

A CRITICAL STUDY IN THE COMPLEX-POLYMORPHOUS GENUS
SCHIMA (THEACEAE)

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SUMMARY

1. The author considers the genus *Schima* monotypic. Its only species, *Schima wallichii* (DC.) Korth., is subdivided into nine geographically separated subspecies and three varieties. These may be recognised sometimes by one dominating character, mostly, however, by a complex of characters. Several new combinations are made.

2. Yet the variability of most of the subspecies is still often enormous and at first sight appears complex. Thus we may often encounter the polymorphy of the whole species in its subspecies again. It was the striking different percentage-numbers of (phenotypically) about the same characters which turned the scale in favour of the recognition of the subspecies, besides their geographic separation.

The attempts made by the author to divide certain resulting complex-polymorphous subspecies into units of still lower rank and to trace correlations with peculiarities of environment such as different heights above sealevel, or with different stages in the age of the trees, failed.

3. On account of these negative results and the above mentioned different percentage-numbers for phenotypically about the same characters, the author came to the conclusion that the most probable explanation is that the variability within the subspecies is just due to Mendel-segregation and nothing else. It looks very much as if one is dealing here with the inheriting of striking characters, each caused by one or only a few polymeric factors, characters which hold their own, just as in panmictically propagated populations (by cross-pollination). This explanation, too, makes the striking fact that in some subspecies we find back phenotypically the whole, or part, of the polymorphy of the entire species more understandable, as well as the fact that individuals of different subspecies may agree phenotypically, whereas genotypically they belong to different races (subspecies). Moreover, all these phenomena strongly support the monotypic conception of the genus.

4. The author saw few examples from the area outside Indonesia. However, this does neither influence his monotypic conception of the genus, nor his method of dividing it into units of lower ranks. The study of the scanty amount of specimens, literature, and the drawings seen appeared more than sufficiently convincing. Yet he is not quite certain whether the correct rank was ascribed to some of the lower taxa involved. It would perhaps have been advisable to consider the variety *superba* and the continental parts of the subspecies *oblata* and *monticola* as distinct subspecies. Future consideration of this matter shall have to decide.

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INTRODUCTION.—From its discovery in 1823 until the present day many species have been described in the genus *Schima*. In the Indonesian part of its area, too, an increasing number of species was recognized, which have later on been reduced to three, namely *Schima noronhae* Reinw. ex Blume (Java), *S. bancana* Miq. (South Sumatra, Bangka, Billiton), and *S. crenata* Korth. (North and Central Sumatra, Borneo).

As to these species, however, some questions about their delimitation still remained to be answered, questions pertaining to the extremely large and complex polymorphy of some of them. In literature as well as in herbarium specimens the author met with the same problems for the larger part of the area outside Indonesia, especially for Burma, Siam, Indo-China, and South China. From the study of the Indonesian material, he received the impression of having before him one complex-polymorphous species for the whole area of the genus.

Within such a species the polymorphy showed a peculiar distribution both in altitudinal and in horizontal direction, by which it was possible to recognize nine geographically separated, and in turn often rather complex-polymorphous, subspecies, three of these with a few geographically separated varieties each.

Formerly some authors already advocated the monotypic conception of the genus and this has been partly followed up by van Steenis (*in* Bull. Jard. bot. Buitenzorg III 13: 50. 1936).

The specimens examined were obtained from the following herbaria: BO = Herbarium Bogoriense, Kebun Raya Indonesia, Bogor, which herbarium also contains some specimens of *Schima* from outside Indonesia.

FIB = the Herbarium of the "Boschbouwproefstation" (Forest Research Institute), Bogor.

Specimens cited from literature have been marked "Lit."

SCHIMA Reinw. ex Blume

Flowers hermaphrodite. Calyx and corolla mostly 5-, sometimes 6-merous, alternating, both quincuncial. Sepals small, almost equal, united over a short distance at the base, persistent. Petals large, unequal, the exterior one the smallest, united at the base into an annulus which may rarely be partly tubular or funnel-shaped, enveloping the flower-bud successively, cap-shaped, early deciduous as a whole together with the stamens. Stamens many, in 3—5 rows, the outer and the inner stamens mostly shorter than the middle ones, and from the inside to the outside arcuate-upright to arcuate-spreading, united at the base with the corolla and shorter than the latter; anthers ellipsoidal, basifix, with the loculi

opening laterally.¹ Style 1; stigma short, 5—6-lobed; ovary superior, 5-sometimes 6—7-celled at the base; ovules, large, half-campylotropous, epitropous, hanging, 3 in each cell, fixed parallel just beneath the middle of a central axis. Fruit a woody capsule, globose, often more or less flattened or elongated, 5-sometimes 6—7-celled, opening loculicid; septa loosening over their lower half from the wall of the fruit as blunt tooth-shaped parts which by pressure against the central columella causes the fruit-wall to split, up to somewhat more than halfway downward; columella thickened at the top, club-shaped to stellate, with 5—6 grooves and ribs corresponding to the scalloped upper halves of the septa; seeds 3 in each cell, side by side in vertical direction, winged all around but especially on the back side, reniform, testa rather thick, endosperm very thin or absent. Embryo curved; cotyledons rather thick, often somewhat longitudinally folded; radicle curved, lying against the base of the cotyledons and length somewhat exceeding width.

Evergreen trees; very rarely shrubby or subscandent. The terete twigs are monopodia growing from an obliquely beaked terminal bud; the ramifications originate simultaneously from one or a few of the uppermost buds in the axils of the leaves of the preceding vegetation period and are as strong as the direct continuation of the central twig; twigs from a vegetation period mostly short, with the leaves and flowers crowded. Leaves alternate, simple, penninerved, entire or the margin wholly or partly undulate, dentate, or serrate, without stipules; petiole flattened or somewhat gutter-shaped above, rounded beneath. Flowers stalked, mostly white, solitary in the axils of the leaves, or by reduction of the leaves grouped into rather small racemes; racemes, which later on may grow on vegetatively, axillary or terminal on the branches. Prophylls 2, more or less remotely inserted from the calyx, caducous.

One polymorphous species.

The first species of the present genus were described in 1824 as members of *Gordoniu* (Ellis in Philos. Trans, roy. Soc, Lond. 60: 518 t. 11. 1770), nomen conservandum. Already Blume (1825) segregated them as forming a distinct genus *Sehima*; in this he was followed by most subsequent authors.

Schhna Reinwardt ex Blume, Cat. Gew. Buitenz., 80. 1823, nomen nudum; Bijdr. Fl. Ned. Indïe, 3de Stuk: 129. 1825; Korthals Bijdr. Ternstr. in Temminck, Verh. nat. Gesch., Bot. 142. 1839-42; Miquel, Fl. Ind. bat. 1 (2): 491. 1859; Bentham, Fl. hongk. 28. 1801; Bentham & Hooker, Gen. PL 1; 185. 1802; Baillon, Hist. des. Pl. 4; 254. 1872; Thiselton Dyer in Hook. 1, Fl. Br. Ind. 1: 288. 1874; Kurz, For. Fl. Burma 1: 106. 1877; King in J. As. Soc. Bengal 59 (2) : 201. 1890; Boerlage, Handl.

¹ The stamens originate probably by dedoablement of five primordia; the author once saw one flower with three very broad stamens alternating with the petals, before these stamens some normal ones were present and on the 'vacant' places only normal ones, too.

² The columella of the fruit perforates, and is sharply distinct from, the fruit-wall at the base and is to be interpreted as the direct continuation of the petiole (receptacle); the carpels finally break off sharply from the columella.

1: 96. 1890: Szyszylowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895; Koorders & Valetton, Bijdr. Booms. Java 3: 282. 1896; Brandis, Ind. Trcos 59, 700 f.16. 1906; Pitard in Lee, Fl. gen. Indo-Chine 1: 350. 1910; Backer, SchooUl. Java 103. 1911; Koorders, ExkFl. Java 2: 609. 1912; Ridley, Fl. Mai. Penins. 1: 201. 1922; Koorders, Fl. Tjib. 2: 185. 1923; Melchior in Engl. & P., PflFam., 2. Ausg., 21: 138. 1926; Airy-Shaw in Kew Bull. 1936: 496; Adelbert in Backer, Eeknopte Fl. Java (Noodflora), fam. 93: 5. 1914; Keng in Taiwania 1: 226. 1950.

SHIMA WALLICHTI (DC.) Korth.

Leafy twigs 2.5—30 cm long; internodes between the adult leaves 2—57 mm long, 1.5—6 mm thick, glabrous, silky, tomentose or villose, mostly soon becoming glabrous, not rarely greyish wax coated. *Petiole* 0.2—3.8 cm long; indument as on the twigs. *Lamina* 2.5—29 cm long, 1.4—9.4 cm wide, roundish to linear, mostly oblong to lanceolate, sometimes more or less ovate or obovate, sometimes somewhat inequilateral or falcate; chartaceous to thin-, more rarely thick- or very thick-, coriaceous; base cuneate, rarely acuminate, rarely decurrent on the petiole, or rounded, often somewhat oblique; apex mostly more or less (rarely caudate!) or even filiformously) acuminate, acute, rarely obtuse, rarely rounded or somewhat emarginate; margin completely entire, or entire over some distance at the apex and at the base and in between faintly or more strongly, somewhat deeply, distantly and obliquely to incliningly undulate, crenate, dentate, or serrate, the 'teeth' often provided with a prickly point or a short needle, sometimes on one and the same twig all the leaves wholly entire or wholly crenate, or partly so and the other leaves with one or few teeth in any combination; lateral nerves 4—20 on either side of the midrib, mostly regularly distributed, sometimes (especially in large laminae) irregularly and widely apart, arcuate and mostly running out directly or with less distinct secondary nerves into the teeth of the margin, sometimes forming a distinct fork before reaching the margin; midrib faintly sunken above, prominent beneath, the lateral nerves and the veins often more or less, sometimes coarsely, prominent, not rarely sunken, very thin to coarse; indument as on the twigs, especially on the nerves and veins and the midrib at the base, rarely the whole lamina more or less adpressedly hairy (to nearly arachnoid-hairy beneath), mostly entirely glabrous or glabrescent, often wax coated on both sides. *Flowers* solitary in the axils of the leaves or united into once- or twice-branched racemes which bear an indument similar to that of the twigs. *Pedicels* 7—65 mm long, 0.5—3.5 (rarely 4—9) mm thick, rigid or flaccid and incurved, sometimes strongly bent upwards, often quadrangular on section, rarely flattened and 2-keeled, mostly thickened at the apex. *Prophylls* 2, caducous, oblong to lanceolate and obovate, rarely roundish, 5—8 mm long, 1.5—2.5(—1.0) mm wide, with the apex rounded to acute. *Sepals* 1.5—3(—5) mm long, 1.7—5(—8) mm wide, semicircular to roundish, rarely cordate at the base, hairy outside like the twigs, with ciliate edge, densely silky to tomentose inside; *corolla* in the adult flower-bud globose to obovate, 6—18 mm long, 5—16 mm in diameter, glabrous to finely short-hairy, shortly tomentose at the base, in open flowers 15 —70

mm in diameter. Petals 8—33 mm long, 7—25 mm wide, obovate with rounded apex, more or less (especially the outermost and smallest one) cap-shaped, the smallest one split and with ciliate edge, at the base over 2.5—5 mm mutually united into an annulus which may sometimes be partly tubular and is also united with the bases of the united stamens, caducous, falling off together with the latter. *Stamens* glabrous, inserted at the base, rarely on the top, of a short tubular part of the corolla; filaments 2—15 mm long, finely apiculate; anthers ellipsoidal, 1—2 mm long. Ovary 2.5—4 mm long, 2.5—5 mm in diameter, ovate, densely silky to tomentose, grading into the 3.75—18 mm long, 0.5—2 mm thick, glabrous, and somewhat longitudinally fissured style; stigma flattened-capitate, 0.5—1 mm long, 1—3 mm in diameter, the small lobes somewhat reflexed. Adult but still closed *fruit* 6—10 mm long, 10—22 mm in diameter, mostly somewhat flattened, rarely elongate-globose, sometimes more or less blunt 5-angular, appressedly silky to tomentose; open fruit 5—23 mm long, 7—26 mm in diameter; valves ovate and cap-shaped, more or less acuminate to the acute apex, glabrous or short-silky outside. Seed suboblong reniform, 6—12 mm long, 3—7 mm broad (without wing respectively 3—6 and 2.25—4 mm), up to 1 mm thick. (Description after the herbarium material mentioned below; some living material from Tjibodas, Mounts Gede-Pangerango, and the Arboretum, Forest Research Institute, Bogor; and literature.)

