometimes partly plicate; radicle near the hilum, small, inferior, cylindrical, somewhat protruding.

\*) Terminology of Erdtman (1952).

Type species — *Schoutenia ovata* Korth.

Distribution — Siam, Indochina, the Malay Peninsula, Sumatra, Borneo, Java, and the Lesser Sunda Islands.

The genus is here divided into 2 subgenera (which eventually may turn out to be 2 genera), the monotypic *Schoutenia* with *S. ovata* and *Chartacalyx* with *S. accrescens* as type species.

§ *Schoutenia*,

1. corolla present
2. anthers subintrorse
3. fruit incompletely 3—5-celled, indehiscent (achene)
4. seedcoat relatively thick, crustaceous

§ *Chartacalyx*

1. corolla absent
2. anthers subextrorse
3. fruit 5-celled, dehiscent (capsular)
4. seedcoat thin, membranous

*Chartacalyx* is here divided into the sections *Chartacalyx* with a disc, and *Adisciflora* (type: *S. kunstleri* King) without one.

*Actinophora* was combined with *Schoutenia* by Planchon (cf. *S. ovata*), whereas King moreover added *Chartacalyx* (cf. *S. accrescens*). The latter is confirmed by pollen studies of Erdtman.

There are only few wood-anatomical data concerning the relationship between the species. Moll & Janssonius noted only slight differences in wood anatomy of *S. ovata* and *S. buurmanii*. Kukachka and Rees found the wood of *Chartacalyx* (*S. accrescens*) to be different and easily distinguishable from *Schoutenia* by the presence of storied rays which are lacking or very indistinct in *Schoutenia*. Their description of *Schoutenia* is based on 2 species, which are not mentioned.

Only *S. buurmanii* has connective-appendages and glabrous pollen (cf. Koorders & Valeton).

The length of the androgynophore varies from less than 0.5 mm (*S. buurmanii*) to 4 mm (*S. accrescens*).

The phalanges in *S. ovata* are rather obscure, in *S. buurmanii* they are visible, in the other species they are conspicuous.

Hasskarl (*S. ovata*) described the leaves as subdistichous. This was corrected by Gagnepain and Hochreutiner.

The inflorescence is frequently described as to be cymose. I think it is better to call them panicles (Hasskarl, Masters) or racemes (Korthals), bearing one-flowered cymulae (cf. Schumann and Burret). Some wrongly described the inflorescence as to be leafy. As the bracts are inserted below the pedicel articulation, there are no bracteoles. As Boerlage, Koorders & Valeton, and Backer, I have not seen a receptacle, as contended by Baillon.

The calyx might not be absent (Adelbert). It is sometimes wrongly described as foliaceous. It may be very deeply lobed (*S. ovata*); it is not free as keyed out by Bentham & Hooker f., Boerlage, and Schumann. Boerlage stated that the calyx should be fleshy, which certainly is an orthographic error (Dutch: "vliezig" = membraneous instead of "vlezig" = fleshy). I have never seen a flower with 3 calyx lobes as mentioned by Koorders & Valeton and Backer. I agree with Korthals that the calyx is persistent. The petals (in *S. ovata*) are apert, and not imbricate or contort as contended by Bentham & Hooker f., Masters, Boerlage, and King.

*S. accrescens* has free stamens, in all other species the stamens are shortly connate at the base. The stamens of *S. curtisii* are uniseriate (almost uniseriate in *S. ovata* and *buurmanii*), all other species have multiseriate stamens. Ridley wrongly reported that the stamens are membraneous. The anthers are erect (Koorders & Valeton and Backer), and not suberect (Bentham & Hooker f. and Boerlage). They are linear and not oblong as described by many authors, and not globose as keyed out by Masters and King.

The ovary is incompletely 3—5-celled in *S. ovata* (Baillon), but not in *S. accrescens*, *glomerata*, and *kunstleri* (King), these and all other species have 5-celled ovaries. The ovules are basal (Hasskarl), attached to a central (Masters) placenta, not parietal (Gagnepain), and not pendulous (Masters, Boerlage, Schumann, Gagnepain). They are not erect (Hasskarl and Brown), but anatropous (Koorders & Valeton). There is always a style, although it may be very short in *S. ovata*. Probably this is why Koorders & Valeton and Backer contended that the style might be absent. The style is not slender (Baillon) or filiform (King, Gagnepain, and Ridley), but thick (Hasskarl). It is cylindric (Masters for *S. accrescens*), and not subulate as contended by Bentham & Hooker f., Boerlage, Koorders & Valeton, Backer. The 3—5 styles are only slightly cohesive. The stigma branches start at different heights.

The fruit may be called conical (Boerlage) only in an early stage of development. It is almost certain that the fruit of *S. ovata* is indehiscent (Hasskarl), whereas the other species may perhaps be loculicidally dehiscent (they open under pressure along the midribs of the carpels). Many authors wrongly reported that the fruit should be (usually) 1-celled. The fruit is always 5-celled (Schumann for *S. accrescens*), except in *S. ovata*, which is incompletely 3 (Hasskarl)—5-celled. The compartments of the fruit are never 3-seeded as reported by Korthals and Walpers, but there may be 3 (relatively large) seeds in the complete fruit of *S. ovata* (Hasskarl). The fruit of all other species are 1-seeded (Koorders & Valeton). Many authors reported that the seed should be erect; it should be ascending

(Baillon). The pericarp is pergamentaceous-crustaceous (Brown). The seed-coat is membranous, except in *S. ovata* where it is relatively thick and crustaceous, and not coriaceous (King, Koorders & Valetton, Backer, Ridley). The presence of albumen is easily overlooked (Hasskarl, King, Ridley) as it is very scanty (Koorders & Valetton and Backer) in a late stage of development. Moreover the albumen is not very fleshy as described by Bentham & Hooker f., and Pierre for *S. ovata*. Koorders & Valetton (*S. ovata*, *S. buurmanii*) mentioned that the embryo is curved, which is sometimes right for *S. ovata* in an early stage of development. The cotyledons are thin (King) and not thick, as contended by Hasskarl. The margins of the cotyledons are not involute in *S. oiiata* as described by Bentham & Hooker f., Baillon, Boerlage, and Schumann, but free. Involute cotyledons are found in *S. accrescens* and in *S. buurmanii*. In *S. glomerata* and in *S. corneri* they are plicate with free margins.

The species are usually found at low elevations, *S. ovata* up to 900 m alt., *S. glomerata* ssp. *peregrina* up to 1100 m alt. They seem to prefer a wet habitat, except *S. ovata*. Dispersal is by wind or water.

*S. ovata*, *buurmanii*, and *accrescens* are economically significant; the timber is used for making charcoal.

Galls are sometimes found in the inflorescence of *S. ovata*, *buurmanii*, and *S. glomerata* ssp. *peregrina*; in *S. ovata* and in *S. glomerata* ssp. *veregrina* they may also be found on the leaves.

#### KEY TO THE SPECIES AND SUBSPECIES

- 1a. Lower leaf surface woolly-stellate, no scales . . . . . 2  
 b. Lower leaf surface scaly and stellate pilose or scaly only . . . . . 4  
 2a. Calyx explanate, very deeply lobed; corolla present; anthers subintrorse; fruit incompletely 3—5-celled, indehiscent (achene); seedcoat relatively thick, crustaceous . . . . . 1.5. *ovata*  
 b. Calyx campanulate, shallowly lobed; corolla absent; anthers subextrorse; fruit 5-celled, dehiscent loculicidally (capsular); seedcoat thin, membranous . . . . . 3  
 3a. Midrib, basal, and lateral nerves sunken on upper surface; calyx inside stellate pilose on the margins only; disc glabrous . . . . . 2a. 5. *accrescens* subsp. *accrescens*  
 b. Midrib prominent; basal and lateral nerves sunken on upper surface; calyx inside stellate pilose on the margins only; disc densely stellate pilose . . . . . 2b. *S. accrescens* subsp. *stellata*  
 c. Midrib, basal, and lateral nerves prominent on upper surface; calyx inside stellate pilose on the margins and on the base; disc very sparsely stellate pilose . . . . . 2c. *S. accrescens* subsp. *borneensis*  
 4a. Flowers less than 2 cm; fruiting-calyx shorter than 1 cm . . . . . 5  
 b. Flowers more than 2 cm; fruiting calyx longer than 1 cm . . . . . 6  
 5a. Midrib prominent on upper surface; calyx inside stellate pilose . . . . .  
 . . . . . 4a. *S. glomerata* subsp. *glomerata*

- b. Midrib sunken on upper surface; calyx inside stellate pilose on the margins only . . . . . 4b. *S. glomerata* subsp. *peregrina*  
 6a. Disc present . . . . . 3 . . . . . *S. curtisii*  
 b. Disc absent . . . . . 7  
 7a. Androgynophore present; connective with an appendage; pollen glabrous . . . . . 5. *S. buurmanii*  
 b. Androgynophore absent; connective without an appendage; pollen hispiduicus . . . . . 8  
 8a. Scales on lower leaf surface non-fimbriate; lobes of fruiting calyx as long as the tube . . . . . *S. S. kostermansii*  
 b. Scales on lower leaf surface long-fimbriate; lobes of fruiting calyx longer than the tube . . . . . 9  
 9a. Petiole scaly; stamens ca 50 . . . . . 6. *S. kunstleri*  
 b. Petiole woolly-stellate; stamens ca 125 . . . . . 7. *S. corneri*

Subgenus *Schoutenia*: *Corolla abest, antheris subintrorsis, jructibus incompletis 3—5-ocularibus indehiscentibus (achena), testa crassiuscula crustaceaque.*

#### 1. SCHOUTENIA OVATA Korthals — Fig. 1; Plate I (1).

*Schoutenia ovata* Korthals in Ned. Kruidk. Arch. 1: 313. 1848; Walp. Ann. bot. 2: 168. 1851—1852; Mueller in id. 4: 827., 328. 1857; Planchon in Ann. Sci. nat. 2: 260. 1854 (in syn.); Hasskarl, Retzia 1 in Natuurk. Tijdschr. Ned. Ind. 10: 135. 1856; Hort. Bogor. (Ed. nov.) 1: 113. 1858; Miquel, Fl. Ind. bat. 1(2): 206. 1859 (not 274Z, but 2747); de Sturler, Houts. O. Ind., Bijlage 1: 56. 1866; Cat. Esp. Bois Arch. Ind. orient. 32. 1867; van Eeden, Cat. Houts. Ned. O. Ind. 65. 1872; Baillon, Hist. Pl. 4: 186. 1872 (in adnot.); Bisschop Grevelink, Pl. Ned. Ind. 2: 361. 1883; Filet, Pl. Wordenb. Ned. Ind., ed. 2: 113, 305. 1888; Pierre, Fl. forest. Cochinch., fasc. 9: pi. 134, 135. 1888 (in adnot.); Boerlage, Handl. Fl. Ned. Ind. 1(1); 137. 1890; Schumann in Engler & Prantl, Nat. Pfl.fam. 3(6): 24, f. 10 H. 1890; in Nachträge 1 z. 2—4 Teil: 234. 1897 (in syn.); Kuntze, Rev. Gen. Pl. 1: 82. 1891 (in syn.); King in 3. Asiat. Soc. Bengal 60(2): 107. 1891 (in adnot.); Koorders & Valetton, Bijdr. Kennis Booms. Java 1 in Meded. Lands Pl.tuin Buitenzorg 11: 211, 213, 214, 216. 1894; Atlas Baumart. Java 1: f. 84. 1913; 2: f. 398. 1914 (in adnot.); Valetton in Icon. Bogor. 1(4): 18. 1901 (in adnot.); Hochreutiner, Cat. Bogor. nov. in Bull. Inst. bot. Buitenzorg 19: 23. 1904 (in syn.); Pl. Bogor. exsicc. 13. 1904 (in syn.); Moll & Janssonius, Mikrogr. Holz. Java 1: 476, 481, 486, 521—525, f. 71. 1906; Backer, Fl. Batavia 1: 204. 1907; Voorlooper Schoolfl. Java 39. 1908; Schoolfl. Java 156. 1911; Adelbert in Backer, Bekn. Fl. Java (emergency Ed.), Fam. 105: 17. 1944; in Backer & Bakhuizen van den Brink Jr., Fl. Java 1, Fam. 91: 392. 1963; De Clercq, Nieuw Pl. Wordenb. Ned. Ind. 157. 1909 (in syn.); Foxworthy in Philip. J. Sci. 4(1): 498. 1909; Koorders in Gedenkboek Junghuhn 179. 1910; Exkursionsfl. Java 2: 574. 1912; Koorders-Schumacher, System. Verzeichn. 1§1. Fam. 174: 3, 4. 1912; Merrill, Bibliogr. Enum. Bornean Pl. in J. Str. Br. Roy. Asiat. Soc. Spec. Numb. 373. 1921; Suringar in Meded. Rijks Herb. Leiden 48: 1—10, f. 1. 1925; 49: 1—4. 1925; Burret

in Notizbi. bot. Gart. Berlin 9: 595, 625, 626, 627, 628. 1926; Den Berger in Meded. Proefst. Thee 97: 106. 1926 (in syn.); Heyne, Nutt. Pl. Ned. Ind... ed. 2..: 1021. 1927 (in syn.); ed. 3, 1: 1021. 1950 (in syn.); Erdtman, Pollen Morphology 436, f. 248 D. 1952. — *Korthals 993 a (H.L.B. 908, 254~S9) (L) (n.v.)*.

*Actinophora fragrans* Wallich, Catal. 1163 (1829) in Endlicher, Gen. Pl. 999. 1840 (nomen); in Steudel, Nomencl., ed. 2, 1: 23. 1840 (nomen); ex Brown in Bennett & Brown, Pl. Jav. rar. 239, 240, f. 46. 1852; Planchon, I.e.; Mueller, I.e. 328 (as a syn. of *Schoutenia ovata* Korth.); Miquel, I.e.; De Sturler, I.e. 1867; Baillon, I.e.; Bisschop Grevelink, I.e.; Schumann, II.ee. (1890: 24); Kuntze, I.e.; Koorders & Valeton, II.ee. 1894 et 1913 (1894: 211); Hochreutiner, II.ee. (1904: 23; 1904: 12); Backer, II.ee.; Adelbert in Backer, I.e.; in Backer & Bakhuizen van den Brink Jr., I.e.; De Clercq, I.e.; Koorders, I.e. 1912; Wind in Jaarb. Dept. Landb. Nijverh. & Handel 1920: 137. 1922; 1921: 106, 107. 1922; Suringar, II.ee.; Burret, I.e. 626; Den Berger, I.e. 105, 173; Heyne, II.ee.; Erdtman, I.e. 436. — *Horsfield s.n. (K) (n.v.)*.

*Schoutenia hypoleuca* Pierre, I.e., pi. 134 et 135 (in adnot.); King, I.e.; Koorders & Valeton, I.e. 1894 (213); Backe^ I.e. 1907 (in adnot.); Gagnepain in Lecomte, Fl. gén. Indoch. 1: 559, 561. 1911; Craib, Fl. Siam. Enum. 1(1): 193. 1925; Burret, I.e. 625, 626, 628; Erdtman, I.e. 436. — *Actinophora hypoleuca* (Pierre) Kuntze, I.e.; Burret, I.e. 869. — *Pierre 659 et S8U (P) (n.v.)*.

*Pterospermum burmannianum* Hochreutiner in Candollea 2: 437, f. 1. 1925 (exclus. cit. *Pentapetes suberifolia* L., Sp. Pl. 959. 1753 *pro minima parte, non alior*); Adelbert in Backer, I.e. (as a syn. of *Schoutenia ovata* Korth.). — *Burmann s.n. (G) (holotype) et Hochreutiner 221\*2 (G) (paratype) (n.v.)*.