Schima wallichii is (according to notes on the herbarium labels and literature) a tree, very rarely shrub-like or subscandent, reaching a height up to 47 m, with a bole up to 127 cm in diameter, rarely with buttresses up to 1.8 m high, 0.5 m wide, and 0.2 m thick. The leaves are mostly glossy green to dark-green above, dull and more pale-green below, not rarely, however, glaucescent, with the nerves often yellowish; young leaves are mostly red, pink, or purple. The flowers are fragrant; the calyx is light-green; the corolla in bud is scarlet outside, over purplish-red, purplish-cream to white in flower (the outermost petal sometimes persistently scarlet outside), rarely yellowish, light-red, red-brown or purple (Clemens 27110); the filaments are yellow, sometimes orange or brown; the anthers more yellow or brown; the style is often yellowish cream or green; the stigma is green. The fruit in the young state is green, turning whitish to red, violet, at last black and dry.

The species occurs from 5—3300 m above sealevel, probably over the whole area in primary as well as in secondary forests, but also on devastated places; it is often very common, often gregarious; sometimes it is cultivated in gardens, along way-sides, or for reafforestation purposes. Flowering and fruiting occurs during the whole year, flowering especially at the end of the wet and the beginning of the dry season (April—June) and at the end of the dry and the beginning of the wet season (October—

January), fruiting especially in the wet season (January—March) and at the beginning of the earlier half of the dry season (May—July).

Gordonia walliehii De Candolle, Prodi-. 1: E28. 1824; Sprengel, Syst. 3: 125. 1826; Hasskarl, Cat. Pl. Horto bot. bogor. alter 210. 1844; Van Eeden, Houtsoorten N.O.I. 33. 1872. — *Schima walliehii* (DC.) Korthals, Bijdr. Ternstr. in Temminck, Verh. nat. Gesch., Bot. 143. 1839-42; Choisy in Zoll., Syst. Verz. Ind. Archip. Hft. 2: 144. 1854 (var. *obtusata*); Micmel, Fl. Ind. bat. 1 (2): 492. 1859; *ibid.*, Suppl. Sum. 190, 484. 1862; in Ann. Mus. Lugd. Bat. 4: 113. 1868; Thiselton Dyer in Hook, f., Fl. Br. Ind. 1: 289. 1874; Kurz in J. As. Soc. Bengal A3 (2): 93. 1874; For. Fl. Burma 1: 106. 1877; Szyszyłowicz in Engl. & Pr., PflFam. 3 (6): 180, 1895; Gamble, Man. Ind. Timb., 2nd Ed., 66. 1902; Bvandis, Ind. Trees 59. 1906; Foxworthy in Philip. J. Sci. 4 (Bot.): 503. 1909; Pitard in Lee, Fl. gen. Indo-Chine 1: 350. 1910 (with var. *lobbii*); Howard, Timb. of the World 254. 1920; *ibid.*, 2nd Ed., 478. 1934; Troup, Silv. Ind. Trees 1: 29. 1921; Melehior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Craib, Fl. siam. Enum. 1: 130. 1925; Pearson & Brown, Commerc. Ind. Timb. 1: 64 3 fs(f. 25). 1932; Airy-Shaw in Kew Bull. 1936: 498.

Gordonia integrefolia Roxburg, Hort. bengal. 52. 1814, nomen nudum; Fl. ind., ed. Carey, 2: 572. 1832.

Gordonia oblatu Roxburg, Hort. bengal. 93. 1814, nomen nudum; Fl. ind., ed. Carey, 2: 572. 1832. — *Schima oblata* (Eoxb.) Kurz in J. As. Soc. Bengal 39 (2): 65. 1870; *ibid.* 43 (2) : 94. 1874.

Gordonia chilaneae Buehanan-Hamilton in D. Don, Prodr. Fl. nepal. 225. 1825.

Schima noronhae Reinwardt *apud* Blume, Cat. Gew. Buitenz. 80. 1823, nomen nudum; *ex* Blume, Bijdr. Fl. Ned. Ind. 3e. Stuk: 130. 1825; Korthals Bijdr. Ternstr. in Temminck, Verh. nat. Gesch., Bot. 144 *pi.* 29 *f.* 21-27. 1839-42; Walpers, Repert. 5: 135. 1845; Teysmann & Binnondijk, Cat. Pl. Horto bot. bogor. 175. 1854 (not legitimately published); Cat. Pl. Horto bot. bogor. 204 & 390 (var. *grandiflora*). 1866; Choisy in Zoll., Syst. Verz. Hft. 2: 144. 1854; Miquel, Fl. Ind. bat. 1 (2): 492. 1859; Bentham, Fl. hongk. 29. 1861; Miquel, Fl. Ind. bat., Suppl. Sum. 190, 484. 1862; Miquel in Ann. Mus. Lugd. Bat. 4: 112. 1868; Kurz in J. As. Soc. Bengal 13 (2): 93. 1874; For. Fl. Burma 1: 107. 1877; Maximowicz, Mel. biol. 12: 426. 1886; Forbes & Hemsley in 3. Linn. Soc. (Bot.) 23: 80. 1886; King in J. As. Soc. Bengal 59: 201. 1890; Szyszyłowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895; Koordeis & Valeton, Bijdr. Booms. Java 3: 283. 1896 (with vars. *serrata* & *angusiifolia*); Matsumura in Bot. Mag., Tokyo 12: 63. 1898; Ito & Matsumura, Tent. Fl. lutch. 828. 1899; Gamble, Man. Ind. Timb., 2nd Ed., 67. 1902; Ridley in Agric. Bull. Str. & Fed. Mai. St., N.S. 1: 47. 1901; Mai. Timmerhout. 12. 1903; Van Eeden, Houts. N.O.I., 3e Druk, 23. 1905; Moll & Janss, Mikrogr. Holzes 1: 327. 1906; Merrill & Rolfe in Philip. J. Sci. 3 (Hot.): 113. 1908; Poxwortli in Philip. J. Sci. 4 (Bot.): 503. 1909; Becker, Schoolfl. Java 103. 1911; Hayata, Ic. Pl. form. 1: 89. 1911; Koorders, ExkFl. Java 2: 610. 1912; Koorders-Schumacher, Syst. Verz. I, Abt. Java, Fam. 186. 1912; iMd. II, Abt. Sumatra 37 & 58 (var. *crenata*). 1914; Koorders, Atlas Baumarten Java 3: *f.*581 A-C. 1915 (with var. *crenata*); Kanehira, Form. Trees 60-61. 1917; Matsumura in Bot. Mag., Tokyo 12: 63. 1917; Hayata in Sched. Herb. Imp. Univ. Tokyo (var. *bonnevnia*); Nakai in Bot. Mag., Tokyo 32: 222. 1918 (var. *boninensis*), in syn.; Merrill, Bibl. Enum. Born. Pl. 390. 1921; Kanehira, Anat. Char. Identif. Form. Woods 38 *pl. e fs.* 34-35. 1921; Ridley, Fl. Mai. Penins. 1: 201. 1922 (with var. *rigida*); Koorders,

Fl. Tjib. 2: 185 *pi.* 6. 1923; Melchior *hi* Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Craib, Fl. siam. Enum. 1: 130. 1925; Heyne, Nutt. PL Ned. Ind., 2de Druk, 1076. 1927; Crook, Flow. Pl. Hongkong, Ran.- Mel. 70. 1930; Burkill, Diet. Econ. Prod. Mai. Penins. 2: 1973. 1935; Van Steenis in Bull. Jard. bot. Buitenz. III 13: 50. 1936 (with subsp. *brevifolia*); Airy-Shaw in Kew Bull. 1936: 497; Corner, Wayside Trees Malaya 630 /s. 238-239 *pi.* 187. 1940; Adelbert in Backer, Beknopte Fl. Java (Nooduitgave), Fam. 93: 5. 1944.

Cleyera mertensiana Siebold & Zuccarini, Fl. japon. I: 154. 1835. — *Schima mrcrtensiana* (Sieb. & Zucc.) Koidzumi in Bot. Mag., Tokyo 44: 107. 1930; Airy-LShaw *ill* Kew Bull. 1936: 497.

Schima creimta Korthals, Bijdr. Ternstr. in Temminck, Verh. nat. Gesch., Bot. 143 *pi.* 29 *fs.* 1-2. 1839-42; Walpers, Repert. 5: 135. 1845; Miquel, Fl. Ind. bat. 1 (2): 491. 1859; *ibid.*, Suppl. Sum. 190, 483. 1862 (with var. *pediedlosa*); in Ann. Mus. Lugd. Bat. 4: 113. 1868; Kurz in J. As. Soc. Bengal 39 (2): 64. 1870; For. Fl. Burma 1: 107. 1877; Pierre, Fl. for. Coehineh. 2: *pi.* 131. 1887; Pitard m Lee, Fl. gen. Indo-Chine 1: 35. 1910; Merrill, Bibl. Enum. Born. Pl. 390. 1921; Craih, Fl. siam. Enum. 1: 129. 1925; Handel-Mazzetti, Symb. sinicae 7: 396. 1931 (n.v.); Airy-Shaw in Kew Bull. 1936: 497.

Schima antherisosa Korthals, Bijdr. Ternstr. *hi* Temminck, Verh. nat. Gesch., Bot. 145. 1839-42; Walpers, Repert. 5: 135. 1845; Miquel, Fl. Ind. bat. 1 (2): 492. 1859; *ibid.*, Suppl. Sum. 190. 1862; Szyszylowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima superba Gardner & Champion in Hook. J. of Bot. & Kew Gard. Misc. 1: 246. 1849; Seeman, Bot. Voy. Herald. 367 *pi.* 75. 1855; Szyszylowicz in Engl. & Pr., PflFam. 3 (61): 186. 1895; Melchior *iu* Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Rehder in J. Am. Arb. 8: 176. 1927; Kanehira, Form. Trees, 2d Ed., 471 *f.* 430 *pi.* 44. 1936; Airy-Shaw in Kew Bull. 1936: 497; Keng in *Taiwania* 1: 227. 1950 (with var. *haukaensis*). — *Gordonia superba* (Gard. & Champ.) Hooker f. & Thomson *en* Thiselton Dyer in Hook. 1, Fl. Br Ind. 1: 289. 1874, in syn.

Gordonia javanica Hooker in Curtis Bot. Mag. III 6: *pl.* 4539. 1850. — *Schima javanica*, (Hook.) Szyszylowicz in Engl. & Pr., PflFam. III 6: 186. 1895, in syn.

Gordonia floribnuda Wallich, Cat. no. 1456. 1828, nomen nudum; *ex* Griffith, Not. Pl. asiat. 4: 563. 1854; *lc.* PL asiat. 4: *pi.* 600 *f.* 2. 1854.

Gordonia brtvifolia Hooker f. in Trans. Linn. Soc. 23 (1): 162. 1860; Walpers, Ann. 7: 367. 1868; Burkill in J. Str. Br. As. Soc. Bengal 76: 158. 1917. — *Skima brevifolia* (Hook, f.) Stapf in Hook. Icon. Pl. 23 (4): *pi.* 2264. 1893 ("Baillon"); Stapf in Trans. Linn. Soc. Bot. II 4: 135. 1894; Gibbs in J. Linn. Soc. (Bot.) 42: 00. 1914; Merrill, Bibl. Enum. Born. PL 390. 1921; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Airy-Shaw in Kew Bull. 1936: 498.

Gordonia lobbii Hooker f. in Trans. linn. Soc. 23 (1): 162 1860; Walpers, Ann. 7: 367. 1868; Burkill in J. Str. Br. As. Soc. Bengal 76: 156. 1917 — *Schima lobbii* (Hook, f.) Pierre, Fl. for. Coehineh. 2: text to *pi.* 121. 1887 (also "*lawii*"); Airy-Shaw in Kew Bull. 1936: 498.

Schima hypogerrima Miquel, Fl. Ind. bat., Suppl. Sum. 190, 484. 1862; in Ann. Mus. Lugd. Bat. 4: 113. 1868; Szyszylowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895.

Gordonia integci-rima Teysmann & Binnendiik, Cat. PL Horto bot. bogor. 174, 247. 1854 (not legitimately published), nomen nudum, prob.; Cat. 's Lands Plantent. 204, 1866, nomen nudum, prob.

Schima bancana Miquel in Ann. Mus. Bot. Lugd. Bat. 4: 113. 1868; Kurz in J. As. Soc. Bengal 43 (2): 94. 1874, For. Fl. Burma 1: 108. 1877; Szyszlowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Heyne, Nutt. PL¹ Ned. Ind., 2e Druk, 1076. 1927.

Schima rigida Miquel in Ann. Mus. Lugd. Bat. 4: 113. 1868; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima sulcinervia Miquel in Ann. Mus. Eot. Lugd. Bat. 4: 113. 1868; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima khasim Thiselton Dyer in Hook. l., Fl. Br. Ind. 1: 289. 1874; Szyszlowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895; Brandis, Ind. Trees. 60. 1906; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Gordonia molisii Wallich, Cat. no. 1458, 1828, nomen nudum.— *Schima mollis* Thiselton Dyer in Hook, f., Fl. Br. Ind. 1: 288. 1874; Kurz in J. As. Soc. Bengal 43 (2): 93. 1874; For. Fl. Burma 1: 106. 1877; Szyszlowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima monticola Kurz in J. As. Soc. Beng. 43 (2): 93, 181. 1874, 186. 1895; For. Fl. Burma 1: 107. 1877; Szyszlowicz in Engl. & Pr., PflFam. 3 (6): 186. 1895.

Schima hypochra Pierre, Fl. for. Cochinch. 2: text to pi. 121. 1887, nomen nudum.

Schima argentea Pritz. in Bot. Jb. 29: 473. 1900; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Handel-Mazzetti, Symb. sinicae 7: 397. 1931 (n.v.); Airy-Shaw in Kew Bull. 1936: 497.

Gordonia sinensis Hemsley & Wilson in Kew Bull. 1906: 153; Burkill in J. Str. Br. As. Soc. Bengal 76: 146. 1917; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 138. 1925. — *Schima sinensis* (Hemsl. & Wils.) Airy-Shaw in Kew Bull. 1936: 497.

Schima pulgarensis Elmer in Leaflet Philipp. Bot. 5: 1843. 1913; Merrill, En. Philip, fl. Pl. 3: 71. 1923; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima brevipes Craib in Kew Bull. 1915: 423; Fl. siam. Enum. 1: 129. 1925; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima mairii Hoehreutiner in Ann. Cons. Jard. bot, Geneve 20: 190. 1917; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

Schima confertiflora Merrill in Philip. J. Sci, 13 (Bot.): 150. 1918; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Hu & Chun, Ic. Pl. sinicarum pi. 92. 1929 (n.v.).

Schima noi'onhae var. *boninensis* Hayata in Sched. Herb. Imp. Univ. Tokyo; Nakai in Bot. Mag., Tokyo 32: 222. 1918, in syn. — *Schima boninensis* Nakai in Bot. Mag., Tokyo 32: 222. 1918, *non* Melchior.

Schima liukiuevsi Nakai in Bot. Mag., Tokyo 32: 223. 1918.

Schima kankaoensis Hayata, Ic. PL form. 8: 9. 1919; Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925; Kanehira, Form. Trees, 472 f. 4Sl. 1936.

Schima beccarii Warburg in Fedde Rep. 18: 329. 1922.

Schima boninensis Melchior in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925, *non* Nakai.

Schima bambusifolia Hu in J. Arn. Arb. 11: 224. 1930; in Bull. Fan. Mem. Inst. Biol. 5 (Bot.): 310. 1934; Hu & Chun, Ic. Pl. sinicarum pi. 172. 1935 (n.v.).

Schima sericea Airy-Shaw in Hook. Ic. Pl. V 4: pl. 8809. 1936; in Kew Bull. 1936: 498.

Schima forrestii Airy-Shaw in Kew Bull. 1936: 496.

Schima villosa Hu in Bull. Fan. Mem. Inst. Biol. 8 (Bot.): 141. 1938.

Gm-donia sp. Griffith, Not. Pl. asiat. 4: 562. 1854?; Ie. Pl. asiat. pi. 585a f.O. 1854?

Gordonia sp. Griffith, Not. Pl. asiat. i: 562. 1854; Ie. Pl. asiat. pl.600 (excl. l.«). 1854.

Concerning the nature and causes of the polymorphy of this species and the delimitation of its subspecies and forms of lower rank, some remarks may follow.

Much may be accounted for by the peculiar distribution (fig. A), as the horizontal as well as the altitudinal distribution extend over a large area. The species avoids regions with an extremely dry season; it has not yet been found in Central Burma, it occurs in North Burma in three separated places, is lacking in Central and West Siam, and Central and East Java, as well as in Central and South-West Borneo, in the latter region, however, through causes unknown to the author. It is distributed from 5—3300 m above sealevel. So there would appear to be enough opportunities to favour the origination of subspecies in more or less isolated parts of the area. And such subspecies are indeed to be found, often connected by transitional series, the subspecies *mertensiana*, *liu-kiuensis*, *noronhae*, *wallichii*, *oblata*, *bancana*, and *crenata* in horizontal direction and the subspecies *monticola* and *brevifolia* in vertical direction.

What are the facts supporting the monotypic conception of the genus? The variation of the vegetative parts, which was used previously in the delimitation of species, varies between clear-cut and rather narrow limits. For instance, the laminae vary greatly in length and width, but laminae of quite different forms, such as have a cordate base or are basined, have never been found. Their margin varies from completely entire to strongly serrate with all possible transitions, but incisions of another type do not occur. The generative parts (flowers and fruits) could never be used in the delimitation of species. They vary merely in dimensions, not in number or form of the composing parts, and their plan is always quite the same.

To my mind it was not merely the fact of the existing differences in vegetative characters, but also the peculiar distribution of these variations all over the area, which struck the authors. They did not and often could not realize the nature of this distribution. There is a matter of forms which differ in rather slight characters of the vegetative parts, such as the dimensions of the laminae, the incisions of their margin, their indument, their texture, and their nervation. Evidently such forms have the possibility of maintaining their characters more or less, although

there are transitions. The blending is evidently not absolute. However, the differences are not large and sharp enough to be used as specific characters. In short, scattered and intermingled over the area there exist forms which differ merely in vegetative characters and which are more or less connected by transitions.

At first, the author assumed that the cause of this peculiar distribution of the polymorphy might perhaps be explained by some irregularities in propagation or in nuclear reduction, such as more or less strong autogamy, apomixis, or apogamy, as well as by factors of isolation; later on he became more and more convinced that a different explanation was called for, as is mentioned on page. 144-145 and in the summary.

The author succeeded in grouping these forms in geographically more or less separated subspecies, each marked by one typical dominating character, or by a complex of characters which may be the same in different subspecies, but which in the latter case are displayed in different proportions. Thus, there occurs in some of the subspecies, distinguished by a complex of characters, as for instance in subspecies *oblata* and *noronhae*, nearly the whole scale of polymorphy of the species. This polymorphy may reappear largely in some subspecies characterized by one dominating character, such as subspecies *bancana* and *crenata*. The same forms may be present all over the area of the species and this makes it understandable now, why previous authors mention some of the species recognized by them as having a very scattered distribution. Examples are *Schima noronhae* and other so-called species mentioned from all over the distribution area of *S. wallichii*. These facts in themselves, too, strongly support the monotypic conception of the genus. The following examples may give an idea not only of the complexity of the polymorphy of the species but also of that of some of the subspecies.

The author investigated the nature of the complex polymorphy of subspecies *noronhae* and *oblata*, respectively from Java and Sumatra only, of which abundant specimens were available.

Thus in subspecies *oblata* 85% of the herbarium numbers have more or less crenate-dentate, 5% very strongly crenate-serrate, 10% completely or nearly completely entire laminae.

In subspecies *noronhae*, however, 9% of the herbarium numbers have more or less crenate-dentate, 4% more strongly crenate-serrate, 72% completely entire, and 15% nearly entire laminae (in the latter case some leaves with only one or a few teeth).

In both subspecies these different forms occur scattered over their area; true correlation with the elevation above sealevel, the climate, or the soil could not be established exactly. However, there exists a slight possibility that in Java forms with strong incisions are more frequently encountered from 100—1500 m above sealevel.

The question whether the differences shown in different habitats are due to (abnormal ?) genetical variation and not merely to modification has also been investigated.

It has been established that some twigs of one and the same individual may have small, others medium-sized leaves. Twigs with large leaves are nearly always sterile and possibly always suckers. Fertile twigs from the same individual have nearly always medium-sized leaves. Twigs from very young plants (2—6 m height) generally have large leaves. Four living trees in the Botanic Garden at Bogor were rather uniform in form and dimensions of the leaves and demonstrated each a very small part of the polymorphy.

The author arranged herbarium specimens of 152 collection numbers with sufficient data of the whole species from the whole Indonesian area in classes after the total height of the trees and the diameter of the boles, to arrive at an at least somewhat reliable estimation of relative age. In this way it could be demonstrated that very young individuals have large leaves. No matter what age classes were adopted for the older individuals, the results show invariably that 15% has small and often narrow leaves, 32% oblong medium-sized leaves, 27.5% more or less lanceolate medium-sized leaves, 14.5% conspicuously large leaves. There is also no question of correlation, except in a very young state, between the shape of the leaf and the age of the plant.

From the specimens Koorders repeatedly collected over a period of 23 years (1890—1913) over the whole area of West Java from the same numbered trees, the author received the following impression about this subject. He obtained a very slight indication, but by no means the conviction, that younger trees (exclusive of the discarded very young state) have smaller, older trees more oblong medium-sized, still older trees conspicuously long, leaves. The very weak arguments in favour of this correlation are contestable and not to be checked, because in many cases suckers might have been collected or any other uncheckable choice might have been made. The specimens demonstrated, however, without doubt that a particular type of incisions of the margin of the blade never changed but persisted.

The question whether modifications caused by different environmental conditions in different individuals, play a part, can be answered only after many years of experimental and genetical investigation. That they might be of importance is not probable, as the differences are too significant and too constant. It seems after all quite probable that the peculiar polymorphy is due to genetical variation.