Tree or shrub, up to 24 m high and 60 cm in diam., bole seldom straight, usually not buttressed, often shallowly fluted, branching usually low, crown rather dense, often very irregular, bark outside greyish, very tough, up to 15 mm thick, with longitudinal cracks, usually peeling off, inside yellowish to redbrown, somewhat astringent; sapwood 2—5 cm, white or red, merging into the red heartwood. Young branchlets, stipules, lower leaf surface and petioles woolly-stellate, tomentum on the young branchlets sparse to dense. Stipules caducous, linear-subulate, 2—13 mm long, at base ca 0.5 mm wide. Leaves coriaceous, rather variable in form, usually oblong, often more or less ovate or almost lanceolate, rhomboid, or oblanceolate, seldom obovate, 1—17 x 1—8 cm, margins irregular, deeply or shallowly coarsely incised in the upper half, or entire, base equal or oblique, 3(—7)-nerved, obtuse, slightly cordate (unilaterally or bilaterally), sometimes somewhat peltate, seldom acute; apex acute, shortly or long-acuminate, seldom obtuse, retuse, or emarginate, main nerves sunk on upper surface, prominent below, secondary nerves distinct or rather obscure on upper surface, sometimes impressed, prominulous below, other nerves distinct on both surfaces; upper surface somewhat glossy, densely rusty stellate pilose, glabrescent except on petiole insertion, lower surface dull, rusty or greyish, the stellate hairs long, glabrescent. Petiole ca 2—10 mm long, 1—2 mm in diam.

Dense corymbiform panicles up to 4 cm long and 1.5 cm in diam. (without flowers), peduncle, ramification, bracts, pedicels, both sides of

calyx, and disc stellate pilose. Bracts caducous, linear, 1—2 mm. Pedicels up to 2 cm, curved at the apex. Flower buds ovoid, up to 1 cm long. Flowers slightly fragrant. Calyx whitish-yellow, the stellate hairs denser and longer outside, explanate, lobed almost to the base, lobes ovate-lanceolate, up to 15 x 7.5 mm, acute or acutish, base ca 2 mm wide. Disc ca 0.5 mm. Petals yellowish-white, thin, hypogynous, alternating with the calyx lobes, oblanceolate-linear, up to 10 x 3 mm, acute or obtuse, narrowed towards the base, veined, glabrous, or sparsely stellate pilose at base on the lower surface. Stamens ca 15—25, almost uniseriate, the 5 phalanges obscure; filaments subulate at base, ca 6 mm; anthers ca 1—2 mm; pollen 3-porate (-colpate), 46—53 n\*). Ovary ca 2 mm high; ovules cuneate-obovate, raphe semi-adnate, style ca 1—2 mm, rusty stellate pilose or glabrous; stigmas erect, sometimes more or less spreading, 3(—4), 1—5 mm long. Fruit ca 6 mm long, with remnant of style, calyx, petals, and stamens persistent. Seed longitudinally 3-lobed, up to 4 mm long, cotyledons flat-convex, broad-reniform, more or less deeply incised at the apex, each half ovate, coarsely dentate, more or less acute at the apex; radicle ca 2 mm, hilum near the base.

Distribution — Siam, Indochina, Java, and the Lesser Sunda Islands, (perhaps Borneo) up to 900 m alt., especially in dry habitats.

Vernac. names — Siam: Dēng samē (Siamese), Binh (or bingue) tchnai (or tchnay) (Kmer), Bēng ta ngē (Kmer, Krabin), Dēng kē yē (East-Lao); Cambodia: Popel thuge, Ach-sat; West Java: Walikukun, Harikukun, Kukun, Ki kuku (Sundanese); Central and East Java: Walikukun, Walikukun, Likukun, Kukun, Landji (Javanese); Madura: Kokon; Kangean: Walikukun, Walikokon; Bali: Kalikukun, Lekukun, Kukon; Sumbawa: Kukin, Luhu; Flores: Kukung/Kuku; Dutch: Oost-indisch paardenvleesch, Vleeschhout (E. Indian meat-wood).

The names Walikukun and Landji are also used for *Schoutenia burmannii* and Ach-sat for *Schoutenia glomerata* subsp. *peregrina*. Landji is used for the young tree with dark wood (Heyne). Dogs, which are reddish with white spots, are called blang kalikukun in Bali (De Clercq).

I follow Backer's suggestion to combine *S. hypoleuca* Pierre and *S. ovata* Korthals. Pierre mentioned that *S. hypoleuca* differs from *S. ovata* by its smaller, more oblong leaves, and silvery tomentum on the lower leaf surface; he added that it hardly differs otherwise. Burret reported that *S. hypoleuca* is related to *S. ovata*; it has a silvery white lower leaf surface with no stellate hairs, whereas that of *S. ovata* is ochre and covered with stellate hairs; he did not see the flowers.

\*) Pollen treated with aceto-carmin and lactophenol.

Vautier (Genève) and Robson (British Museum, London) provided me with the following information on *Pterospermum burmannianum* Hochreutiner. In the Geneva herbarium the Burman specimen, identified by Hochreutiner as *Pterospermum burmannianum* is labelled cockoen and in a different handwriting Java and in a third handwriting *Pentapetes suberifolia*. *Pentapetes suberifolia* L. (based on Welagha Hermann: Mus. Zeyl. 3) is represented in the Hermann Herbarium by a sterile specimen which is an exact match for material of *Pterospermum suberifolium* (L.) Lam. This species is entirely different in leaf-shape and indumentum from *Pterospermum burmannianum*.

The branches are minutely lenticellate, and not without lenticels (Koorders & Valetton).

Backer mentioned that the lower leaf surface is first grey, later brown, which is right, but later on it becomes grey again when older. Brown and Miquel reported that there are also simple hairs on the lower leaf surface; in fact these are not simple, but stellate hairs (woolly in my description).

The pedicel is up to 2 cm long. The figure 15—30 mm as mentioned by Gagnepain includes the part below the articulation.

The calyx is not cup shaped (Schumann), it is explanate. It is not first coriaceous and then subscarious-membranous after anthesis (Brown), but first membranous then papery. It is not caducous (cf. key of Gagnepain). The inside of the calyx is not glabrous except the base (Hasskarl); Brown already mentioned that it is stellate pilose on both sides.

Three or four petals in one flower (Koorders & Valetton, Backer, Adelbert) could not be found.

All stamens have anthers and all are fertile and grouped in phalanges. Brown thought that the connective was small; possibly he observed it from the inside; actually it is broad. There is no appendage as mentioned by Gagnepain.

The ovary is 3(—5) celled, and not 2-celled as mentioned by several authors.

There are only 3(—4) stigmas on the pistil, but many authors saw 5.

There is usually one large seed and several small abortive ones in the fruit. Sometimes the large seed is abortive too. There may be also several large seeds, these are in fact all abortive.

Pierre reported that the albumen is abundant, which is true only in an early stage of development.

The cotyledons are slightly folded at the upper margins and not strongly plicate or crumpled (Koorders & Valetton, Gagnepain).

*Schoutenia ovata* is deciduous or sometimes evergreen. The fruit persists for a long time. Propagation is easy, either by stump or by seed. In Java and Indochina the timber is in high esteem, it is nearly as good as that of *Heritiera* and *Pterospermum*. Mixed stands of teak, *Schoutenia ovata*, and *Schleichera oleosa* gave good results in Java (Wind).

The wood is light to dark purplish redbrown, smooth to the touch, has a slight or moderate gloss, scent and taste are not characteristic (Den Berger); specific gravity 0.8—1.05, very tough, durable, and hard, it is difficult to cut, splits easily and is very elastic. In remote times it was used for bows by the Javanese (Van Eeden from van Musschenbroek \*). It can be used for various purposes as house and boat construction, for carriages, sleepers, anchors, gymnastic tools, spring parts of shakesieves, handles of tools, combs of mills, etc., but it can not substitute ash or white spruce in plane construction (Wind). The bark is used as rough bind material. The tree is ornamental. \*

The characteristics of the timber have been described extensively by Moll & Janssonius and Den Berger, from which the following is extracted.

Growth rings obscure to conspicuous, 2—8 mm thick. Sometimes the vessels in the late, sometimes in the early wood more numerous. Sometimes the libriform fibres in the outer growth rings smaller in diam. On some growth rings there is a layer of 1 to more cells thick woodparenchyma; medullary rays here usually somewhat wider with somewhat wider cells; the cells sometimes also radially shorter. With or without conspicuous flames and colour bands.

Vessels solitary to radially grouped (groups usually of some, often of 2 radially connected rows of vessels). Rather evenly distributed, or more or less conspicuously tangentially rowed; small and very small, numerous (ca 40 per mm<sup>2</sup>). Often confined on one or sometimes on both radial sides to the medullary rays; usually for the greater part surrounded by woodparenchyma. Sometimes empty, usually with tyloses. Solitary vessels 45—90 μ, r \*\*), 60—75 μ t \*\*). Groups of vessels 20—90 μ, 30—90 μ t. Vessel-segments 200—260 μ l \*\*). Vessels elliptic or cylindrical, flattened on both sides where they are confined to each other. Septa rather oblique; perforations round or oval. Walls 4 μ thick where they are confined to each other, usually 2—3 μ; wooded; with very numerous bordered pits where they are confined to each other; pit chambers very small, 2 μ, in diam., often 6-sided; the inner apertures somewhat slit-like; without pits where they are confined

\*) Catalogus der Houtsoorten Verz. van Musschenbroek, 1: 310; 2: 1; 5: 56.

\*\*\*) r, t, and l mean radially, tangentially and longitudinally respectively.

to libriform fibres; with very numerous one-sided bordered pits where they are confined to woodparenchyma and medullary ray cells; the pit chambers and slit-like inner apertures often somewhat more broader; usually the one-sided pits the same as the two-sided ones.

Libriform fibres dense, forming the groundmass of the wood; the ends, which touch the medullary rays, are often rectangularly curved.  $10-12\mu$  r and t,  $950-1250\mu$ . l; 4-8-sided. Walls  $4-5\mu$ . thick, usually with very small lumen; wooded, especially the thin middle lamella with the solid or hollow broadening, where more than 2 wood elements come together; with less numerous slit-like bordered pits where they are confined to each other; pit chambers small; the slit-like inner apertures long and almost vertical; with one-sided bordered pits where they are confined to woodparenchyma and medullary ray cells; the one-sided pits usually more or less the same as the two-sided ones. Intercellulars and content absent.

Woodparenchyma paratracheal, metatracheal and dispersed among the libriform fibres. The paratracheal ones are often very difficult to observe; they are rather numerous, often in one, sometimes in more layers surrounding the greater part of the vessels. The metatracheal ones are only found here and there, they are very irregularly distributed, locally entirely absent, elsewhere in short, very small, for the greater part connected with vessels and connecting two or a few vessels or extending over some medullary rays, somewhat wavy bands. Sometimes present on growth rings in frequently interrupted, very small bands. The dispersed ones are only very few, and then only near the vessels, sometimes partly participating in the bands mentioned. Woodparenchyma conspicuously fibred; fibres composed of 2-5, often of 4 cells. Cells near the vessels sometimes conjugated. Single cells with a few simple crystals; the cells are usually septate and then in each segment a simple crystal is present. Woodparenchyma cells  $10-16\mu$  r,  $10-12\mu$  t,  $40-140\mu$ . l, often ca  $60\mu$ ; some dispersed ones also bigger, for instance  $25\mu$  n r,  $25\mu$  t; cells confined to the vessels sometimes somewhat broader, for instance  $8-10\mu$ . deep,  $15-30\mu$  wide. Woodparenchyma fibres  $220-290\mu$ . l. Cells 4-8-sided prisms with longdrawn axis and sometimes rounded (off) sides. Walls  $1-1.5\mu$  thick, the longitudinal walls which are perpendicular to the vessel walls often much thickened between the pits, sometimes looking like conjugated woodparenchyma; wooded; with one-sided bordered pits where they are confined to vessels and libriform fibres; with simple pits, especially on the cross and radial walls where they are confined to each other and to medullary ray cells. Sometimes with intercellulars. Sometimes containing simple starch grains, up to  $10\mu$ . in diam. In single cells there are a few

simple crystals; these cells are usually septate and then in each segment a simple crystal of calcium oxalate is found. In many cells there is a yellow-deepbrown mass.

Medullary rays numerous; 1-3-, usually 2- and 3- layered and 3-80 cells high. Usually about 15 cells high or double this height. They are sidely separated from each other by 3-12 layers of libriform fibres. One-layered rays are entirely composed of short upright cells or radial, short lying cells. The remainder are for the greater part composed of lying cells, only the radial row or rows above and below usually consists of upright cells and on the radial sides there are sometimes short border cells or radial, short lying cells. On the incised parts of the high medullary rays, as on the ends, often upright cells are found. Sometimes in the medullary rays there are also one or more radial rows of radial, short lying cells or upright cells; these cells are often wider than the surrounding cells and often contain a crystal. Often in the upright cells and sometimes in the radial, short lying cells there are simple crystals; usually in each cell one simple crystal, sometimes more and then the cells are usually segmented and in each segment a simple crystal is present. Sometimes 2 rays stay vertically over each other and in this direction are separated from each other by one or two layers of oblique libriform fibres. Lying cells  $20-100\mu$  r,  $6-20\mu$  t,  $8-20\mu$  l, the shortest radially to the longest; 4-8-sided prisms with radially directed axis and rounded (off) sides. Walls  $1-2\mu$  thick; wooded; the simple pits here the most numerous on the tangential walls; sometimes aiming at simple pits through the intercellulars. Intercellulars in all directions, also where the cells are confined to the libriform fibres. Content about the same as the woodparenchyma cells, but here usually only one crystal per cell. The calcium oxalate sometimes may fill the entire cell, seeming to be fused with the wall. In some cases pit canals are present and often the crystal is absent. Upright cells  $5-25\mu$  r,  $6-20\mu$  t,  $20-40\mu$  l. Without intercellulars. Content more crystals.

Stories not very conspicuous to conspicuous; ca 200 n high. Containing all elements, or vessel-segments, libriform fibres and woodparenchyma fibres, but not most of the medullary rays. These are namely much higher than the corresponding vessel-segments, but they often show incisions on places corresponding to the septa of the vessels.

INDIA. Hort. Bot. Cal., fr. (BO) (cult); *ibid.*, *Hooker* s.n. (CAL); *ibid.*, *Wallich* 1163 (CAL) et *Wallich* 1117 (BR); SIAM. Maharat. Me Kammi, Pre, 180 m alt., Febr., fr., *Kerr* 2355 (CAL, K\*); Nakawn Sawan, Ban Klawng- Pong, Kampengpet distr., 100 m alt., Nov., fr., *Kerr* 5505 (K\*); Ayuthia., Ban Nawg Bua, Saraburi,

K\* means examined by Dr. A.J.G.H. Kostermans at Kew.