Motives for subdividing the most complex-polymorphous subspecies, as subspecies *oblata*, *noronhae*, *baneana*, and *crenata*, in taxa of the rank of formae might appear to exist. But such forms would occur in scattered areas and would, in turn, be complex-polymorphous. Their differentiation, however, is impossible, because specimens which might be differentiated owing to one noticeable characteristic generally possess other remarkable characteristics which could also be used as a foundation for other formae. For instance, the material of subspecies *oblata* which might be recognized as a forma owing to its remarkably narrow leaves, could also be assigned to various formae distinguished by noticeably large or noticeably small leaves, by entire leaves, by prominent or sunken nervation, and by papery texture of the laminae.

Species and varieties were described in former times precisely on such characteristics, for instance in subspecies *oblata*: *Schinia crenata* var. *pedicellosa* (long pedicels), *S. hypoglavca* (wax coated leaves), *S. sulcinervia* (sunken nervation), *S. brevipes* (short pedicels); in subspecies *noronhae*: *S. noronhae* var. *serrata* (serrate margins), *S. noronhae* var. *crenata* (crenate margins), and *S. noronhae* var. *migustifolia* (narrow leaves), *S. rigida* (thickly coriaceous laminae), *S. sericea* and *S. argentea* (indument), *S. bambusifolia* (small leaves); etc.

What may be the probable explanation of the polymorphy in *Sehima*? All things considered, the facts point in one direction!

(i) Within the species *S. wallichii* differentiation of races has taken place, i.e. the subspecies described in the present paper.

(ii) The polymorphy of these subspecies, most amply demonstrated and expressed in numbers by the author in the subspecies *oblata* and *noronhae*, is exactly comparable with that of populations in general that originated due to (preponderant) cross-pollination (of all individuals), eventually after many generations from a pair of heterozygotic parents (panmixy).

This polymorphy then would be nothing else but normal genetical variation owing to Mendel-segregation. The 'complex' nature of the polymorphy in the subspecies of *S. wallichii* would have to be interpreted

as the inheriting of striking" morphological differences caused merely by one or only few polymeric factors.

That in most other species and races the genetical variation has a much less striking character is due to the fact that the differences between the individuals form a more or less fluent transitional series. This latter fact is due to the inheriting of small morphological differences caused by mostly many polymeric factors. See also the "Summary."

The following parts of the plants and their variations are of importance in connection with the distinction of subspecies and varieties.

THE PETIOLE.—Mostly more than 1 cm long; subspecies *brevifolia* always has petioles 0.2—0.5 cm long.

THE LENGTH OF THE LAMINA.—Varies from 2.5—29 cm. Rather uniform in this character are subspecies *brevifolia* with the lamina up to 5, the variety *pulgarensis* of subspecies *erenata* with the lamina up to 6.2, subspecies *mertensiana* with the lamina up to 10.3, and the continental part of subspecies *oblata*, with the lamina up to 13 cm long. The complex-polymorphous subspecies *noronhae*, *oblata* (Sumatra), *bancana*, and *crenata* have forms distributed over their area with laminae up to 10 cm long (for instance, subspecies *norm/hue* from Java, 22% of the collection numbers); other numbers have medium-sized laminae from 10—17 cm long (subspecies *noronhae*, Java 68%), and more rarely specimens, mostly sterile, have been collected with laminae 17—29 cm long (subspecies *noronhae*, Java, 10'/r). The latter evidently represent mostly suckers or were derived from very young plants.

THE SHAPE OF THE LAMINA.—Varies from roundish to linear. In subspecies *brevifolia* the lamina is always roundish, in subspecies *monticola* (Mt. Kinabalu) oblong, in subspecies *mertensiana* lanceolate, in subspecies *liukiuensis* linear-lanceolate. In subspecies *noronhae* the shape varies from elliptic to linear, although some more or less constant forms occur within its range; in China and Indochina the shape varies from elliptic to lanceolate (in China oblong to lanceolate, in Indochina dominantly lanceolate); in Java it varies from elliptic to linear, with linear-lanceolate and oblong laminae dominant, linear and elliptic laminae being rather rare; in Borneo it varies from elliptic to lanceolate, but elliptic dominant. The shape of the laminae in subspecies *wallichii* and *oblata* from continental Asia varies from elliptic to lanceolate, oblong-lanceolate laminae being dominant; in subspecies *oblata* (Sumatra), however, oblong laminae are dominant. The laminae of subspecies *bancana* vary from oblong to linear-lanceolate, oblong laminae being dominant, and linear-lanceolate laminae

not rare; of subspecies *crenata* the laminae vary from elliptic to lanceolate, in south-eastern Borneo from oblong to lanceolate, in East Borneo oblong laminae being dominant.

THE INCISIONS OF THE MARGIN OF THE LAMINA.—In subspecies *mertensiana* the margins vary from completely entire to more or less obliquely to incliningly serrate, completely entire margins being dominant; in subspecies *liukiuensis* they are never completely entire (from more or less crenate to dentate or serrate, very rarely to subentire); in the variety *superba* they range from completely entire to strongly serrate (completely entire and dentate-serrate laminae sometimes together with subentire leaves on one and the same twig; very strongly serrate laminae being not too frequent). In the variety *noronhae* from continental south-eastern Asia and Borneo the margins vary from completely entire to distantly dentate. (Collections with completely entire laminae or on one and the same twig—most of the laminae entire and some leaves with one or a few teeth occurring rather frequently are found in about equal numbers as those with the laminae distantly dentate.) On Java the situation is: 72% with completely entire, 16% with entire and on the same twig with laminae possessing one or few teeth, 9% with on one and the same twig slightly and rather distantly crenate-dentate, 4% with strongly dentate-serrate, laminae. In subspecies *wallichii* the margins are generally completely entire, a few individuals possessing crenate-serrate laminae, or rarely strongly serrate laminae. In subspecies *oblata* the margins vary from completely entire to serrate, crenate-dentate laminae being strongly dominant; rarely the margins are entire or coarsely serrate. For instance, in the Sumatra material 85% of the laminae are more or less crenate-dentate, 5% strongly crenate-serrate, 10% completely entire or subentire. In subspecies *bancana* the margins are always completely entire; in subspecies *crenuta* always crenate-dentate or serrate, often slightly, rarely rather coarsely, so; in subspecies *monticola* always crenate-serrate, sometimes subcrenate, often rather coarsely crenate-serrate; in subspecies *brevifolium* completely entire, very rarely finely crenate-dentate.

THE NERVATION OF THE LAMINA.—The lateral nerves and veins vary from sunken and often thin and hardly visible to mostly more or less prominent, more rarely to coarsely and markedly prominent; the latter condition occurs scattered especially in the variety *superba*, and in subspecies *oblata* (Sumatra). Subspecies *wallichii* nearly always has forked lateral nerves, but also in other subspecies this forking is sometimes present; in subspecies *oblata*, for instance (Sumatra), it is not rare.

THE TEXTURE OF THE LAMINA.—Varies from chartaceous to very thick-coriaceous. In subspecies *mertensiana*, *oblata* (continental Asia), and *noronhae* (Borneo) the coriaceous to rarely thick coriaceous texture is predominant. Very thick-coriaceous texture is found in subspecies *monticola*. In the other subspecies the whole polymorphy occurs, but thin-coriaceous texture is dominant.

THE INDUMENT.—Scattered over the China and Borneo parts of the area of subspecies *noronhae*, and the Sumatra part of the area of subspecies *oblata* occur some more conspicuously and persistently-hairy forms. Subspecies *irallichii* always seems to be soft-hairy on the nerves beneath.

THE THICKNESS OF THE PEDICELS.—This varies from 0.5—10 mm! The pedicel is mostly 6.5—2(—3) mm thick and thickens generally gradually from its base upwards. More rarely some forms occur with pedicels more or less thickened and swollen, up to 3 mm over their whole length. In subspecies *monticola*, in plants from Mt. Kinabalu (1200—1500 m elevation), the pedicel is always thickened and swollen from 4—10 mm; in plants from the Asiatic continent (1500—2100 m elevation) from 3—4 mm. In subspecies *brevifolia* (1650—3300 m elevation) the pedicel is always from 2—3.5 mm thick. In some specimens of subspecies *crenata* (especially from Mount Kinabalu, 1200—1500 m elevation) and one specimen from East Borneo (1200 m) the pedicel varies from 1.5—3.5 mm in thickness.

THE DIAMETER OF THE FLOWERS.—This varies from 15—70 mm, generally from 20—40 mm. Scattered, and generally at higher elevations, large flowers have been found, i.e. in subspecies *noronhae* and *oblata*. Moreover, subspecies *monticola* and *brevifolia* are characterized by large flowers (35—70 mm diameter), as in subspecies *mertensiana* (50 mm in diameter).

THE DIMENSIONS OF THE SEPALS.—These vary in length from 0.5—5 mm, in width from 1.7—10 mm, generally from 1.5—3 and 1.75—5 mm respectively. Forms with large flowers have often (although not always) large sepals; for instance in subspecies *monticola* and *brevifolia*, they are 2.5—5 mm long and 4—8 mm wide, in subspecies *mertensiana* 5—8 mm long.

THE DIMENSIONS OF THE FRUIT.—These vary from 5—23 mm in length and 6—26 mm in diameter; generally the diameter is up to 20 mm. Forms with large fruit occur especially in subspecies *oblata* (up to 22 mm in diameter) and in subspecies *noronhae* (up to 26 mm in diameter).

KEY TO THE SUBSPECIES AND VARIETIES OF SCHIMA WALLICHII

1. Petioles of a larger or smaller amount of the leaves more than 1 cm long. 2
 Petioles of all the leaves never more than 0.2—0.5 cm long. Borneo; Mt. Kinabalu
 (elevation 1650—3300 m). 9. Subsp. *brevifolin*
2. Laminae chartaceous to coriaceous, seldom thick-coriaceous; pedicels 0.5—2(—3)
 mm thick, rarely over their whole length 1.5—3.5 mm thick. 3
 Laminae pronouncedly thick-coriaceous; pedicels thickened and swollen over their
 whole length, rigid, 3—10 mm thick. Borneo: Mt. Kinabalu (elevation 1200—1500
 in); Malay Peninsula: G. Tahan (elevation 1500—1600m); Burma: Martaban,
 Nattoung Hills (elevation 1800—2160 m); China: Yunnan, east of Teng Yueh
 (elevation 1800 m). 8. Subsp. *monticola*
- Laminae either always more or less crenate, dentate, or serrate (SE, E, and N
 Borneo, Palawan, Riu Kiu Islands), or always completely entire (Sumatra:
 Palembang, Lampung; Bangka; Billiton) 4
- Laminae of most individuals completely entire (Bonin Islands, Himalaya, Upper
 Burma, W Borneo, and Java) or about as many with completely entire laminae
 as with more or less crenate, dentate, or serrate ones (China, Formosa, Indo-
 China, E Siam), or else laminae of most individuals crenate, dentate, or serrate,
 more rarely entire or subentire (Lower Burma, W Siam, Malay Peninsula, N
 and Central Sumatra). 7
4. Laminae always more or less crenate-dentate, or serrate, rarely subentire. 5
 Laminae always completely entire. Sumatra: Palembang, Lampung; Bangka;
 Billiton (elevation 5—800 m). fi. Subsp. *bancana*
5. Laminae elliptic to lanceolate (Borneo, Palawan). 6
 Laminae always linear-lanceolate, 8—20 cm long; flowers 4 cm in diameter. Riu
 Kiu Islands 2. Subsp. *lutkiuensis*
- (5. Laminae 3.5—19 cm long, mostly thin, rarely thick-coriaceous; pedicels 10—50 mm
 long; flowers 17—35 mm in diameter. SE, E, and N Borneo (elevation 8—1500
 m). 7a. Subsp. *crenata* var. *crevata*
- Laminae up to 6.2 cm long, chartaceous; pedicels 1—1.5 cm long (always?);
 flowers 10—15 mm in diameter (always?). Philippines: Palawan (elevation
 1100—1275 m). 7b. Subsp. *crociata* var. *pitlgarensis*
7. Laminae of most individuals completely entire or about as many with completely
 entire laminae as with more or less crenate, dentate or serrate margins. 8
 Laminae mostly slightly, sometimes strongly crenate, dentate, or serrate, rarely
 entire or subentire. NW Siam, Lower Burma, Malay Peninsula, N and Central
 Sumatra (elevation 50—2000 m). 5. Subsp. *obtota*
8. Laminae always small, 7—10.5 cm long, lanceolate, rarely more oblong, coriaceous,
 flowers 5—6 cm in diameter, sepals 5—6 mm long. Bonin Islands.
 1. Subsp. *Hicrteusicaia*
- Laminae 3—29 cm long, mostly longer than 10.5 cm. 9
0. Lateral nerves not, or rarely, forked; young parts and leaves often glabrous,
 rarely silvery-white or silky-hairy; nerves and veins rarely strongly prominent
 (China, Formosa, Indo-China, NW Siam, W Borneo, W Java). 10
 Lateral nerves mostly forked; young parts and leaves especially on the nerves
 below more or less silky-hairy; nerves and veins generally distinctly prominent
 (Himalaya to Upper Burma). 11

10. Laminae 3—29 cm long, 1.5—10 cm wide, elliptic to linear, mostly quite entire, or on one and the same twig some laminae with one or a few teeth, sometimes (especially in Indo-China, and E Siam more frequently) with the whole margin of the laminae slightly, rarely strongly, crenate-dentate. Indument of the young parts sometimes short, ferruginous, rarely more conspicuously densely silky or tomentose, mostly glabrescent and adult laminae glabrous, sometimes persistent, especially along the midrib below. Laminae chartaceous to thick-coriaceous, mostly thin-coriaceous. E Siam, Indo-China, W Borneo, Java (elevation 100—2450 m). 3a. Subsp. *uovouhae* var. *noronkae*
- Laminae 4.5—18 cm long, 2—6.5 cm wide, elliptic to lanceolate, often entire, but in certain specimens frequently with dentate and subtire laminae on the same twig, and in other ones with all laminae strongly dentate, rarely very strongly dentate-serrate. Mostly glabrous, occasionally young parts and laminae below silky. Laminae chartaceous-coriaceous, mostly thin-coriaceous. S China, Formosa (elevation 150—1500 m). 3b. Subsp. *noronhae* var. *supcrba*
11. Laminae mostly entire, more rarely faintly crenate-serrate; lateral nerves mostly forked. Pedicels rather thin, 0.9—5 cm long; flowers up to 5 cm in diameter. E Himalaya, Upper Burma (elevation 300—2100 m). 4a. Subsp. *wallichii* var. *wallichii*
- Laminae very strongly crenate; lateral nerves not forked; pedicels stout, 1.8 cm long; flowers up to 6.25 cm in diameter. Khasia Hills, Upper Burma (Bhamo) (elevation 1200—2250 m). 4b. Subsp. *wallichii* var. *khasiana*

1. Subsp. *mertensiana* (Sieb. & Zucc.) Bloembergen, *comb. nov.*—
Fig. A 1.

Indument of *young parts* and outside of calyx velvety. *Petiole* 0.5—2 cm long. *Lamina* 7.8—10.5 cm long, 2.6—4.2 cm wide, mostly lanceolate, rarely more oblong, not acuminate to the acute apex, coriaceous; margin mostly entire, more rarely obliquely-incliningly serrate. *Pedicels* 2—3.5 (in fruit —5) cm long. *Flowers* 5 cm in diameter; calyx 5—6 mm long. (Description according to literature.)

According to literature this subspecies is a tree. It belongs to the 'noronhae' group of subspecies, but is more uniform, especially in the shape of its lamina; it is more hairy, and has a rather large calyx.

Cleyera mertensiana Sieb. & Zucc., 1835. — *Schima mertensiana* (Sieb. & Zucc.) Koidzumi, 1930; Airy-Shaw, 1936.

Schima noronhae (non Reinw. ex BL) *sensu* Maxim., 1886, p.p.; Hayata in Sched. (var. *boninensis*); Nakai, 1918 (var. *boninensis*), in syn.

Schima honiunensis Nakai, 1918 (non Melchior); Wilson in J. Arn. Arb. 1: 109, 115. 1920, nomen nudum; Terasaki, Nippon Shokubutsu Zufu (Jap. bot. illustr. Album) 1729. 1933, n.v.

Schima boninensis Melchior, 1925, HOW. Nakai.

BONIN IS. Tsitsi Shima: *H. Hattori* (Lit.), *T. Uchiyama* (Lit., type of *Schima boninensis* Nakai). Local name: himetsubaki.



FIG. A. *Sckima wallichii*, distribution areas of the subspecies and varieties: 1, subsp. *mertensiana*; 2, subsp. *liukuensis*; 3a, subsp. *noronhae* var. *noronhae*; 3b, subsp. *noronkae* var. *superba*; 4a, subsp. *wallichii* var. *wallichii*; 4b, subsp. *wallichii* var. *khamana*; 5, subsp. *oblata*; 6, subsp. *bancana*; 7a, subsp. *crenata* var. *crenata*; 7b, subsp. *crenata* var. *pitlgarensis*; 8, subsp. *monticola*; 9, subsp. *brevifolia*.

2. Subsp. **liukuensis** (Nakai) Bloembergen, *comb.nov.*—Fig. A 2.

Petiole 1—2 cm long. *Lamina* 8—20 cm long, 2—6.5 cm wide, linear-lanceolate, sometimes oblanceolate, caudately acuminate towards the apex, glabrous, mostly incliningly crenate-serrate, rarely subentire. *Flowers* about 4 cm in diameter; calyx 3 mm long. (Description according to literature.)

According to literature this subspecies is a tree. It belongs to the 'crenata' group of subspecies, but is more uniform in its narrow linear-lanceolate leaves.

Sckima liukuensis Nakai, 1918.

Sckima noronhae (now Reinw. ex Bl.) *sensu* Maxim., 1866, p.p.; Matsum., 1898, p.p.; Ito & Matsum., 1899.

Schima superba (non Gard. & Champ.) *sensu* Melch., 1925, p.p.

RIU KIU IS. Amami-o Shima: *Tashiro* (Lit.). Yaeyama: *Tushiro* (Lit.). Uchina: Nakagun, *Tashiro* (Lit.). Okinawa Shima: Mt. Nagodak, *Nakahara* (Lit.); Yontanzon, *Matsumura* (Lit.); Nagoma, *Tunalta* (Lit.); without

exact locality, *Yajima* (Lit.); Nago, open foothills, *W. R. Price 1412* (Lit.). Yonakuni Shima: (Lit.). Local name: iju.

3. Subsp. *noronhae* (Reinw. *ex* Blume) Bloembergen, *comb. nov.*

Young parts often ferrugineous-hairy, sometimes tomentose, or soft-hairy, more rarely conspicuously argenteous or silky, mostly glabrescent. *Petiole* 5—30 mm long, 1—3 mm thick. *Lamina* 3—29 cm long, 1.5—10 cm wide, elliptic to linear, mostly oblong to lanceolate, rarely more or less ovate or obovate, glabrous, rarely persistently hairy like the young parts, especially along the midrib below, chartaceous to coriaceous, very rarely thick-coriaceous, mostly thin-coriaceous; nervation sunken to prominent, mostly somewhat prominent and the nerves rather thin, rarely coarse and strongly prominent, rarely forked, occasionally irregular and widely separated; margins mostly completely entire, sometimes on one and the same twig most of the laminae completely entire or dentate and one or a few other ones with one or a few teeth or subentire, more rarely the whole margin more or less shallowly and rather distantly crenate-dentate, very rarely strongly dentate-serrate. *Pedicels* 3—65 mm long, 0.75—2 mm thick. *Flowers* 20—65 mm in diameter; sepals 2—3.5 mm long, 2.5—5 mm wide. *Fruit* 8—22 mm long, 10—25 mm in diameter. (Description after the herbarium specimens mentioned below and according to literature.)

3a. Var. *NORONHAE*—Figs. A 3a, B, C 13-14, D, E 1-15, G 6.

Young parts generally ferruginous, silky-hairy or tomentose, mostly glabrescent. *Petiole* 5—30 mm long, 1—3 mm thick. *Lamina* 6.3—29 cm long, 2—10 cm wide, elliptic to linear, sometimes more or less ovate or obovate, generally oblong or linear-lanceolate, mostly glabrous, very rarely with indument like that of the young parts, especially along the midrib below, persistent; chartaceous to coriaceous, rarely thickly, generally thinly, coriaceous; margin generally completely entire, sometimes on one and the same twig some laminae with one or a few teeth, sometimes the whole margin of all the laminae slightly and distantly, rarely strongly, crenate-dentate or serrate; nervation more or less, never strongly, prominent. *Pedicels* 18—65 mm long, 0.75—2.5 mm thick. *Flowers* 20—55 mm in diameter. *Fruit* 8—22 mm long, 10—25 mm in diameter. (Description after the herbarium specimens mentioned below.)

This variety is extremely complex-polymorphous. There is in this respect a difference in the three separated parts of the area. In the Siam and Indo-China regions, specimens with crenate-dentate leaves are evidently more frequent than in Java and Borneo. Over the whole area forms with small leaves occur. In Java, forms with oblong and linear-lanceolate laminae are dominant, forms with linear and elliptic laminae being rather rare. In East Siam and Indo-China, forms with lanceolate laminae are more, and forms with elliptic to oblong laminae less, frequent. In Borneo, forms with elliptic (up to 10 cm wide) are more, and forms with oblong



FIG. B. *Schiwa waUichii*: 1, twig with leaves and inflorescence, 1 x; 2, stamen, 5 X; 3, calyx with pistil, 2 X; 4, seed, 2 X; 5, valve of fruit, showing septum loosening from lower half of fruit-wall, 2 x; 6, calyx and central columella of fruit, 2 x; 7, open fruit from above, 15 x; all, subspecies *noronhae*, var. *noronhae*. — After living material cultivated in Hortus Bogoriensis, V.L.C. 91.

to lanceolate laminae less, frequent. The adult leaves in Java are entirely or nearly glabrous; in East Siam and Indo-China rather soft-hairy forms occur, in West Borneo forms with the leaves conspicuously silky-hairy. In Java, East Siam, and Indo-China the laminae are mostly thin- very rarely thick-coriaceous; in Borneo they are often thick- to very thick-coriaceous.

This variety is, according to notes on the herbarium-labels and literature, a tree reaching a height up to 40 m, with a bole up to 127 cm in diameter. It occurs from 100—2400 m above sealevel (in Java from 150—2400 m, in Borneo from 840—1230 m, in Siam and Indo-China from 100—900 m), in forests, secondary forests, and grass-wildernesses, and is often very common. In West Java it is one of the most common trees, often gregarious; it is cultivated here and there as a way-side tree, in kampong yards, or for reforestation purposes (especially in Central Java). Pierre mentions that on the Isle of Phuquoc in the Gulf of Siam this variety occurs in large masses in regions inundated by brackish water just above sealevel. The wood is used for building prahus and houses, in Java also for building bridges, sleepers, and furniture. The bark is said to contain a caustic juice, and is used here and there in Java, grinded and mixed with ashes, as a fish-poison.

Sehima noronhae Reinw. *apud* El., 1823, nomen nudum; *ex* El., 1825; Korth., 1839-42; Walpers, 1845; Teysm. & Binnend., 1854; Choisy, 1854, p.p.; Miquel, 1869, p. p.; Teysm. & Binnend., 1856 (var. *grandiflora*); Sysz., 1895, p. p.?; Koord. & Val., 1896 (with vars. *serrata* & *angustifolia*); Van Eeden, 1905, p.p.; Moll & Janss., 1906; Back., 1911; Koord., 1912 (with vars. *angustifolia* & *serrata*); Koord., 1915 (with var. *crenata*); Men., 1921, p.p.; Koord., 1923; Melch., 1925, saltern p.p.; Heyne, 1927, p.p.; Adelb., 1944."