Oct., fr., *Put 1184* (K\*); Rachasima, Korat, Chan Tuk, 300 m alt., Dec, fr., *Kerr 8077* (K\*); *ibid.*, Hui Taleng, Dec, fr., *Put 2215* (K\*); *ibid.*, Dau Kuntot, 200 m alt., Jan., fr., *Kerr 19936* (K\*); *ibid.*, Pak Thong Chai, ca 200 m alt., Oct., fl., fr., *Phong Sono 29* — R.F.D. 5,2894 (BKP); INDOCHINA. Laos. Muong-phnih, road from Savannathet to Quang-tri, Jan., fr., *Poilane 114.52* (K\*); Muong niai, Sekhong valley, Attopeu prov., Oct., fr., *Poilane 15935* (K\*); North Vietnam. Phanrang prov., near Balac station on the railroad from Tourane to Liang-biang, Febr., fr., *Chevalier 80909* (BO, K\*, P); Cambodia. Trapeang-Kong, Kg. Bhuuang prov., Febr., fr., *Chevalier 86909* (BO, P); Kompongcham, Aug., fl., young fr., *Cam 85* (P); South Vietnam. Tay ninh, Nov., fl., *Poilane 766* (K\*); Mt. Chiua Chiang, Bien hoa prov., Sept., fr., *Pierre 659* (K\*, SING); Sept., young fr., *Pierre 3814* (CAL); Saigon, Jardin Botanique, June, fr., *Hiep 697* (BO, P) (cult); Baria, Dec, fr., *Pierre 9S* (CAL); *ibid.*, Febr., fr., *Chevalier 36561* (P); INDONESIA. Java. West Java. P. Merak, Febr., buds (BO); *ibid.*, March, fl. (BO); Serang, near Mantjak, ca 100 m alt., Sept., ster., *Endert 1201* (BO, BZF); Djakarta, May, fl., fr., *Backer 34025* (BO); *ibid.*, June, fr., *Backer 34026* (BO); *ibid.*, March, fl., *Backer 34027* (BO); Bogor, Hort. Bot., fl., fr. (BO) (cult); *ibid.*, seedbed 62 For. Res. Inst. (seedling), Nov., ster., *Burger s.n.* (BO) (cult); *ibid.*, Febr., ster., *Burger s.n.* (BO) (cult); Pelabuhanratu, May, fr., *Koorders 8595* (BO, CAL); *ibid.*, 40 m alt., Dec, fr., *Koorders 8596* (BO); *ibid.*, May, ster., *Koorders 8597* (BO); *ibid.*, June, ster., *Koorders 8600* (BO); *ibid.*, April, fr., *Koorders 12355* (BO, CAL); *ibid.*, fl., *Koorders 33092* (BO); Balekambang, 40 m alt., July, ster., *Koorders 8601* (BO); Djampangkulon, ca 10 m alt., May, ster., *Ja 1254* (BO, BZF); South of Tjiandjur, 5 km from Tjibeber, way to Tjidadap, ca 400 m alt., July, fr., *Kuswata 19* (BO); between Tipar and Tjikepuh, 175 m alt., July, ster., *Van Steenis 11432* (BO); *ibid.*, 50—235 m alt., July, fr., *Van Steenis 11452* (BO); Plered, 300 m alt., July, ster., *Bakhuizen van den Brink 4891* (BO); Preanger, fr., *Junghuhn 463* (BO); Indramaju, 20—30 m alt., March, ster., *Van Steenis 6620* (BO); Tjirebon, Mandapa, 50 m alt., April, fl., *Den Berger 2* (BO); Tomo, May, fr., *Koorders 8598* (BO, CAL) et *Koorders 8599* (BO); *ibid.*, July, ster., *Koorders 8602* (BO); *ibid.*, April, fr., *Koorders 11898* (BO); Madjalengka, Jan., ster., *Roelofsen 11* (BO); Kuningan, March, ster., *Houter 165* (BO); Central Java. Prupuk, ca 100 m alt., Sept., fr., *Wind 22* (BO); Kalisalak, 50 m alt., Nov., ster., *Koorders 8620* (BO); Margasari, 100 m alt., June, ster., *Beum. ee 107* (BO); *ibid.*, 100 m alt., July, ster., *Beum. ee 198* et *247* (BO); *ibid.*, Nov., ster., *Beumee 408* et *468* (BO); *ibid.*, 100 m alt., March, fl., fr., *Beumee 1818* (BO); *ibid.*, 125 m alt., April, fl., *NolUe 4.00* (BO); *ibid.*, 50 m alt., Nov., ster., *Koorders 8621* (BO); "West Tegal, 30—100 m alt., March, fl., *Beumee 1844* (BO); *ibid.*, 75 m alt., Nov., ster., *Roelofsen 6604* (BO); Pemalang, ca 25 m alt., May, ster., *Brascamp 47* (BO); Subah, June, ster., *Koorders 14261* (BO, CAL); *ibid.*, May, fr., *Koorders 22548* (BO); *ibid.*, April, fl., fr., *Koorders 27567* (BO); *ibid.*, May, fr., *Koorders 37060* (BO); Semarang, hill terrain, ca 50 m alt., April, fl., *Van Leeuwen-Reynvaan 2166* (BO); *ibid.*, ca 100 m alt., Aug., fr., *Burger 4623* (BO); Manggar, 100 m alt., April, fl., *Noltee 4623* (BO); Djepara, ster., unknown Collector *31* (BO); Rembang, Tg. Bendo, low, Dec, ster., *Van Steenis 17451* (BO); Karangasem, March, ster., *Koorders 8611* (BO); *ibid.*, 200 m alt., March, ster., *Koorders 8623* (BO); *ibid.*, June, fr., *Koorders 28423* (BO, SING); *ibid.*, Nov., ster., *Koorders 33206* (BO); Sedan, 600—800 m alt., June?, ster., *Koorders 376161* (BO); Tempuran, May fr., *Van Leeuwen Reynvaan s.n.* (BO); *ibid.*, 100—200 m alt., March, fl., *Beumee 5112* (BO); Kedungdjati, March, ster., *Koorders*

*860S* (BO); *ibid.*, March, loose fr., *Koorders 8604* (BO, CAL); *ibid.*, ster., *Koorders 8605* (BO); *ibid.*, April, fr., *Koorders 8606* (BO); *ibid.*, March, fl., *Koorders 8607* (BO, CAL); *ibid.*, May, fr., *Koorders 8608* (BO); *ibid.*, April, fl., *Koorders 8609* (BO); *ibid.*, June, fr., *Koorders 8610* (BO); *ibid.*, March, ster., *Koorders 8614* (BO); *ibid.*, April, fl., *Koorders 8615* (BO, CAL); *ibid.*, fl., fr., *Koorders 8616* (BO, CAL); *ibid.*, March, ster., *Koorders 8617* (BO); *ibid.*, fr., *Koorders 8618* (BO); *ibid.*, March, ster., *Koorders 8619* (BO); *ibid.*, Nov., ster., *Koorders 24887* (BO); *ibid.*, loose fl., *Koorders 24956* (BO); *ibid.*, ster., *Koorders 25254* (BO); *ibid.*, April, fl., fr., *Koorders 27095* (BO); *ibid.*, June, fr., *Koorders 28149* (BO); Telawa, 100 m alt., Dec, ster., *Beumee 544* (BO); *ibid.*, ster., *Kalshoven 19* (BO); *ibid.*, April, buds, *Koorders 8612* (BO); *ibid.*, Oct., ster., *Koorders 861S* (BO); South Kradenan, ca 80 m alt., May, fr., *De Boer 17* (BO); Surakarta, fl., fr., *Hemken 9* (BO); Jogjakarta, S. of Kemadang, 50 m alt., April, fr., *Backer 2689* (BO); *ibid.*, Klumpit, ca 100 m alt., Aug., fr., *Burger 2074* (BO); East Java. Bodjonegoro, fr., *Ja 610* (BZF); *ibid.*, 100—600 m alt., Oct., loose fr., *Attona 6542* (BO); Tambakredjo, ca 325 m alt., March, buds, *Ja 1575* (BO, BZF); near Klino, ca 500 m alt., Jan., ster., *Ja 2038* (BO, BZF); G. Pandan, Sept., ster., *Thorenaar 1* (BO); Ngawi, ca 100 m alt., March, fl., *Burger 2148* (BO); Ponorogo, 125 m alt., Sept., ster., *Wisse 47* (BO); Slaung, 500 m alt., Oct., ster., *Koorders 8641* (BO); Saradan, 500 m alt., Nov., fr., *Koorders 12412* (BO); Gadungan, ca 150 m alt., May, fr., *Kramer 5708* et *5708 a* (BO); Gadungan-Pare, ca 130 m alt., March, fl., *Jansen 5708* et *5708 a* (BO); S. Surabaja, 50—100 m alt., May, buds, *Beumee 2625* (BO); Pasuruan, ca 150 m alt., Nov., ster., *Bijhouwer 32* (BO); *ibid.*, 75 m alt., Jan., ster., *Backer 18380* (BO); Kraksaan, Wangkal, 25—100 m alt., fl., fr., *Backer 13030* (BO); Puger, Febr., fl., *Koorders 30069* (BO); *ibid.*, June, fr., *Koorders 8624* (BO, CAL); *ibid.*, Jan., ster., *Koorders 8625* (BO, CAL); *ibid.*, Aug., fr., *Koorders 8626* (BO, CAL); *ibid.*, ster., *Koorders 8627* (BO); *ibid.*, Sept., ster., *Koorders 8628—8682* (BO); *ibid.*, 50—250 m alt., Dec, ster., *Backer 18027* (BO); *ibid.*, Febr., fl., young fr., *Koorders 29836* (BO); *ibid.*, fl., fr., *Koorders 29928* (BO); *ibid.*, March, fl., *Koorders 29981* (BO); *ibid.*, May, ster., *Koorders 39718* et *39743* (BO); *ibid.*, March, fr., *Zollinger 2747* (CAL); Djember, ca 100 m alt., Febr., fr., *Ja 4901* (BO, BZF, SING); Mt. Ringgit, 10—50 m alt., March, ster., *Clason & Van Slooten 49* (BO); Pradjekan, 50 m alt., June, ster., *Backer 24600* (BO); Situbondo, 200 m alt., Oct., fl., loose fr., *Koorders 14871* (BO, CAL); Mt. Baluran, 50—150 m alt., March, fl., *Clason & Van Slooten 4* (BO); *ibid.*, 160 m alt., June, fr., *Backer 24820* (BO); Badjulmati, July, loose fr., *Koorders 8633* (BO); *ibid.*, May, fr., *Koorders 8634* (BO); *ibid.*, fl., *Koorders 8635* (BO, CAL); Banjuwangi, Djatipapak, June, fr., *Koorders 8636* (BO, CAL); *ibid.*, Aug., fr., *Koorders 8639* (BO, CAL); *ibid.*, ster., *Koorders 8640* (BO); Gradjagan, June, ster., *Koorders 8637* (BO); *ibid.*, fr., *Koorders 8638* (BO, CAL); locality unknown, fr., *Horsfield s.n.* (CAL); locality unknown, bud & loose fr., *De Vriese s.n.* (BO, SING); Madura. Hill South West of Ketapang daja, 100 m alt., March, ster., *Backer 19936* (BO); Pegantenan, fr., *Vorderman s.n.* (BO); Hill West of Sumenep, 50 m alt., March, fl., *Backer 20932* (BO); Hill North of Sumenep, 50 m alt., March, ster., *Backer 20708* (BO); Kangean Arch., Kangean, Ardjasa, 30 m alt., March, buds, *Backer 27089* (BO); *ibid.*, Budi, Sept., fr., *Dommers 15* (BO); *ibid.*, Tjangkramaan, 25 m alt., March, fl., *Backer 28123* (BO); *ibid.*, Dukoh, 27 m alt., Sept., fr., *Dommers 259* (BO); Sepapan Isl., 3 m alt., April, fl., fr., *Backer 28493* (BO); Saubi Isl., 5 m alt., April, ster., *Backer 28294* (BO); Paliat Isl., Paliat, 10 alt., May, ster.,



*Backer* 29830 (BO); *ibid.*, 1—10 m alt., May, fl., *Backer* 29504 (BO); Bang-ko Isl., 2 m alt., April, fr., *Backer* 29201 (BO); Sepandjang- Isl., Sepandjang, 1 m alt., April, ster., *Backer* 28748 (BO); *ibid.*, 2 m alt., April, fr., *Backer* 28769 (BO); Kalimantan, locality not indicated, fr., *Korthals* 486 (CAL); Bali. North West Bali, June, ster., *Van der Paardt* 57 (BO); Prapatagung, 20 m alt., March, fl., fr., *Becking* 53 (BO); *ibid.*, buds, *Becking* 65 (BO); Sumberklampok, ca 3 km from Gilimanuk towards Singaradja, low, June, fr., *Kostermans* s.n. (BO); Karangasem, near Tongtongan, ca 400 alt., Nov., ster., 66 13266 (BO, BZF); Mt. Sangiang, ca 150 m alt., March, fr., *Dilmy* 1033 (BO); Lombok. Mt. Rindjani N. side, Sadjang, 500—700 m alt., April, fl., fr., *Elbert* 746 (BO, SING); *ibid.*, S.S.E. side, Pringgabaja, 50—75 m alt., June, fr., *Elbert* 2048 (BO); Ekas, 5—10 m alt., April, fr., *Rensch* 245 (BO); Sumbawa. Batudulang, 900 m alt., May, loose fl. & fr., *Rensch* 6U (BO); Mt. Batulanteh, 400 m alt., May, fl., *Kostermans* s.n. (BO); *ibid.*, Semongkat Atas., ca 17 km S. W. of Sumbawa Besar, ca 250 m alt., May, buds, *Kuswata* s.n. (BO); *ibid.*, Parnek, Olat Seli, ea 12 km S. of Sumbawa Besar, May, fl., *Kuswata* s.n. (BO); *ibid.*, 8 km E. of Sumbawa Besar, 100 m alt., April, fl., *Kostermans* 18043 (BO); Dompu, 80 m alt., May, fr., *Rensch* 842 (BO); Bima, Dororupah, 40—200 m alt., Dec., ster., *Elbert* 3876 (BO); *ibid.*, Dorokedo, 10—150 m alt., Dec, ster., *Elbert* 3887 (BO); 5 km South of Bima, 70—80 m alt., Febr., fr., *Bloembergen* 3150 (BO); near Mawar, ca 40 m alt, July, fr., 66 12011 (BO, BZF); near Mungkin, ca 750 m alt., April, fr., 66 14028 (BZF); Sumba. Laora, April, buds, *Ibut* 355 = *Sumba-expedition* 1925 s.n. (BO); Komodo. ca 50 m alt., June, ster., *Hoogerwerf* 47 et 49 (BO); Rintja. Sok Nelu, June, ster., *Hoofferwerf* 140 (BO); Flores. Manggarai, near village Watungong, alt. ca 200 m, July, fr., 66 9984 (BO, BZF); *ibid.*, near village Wailako, alt. ca 10 m, June, ster., 66 11565 (BO, BZF); East Flores, near village Lowewerang, alt. ca 700 m, Febr., ster., 66 11409 (BO, BZF); *ibid.*, Larantuka, May, fl., fr., Landbouwvoorlichtingsdienst Oost Flores (Agriculture Extension Service East Flores) Larantuka 1 (BO).

Subgenus *Chartacalyx* {*Maingay ex Masters*} Roekmowati-Hartono *subg. nov.*: *Corolla deest; antheris subextrorsis; fructibus 5-ocularibus dehiscentibus (capsula); testa tenui membranaceae.*

Sectio *Chartacalyx*, *sect. nov.*: Discus abest.

## 2. SCHOUTENIA ACCRESCENS (Mast.) Curtis

Lower leaf surface woolly-stellate; calyx campanulate, shallowly lobed; disc and androgynophore present; stamens free.

2a. *Schoutenia accrescens* (Mast.) Curtis, *subsp. accrescens* — Fig. 2a; Plate I (2).

*Schoutenia accrescens* (Mast.) Curtis in J. Str. Br. Roy. Asiat. Soc. 25: 84. 1894; Merrill in *id.*, Spec. Numb. 373. 1921; Burret in *Notizbl. bot. Gart. Berlin* 9: 625. 1926. — *Chartacalyx accrescens* Masters in Hooker f., *Fl. Brit. India* 1: 380, 382. 1874; Boerlage, *Handl. Fl. Ned. Ind* 1(1): 134. 1890; Schumann in Engler & Prantl, *Nat. Pfl.fam.* 3(6) : 16. 1890 (*Char to calyx*); King in J. Asiat. Soc. Bengal 60(2) : 106. 1891 (as a syn. of *Schoutenia mastersii* King); Valetton in *Icon. Bog.* 1(4) : 18. 1901 (in adnot.; as a syn. of *Schoutenia mastersii* King); Merrill, I.e. (as a syn. of *Schoutenia accrescens* (Mast.) Merr.); Ridley, *Fl. Malay Pen.* 1: 298. 1922 (as a

syn. of *Schoutenia mastersii* King); Burret, I.e. (as a syn. of *Schoutenia accrescens* (Mast.) Merr.); Erdtman, *Pollen Morphology* 436. 1952 (*Chartacalyx*). — *Maingay* 1652 (Kew Distr. 252) (CAL).

*Schoutenia mastersii* King, I.e.; Valetton, I.e. (in adnot); De Clercq, *Nieuw PL Woordenb. Ned. Ind.* 323. 1909; Merrill, I.e. (as a syn. of *Schoutenia accrescens* (Mast.) Merr.); Ridley, I.e.; *id.* 5: 293. 1925; Burret, I.e. 626 (as a syn. of *Schoutenia accrescens* (Mast.) Merr.); Erdtman, I.e. — *Maingay* 1652 (Kew Distr. 252) (CAL).

var. *microphylla* Ridley, I.e. 1925; Burret, I.e. 626 (in adnot.) — *King's Coll.* (Kunstler) 3381 (K\*) et *Scortechini* s.n. (K\*).

var. *angustifolia* Ridley, I.e. 1925; Burret, I.e. 626 (in adnot.). — *Burkill S.F.N.* 3176 (K\*).

Tree, up to 35 m high and 50 cm in diam.; bole long, straight, fluted, somewhat twisted, branches stiff, obliquely ascending; crown dense; buttresses thick, 80 cm high, out 1.35 m. Bark black or brownish, flaky, 3 mm, inner bark 6 mm, reddish, with acrid taste and little bright coloured sap. Young branchlets, stipules, lower leaf surface and petioles woolly-stellate. Stipules caducous, acicular to linear-acicular, 1—7 mm long. Leaves thinly coriaceous, elliptic, sometimes oblong, seldom ovate-lanceolate or slightly obovate, 0.5—13 x 0.5—5.5 cm, base equal or slightly to distinctly oblique, rounded, sometimes cuneate, seldom very slightly peltate, apex tapering, rounded-acuminate, sometimes shortly and bluntly acuminate, main nerves sunken on upper surface, prominent below, veins obscure above, prominent below, upper surface glossy, in young leaves rusty stellate pilose, lower surface dull. Petiole 2.5—7.5 mm long, up to 1.5 mm in diam.

Panicles up to 2 cm long and 1 cm in diam., peduncle, ramifications, bracts, pedicels, outer calyx surface, androgynophore, anthers and style stellate pilose, the peduncle moreover sometimes woolly (the specimen *S.F.N.* 28812 has long-fimbriate scales instead of straight-haired stellate hairs). Bracts caducous, linear-acicular to filiform, up to 9 mm long, glabrescent on upper surface. Pedicels up to 2 cm long. Calyx yellow, or pink (King, Ridley), ca 1—3 cm long, tube up to 2 cm, lobes triangular, acute, up to 1 cm long, base up to 2.5 cm wide, inside of calyx glabrous, except the margins and tip of lobes which are stellate pilose (hairs slender, wavy). Disc up to 0.5 mm, glabrous. Androgynophore ridged, up to 4 mm, glabrescent. Stamens ca 30—40, free; filaments 3.5—5 mm, sparsely stellate pilose with simple hairs or glabrous; anthers 1—2 mm, stellate pilose or glabrous. Pollen 3-porate (-colpate), 45—52  $\mu$ . Ovary obscurely 5-lobed, ca 1—1.5 mm high; style ca 4—7 mm, hairs (or scales) denser towards the base, or sometimes glabrous with stellate hairs at the base only; stigmas 0.5—1.5 mm, recurved, sometimes suberect, sparsely stellate pilose or glabrous on the lower surface. Fruit ca 7 mm long, glaucous-blue (Anderson), obscurely 5-ribbed. Seed ca 3 mm long, cotyledons involute, not plicate, radicle 2.5 mm.

Distribution — Common at low elevations up to 750 m alt. in the Malay Peninsula, Sumatra (Lingga Arch.), and Borneo (W. part).

Vern. names — Malay Peninsula: Bayur, Bayur bukit; Sumatra: Merawai, Pasak.

This subspecies differs from *stellata* and *borneensis* by the thinly coriaceous leaves, the sunken main nerves on the upper leaf surface, the calyx base, which is glabrous inside and the glabrous disc.

The varieties *microphylla* and *angustifolia* of Ridley do not deserve varietal rank because the size and shape of the leaves, the size of the flowers and the size of the fruiting calyx represent only minor variations. The specimen *S.F.N.* 28812 differs because of a scaly and not stellate pilose inflorescence; this is called here forma *lepidota*.

The young branchlets are at first woolly-stellate and not scaly (King). According to Masters the petiole may be up to 12.5 mm long.

The axillary, solitary flowers (King, Valetton, Ridley) represent reduced one-flowered inflorescences.

The pedicel is up to 2 cm long, it does not include the lower articulate part.

The calyx is shallowly lobed (wrong in King's and Ridley's key). The calyces which I have seen are always campanulate, and not rotate, flat (King).

The ovary is more globular than ovoid (Masters).

The pistil has always 5 stigmas and not less (Masters).

The hard and strong wood, which is heavier than water, is used for house building (Alvins 1825).

CEYLON. Hort. Bot. Peradenya, April, young fr., unknown Coll. 349 (CAL); MALAY PENINSULA. Penang. Telok Bahang For. Res., June, fr., *Yahya S.F.N.* 3577k (BO, K\*, SING); *ibid.*, fr., *Fox* s.n. (BO); *ibid.*, fr. (BO); Penang Hill, July, ster., *Corner* s.n. (SING); *ibid.*, Nov., ster., *Sinclair S.F.N.* 39036 (K\*, SING); July, fr., *King F.M. S.F.N.* 2561 (SING); Government Hill road, Sept., seedling and 1 loose fruit, *Burkill S.F.N.* 3188 (BO, SING); March, fl., young fr., *Curtis 1520* (CAL, K\*, SING); *ibid.*, 200 m alt., July, fr. (SING); Jungle above waterfall gardens, March, young fr., *Nauen S.F.N.* 37095 (BO, K\*, SING); waterfall, April, fl., young fr., *Haniff S.F.N.* 3359 (BO, CAL, K\*, SING); *ibid.*, March, fl., young fr., *Curtis 1520* (CAL, K\*); Perak, Larut, 150–300 m alt., Sept., fl., *King's Coll. (Kunstler) 3381* (CAL, K\*, SING) (labeled var. *microphylla*); fr., *Scortechini* s.n. (CAL, K\*, SING) (type of var. *microphylla*); Kepong, Bukit Lagong For. Res. Selangor, 300 m alt., Sept., young fr., *Ahmad K.F.N.* 94452 (BO); Pahang. Temerloh, Bukit Toralang, Sept., fl., *F.M.S.* 13772 (SING); *ibid.*, Belingo, Sept., fl., *Awang Lela* C.F. field no. S695 (SING); Kuantan. Gunong Tapis, 750 m alt., June, fl., *Symington & Kiah S.F.N.* 28812 (BO, K\*, SING) (labeled var. *angustifolia* Ridley; now becoming forma *lepidota*); Rompin, Oct., fr., *F.M.S.* 15761 (SING); Negri Sembilan. Gunong Angsi, April, young fr., *Watson C.F.* 546 *S.F.N.* 1894 (SING); Gunong Tampin, 690 m alt., May, fl., young fr., *Burkill S.F.N.* 3176 (CAL, BO, K\*, SING) (labeled var. *angustifolia* Ridley); Bukit Tumiang, July, fr., *Alvins 1825* (SING); Malacca, fl., fr., *Maingay 1652* (Kew Dist. 252) (CAL, K\*, P); Johore. Sungai Ayer **Hitam Besar**,

Gunong Pulau, May, ster., *Sinclair S.F.N.* 39620 (BO, SING) et 39627 (SING); *ibid.*, March, young fr., *Sinclair 10580* (BO, K\*); Kulai Young Estate, July, ster., *Corner S.F.N.* 33595 (BO, K\*, SING); *ibid.*, July, ster., *Corner* s.n. (SING); Sungai Kayu Ara, Mawai-Jemaluang road, low, Febr., young fr., *Corner S.F.N.* 29006 (CAL, BO, K\*, SING); Mile 12.5 Mawai-Jemaluang road, low, Jan., fl., young fr., *Corner S.F.N.* 28681 (CAL, BO, K\*, SING) (labeled var. *glabra* Henderson); Mile 12 Mawai-Jemaluang road, low, April, fl., young fr., *Corner S.F.N.* 37250 (BO, K\*, SING); Sungai Sedili, Mile 3 below Mawai, Sept., ster., *Corner* s.n. (SING); *ibid.*, below Mawai, low, July, fr., *Corner S.F.N.* 36975 (K\*, SING); *ibid.*, low, July, fr., *Ngadiman S.F.N.* 36846 (BO, SING); SUMATRA. Riouw, Lingga, Singkep, near Ulu Sungai Marok Tua, Jan., ster., 66 1716 (BO, BZF); *ibid.*, Hulu Manggu, Marok ketjil, ca 10 m alt., Nov., ster., 66 5997 (BO); *ibid.*, Hulu Labuh, Marok ketjil, ca 12 m alt., May, ster., 66 5373 (BO); BORNEO. Sarawak, fr., *Beccari 2150* (Fl, G, K\*, P); district Lundu, Mt. Gading near first waterfall, 210 m alt., Oct., fr., *Anderson et al.* 15365 (BO); *ibid.*, Sept., loose young fruits (SING); Kalimantan. Sambas, Paloh, 5 m alt., Aug., ster., 66 1517 (BO, BZF).

Forma *lepidota* Roekmowati-Hartono, *l. nov.* — Fig. 2b.

*Foliis oblongo-linearibus, floribus minutis fimbriato lepidotis (pilis marginalibus longis).*

Leaves oblong-linear, up to 6 cm long and 1.5 cm wide; panicles lepidote (scales long-fimbriate), the peduncle moreover may be woolly, flowers lepiclote (scales long-fimbriate).

Typus — *Symington & Kiah S.F.N.* 28812 (SING).

Distribution — Only known from the type locality.

MALAY PENINSULA. Pahang, Kuantan, Gunong Tapis, 750 m alt., June, fl., *Symington & Kiah S.F.N.* 28812 (BO, K\*, SING).

2b. Subsp. *stellata* Roekmowati-Hartono, *subsp. nov.* — Fig. 2c; Plate I (3).

*Arbor, ramulis juvenilis stellato pilosis, foliis rigide coriaceis, ellipticis, apice plerumque obtusis acuto-acuminatis, interdum acutis vel obtusis, fides superioribus nervo mediano prominulo nerviis impressis, calicibus fides interioribus glabris, marginis stellato pilosis, discus dense stellato pilosis, pollen 3–4, plerumque 3-porosis, fructibus basin breviter angustatus.*

Tree, up to 14 cm in diam., young branchlets stellate pilose, older ones glabrescent, rough, cracked longitudinally and transversely. Stipules linear-acicular, 4 mm long. Leaves rigidly coriaceous, elliptic, 3–8 x 1–4 cm, base distinctly oblique, rounded, apex usually rounded acuminate with sharp tip, acute or obtuse; upper surface with prominulous midrib and sunken veins, lower surface with prominent main nerves and prominulous veins. Petiole 4–7.5 mm long, 1–2 mm in diam.

Panicles up to 1.5 cm long. Bracts long persistent, filiform, up to 4 mm long. Pedicels 15—22 mm. Calyx ca 2.5 cm long, tube ca 2 cm, lobes ca 0.5 cm long, base 2—2.5 cm wide. Disc ca 0.5 mm, densely stellate pilose. Androgynophore ca 0.5 mm. Stamens ca 25; filaments ca 5 mm; anthers ca 2 mm. Pollen 3—4, usually 3-porate (-colpate), 45—48  $\mu$ . Style ca 7 mm, glabrous, stellate pilose at the base only; stigmas ca 1 mm, recurved. Fruit shortly (ca. 0.5 mm) narrowed at the base. Seed ca 4 mm long.

Typus — *Anderson S 2173* (BO).

Distribution — Only known from the type locality.

This subspecies differs from *accrescens* and *borneensis* by the rigidly, coriaceous leaves, prominulous midrib and sunken veins on the upper leaf surface, the calyx base which is glabrous inside, and the densely stellate pilose disc.

BORNEO. Sarawak. Andulau For. Res., 39 m alt., *Anderson S 2173* (BO, K\*, SING) : : . -

2c. Subsp. *borneensis* Roekmowati-Hartono, *subsp. nov.* — Fig. 2d; Plate I (4),

*Arbor, ramulis juvenilis stellato pilosis, foliis coriaceis, ellipticis, apice longissime obtuse acuminatis, fades superioribus nerviis mediants, basilibus et lateralibus prominentibus, calicibus fades interioribus glabris, stellato pilosis ad lobis marginem et prope basin discus, discus sparsissime stellato pilosus, pollen 3—4, plerumque 3-porosis.*

Tree, up to 30 m high and ca 13 cm in diam.; young branchlets stellate pilose; bark smooth, purplish, outer bark reddish, inner bark light red, sapwood brownish. Leaves coriaceous, elliptic, 6—15 x 2.5—5.5 cm, base slightly to distinctly oblique, cuneate-rotundate, apex tapering, rounded-acuminate, main nerves prominent on both surfaces (more below), veins prominulous on both surfaces (more below), upper surface rusty stellate pilose, glabrescent. Petiole 0.5—1 cm long, 1—2 mm in diam.

Panicles ca 1 cm long. Flowers green (Madani). Pedicels 18—20 mm. Calyx ca 3 cm long, tube ca 2 cm, lobes sometimes 6, ca 1 cm long, base 12—20 mm wide, inside of calyx base around the disc stellate pilose (hairs slender, wavy). Disc ca 0.25 mm, very sparsely stellate pilose. Androgynophore ca 0.5 mm. Stamens 35—40; filaments ca 5 mm; anthers ca 2 mm. Pollen 3—4, usually 3-porate (-colpate), 46—59  $\mu$ . Style ca 7 mm, glabrous, stellate pilose at the base only; stigmas ca 1 mm, recurved. Seed ca 4 mm long.

Typus — *Madani SAN 35105* (BO).

Distribution — Only known from the type locality.

This subspecies differs from *accrescens* and *stellata* by the coriaceous leaves, the prominent main nerves on the upper leaf surface, the pilosity of the calyx base around the disc, and the very sparsely stellate pilose disc.

BORNEO. North Borneo. Sandakan, Beaufort Hill, ca 90 m alt., fr., *Madani SAN 35X05* (BO).

3. *Schoutenia curtisii* Roekmowati-Hartono, *spec. nov.* —• Fig. 3; Plate I (5).

*Arbor, ramulis juvenilis, foliis fades inferioribus, petiolis et paniculis fimbriato lepidotis (pilis marginalis in omnibus partibus plantarum longis), foliis coriaceis, ellipticis vel lanceolato-ellipticis, lobis calicibus tubo longioribus, lobis suboblongis vel interdum ellipticis, acutis vel subobtusis, calicibus utrinque fimbriato-lepidotis et stellato pilosis, androgynophora glabra, staminibus ca 25 uniserialis, pollen 3—4, plerumque 3-porosis, stylo glabro, stigmata plerumque fere erecta.*

Tree, up to 18 m high; young branchlets, stipules, lower leaf surface, petioles, panicles and calyx covered with fimbriate scales, of which the fringe hairs are long and slender. Stipules deciduous, linear-acicular, ca 5 mm long. Leaves coriaceous, elliptic to lanceolate-elliptic, 1.5—15 x 0.5—6 cm, base usually rounded, apex acute to acuminate, main nerves slender, prominent on both surfaces (more below), reticulation faint, upper surface glossy, glabrous, except for some scales on the basal part of the main nerves (sometimes mingled with rusty stellate hairs in a more juvenile stage), lower surface adpressed lepidote, glabrescent on the main nerves (young leaves also with stellate hairs). Petiole 4—10 mm long, 0.5—1.5 mm in diam.