Gordonia javanica Hook., 1850. — *Sehima javanica* (Hook.) Sysz., 1895, in syn. *Gordonia integerrima* Teysm. & Binnend., 1854, 1866, nomen nudum, prob.

Gordonia lobbii Hook, f., 1860; Walp., 1868; Burk., 1917. — *Sehima lobbii* (Hook. f.) Pierre, 1887 O'oiim"; Airy-Shaw, 1936.

Sehima rigida Miq., 1868; Melch., 1925.

Sehima hypochra Pierre, 1887, nomen nudum.

Sehima beearii Warb., 1922.

Sehima sericea Airy-Shaw, 1936, 1936 bis.

Gordonia sp. Van Eeden, 1872.

Gordonia walliehii (MOM DC.) *sensu* Hassk., 1844. — *Sehima willtehii* [»»» (DC.) Korth.] *sensu* Pitard, 1910 (with var. *lobbii*).

Sehima crenata (7»» Korth.) *sensu* Pierre, 1887; Pitard, 1910; Craih, 1925, p.p.

SIAM (eastern part). Uda w n: Nakawn Panom, Ta Uten, ± 200 m, open evergreen forest, *Kerr 8844b* (Lit.); Loi, Kao Krading, ± 900 m, edge of evergreen forest, *Ken- 8950* (Lit). Ubon: ± 100m, scrub jungle, *Kerr 8344, 8344"* (Lit.). Chantaburi: Kaw Chang, Klawng Mayom, ± 200 m, common in evergreen forest, *Kerr 11845* (Lit.); Klawng Nonsi, jungle, *Schmidt 870* (Lit.). — INDO-CHINA. Ton-

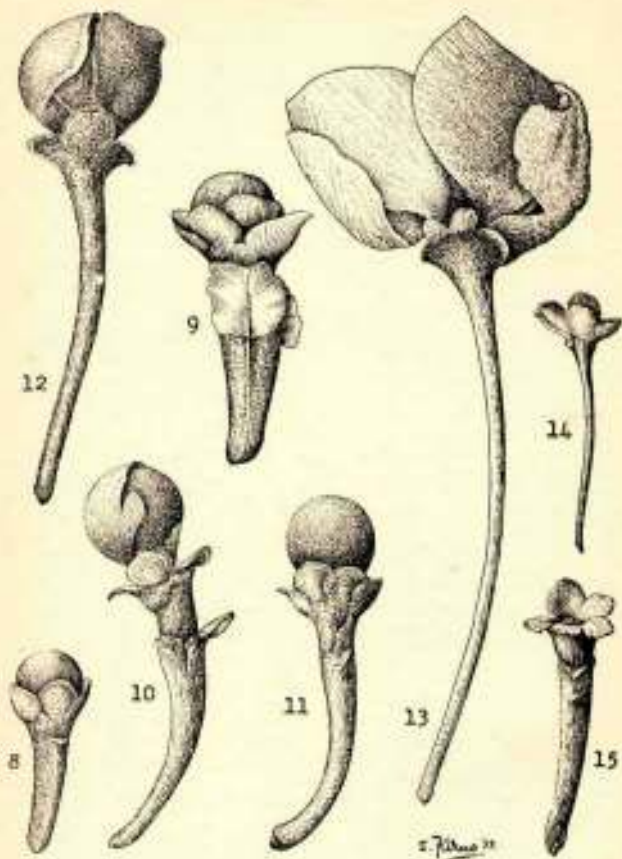


FIG. C.

kin: Thai Nguyen Province, between Hanoi and Thai Nguyen, in small forest, *Pételot 2338* (BO). Laos: Ubon near Kemmerath, *Thorel* (Lit.); Dang-rek, basin of the Sé-moun R., *Harmand* (Lit.). Annam: Province of Haut Donnai, vicinity of Blao, 900 m, in forest, *Pételot 8847* (B). Cambodia: without exact locality, *Pierre* (Lit.), *Hahn* (Lit.); Gamronytông Province: Camchay, on summit of Mt. Srâl, *Pierre 579* (BO); Phudnong, *Harmand* (Lit.). Cochín-China: Phuquoc I. in Gulf of Siam, l.n. sang-soc, *Pierre 1413* (BO; *Schima crenata sensu Pierre*). — JAVA. WEST JAVA. Cultivated: in Hortus Bogoriensis, *V.I.C. 91*, *V.I.C. 91a*, & *V.I.C. 240* (BO); near Berastagi (Sumatra), 1350 m, near bungalows, from Java, *Lörzing 6447* (BO). Without exact locality: four old specimens (BO); perhaps from Mt. Salak and perhaps parts of the type collection of *Schima noronhae* Reinw. ex Bl., *Ploem s.n.* (BO). Banten: without exact locality, *Backer s.n.* (BO), *Forbes 330*, *463a*, *601* (= *709*) (BO); Forest Reserve G. Pulasari, summit, 1375 m, common, l.n. puspa, *Koorders 8283β*, *10125β* (BO), 1050 m, common, l.n. puspa, *Koorders 8290β* (BO), 1050 m, *Koorders 8287β* (BO), 1250 m, common, l.n. puspa, *Koorders 8288β* (BO); Forest Reserve G. Karang, south-slope, 700 m, l.n. wuru kaworo, *Koorders 9918β* (BO), l.n. puspa, *Koorders 8284β* (BO), l.n. puspa bodas, *Koorders 8285β* (BO); above Kadu Engon, 1770 m, l.n. puspa, *Koorders 8289β* (BO); Serang Regency, Wangun, forest reserve, 804 m, scattered, l.n. huru puspa, *Ja.3808* (FIB); Lebak Regency, Babakanpadik, 150 m, in secondary forest, rare, l.n. puspa beureum, *Ja.5473* (FIB), l.n. puspa honeng, *Ja.5474* (FIB), l.n. puspa bodas, *Ja.5475* (FIB); between Muntjang, Sadjirat, and Pasir Ajunan, scattered along road, l.n. puspa, *Backer 1912* (BO); Forest Reserve Tjiherang, *Ja.4071* (FIB); G. Madur, near Bajah, 150 m, in forest, scattered, l.n. puspa, *Backer 1639* (BO). Bogor (Buitenzorg): Haurbentes, 300 m (Djasinga II), in secondary forest on pasirs (ridges) up to 750 m, very common, gregarious, l.n. puspa, *Ja.4495* (FIB), 175 m, in forest, common, gregarious, l.n. puspa, *Ja.5341* (FIB), 270 m, in secondary forest, on pasirs, very common, gregarious, l.n. puspa, *Ja.4492* (FIB) (the most common tree on pasirs); Djasinga, 300—1000 m alt., abundant in secondary as well as in primary forest, *Backer 10270* (BO); hilly country S of Djasinga, 250 m, in secondary forest abundant, *Backer 26023* (BO); Forest Reserve Djanglepa, in Maribaja forest, *de Voogd 12* (BO); Bolang estate, near Bunar, G. Tendjoleat, 200—471 m, in forest on slope, secondary growth, *van Steenis 12686* (BO); near Bunar, G. Pekapuran, 150 m, in forest, very common, gregarious, l.n. puspa, *Ja.5206* (FIB); Tjipetir: between Tjigudeg and Bunar, 250—300 m, in secondary forest, rather common, *Ja.5383*, *Ja.5384* (FIB), 320 m, very common, gregarious, *Ja.5279* (FIB), Kebon Pedes, 250—300 m, in secondary forest, rather common, *Ja.5390*, *Ja.5391*, *Ja.5392*, *Ja. 5393*, *Ja. 5394* (FIB), Tjianger, 320 m, in secondary forest, rather common, *Ja.5387*, *Ja.5388*, *Ja.5389* (FIB), Pasir Angin, 320 m, in secondary forest, rather common, *Ja.5385*, *Ja.5386* (FIB); all Tjipetir specimens, l.n. puspa; Nirmala, 1200—1300 m, ravines, abundant, *Backer 11152* (BO); near Tjianten, S of Leuwiliang, 800—1000 m, in forest, abundant,

EXPLANATION OF FIGURE C

FIG. C. *Schima wallichii*: 8—15, pedicels, with prophylls or their scars, calyx, and flower-buds or flowers, 2 ×; 8 and 10, subsp. *brevifolia*; 9 and 11, subsp. *monticola*; 12 and 15, subsp. *crenata* var. *crenata*; 13 and 14, subsp. *noronhae* var. *noronhae*. — After Clemens 32637 (8); Clemens 33197 (9); Clemens 32444 (10); Clemens 32704 (11); Clemens 29931 (12); J. J. Smith & Rant 86 (13); Bakhuizen van den Brink 5033 (14); Endert 3635 (15).



FIG. D. *Sakasa wallichii*, leaf-shapes, lacinate fruct below, 6.5 \times ; all stip. punctate var. *uvosulca*. — After Koorders 41931; (1); Boeker 17071 (2); Bakhuizen van den Brink 1271 (3); Koorders 8284; (4); Koorders 12138; (5); Ja.5681 (6); Koorders 11341; (7); Bakhuizen van den Brink 4113 (8); Koorders 8259; (9).