Panicles up to 3 cm long and 2 cm in diam., lepidote and stellate pilose. Bracts caducous, subulate or filiform, up to 3 mm long. Pedicels 10—12 mm long. Flower buds ovoid. Calyx up to ca 25 mm long, tube up to ca 10 mm long, lobes suboblong, sometimes elliptic, acute or subobtuse, up to ca 15 mm long, base 5—9 mm wide; outside of calyx lepidote and stellate pilose, inside lepidote, the scales towards the base more stellate-hair like and towards the lobe margins there are small, slender, and wavy stellate hairs. Disc ca 0.5 mm, stellate pilose (hairs slender and in bundles). Androgynophore 0.5 mm, glabrous. Stamens ca 25, uniseriate; filaments 8—9 mm; anthers 1—1.5 mm. Pollen 3—4, usually 3-porate (-colpate), 37—42  $\mu$ . Ovary ca 2 mm high; style 6—7 mm, glabrous; stigmas 1—1.5 mm, as a rule almost erect.

Typus — *Curtis 2914* (SING); paratypus *R.F.D. 13898* (*Vanpruk 1*) (BKF) et *Seidenfaden 2475* (SING).

Distribution — Lower Siam from 3—150 m alt.

Vern. name — Siam: Mai hab.

This species stands apart in the group with scales on the lower leaf surface, because it has a disc and androgynophore.

S I A M. Puket, Tungka, Flagstaff Hill, 150 m alt., Febr., fl., fr., *Curtis 2914* (BO, CAL, K\*, SING); *ibid.*, Trang, Lem Sai, 3 m alt., Febr., fl., *R.F.D. 13898* (*Vanpruk 1*) (BKF); Surat, Kong Ta, w.e.o. Bandon, Jan., fl., *Seidenfaden 2475* (SING).

#### 4. SCHOUTENIA GLOMERATA King

Panicles glomerulate; calyx campanulate, smaller than 1 cm in length, lobes as long as the tube; disc present.

##### 4a. *Schoutenia glomerata* King, *subsp. glomerata* — Fig. 4a; Plate I (6).

*Schoutenia glomerata* King in *J. Asiat. Soc. Bengal* 60(2): 107. 1891; Ridley, *Fl. Malay Pen.* 1: 298. 1922; Craib, *Fl. Siam. Enum* 1(1): 193. 1925; Burret in *Notizbl. bot. Gart. Berlin* 9: 627. 1926. — *King's Coll.* (*Kunstler 159*) (CAL).

Shrub or small tree, 12–16 m high; young branchlets, stipules, lower leaf surface, petioles, panicles and outside of calyx lepidote (scales long-fimbriate) and stellate pilose, the hairs on lower leaf surface only present in young leaves. Stipules long persistent, linear-acicular, 2–12 mm long, glabrous on upper surface. Leaves thinly chartaceous to chartaceous, elliptic-oblong, 4.5–37 x 2–13 cm, margins obscurely wavy, base equal or subequal, more or less cordate, apex as a rule shortly obtusely acuminate, upper surface glossy (fresh), dark green (fresh), in young leaves rusty stellate pilose, the usually rusty pilose main nerves prominulous; lower surface silvery (fresh), pale, main nerves prominent. Petiole 3–7 mm long, 1–3 mm in diam., the stellate hairs woolly and straight or straight only, sometimes without scales.

Panicles as a rule glomerulate, up to 2 cm long and 1 cm in diam. Bracts long persistent, linear-acicular or linear, up to 4 mm long, upper surface glabrous. Pedicels ca 5 mm. Calyx 7–9 mm long, lobes, as long as the tube, broadly triangular, acute, base up to 5 mm wide; inside of calyx stellate pilose (hairs thin, wavy). Disc ca 0.5 mm, stellate pilose (hairs thin, wavy). Stamens 20–40; filaments 6–9 mm; anthers 1 mm. Pollen 3-porate (-colpate), 36–39 $\mu$ . Ovary ca 2 mm high; style 3–6.5 mm, glabrous or lower part stellate pilose; stigmas 0.5–1 mm, recurved or sometimes almost erect. Fruit 13 mm long, obscurely 5-grooved, with remnant of style. Seed 6–9 mm, cotyledons partly plicate, not involute, radicle 3 mm.

Distribution — Malay Peninsula and Borneo, along streams and in wet forests at low elevations.

This subspecies differs from *peregrina* by the larger leaves, the prominulous midrib on the upper leaf surface, and the inside of the calyx which is entirely stellate pilose.

Only the specimen *Native Coll. 5225* from Sampadi Hill, Sarawak has its calyx stellate pilose at the margins only and tips of the lobes on the

inside, as is *peregrina*. It has moreover a long panicle, but this represents perhaps a branch of which the leaves have dropped.

I have not seen membraneous, glabrous leaves as mentioned by King and Ridley.

The pilosity of the petiole varies, in the specimens from Borneo woolly and straight, in the Malay specimens woolly and straight to straight stellate haired only. The Brunei specimen *Sinclair 10515* has no scales on its petioles.

The style may exceed the stamens, but is not longer than the stamens as reported by King.

I have not seen large fruits (0.75 inch) as mentioned by King and Ridley.

MALAY PENINSULA. Kemaman. Kajang, Ulu Banum, June, ster., *Corner s.n.* (SING); Johore. S. Kayu Ara, Mawai-Jemaluang road, low, May, fl., *Corner S.F.N. 29463* (BO, CAL, K\*, SING); Mile 12 Mawai-Jemaluang road, Jan., ster., *Comer s.n.* (SING); G. Panti, fl., fr., *Kunstler 159* (CAL, K\*, SING); *ibid.*, S. Sagun, near Mawai, low, May, buds, *Corner s.n.* (SING); BORNEO. Brunei. S. Belait, about 0.5 mile above Bukit Puan, Aug., fr., *Sinclair 10515* (BO, K\*); Sarawak. Sampadi Hill, 90 m alt., Oct., fl., *Native Coll. 5225* (UC); locality unknown, fr., *Beccari 2791* (BO, Fl, G, K\*); Kalimantan, locality unknown, fl., *Jaheri 34* (BO).

##### 4b. *Subsp. peregrina* (Craib) Roekmowati-Hartono, *subsp. nov.* — Fig. 4b; Plate II (7).

*Schoutenia peregrina* Craib in *Kew Bull.* 1925: 22; *Fl. Siam. Enum.* 1(1): 193. 1925; Burret in *Notizbl. bot. Gart. Berlin* 9: 625, 627, 628. 1926. — *Winit 335* (K) (holotype) (n.v.); *Kerr 4433a* (K) (n.v.), *Kerr 4433* et *Marcan 1399* (K\*) (paratype).

Shrub or small tree, ca 4–8 m high; the stellate hairs on petioles and lower leaf surface only present in young state. Stipules caducous, 3.5–8 mm long, glabrescent on upper surface, except the base. Leaves chartaceous to subcoriaceous, elliptic or suboblong, 1–11 x 0.5–4 cm, margins obscurely wavy on the apical part, base subequal, rounded or cuneate-rotundate apex shortly obtusely acuminate or acute, upper surface dull, rusty stellate pilose, glabrescent except the base, midrib sunken, basal nerves prominulous, lateral and secondary nerves slender; lower surface dull, scales rather sparse on the main nerves, midrib prominent, other nerves prominulous. Petiole 2–6 mm long, ca 1 mm in diam.

Panicles UP to ca 2.5 cm long and 1.5 cm in diam. Bracts caducous, linear-acicular, "usually without stellate hairs. Flowers honey scented. Calyx ca 7 mm long, inside glabrous, except the margins and tip of lobes which are stellate pilose (hairs slender, wavy). Disc ca 1 mm. Stamens ca 25; filaments ca 9 mm; anthers ca 1 mm. Pollen 3–4, usually 3-porate (-colpate), 40–55  $\mu$ . Ovary ca 1.5 mm high; style 1.5–3 mm, glabrous, sometimes sparsely lepidote in young flower; stigmas 0.5–2 mm, sometimes sparsely lepidote on lower surface in young flower, recurved. Fruit more or less obovoid, up to 1 cm long. Seed ca 6 mm, radicle 2 mm.

Distribution — Siam and Indochina, common in evergreen forests, up to ca 1100 m alt.

Vern. names — Siam: Sai nam phueng, Dok-nam(-)phung, Nam p̄ung or Ruang puang; Cambodia: Ach-sat.

This subspecies differs from *glomerata* by the smaller leaves, the sunken midrib on the upper leaf surface, and the inside of the calyx which is stellate pilose at the margins only and the tips of the lobes. It is not allied to *S. ovata*.

The lower leaf surface is not white tomentose (Craib) in the material which I have seen.

The pedicel is 5 mm long. The figure 8 as mentioned by Craib included the part below the articulation.

The calyx lobes are acute, and not more or less obtuse as reported by Craib.

S I A M. Chiangmai, Doi Suthep, ca 1100 m alt., July, fl., *Singhasthit* 498 R.F.D. 2776 (BKF); *ibid.*, 300 m alt., Aug., fl., *Winit* 335 (BKP) (cult); Bangkok, Khao Din Park, under 20 m alt., Dec, ster., *Suvarnakoses* 837 R.F.D. 9732 (BKP) (cult); *ibid.*, under 5 m alt., Sept., fl., *Kerr U33a* (BO); *ibid.*, Aug., fl., *Kerr U33* (K\*); *ibid.*, *Marcan* 1399 (K\*); CAMBODIA. Ngon-kg Srai-kg Thorn, banks of Po, Aug., fl., young fr., *Bejaiid* 5 (P); forest of Phnom Penh, June, ster., *Bejaud* 710 (BO).

Sectio Adisciflora Roekmowati-Hartono, *sect. nov.*: Discus deest;

5. SCHOUTENIA BUURMANII Koorders et Valeton — Fig. 5; Plate II (8a.,b).

*Schoutenia buurmanni* Koorders et Valeton, Bijdr. Kennis Booms. Java 1 "in Meded. Lands Pl.tuin Buitenzorg 11: 211, 214, 215. 1894; Atlas Baumart. Java 1; t. 85. 1913; 2: t. 398, 1914; Valeton in Icon. Bogor. 1(4): 17, 19, t. 81; 1901; Möll & Janssonius, Mikrogr. Holz. Java 1: 476, 481, 485, 525—529, f. 72. 1906; De Clercq, Nieuw PL. Wordenb. Ned. Ind. 323. 1909; Backer, Schoolfl. Java 157. 1911; Adelbert in Backer, Bekn. Fl. Java (emergency Ed.), Fam. 105: 17. 1944; in Backer & Bakhuizen van den Brink Jr., Fl. Java 1, Fam. 91: 392. 1963; Koorders-Schumacher, System. Verzeichn. 1§1. Fam. 174: 3. 1912; Koorders, Exkursionsfl. Java 2: 574. 1912; Burret in Notizbl. bot. Gart. Berlin 9: 627, 628. 1926; Heyrie, Nutt. Pi. Ned. Ind. ed. 1, 3: 187. 1917; ed. 2, 2: 1021. 1927 (in syn.); ed. 3, 1: 1021. 1950. — *Actinophora buurmanni* (Koorders et Valeton) Heyne, l.e. 1917 (as a syn. of *Schoutenia buurmanni* Koorders et Valeton); -in Burret, l.e. 627 (*Actinophora buurmanni* (Koorders et Valeton) Koorders). — *Koorders 8645* (BO) (holotype); *Koorders 86i3* et *86U* (BO) (paratype).

Tree, up to 30 high and 50 cm in diam.; buttresses up to 1.70-Gin high, out 80 cm, 6—8 cm thick; bole cylindrical, sometimes "twisted; bark

grey-brown, very flaky is small oblong plates, 1—1.5 mm, inner bark 9 mm, flesh coloured, aromatic, taste acrid, with little brown sap; sapwood 3 cm, pinkish-white, merging into the pinkish-brown heartwood. Young branchlets lepidote (scales long-fimbriate as in all other parts) and woolly-stellate. Stipules caducous, linear-acicular, 5—14 mm long, rusty lepidote. Leaves subcoriaceous, elliptic-oblong or obovate-oblong, 12—19 x 5—7 cm, sometimes longer, up to 21 cm or shorter, to 3.5 cm, sometimes wider, up to 9.5 cm, margins entire or very rarely slightly wavy, base very oblique, slightly cordate or obtuse, apex obscurely to conspicuously, usually obtusely acuminate, midrib prominent on both surfaces (more below), basal and lateral nerves prominent on upper surface, prominent below, reticulation faint, upper surface dull, dark green (fresh), rusty stellate pilose, glabrescent, lower surface glossy (fresh), pale yellowish-brown or yellowish-grey, adpressed lepidote and woolly-stellate, ultimately more or less scaly only with glabrescent nerves. Petiole usually slightly ridged, 3—10 mm long, 1—2 mm in diam., lepidote and stellate pilose.

Panicles up to 4 cm long and 1 cm in diam., lepidote and stellate pilose. Bracts caducous, linear, up to 5 mm, rusty lepidote. Pedicels ca 1—2 cm long. Flower buds pyramidal. Calyx up to 22 mm long, tube up to 4 mm long, lobes obovate-oblong or subelliptic, rounded or acutish, concave (concave side below), up to 1a mm long, base ca 3—4 mm wide. Calyx lepidote and stellate pilose on both surfaces, the stellate hairs numerous on margins and top of lobes on the inside of the calyx (hairs slender and wavy). Androgynophore up to 0.5 mm, sparsely lepidote (scales dense at the base). Stamens ca 25—35, almost uniseriate in phalanges; filaments 4.5—9 mm, sparsely stellate pilose with simple hairs or glabrous; anthers ca 2.5 mm, connective with an apical appendage. Pollen glabrous, 3- or 4- porate (-colpate), 37—46 n. Ovary ca 1.5 mm high; style 6—10 mm, rusty stellate pilose; stigmas 1—2 mm long. Fruit 6—8 mm in diam., obscurely 5-angled. Seed 4—5 mm long, cotyledons involute, not plicate, radicle 2—2.5 mm.

Distribution — Central Java (W. part) between 0—500 m alt. in moist habitats.

Vern. names — Walikukun, Ki terong (Sundanese); Durenan, Walikukun, Sinduk, Landji (Javanese).

The specific epithet *buurmanni* has to be changed to *buurmanii* according to the Code, because it is named after Buurman. *S. buurmanii* has an androgynophore, although very short (Koorders & Valeton described the ovary as sessile), glabrous (Koorders & Valeton) pollen, and appendaged connectives.

The stipules are lepidote, and not stellate pilose (Koorders & Valeton). Four-celled ovaries as mentioned by Adelbert could not be found.

There are always 5 stigmas, and never 4 (Adelbert).

The seed is only slightly plicate on the upper margins and has no lumen, as mentioned by Koorders & Valeton.

The strong and durable timber which is excellent and as resistant as that of *S. ovata* is in Tjilatjap (Central Java) used as building material and is as highly estimated as *Lagerstroemia speciosa* wood.

Growth rings slightly to rather conspicuous, 1—9 mm thick. The libriform fibre walls in the outer part of the growth rings mostly thicker than usual. On the growth rings usually a rather regular woodparenchyma layer of only one cell thick is found, the medullary rays here are sometimes somewhat wider, with somewhat wider cells; the cells are sometimes also radially shorter.

Vessels evenly distributed; ca 15 per mm<sup>2</sup>; solitary and in groups. The groups usually composed of one, often of two radially connected vessels. Usually on one or both radial sides confined to the medullary rays; usually almost entirely surrounded by woodparenchyma. Sometimes a group in one and partly in another growth ring. Solitary vessels 80—170  $\mu$  l r, 60—145  $\mu$  t. Groups of vessels 30—150 n r, 40—125 y, t. Vessel-segments 1:50—350 y. 1. Vessels elliptic or cylindric, flattened on both sides where they are confined to each other. Septa only very slightly oblique; perforations round or oval. Walls 5  $\mu$  thick where they are confined to each other, usually 1—2  $\mu$  [A; wooded; with very numerous bordered pits where they are confined to each other; pit chambers only separated from each other by small parts, very small, 2 n in diam., often 6-sided; with very numerous one-sided bordered pits where they are confined to woodparenchyma and medullary ray cells; the one-sided pits usually as the two-sided ones. Content sometimes a light red mass, which in phloroglucin and hydrochloric acid becomes dark red.

Libriform fibres form the groundmass of the wood; usually in radial rows. 8—15  $\mu$  r, 12—18  $\mu$  t, 650—950  $\mu$  l, 4—8-sided. Walls 2—3.5  $\mu$  thick; wooded, especially the middle lamella; with numerous bordered pits especially on the radial walls, where they are confined to each other; the slit-like inner aperture only slightly longer than the diam. of the pit chamber; with one-sided bordered pits where they are confined to woodparenchyma and medullary ray cells; the one-sided pits usually about the same as the two-sided ones. Intercellulars and content absent.

Woodparenchyma paratracheal, metatracheal and dispersed among the libriform fibres. The paratracheal parenchyma not many, while the vessels for the greater part are confined to the medullary rays and in all cases are only surrounded by one cell layer. The metatracheal parenchyma layers only one cell thick; separated from each other by 1—3 layers of libriform fibres; in tangential direction often only slightly broader, usually only reaching from one medullary ray to the other. These layers in the

inner part of the growth rings often the most irregular ones. The dispersed parenchyma among the libriform fibres only rare, connected with the metatracheal ones by many transitions.

Woodparenchyma conspicuously fibred; fibres of 3—5 cells. The cells which are confined to the vessels often conjugated. Woodparenchyma cells 6—18  $\mu$  r, 10—18  $\mu$  t, 60—150  $\mu$  l, often ca 90  $\mu$ ; the cells which are confined to the vessels often less broad, 6—12  $\mu$  deep, 10—25  $\mu$  wide, 30—50  $\mu$  l. Woodparenchyma fibres 300—375  $\mu$  l. The cells 4—8; often 4-sided prisms with longitudinally directed axis. Walls 1 n thick, the longitudinal walls, which are perpendicular to the vessel walls, often very thickened between the pits, sometimes looking like conjugated woodparenchyma; wooded; with one-sided bordered pits where they are confined to vessels and libriform fibres; with simple pits, especially on the cross and radial walls where they are confined to each other and to medullary ray cells. Content sometimes a few simple elliptic starch grains, till about 10  $\mu$  in diam. In almost all cells a deep brown mass as walkover present.

Medullary rays conspicuously of two kinds, namely one-layered and many-layered ones. The one-layered more numerous than the many-layered ones; in the middle sometimes two-layered; 1—8 cells high; entirely composed of upright cells. The many-layered rays 3—6-, often 4- and 5-layered and 15—60 cells high; sometimes composed of 3 stories. The one-layered stories are usually only a few cells high, these are entirely as those of the one-layered medullary rays. The medullary rays are separated from each other by 1—12 layers of libriform fibres. The radial rows above and below of the wider medullary rays are usually composed of upright cells. Usually among the radial rows of lying cells there are rather numerous radial rows of cells with bigger tangential and longitudinal diam. and with such a radial diam., that the cells are almost lying and almost upright. In these rows sometimes there are also a few plane lying cells. In many of the bigger cells a simple crystal is present, sometimes also a bigger simple crystal and

1 or 2 smaller ones. Two or 3 many-layered medullary rays on tangential plane very often stay vertically over each other and in this direction are separated from each other by 1 or 2 layered oblique libriform fibres or woodparenchyma cells; sometimes also a medullary ray on this plane is divided by 1 or 2 layers of libriform fibres or woodparenchyma cells into 2 parts. Sometimes these dividing layers are in the middle of a medullary ray. Lying cells 4—120  $\mu$  r, 6—12  $\mu$  t, 6—18  $\mu$  l, 4—8-sided prisms with radially directed axis and rounded off radial sides. Walls 1 n thick; very slightly wooded, in KJJ and H<sub>2</sub>SO<sub>4</sub> not blue; for the pits compare the description of woodparenchyma cells; the simple pits here most numerous

on the tangential walls. Intercellulars only present in radial direction, also where the cells are confined to libriform fibres. Content as those of the woodparenchyma cells. Upright cells 10—20  $\mu$ , r, 6—18  $\mu$  t, 30—100  $\mu$ , l, 1. Without intercellulars. For the rest see the lying cells. Cells with bigger tangential and longitudinal diam. 20—35  $\mu$ , r, 20—25  $\mu$  t, 20—40  $\mu$ , l. Content often a big simple crystal, sometimes besides this also plus 1 or 2 smaller ones. The calcium oxalate sometimes very thick, often conspicuously connected with the cell wall, only slightly wooded. Usually the content as those of the woodparenchyma cells (after Moll and Janssonius).

JAVA. West Java. Bogor, Hort. Bot., Jan., fl. (BO) (cult); *ibid.*, fr., *Rastini* s.n. (BO); Central Java. Madjenang, 20—30 m alt., Jan., ster., *Backer 1880G* (BO); *ibid.*, 50 m alt., Jan., ster., *Backer 1885* (BO); Nusakambangan Isl., 50 m alt., Dec., Jr., *Koorders 864.3* (BO, CAL); *ibid.*, ster., *Koorders 8644* (BO); *ibid.*, fr., *Hoorders 8645* (BO, CAL); *ibid.*, ster., *Koorders 20227* (BO); *ibid.*, Jan., ster., *Koorders 22188* et *22194* (BO); *ibid.*, Sept., ster., *Koorders 24768* et *24786* (BO); *ibid.*, Sept., buds, *Koorders 24831* (BO); *ibid.*, June, ster., *Koorders 30827* (BO); *ibid.*, Feb., fr., *Koorders 39479* (BO); *ibid.*, Brambang, Nov., ster., *Valeton 109* (BO); *ibid.*, Limus Buntu, Nov., ster., *Valeton 146* (BO); Tjilatjap, Pruah, ca 0—5 m alt., May., ster., *Ja 2302* et *2303* (BZP); Banjumas, Watuagung, ca 500 m alt., Nov., ster., *Ja 2500* (BZF); Pekalongan, 125 m alt., Jan., ster., *Noltee 4.058* (BO).

#### 6. SCHOUTENIA KUNSTLERI King — Fig. 6; Plate II (9).

*Schoutenia kunstleri* King in J. Asiat. Soc. Bengal 60(2): 106, 107. 1891; Ridley, Fl. Malay Pen. 1: 298. 1922; Burret in Notizbl. bot. Gart. Berlin 9: 597, 625 (*kunstleri*), 626, 627. 1926; Erdtman, Pollen Morphology 436. 1952 (*Wray 2692*, not 2642). — *King's Coll*, 3409 (CAL) (holotype); *Wray 2692* (CAL) (paratype).

Tree, 18—21 m high and 45—60 cm in diam., deeply fluted. Young branchlets, stipules, lower leaf surface and petioles lepidote (scales long-fimbriate as in all other parts), young branchlets and stipules moreover with stellate hairs. Stipules persistent, linear-acicular or subulate, 3—12 mm long. Leaves thinly coriaceous, suboblong or elliptic, 2—22.5 x 1—9.5 cm, margins slightly wavy, base slightly or distinctly cordate, or cuneate, apex acuminate or acute, main nerves prominent on both surfaces (more below), veins obscure above, slightly prominulous below, upper surface dull, glabrous, or pilose on the main nerves (young leaves with indumentum as on the young branchlets), lower leaf surface rather dull, young leaves also with stellate hairs. Petiole 4—9 mm long, 1—2 mm in diam.

Panicles up to 4 cm long and 2 cm in diam., stellate pilose, or lepidote and stellate pilose as the bracts and pedicels. Bracts persistent, subulate or acicular, up to 6 mm long, upper surface glabrous, except margins and tip. Pedicels 1L—21 mm long. Flower buds depressed pyramidal. Calyx ca 15—25 mm long, tube ca 5—10 mm long, lobes ovate or triangular, sometimes suboblong, acute, sometimes subobtuse, ca 10—15 mm long, base 5—15 mm wide. Calyx outside lepidote and stellate pilose, inside lepidote

(scales stellate-hair like and becoming denser towards the base), towards the lobe margins stellate pilose (hairs denser, small, slender and wavy). Stamens ca 50; filaments 6—10 mm; anthers 1—2 mm. Pollen 3-porate C-colpate) (Erdtman saw 3—4 aperturate pollen), 46—55 a. Ovary ca 2 mm high; style ca 5—10 mm, glabrous or stellate pilose (the hairs dense or sparse), sometimes stellate pilose on the basal part only; stigmas 0.2—2 mm, glabrous or stellate pilose\* on the lower surface. Fruit ca 10 mm long, with remnant of style. Seed ca 4.5 mm long.

Distribution — Malay Peninsula along streams, swampy places and on hillsides, from 90—240 m alt.

The calyx is lobed almost to the base (incorrect in King's and Ridley's key). Ridley gave the number of lobes as 4, actually there are 5 (King).

King mentioned that there is a slightly elevated torus in his key to the genus, but in his species description he described the ovary as sessile.

MALAY PENINSULA. Penang Isl., Ayer Hitam, April., fr., *Haniff S.F.N. 3428* (BO, CAL, K\*, SING); Perak, Larut, 90—240 m alt., Sept., fl., fr., *King's Coll. 3409* (CAL, K\*); *ibid.*, Ulu Tupai, Aug., fl., *Wray 2692* (CAL, SING); Kemaman, Bukit Kajang, 150 m alt., Nov., fl., *Corner S.F.N. 30320* (K\*, SING); *ibid.*, loose fl., *Corner* s.n. (SING) et immature fr., *Corner* s.n. (SING); Pahang, S. Kechau, June, fl., fr., *Hashim C.F. 671* (SING); *ibid.*, K. Lipis, S. Cheka, May, fr., *C.F. Field no. 4023 F.D.* (K\*, SING); *ibid.*, Maran road 10—15 miles E. of Temerloh, May, fl., *Allen* s.n. (SING).

#### 7. *Schoutenia corneri* Roekmowati-Hartono, *spec. nov.* — Fig. 7; Plate II (10).

*Arbor, ramulis juvenilis fimbriato-lepidotis (pilis marginalis in omnibus partibus plantarum longis) et stellato pilosis, foliis coriaceis, lanceolato-oblongis ad ellipticis, fides inferioribus fimbriato-lepidotis, glabrescentibus, petiolis stellato-tomentosis; paniculis stellato pilosis, pedicellis fimbriato-lepidotis et stellato pilosis, lobis calicibus tubo longioribus, lobis suboblongis vet ellipticis, acutis, calicibus utrinque fimbriato-lepidotis et stellato pilosis, staminibus ca 125, pollen 3-porosis, ovario ovoideo cum stylo stellato piloso.*

Small tree; young branchlets lepidote (scales long-fimbriate as in all other parts) and stellate pilose; bark smooth, grey-brown, inner bark pink; sapwood yellowish white. Stipules long persistent, lanceolate-triangular, 1—2 mm long, lepidote and stellate pilose. Leaves coriaceous, lanceolate-oblong to elliptic, 7—30 x 2—8 cm, base slightly cordate or cuneate, apex acuminate to cuspidate, nerves prominulous on both surfaces (more prominent below), reticulation obscure above, prominulous below; upper surface rather glossy, glabrous, except for the base and the main nerves, lower surface lepidote, glabrescent. Petiole 4—15 mm long, 1—3 mm in diam., woolly-stellate.

Panicles up to 2 cm long and 1 cm in diam., stellate pilose. Bracts long persistent, bracts on main axis lanceolate-triangular, ca 2 mm long, bracts near pedicel large, ovate, up to 1 cm long, rusty lepidote and stellate pilose as are the pedicels and outside of calyx. Pedicels 4—5 mm long. Flowers fragrant (of honey-suckle). Calyx 30—45 mm long, tube ca 10 mm long, upper part of tube lepidote, lower part stellate pilose (with pedicelled hairs in the upper and sessile, slender ones in the lower region); lobes suboblong or elliptic, 20—35 mm long, base 7.5—10 mm wide, central part of inside of lobes with pedicelled, stellate hairs, basal part lepidote, towards the lobe margins stellate pilose (hairs denser, small, slender and wavy). Stamens ca 125; filaments ca 15 mm; anthers 2—3.5 mm. Pollen 3-porate (-colpate), 45—65  $\mu$ . Ovary ovoid, ca 3.5 mm high, white (Corner), stellate pilose; style 5—15 mm, stellate pilose (sometimes hairs more scanty towards apex); stigmas ca 2 mm long. Fruit ca 13 mm long, 5-furrowed. Seed 7 mm long, cotyledons partly plicate, not involute, radicle 3 mm.

Typus — Corner S.F.N. 37381 (SING), paratypus Kochummen K.F.N. 77950 (BO) et Corner S.F.N. 29978 (BO).

Distribution — Malay Peninsula: Johore.

The species is close to *S. kuestleri* and differs by the large number of stamens and the woolly-stellate petiole.

The style may vary considerably in length (in the specimen Corner S.F.N. 37361, 5—6 mm; in Kochummen K.F.N. 77950, 12—13 mm).

MALAY PENINSULA. Johore, Mersing, flat land near stream, 15 m alt., July, fl., fr., Kochummen K.F.N. 77950 (BO, K<sup>2</sup>); *Ibid.*, Mile 17 Mawai-Jemaluang road, low, Dec., fl., Corner S.F.N. 29978 (BO, K<sup>2</sup>, SING); *Ibid.*, Mile 14 Mawai-Jemaluang road, low, Sept., fr., Corner S.F.N. 37361 (SING).

8. *Schoutenia kastermansii* Roekmowati-Hartono spec. nov. — Fig. 8; Plate II (11).

*Frutex*; ramulis juvenilibus, foliis facies inferioribus et petiolis lepis non-fimbriatis obtectis, foliis subcoriaceis, oblongis ad oblanceolato-oblongis, facies inferioribus glabrescentibus (nerviis primariis exceptis); paniculis fimbriato-lepidotis (pilis marginalis longis), tubus intus parte apicalibus glabris, lobis calicibus tubo aequalongis, ovatis, obtusis vel interdum subacutis, intus fimbriato-lepidotis et stellato pilosis; staminibus ca 75; pollen 4-porosis; stylo glabro.

Shrub; non-fimbriate lepidote on young branchlets, lower stipule surface, lower leaf surface and petioles, the scales on upper stipule surface and panicles are long-fimbriate. Stipules caducous, subulate, ca 5 mm long, glabrescent on the upper surface, except the base. Leaves subcoriaceous, oblong to oblanceolate-oblong, 11.5—17.5 × 3—4 cm, base rounded, apex

bluntly shortly acuminate, main nerves prominent on both surfaces (more below), veins prominulous on upper surface, prominulous below; upper surface rather dull, glabrous, except for some scales on the basal part of the main nerves, lower surface dull, glabrescent except the main nerves near the base. Petiole ridged, ca 1 cm long, ca 1.5 mm in diam.

Panicles ca 3 cm long and 1 cm in diam. Bracts long persistent, subulate or lanceolate, up to 6 mm long, upper surface rusty stellate pilose (hairs rather slender and wavy). Flower buds pyramidal. Calyx 19—24 mm long, lobes as long as the tube, obtuse, sometimes slightly acute, base ca 1 cm wide; outside of calyx lepidote (scales with large body), inside of tube glabrous, except the base which has a ca 0.5 mm strip of dense scales (scales with small body), lobes inside lepidote (scales with small body) on the base, changing to stellate hairs towards the margins (hairs denser, small, slender and wavy towards the margins). Stamens ca 75; filaments ca 8 mm; anthers almost 1.5 mm. Pollen 4-porate (-colpate), 45—52  $\mu$ . Ovary ca 2 mm high; style ca 11 mm, glabrous; stigmas ca 1 mm.

Typus — Nakkara 192 R.F.D. 2785 (BKF).

Distribution — Lower Slam, only known from the type locality.