Backer 25978 (BO); along road to Tjianten tea estate, 800 m, in forest, *Lam* 2258 (BO); above Puraseda, road to Tjipatjet, 600 m, in partly cut out forest on ridge (pasir), *iran Slenis* 11753 (BO); Pasir Tonggeret near Hamaro, in forest and grass wilderniss, locally very abundant, l.n. puspa, *Bakhuizen van den Brink* 7571 (BO); Pabangbon, near Tjiampea, 500 m, grass wilderniss rather abundant, *Bakhuizen van den Brink* 5033 (BO); G. Salak: l.n. puspa, *Koorders* 24356 (BO), near pasangrahan Imah Leutik, 750 m, in secondary forest, common, gregarious, l.n. puspa, *3a.5(III)*, (FIB), forest Kumpel, cultivated, 700m, l.n. puspa, *Ja.5651, Ja.5652* (FIB), 1050m, in secondary forest, very common, gregarious, l.n. puspa, *Ju.5627* (FIB); G. Salak (summit IV), 1688m, in forest, l.n. puspa, *Ja.5628* (FIB), 1000m, l.n. puspa, *Koorders* 33270 (BO); G. Salak (summit I), 2215m, l.n. puspa, *Koorders* 36712 (BO); G. Salak (N), Pasir Leutik, 7700 m, *Byhoner* 257 (BO); G. Perbakti, W of railway station Tjiturug, in forest, abundant, *Bakhuizen van den Brink* 1728 (BO); Gede Pangrang Mts.: Tjibodas, l.n. huru manuk, *without collector s.v.* (BO), *Scheffer s.n.* (BO), 1450 m, *yon Slooten* 90 (BO), 1700 m, in forest, *Larzig* 1975 (BO), in forest, l.n. puspa, numbered tree 3351a, *Koorders* 41981 (BO), 1300—1450 m, in forest, very common, l.n. puspa, numbered tree 3005a, *Koorders* 8258, *S259*, *13278*, *15574*, *41812* (BO), *ibid.*, l.n. puspa and huru manuk, numbered tree 3051a, *Koorders* 8260, *12619*, *15581*, *11788* (BO), 2000—2070 m, in forest, common, l.n. puspa, numbered tree 3081a, *Koorders* 8261, *8262*, *12603*, *32182/1* (BO), l.n. puspa merang, numbered tree 3143a, *Koorders* 8268, *8364*, *12362* (BO), 2020—2450 m, in forest, l.n. puspa, numbered tree 3254a, *Koorders* 8265, *8266*, *12642*, *15564*, *41931* (BO), *ibid.*, l.n. puspa merang, numbered tree 3257a, *Koorders* 8267, *8268*, *41934* (BO), *ibid.*, l.n. puspa, numbered tree 3262a, *Koorders* 8269, *8270*, *1,1757*, *41939* (BO), *ibid.*, l.n. ki getas, numbered tree 3268a, *Koorders* 1318, *11319*, *12361*, *11944* (BO), (Mandelawangi), 1800 m, in forest, common, l.n. puspa, *Knkah* 131 (BO), *ibid.*, l.n. huru puspa, *Soeivarta* 144 (BO), *ibid.*, l.n. puspa, *Enoh* 205 (BO), between Tjibeureum and Tjipanas, 1600—2000 m, in forest, very common, l.n. puspa *Hallier* 408 (BO), Kandangbadak, 2400m, *van Slenis* 2010 (BO), 2390 m, *Bmgoeman* 3718 (BO), G. Putri, 1400—1500 m, in forest, l.n. puspa, numbered tree 3237a, *Koorders* 14316 (BO), numbered tree 3238a, *Koorders* 14318, (BO), G. Gegerbintang, Pasir Bundera, 1400—1500m, in forest, l.n. puspa, numbered tree 3234a, *Koorders* 11,325 (BO), G. Batu, 1400—2000 m, in forest, l.n. puspa, numbered tree 3305a, *Koorders* 1551,2 (BO); G. Cede (S), 1410—1500 m, in secondary and primary forest, abundant, *Backer* 14901 (BO); Kebon Podjok, 1200 m, scattered, l.n. puspa, numbered tree 102, *Hamar de la Brethoniere* 5806 (BO), numbered tree 13, *Kramer* 5806a (BO), Los 580Ga with two sheets of seedlings 29 & 54 days old from same tree, also numbered *BoschbPrSta. Registro*, 1844 (BO), numbered tree 36, *Lcs* 5806b (BO); Tjiparaj, desa Latamiang, l.n. puspa, *Ja.1092* (FIB); Pasir Tjinerus, l.n. puspa, *Ja.1193*, *Ja.1194*(FIB); Pasir Kerud, 1000m, l.n. puspa, *Ja. 1910*, *Ja.1911* (BO, FIB); Pasir Malang, Tjikareo, 700m, cultivated, l.n. huru honeng (?), *Ja.S500* (FIB); Selabintana, above Sukabumi, cultivated, along highway, 900 m, *de Visser Smits s.n.* (BO); Forest Reserve Palabuanratu, southcoast, 0—300 m, in forest, l.n. puspa, numbered tree 1197a, *Koorders* 8253, *12219/*, *31,276* (BO), numbered tree 1314a, *Koorders* 12312, *33029* (BO), numbered tree 1316a, *Koorders* 12500, *33031* (BO), numbered tree 1321a, *Koorders* 12253 (BO); Sanggrawa (Djampangkulon District), 400m, very common, gregarious, l.n. puspa, numbered tree *I.W., *Koorders* 8273/1, *8274* (BO); between Lengkong and Pesawahan, 700 m, ravines, sporadic, *Backer* 1707(BO); Pesawahan, 400 m, in secondary forest, *Backer* 2216 (BO); Tjiateul, 250 m,

in secondary forest, very rare, scattered, l.n. puspa, *Ja.5431* (FIB); Wates, 500m, in secondary forest, common, scattered, *Ja.5432*, *Ja.5488* (FIB), *ibid.*, rather common, scattered, *Ja.5489* (FIB), *ibid.*, rare, scattered, *Ja.5490* (FIB), all, l.n. puspa; Tjika rang, 250 m, along river, in secondary forest, rather common, gregarious, *Ja.5491* (FIB), *ibid.*, rather rare, *Ja.5492* (FIB), *ibid.*, very rare, *Ja.5493* (FIB), all, l.n. puspa; near Tjireungas, cultivated along wayside, *Backer s.v.* (BO); Tjiandjur Division: Takokak, 1400 m, *Wind W.VIII* (BO), 1000—1250 m, in forest, common, numbered tree 2001a, *Koorders 8254*, *8255*, *25622*, *82750 39577* (BO), numbered tree 2251a, *Koorders 12136*§ (BO), numbered tree 2326a, *Koorders 12137*, *25700 37289* (BO), numbered tree 2352a, *Koorders 12138*, *15303*, *25676*, *32717 39643* (BO), numbered tree 2359a, *Koorders 15802*, *25677 32719* (BO), numbered tree 2360a, *Koorders 15299*§, *25731*, *32720*, *39628* (BO), 1100m, rare, numbered tree marked with¹*, *Koorders 8190*, *8282* (BO), all, l.n. puspa, G. Tjikawung, l.n. puspa, *Koorders 25776* (BO); Tjadasmalang near Tjidadap: S of Tjibeber, 1000 m, in forest, abundant, l.n. puspa, *Winckel 394*§, *1396*§ (BO), 1000 m, wayside and forest, abundant, l.n. puspa, *Bakhrizen van den Brink 3526*, *3529*, *3784* (BO), G. Beser, 1000—1350 m, in forest, and cultivated along wayside, abundant, l.n. puspa, *Backer 22679* (BO); Tjiandjur Regency: G. Batu, 1000m, in old forest, rather common, l.n. puspa, *Ja.3899* (FIB), near Tjipadabati, 1100m, in old forest, common, gregarious, l.n. puspa, *Ja.5434* (FIB), *ibid.*, common, *Ja.5433* (FIB). D j a k a r t a (Batavia): Krawang, *de Mo nchy 81* (BO); Wanajasa, S of Purwakarta, 550 m, in forest, abundant, l.n. puspa, *Bakhuhev van den Brink 4713* (BO); G. Burangrang, north slope, 1200—1500m, in forest, abundant, *Backer 14234* (BO); G. Tangkubanprahu, *Backer S.H.* (BO). P r i a n g a n : without exact locality, *Koorders 32450*§ (BO); N Priangan, l.n. puspa, *Ja.875* (BO); Tjisarua, 1200 — 1600 m, cultivated in forest reserve and kampong yards, common, l.n. puspa, *Poj>ta 64* (BO); Tjiguludug, Forest Reserve Tambakrujung (N), 1050 m, in forest, very common, scattered, l.n. puspa, *Ja.1497* (BO, FIB); Datarpuspa, 1700 m, in forest, common, gregarious, l.n. puspa merah, *Ja.1989* (BO, FIB), *ibid.*, l.n. puspa putib, *Ja.1940* (BO, FIB); Bandung (?), *Forbes 1073* (BO); 7 km NE of Bandung, 850m, wayside, one tree seen, *Wisse 902* (BO); Tjipadaruum (Tjiwidej), 1763m, in forest, common, l.n. puspa bodas, *Ja.5423*, *Ja.5423*, *Ja.5424* (FIB), in secondary forest, common, *Ja.5487* (FIB), 1517 m, l.n. puspa beureum, *Ja.5486* (FIB), 1784 m, in second ary forest, common, *Ja.5485* (FIB), 1694m, *Ja.5484* (FIB), l.n., both, puspa bodas, 1750m, *Ja.5428* (FIB), 1755m, *Ja.5427* (FIB), l.n. both, puspa beureum, 1750m, l.n. puspa bodas, *Ja.5426* (FIB), 1720m, l.n. puspa beureum, *Ja.5425* (FIB), 1768m, l.n. puspa bodas, *Ja.5403* (FIB), 1765m, l.n. puspa beureum (gadog), *Ja.5412* (FIB), 1856 m, l.n. puspa bodas, *Ja.5419* (FIB), 1356 m, gregarious, l.n. puspa bodas, *Ja.5U20* (FIB), 1750 m, l.n. puspa beureum, *Ja.5425*, 1856 m, gregarious, l.n. puspa bodas, *Ja.5421* (FIB); Forest Garden near Tjipadaruum, 2000m, in forest, rather common, scattered, l.n. puspa, *Ja.4008* (BO, FIB); Tjiwidej, 1700m, in forest, common, gregarious, l.n. puspa, *Ja.3664* (FIB); Forest Reserve Tjigenteng, 1350—1600m, in forest, common, l.n. puspa merang, numbered tree 2153a, *Koorders 8256*§, *8257* (BO), *ibid.*, l.n. puspa, numbered tree II W, *Koorders 8272*, *8279* (BO); above Tjigenteng, 1450 m, in forest, common, l.n. puspa, *Koorders 8280* (BO); G. Patuba (N), near Tjibodas, 1416 m, in forest, l.n. hum katjang (?), *Ja.1317* (BO, FIB); G. Patuha, Rantja Tjibodas, 1900m, on small, wet peat hill l.n. puspa, *de Haav II*, (BO); Tjiwidej, kawah, *Binnentlijk? s.n.* (BO); G. Malabar: Puntjak Cede, l.n. puspa, *Monterie 1G* (BO), crater of G. Wajang, 2181m, in forest, l.n. puspa, *Denker 24* (BO); Forest Reserve

Pengalengan, 1700 m, l.n. puspa, *Koorders 8281* (BO); Tjibeureum near Pengalengan, 1550 m, *J. J. Smith & Rant 86* (BO); Pengalengan, Talun estate, 1650 m, in forest, abundant, *Backer 26128* (BO); G. Papandajan, l.n. puspa, *Scheffer s.n* (BO); Garut subdivision: G. Mandalawangi, 1000—1300 m, in forest, rather common, scattered, l.n. puspa hedjau, *Ja.H359* (BO, FID), G. Kratjak (Tjirerek), 1100m, cultivated, l.n. puspa, *Ja.2882* (FIB), *ibid.*, l.n. puspa bodas, *Ja.2883* (FIB), Tjiparaj, 1200 m, l.n. puspa, *uhl 6543* (BO), Garut, *Burck 21* (BO), near Telagabodas, *Black 123* (BO); Forest Reserve Pangentjongan Telagabodas (G. Galunggung) : near Pangentjongan, 1300 m, l.n. puspa, *Hoorders 13940* (BO), *Reorders 13881* (BO), Pasir Ipis, 1400m, forest, l.n. puspa, numbered tree 2441a, *Koorders 13856*, *14113* (BO), above Garut, 1400m, *Koorders 8271* (BO), 1400m, in forest, l.n. puspa, *Rom den 13985* (BO), 1400m, l.n. puspa, *Koorders 14147*, *14172* (BO), near pasanggrahan Pangentjongan, 1400m, l.n. puspa, *Roorders 26759* (BO), near coffee estate, in Kawah Tjibeureum, Galunggung (NW), 1450m, in forest, l.n. puspa, *Roorders 10999* (BO), Galunggung (NW), forest Segaro, near Pangentjongan, 1500 m, common, l.n. puspa, *Koorders 8278/*, (BO), between Pangentjongan and Telagabodas, 1600m, common, l.n. puspa, *Reorders 8276* (BO), 1690 m, *Roorders 8277* (BO); Tjipatudja, Denu bivouac, 500—600 m, in secondary forest and here and there along waysides, *Backer 9000* (BO); Nusagede (island) in Lake Pendjalu, 700—720 m, in forest, rather common, l.n. puspa, *Koorders 47825*, *47826*, (BO). CENTRAL JAVA. G. Slamet, Baturaden, 700m, cultivated, *Ju.5i7S* (FIB), 700—800m, *Ja.3411*, *Ja.3416* (FIB), all, l.n. puspa; G. Sendoro: Wonosobo, l.n. puspa, *BuschPrSta. Reoistemo. 2067* (FIB), Garungan (Karangsari), 700m, cultivated, *Ja.5441* (FIB), Kliwonan (Petjehalan), 750m, cultivated, l.n. puspa, *Ja.5442*, with out exact locality, l.n. puspa, *Koorders 8291*, *Thnvier 6333* (BO), 1750m, l.n. puspa, *Koorders 11362* (BO), *ibid.*, in 10 years old reafforestation, seedlings, *Koorders 1136.3*, *11364*, *11365* (BO), Parakan, l.n. puspa, *Koorders 11366* (BO); G. Telemojo, Forest Reserve, near Telomojo, *Koorders 27981* (BO); G. Lawu: Tawangmangu, 1000 m, l.n. puspa, *Ja.5612* (FIB), Modjosemi (Sarangan), 1550m, cultivated, l.n. puspa, *Ja.5598* (FIB), near Sarangan, 1600m, l.n. puspa, *Ja.555S* (FIB). — BORNEO. With out exact locality: (W Borneo), *Beccari 1650* (BO; type of *Schima beccarii* Warb.). Sarawak: without exact locality, *Foxworthy 247*, *365* (Lit.), *Native collector 869*, *1642*, *2290* (Lit.), *Bureau of Science 1257* (Ridley) (Lit.), *Lobb* (Lit.; type of *Gordonia lobhii* Hook, f.); G. Matang, 840 m, in summit thickets, *Clemens 20971* (BO); Dulit, high camp, 1230 m, *Synge 1611*, (Lit.; type of *Schima sericea* Airy Shaw) Western Division: G. Klamm (W of Sintang), *Hallier B.2340*, *B.2447*, *B.2479* (BO); G. Kenepai (W of Semitan), *Hallier B.1860* (BO),