The species is close to *S. kuestleri* and *S. corneri*, which all have neither disc nor androgynophore. It differs by the calyx lobes which are as long as the tube, and by the non-fimbriate scales on the lower leaf surface.

SIAM. Trang, Chawng, ca 100 m alt., June, fl., Nakkara 192 R.F.D. 2785 (BKF).

#### SPECIES EXCLUDENDAE

1. *Schoutenia godefroyana* Baill. = *Sierca godefroyana* (Baill.) Hallier f.
2. *Schoutenia* n. sp. Fries in Svensk. bot. Tidskr. 7: 240. 1913 = *Marquesia macraura* Gilg (Dipterocarpaceae).
3. *Schoutenia excelsa* Pierre = *Marquesia excelsa* (Pierre) Fries (Dipterocarpaceae).



## LIST OF COLLECTOR'S NUMBERS

- Ahmad K.F.N. 94425 = 2a; Allen s.n. = 6; Altona 6542 = 1; Alvins 1825 = 2a; Anderson S 2173 — 2b; Anderson et al. 15365 = 2a; Awang Lela C.F. field no. 2695 = 2a;
- bb. 1517, 1716, 5373, 5997 = 2a; 9984, 1140-9, 12011, 13266, 14028, 14365 = 1; Backer 2689, 13030, 18027.. 18380, 19936, 20708, 20932, 24600, 24820, 27089, 28123, 28294, 28493, 28748.. 28769, 29201, 29330, 29504, 34025 — 34027 = 1; 1885, 18806 = 5; Bakhuizen van den Brink 4891 = 1; Beccari 2150 = 2a; 2791 = 4a; Becking 53, 56 = 1; Bèjaud 5. 710 = 4b; Den Berger 2 = 1; Beumée 107, 198, 247, 403, 468, 544, 1818, 1844, 2625, 5112 = 1; Bjjhouwer-32 = 1; Bloembergen 3150 = 1; De Boer 17 = 1; Brascamp 47 = 1; Burger s.n., 2074, 2148, 4623 = 1; Burkill S.F.N. 3138, 3176 = 2a;
- Cam 85 = 1; C.F. Field no. 4023 F.D. = 6; Chevalier 30909, 36564, 36909 = 1; Clason & Van Slooten 4, 49 = 1; Corner s.n., S.F.N. 28681, 29006, 33595, 36975, 37250 = 2a; s.n., S.F.N. 29463 = 4a; s.n., S.F.N. 30320 = 6; 29978, 37361 = 7; Curtis 1520 = 2a; 2914 = 3;
- Dilmy 1033 = 1; Dommers 15, 259 = 1;
- Elbert 746, 2048, 3876, 3887 = 1; Ender 1201 = 1;
- F.M.S. 13772, 15761 = 2a; Fox s.n. = 2a;
- Haniff S.F.N. 3359 = 2a; 3428 = 6; Hashim C.F. 671 = 6; Hemken 9 = 1; Hiep 697 = 1; Hoogerwerf 47, 49, 140 = 1; Hooker s.n. = 1; Horsfield s.n. = 1; Houter 165 = 1;
- Ibut 335 = Sumba-expedition 1925 s.n. = 1;
- Ja 610, 1254, 1575, 2038, 4901 = 1; 2302, 2303, 2500 = 5; Jaheri 34 = 4a; Jansen 5708, 5708a = 1; Junghuhn 463 = 1;
- Kalshoven 19 = 1; Kerr 2355, 4545, 8077, 11936 = 1; 4433, 4433a = 4b; King F.M. S.F.N. 2561 = 2a; King's Coll. 3409 = 6; King's Coll. (Kunstler) 3381 = 2a; Kochummen K.F.N. 77950 = 7; Koorders 8595 — 8621, 8623 — 8641, 11898, 12355, 12412, 14261, 14871, 22548, 24887, 24956, 25254, 27095, 27567, 28149, 28423, 29836, 29928, 29981, 30069, 33092, 33206, 37060, 39718, 39743, 376161 = 1; 8643 — 8645, 20227, 22188, 22194, 24768.. 24786, 24831, 30827, 39479 = 5; Korthals 486 = 1; Kostermans s.n., 18043 = 1; Kramer 5708, 5708a = 1; Kunstler 159 = 4a; Kuswata s.n., 19 = 1;
- Landbouwvoorlichtingsdienst Oost Flores (Agriculture Extension Service East Flores) Larantuka 1 = 1; Van Leeuwen - Reynvaan s.n., 2166 = 1;
- Madani SAN 35105 = 2e; Maingay 1652 (Kew Distr. 252) = 2a; Marcan 1399 = 4b; Nakkarn 192 R.F.D. 2785 = 8; Native Coll. 5225 = 4a; Nauen S.F.N. 37095 = 2a; Ngadiman S.F.N. 36846 = 2a; Noltee 400, 4623 = 1; 4058 = 5;
- Van der Paardt 57 = 1; Phong Sono 29 = R.F.D. 28894 = 1; Pierre 93, 659, 3814 = 1; Poilane 766, 11452, 15965 = 1; Put 1134, 2215 = 1;
- Rastini s.n. = 5; Rensch 245, 644, 842 = 1; R.F.D. 13898 (Vanpruk 1) = 3; Roelofsen 11, 6604 = 1;
- Scortechini s.n. = 2a; Seidenfaden 2475 = 3; Sinclair 10515 = 4a; 10580, S.F.N. 39036, 39620, 39627 = 2a; Singhasthit 498 R.F.D. 2776 = 4b; Van Steenis 6620, 11432, 11452, 17451 = 1; Suvarnakoses 837 R.F.D. 9732 = 4b; Symington & Kiah S.F.N. 28812 = 2a;
- Thorenaar 1 = 1;

- Unkonwn Coll. 31 = 1; 349 = 2a;
- Valeton 109, 146 = 5; Vorderman s.n. = 1; De Vriese s.n. = 1;
- Wallich 1163, 1167 = 1; Watson C.F. 546 S.F.N. 1894 = 2a; Wind 22 = 1; Winit 335 = 4b; Wisse 47 = 1; Wray 2692 = 6;
- Yahya S.F.N. 35774 = 2a;
- Zollinger 2747 = 1.

## INDEX

Infrageneric and supraspecific epithets have been entered under the generic name to which they belong preceded by the indication of their rank.

New taxa are printed bold face; synonyms are in *italics*.

Actinophora Nutt	92
Actinophora Raf.	92
Actinophora Turcz. de Juss.	92
<i>Actinophora</i> Wall, ex Brown	92, 94
<i>buurmanni</i> (K. et V.) Heyne	114
<i>fragrans</i> Wall, ex Brown	98
<i>hypoleuca</i> (Pierre) Kuntze	98
<i>Chartaclyx</i> ( <i>Chartocalyx</i> ) Maingay ex Mast	92, 94
<i>accrescens</i> Mast	106, 107
Chartocalyx Regel	92
Heritiera	101
Lagerstroemia speciosa	116
Marquesia excelsa (Pierre) Fries	121
<i>macroura</i> Gilg	121
Pentapetes suberifolia L.	98, 100
Pterospermum *	101
<i>burmannianum</i> Hochr.	98, 100
<i>suberifolium</i> (L.) Lam.	100
Schleichera oleosa	101
Schoutenia Korth	91, 92, 94
<i>accrescens</i> (Mast.) Curtis	93, 94, 95, 96, 106
subsp. <i>accrescens</i>	96, 106, 20, 111
f. <i>lepidota</i> R.-H.	108, 109
subsp. <i>borneensis</i> R.-H.	96, 108, 110
subsp. <i>stellata</i> R.-H.	96, 108, 109, 111
var. <i>glabra</i> Hend.	109
<i>buurmanii</i> ( <i>buurmanni</i> ) K. et V.	93, 94, 95, 96, 97, 99, 114, 115
<i>corneri</i> R.-H.	96, 97, 119, 121
<i>curtisii</i> R.-H.	93, 95, 97, 111
<i>excelsa</i> Pierre	121
<i>glomerata</i> King	95, 96; 112
subsp. <i>glomerata</i>	96, 112, 114
subsp. <i>peregrina</i> (Craib) R.-H.	96, 97, 99, 112, 113

<i>godefroyana</i> Baill. . . . .	121
<i>hypoleuca</i> Pierre. . . . .	98, 99
<i>kostermansii</i> R.-H. . . . .	97, 120
<i>kunstleri</i> King. . . . .	94, 95, 97, 118, 120, 121
<i>mastersii</i> King. . . . .	106, 107
var. <i>angustifolia</i> Ridl. . . . .	107, 108
var. <i>microphylla</i> Ridl. . . . .	107, 108
<i>n. sp.</i> Fries . . . . .	121
<i>ovata</i> Korth . . . . .	93.                   94, 95, 96, 97, 98, 99, 101, 114, 116
<i>peregrina</i> Craib. . . . .	113
subg. <i>Chartacalyx</i> (Maingay ex Mast.) R.-H. . . . .	94, 106
sect. <i>Chartacalyx</i> . . . . .	94, 106
sect. <i>Adisciflora</i> R.-H. . . . .	94, 114
subg. <i>Schoutenia</i> . . . . .	94, 97
<i>Sicrea godefroyana</i> (Baill.) Hallier f. . . . .	121

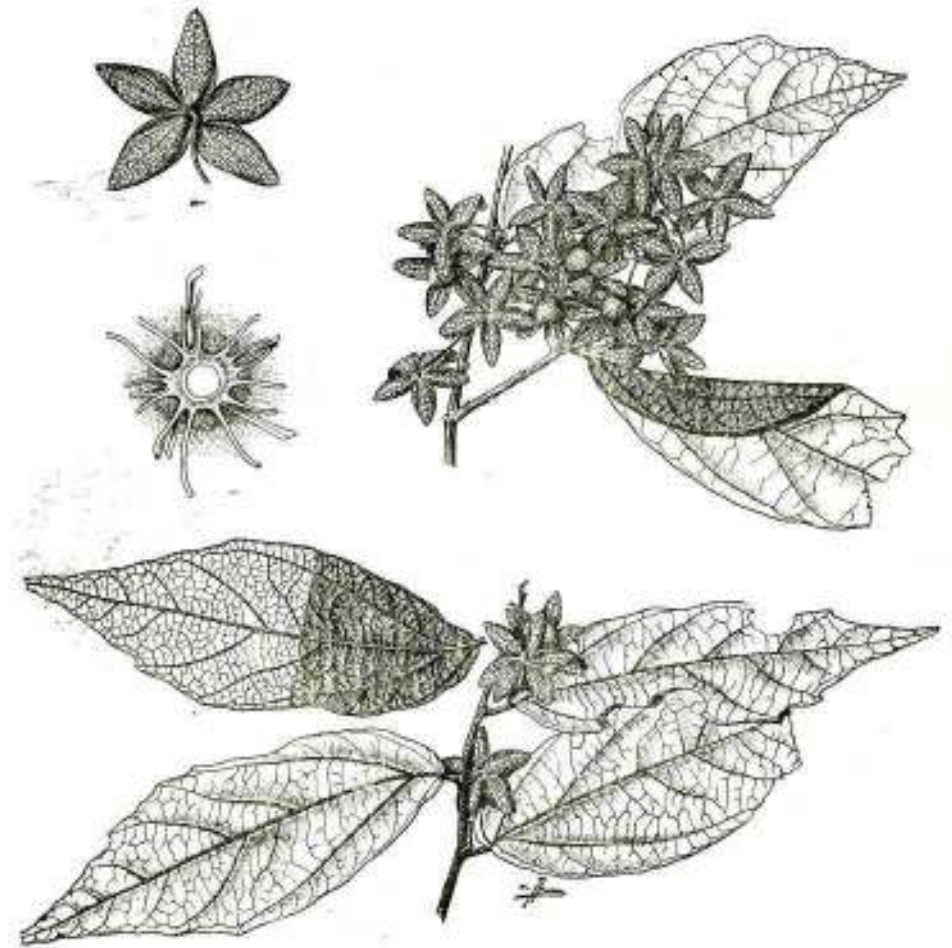


Fig. 1. *Schoutenia ovata* Korth.; after Van Steenis 1H5Z (BO).



Fig. 2a. *Schoutenia accrescens* (Mast.) Curtis, subsp. *accrescens*; left after Ngadiman S.F.N. 36846 (SING); upper right after id. (BO).



Fig. 2b. *Schoutenia accrescens* (Mast.) Curtis, subsp. *accrescens* forma *lepidota* Roekmowati-Hartono; holotype.

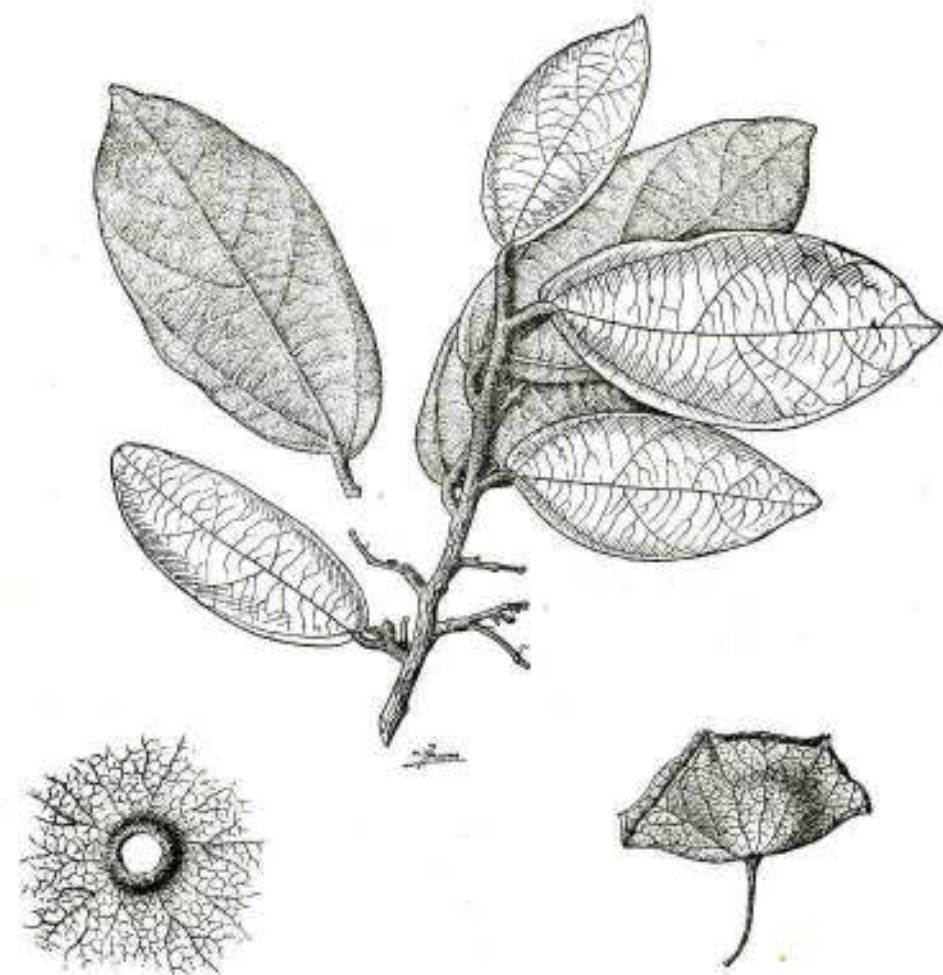


Fig. 2c. *Schoutenia accrescens* (Mast.) Curtis, subsp. *stellata* Roekmowati-Hartono; holotype.

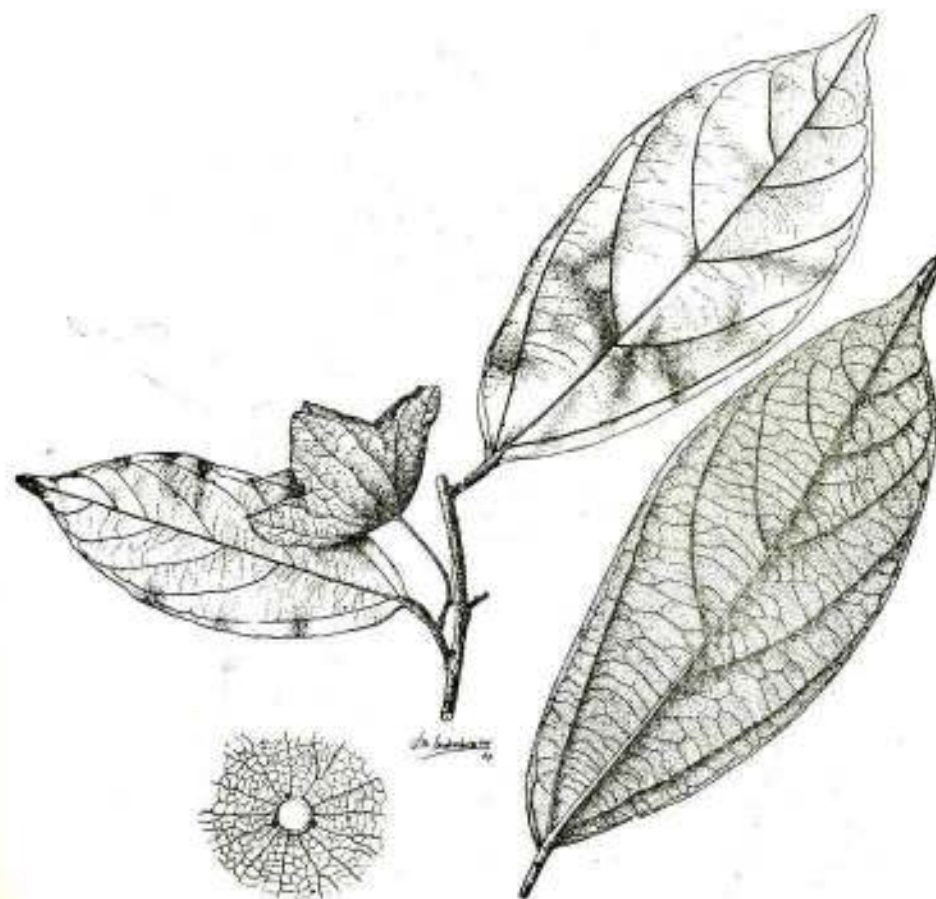


Fig. 2d. *Schoutenia accrescens* (Mast.) Curtis, subsp. *borneensis* Roekmowati-Hartono; holotype.



Fig. 3. *Schoutenia curtisii* Roekmowati-Hartono; isotype (BO).



Fig. 4a. *Schoutenia glomerata* King, subsp. *glomerata*; isotypa (SING); fruit after Beccari 2791 (BO).



Fig. 4b. *Schoutenia glomerata*, King, subsp. *peregrina* (Craib) Roekmowati-Hartono • isotype (BKP).



Fig. 5. *Schoutenia buurmanii* K. & V.; left after *Rastini s.n.* (BO); right after a specimen from Herb. Bogor. (BO).



Fig. 6. *Schoutenia kunstleri* King; isotype (CAL).

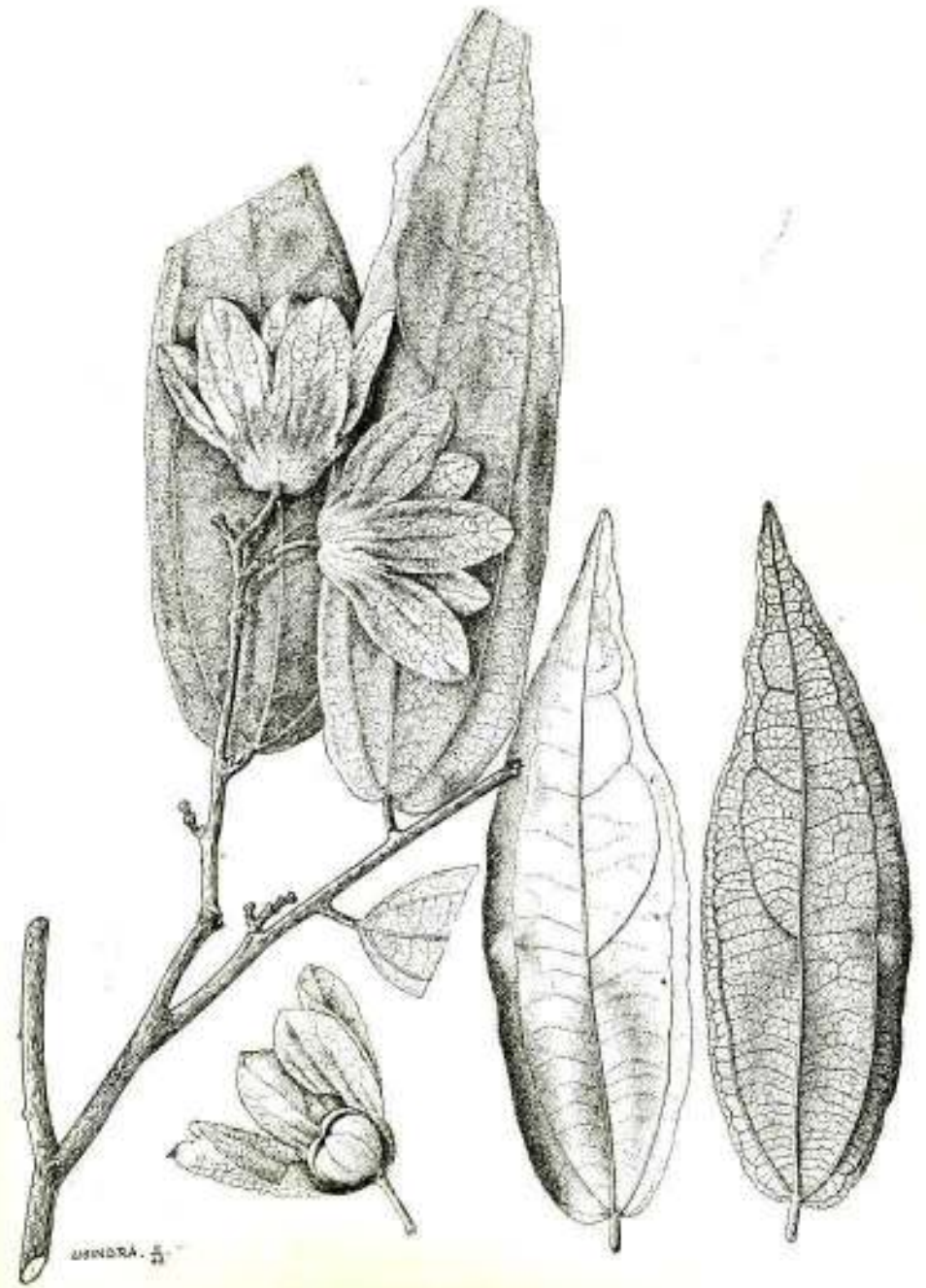


Fig. 7. *Schoutenia corneri* Roekmowati-Hartono; holotype.



Fig. 8. *Schoutenia kostermansii* Roekmowati-Hartono; holotype.

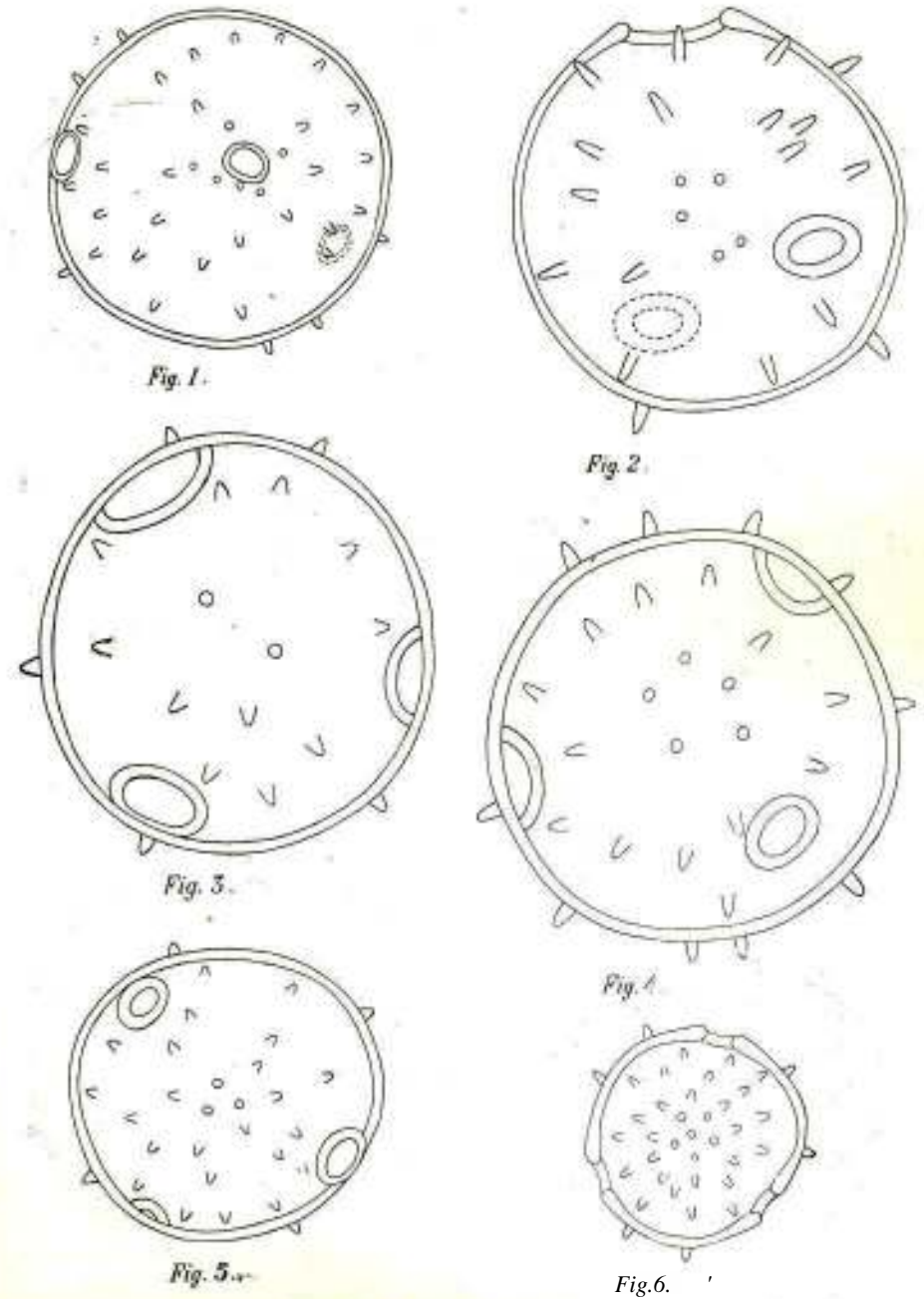


Plate I. Pollen (schematic) X 450.

Fig. 1. *S. ovata*; fig. 2. *S. accrescens*, subsp. *accrescens*; fig. 3. *S. accrescens*, subsp. *stellata*; fig. 4. *S. accrescens*, subsp. *borneensis*; fig. 5. *S. curtisii*; fig. 6. *S. glomerata*, subsp. *glomerata*.



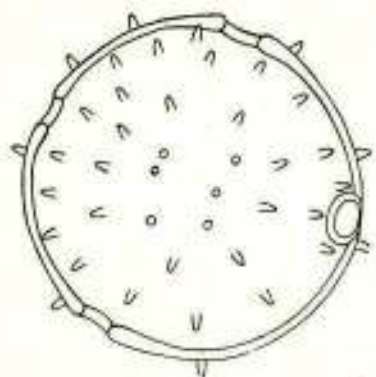


Fig. 7.

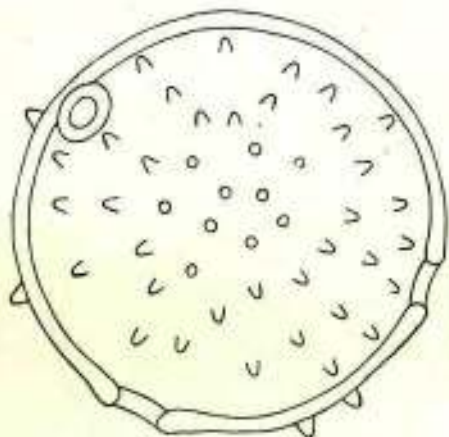


Fig. 9.

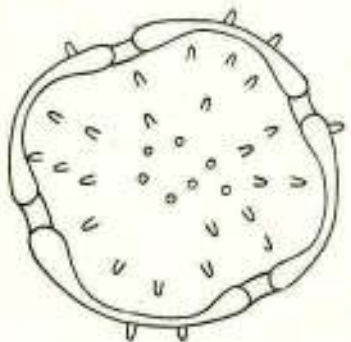


Fig. 11

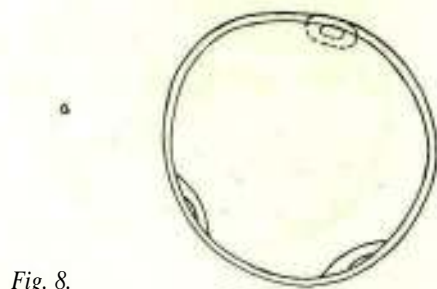


Fig. 8.

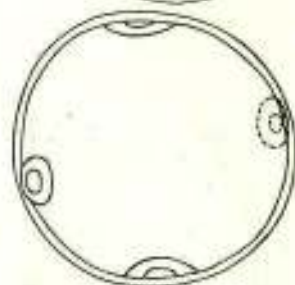


Fig. 10.

Plate II. Pollen (schematic) x 450.

Fig. 7. *S. glomerata*, subsp. *peregrina*; fig. 8. *S. buurmanii*; fig. 9. *S. kunstleri*; fig. 10. *S. corneri*; fig. 11. *E. kostermansii*.

### THE IDENTITY OF HORNERA Jungh. (Thymeleaceae)

A. J. G. H. KOSTERMANS \*)

Dr. Airy Shaw (Van Steenis, Fl. Males. Ser. I, 6(1): 48. 1960), referred *Hornera* Jungh. (Tijdschr. natuurl. Geschied. & Physiol. 7: 314. 1840) tentatively to Lauraceae.

*Hornera* was described in an article with the misleading title: Nova genera et species plantarum Javanicum, as the species numbered 22 to 27 are from Japan. Under no. 22 there is a remark: "siccatam e regius japonico accepi".

Flora Malesiana gives no clue where this Japanese collection came from; no collecting localities and no collectors are mentioned by Junghuhn \*\*).

According to Maximowicz (*in* Bentham & Hooker f, Gen. Pl. 3: 188—189. 1880) the genus should not be Japanese; this wrong statement is apparently due to the fact, that Maximowicz could not attribute the genus in its circumscription to any Japanese plant.

*Hornera* Junghuhn, according to the author related to *Gnidia*, is described with two species. As the type specimens so far have not been located, identification has to be based entirely on the descriptions, which are, luckily, very extensive.

*Hornera umbellata* (I.e. 314) represents without doubt a species of *Neolitsea* Merr. The flowers are dimerous and the flower described is a female one. The stalked glands were mistaken by Junghuhn for stamens. There are 6 "fila sterilia", which represent the 6 sterile stamens, which in *Neolitsea* are arranged in 3 cycles of 2 opposite stamens each. The description fits *Neolitsea* perfectly and the lengthy and adequate description will make it possible to identify even the species, when *Neolitsea* of Japan is revised.

The second species: *Hornera glomerata* (I.e. 316) belongs either in *Litsea*, *Lindera* or *Actinodaphne*. As nothing is stated about the leaves being verticillate, we may exclude *Actinodaphne*. As *Lindera* has usually triplinerved leaves, the best guess is *Litsea*.

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\*\*\*) Perhaps Junghuhn received his material from H. Burger (cf. Van Steenis - Kruseman *in* Blumea 11: 495. 1962).