3b. Var. *superba* (Gardn. & Champ.) Bloembergen, *comb. nov.*—Figs. A 3b, E 16, F 14 & 9 10

Petiole 8—24 mm long. *Lamina* 4.5—18 cm long, 2—6.5 cm wide, elliptic to lanceolate, mostly oblong to lanceolate, rarely more ovate or obovate, glabrous, rarely young parts and lamina beneath conspicuously silvery white or silky hairy chartaceous to mostly thin coriaceous nervation sunken and the nerves thin, occasionally somewhat, very rarely strongly and coarsely, prominent, nerves sometimes forked; margin from completely entire to more often dentate and some laminae on the same twig subentire, or not rarely strongly, seldom very strongly, dentate.



FIG. E.

Pedicels 6—45 mm long. *Flowers* 25—65 mm in diameter; sepals mostly 3 mm long, 5 mm wide. *Fruit* 10—15 mm long, 15—20 mm in diameter. (Description according to literature and some herbarium specimens.)

This variety is also extremely complex-polymorphous; specimens from the China and Formosa parts of its area seem to correspond with each other in this respect. Forms with dentate leaves are evidently of more frequent occurrence than in variety *noronhae*. Here and there forms are encountered with small leaves, others with more conspicuous indument, still others with very strongly and coarsely prominent lateral nerves (sometimes forked) and veins, and finally some with large flowers.

This variety is, according to notes on the herbarium labels and literature, a tree reaching a height up to 21 m, with a bole up to 1 m in diameter; on exposed ridges, however, it may sometimes be shrub-like. It occurs from 125—1500 m above sealevel. It is often common in forests, and is found also in more or less barren areas and thickets; sometimes it is cultivated near farmhouses, temples, and roadsides.

Schima superba Gard. & Champ., 1849!; Seem. 1855; Szysz., 1895; Mekh., 1925, p.p.!; Render, 1927; Kaneh., 1936; Airy-Shaw, 1936; Kenft, 1950 (incl. var. *kankaöensis*).

Schima argentea Pritz., 1900; Melch., 1925; Hand.-M., 1931; Airy-Shaw, 1936.

Gordonia sinensis Hemsl. & WUs., 1906; Burk., 1917; Melch., 1925. — *Schima sineHsis* (Hemsl. & WUs.) Aivy-Shaw, 1936.

Schima mairei Hochr., 1917; Meleh., 1925.

Schima cimfertiflora Men., 1918; Melch., 1925; Hu & Chun, 1929.

Schima kankaöensis Hayata, 1919; Melch., 1925; Kaneh., 1936.

Schima bambusifolia Hu, 1930, 1934; Hu & Chun, 1935.

Schima noronhae (ntrn Reinw. ex Bl.) sentm Benth., 1861; Forbes & Hemsl., 1880; Matsum., 1898, p.p.; Hayata, 1911; Kaneh., 1917, 1921; Crook, 1930.

Schima crenata (non Korth.) *ftensu* Hand.-M., 1931.

CHINA. Anhwei; without exact locality, Abel (Lit.), Millet (Lit.); South Wo Yuan, 125 m, *Ching 3S81* (Lit.); Tongmun, *Heude* (Lit.). Szechwan: Hsiao nan shu, *Bock von Rosthorn 134* (Lit.); Shan huang kang shu, *Hock i-öü Rosthorn 2M>* (Lit.); Kin shan, Leichap'ing, in forest, *Bock van Roathorn 134'* (Lit.); Nan chu'an, Tao kuo kou, in forest, *Bock von Rosthorn 212'* (Lit.); Hsiaoy, in forest, *Bock von Rosthorn 258* (Lit.); Ma fu lin po, *Bock von Roathorn 630* (Lit.) (all Szechwan numbers mentioned as syntypes of *Schima avevtea* Pritz.); Mt. Omi, in

1) In Bot. Jahrb. 29: 473. 1900 the numbers Bock von Rosthorn 134 and 212 indeed occur twice for different specimens.

EXPLANATION OF FIGURE 1

FIG. 1. *Schima wallichii*, leaf-branches, habitus 1—11 and 12 and 13 from below, 12 and 14 from above, 15 & 16 1—12, habitus, *noronhae* var. *noronhae*; 16, habitus, *noronhae* var. *superba*. — Atlas: Hallier B. 1869 (1); Herdner 16 (1); Ja. 1918 (1); Bucker 22678 (1); Koorders 13874 (1); Koorders 13874 (2); Hallier 408 (2); Hance de la Bretholiers 3800 (1); Hallier B. 2447 (1); Koorders 15203 (1); Hallier B. 2478 (2); Poore 578 (2); Pököst 8947 (1); Pököst 2228 (2); Pierre 1413 (1); Fan & Li 348 (1).



FIG. P.

forests, *Wilson 4805* (Lit.; type of *Gordonia sinensis* Hemsl. & Wils. Hunan: Changning Hsien, I Chia Ao 240 m, slope, *Fan & Li 69* (BO), Yang Shan, 500 m, near farmhouse, *Fan & Li 360* (BO). Kwangsi: Yung Hsien, Ta Tseh Tsuen, in forest, *Steward & Cheo 842* (BO); Shih wan dar Shan, S of Nanning, 1300 m, common in woods, *Ching 8020* (Lit., type of *Schima bambusifolia* Hu), *Ching 8523* (Lit.); Ling Yun Hsien, Na I, valley roadside, *Steward & Cheo 539* (BO). Fukien: Buong Kang and Yenping, 800 m, in thickets above bamboo forest *Chang 3425* (BO); Iraccy Hill side, Kuliang Si vicinity, Moon Temple, 750m, *Chen Hsi Cheng 1944* (BO). Kwantung: Lo Pau Shan, *Ford* (Lit.); 950m, on open exposed ridges, *Merrill 10690* (Lit.; type of *Schima confertiflora* Merr.), 900 m, in damp forested ravines, *Merrill 11052* (Lit.), 900m, on open slopes, *Merrill 10156* (Lit.), *Leviue 601, 1513* (Lit.); San on Distr., Ng Tung Shan, 924 m, *Tsui 206* (BO); Canton, Tingwushan, in dense woods, *Suit For Sen Univ. Field No. 6456* (Chun) (BO). — HONGKONG. Wong nychong Valley, and abundant near the top of the slopes of Little Hongkong, *Champion* (Lit.; type of *Schima aupeba* Gardn. & Champ.), *Lamont* (Lit.), *Ford* (Lit.). — FORMOSA. Northern part: 300—1500 m, in forest, usually in mixed, rarely pure, stands, *Suzuki 11764, 20723* (Lit.), l.n. himetubaki, *Simida 24120* (Lit.). Central southern part: *Kudo & Sasaki 15142, 15286, 15342* (Lit.), *Yamamoto 1931* (Lit.), *Mori 692, 1932*, (Lit.), *Matuda 1328* (Lit.); Mt. Morrison, *without collector* (Lit.); Nunaisha, *Owatari* (Lit.). Hunehuen Peninsula: Kanko, Hunchen, l.n. sima himetubaki *Kawa kami 1188* [type of *Schima kankaensis* Hayata (Lit.), *Nakahara 17003* (Lit.), *Konishi 17001* (Lit.), *Sasaki 17016* (Lit.), *Matuda 1324* (Lit.), *Kanehira 1325* (Lit.); South Cape, *Schiirer & Henry 366, 659* (Lit.).

4. Subsp. WALLICHII.

Petiole 8—25 mm long, soft hairy *Lamina* 10—17.5 cm long, 2.5—10 cm wide, elliptic to lanceolate, mostly oblong to lanceolate, sometimes more or less ovate, especially on the nerves below soft hairy thin coriaceous; nervation mostly conspicuously prominent; nerves generally forked; margin mostly completely entire, or faintly, very rarely strongly, dentate serrate. *Pedicels* 0.9—5 cm long. *Flowers* 1.8—5 cm, rarely 6.25 cm in diameter; sepals 2—4(—7) mm long. *Fruit* 9—18 mm in diameter. (Description according to literature.)

This subspecies is very close to subspecies *noronhae*, but is evidently much less polymorphous, a typical character being the prominent nervation and the generally forked lateral nerves.

4a. var. WALLICHII.—Figs. A la, F 11.

Lamina entire, sometimes slightly crenate serrate lateral nerves generally forked, with the veins mostly strongly prominent. *Flowers* 1.8—5 cm in diameter.

EXPLANATION OF FIGURE F

FIG. F. *Schima ivallichii*, leaf shapes laminae 1 and 2 and 4—8 from below, 3 and a—11 from above, 0.5 X; 1—4 and 9—10, subsp. *noronhae* var. *superba*; 5—8 subsp. *oblata*; 11, subsp. *wallichii* var. *uxillichii*. —After *Steward & Cheo 842 11*) • *Steward & Cheo 539* (f); *Cheng 1944 1,3*); *Tsui 206* (4); bb.18753 (5); *Koorders 10638* (6) • *T.B.239* (7); **T.B.277** (8); *Kanehira*, Form. Trees fig. 431. 1936 (9); *Kanehira 210, op. dt. fig. 430* (10); *Griffith, Icon. Plant. asiat. pi. 600. 1854* (11).

According to literature this variety is a large tree, reaching a height up to 30 m, with a bole up to 1 m or more in diameter. It is an important timber supplier. It occurs from 300—2100 m above sealevel, in forests, where it is often common and sometimes gregarious, in the Himalaya especially together with sal (*Shorea t-obusta* Gaertn. f.), in Upper Burma in three different places (with slight differences in indument and nervation) especially associated with *Quercus spp.* It does not seem improbable that in the most eastern part of the area the specimens represent a transitional series connected with the variety *supcrhth* of subspecies *noronhae*.

Gordonia wallichii DC, 1824; Spreng., 1826. — *Schima Kallichii* (DC.) Korth., 1839-42; Dyer, 1874; Kurz, 1874, 1877; Szysz., 1895, p. p.1; Gamble, 1902, Brandis, 1906; Howard, 1920, 1934; Troup, 1921; Melch., 1925, p.p.1; Pearson & Blown, 1932.

Gordonia integrifolia Roxh., 1814, nomen nudum, 1832.

Gordonia ckUaunea Bueh-Ham. in D. Don, 1825.

Gordonia mollis Wall., 1828, nomen nudum. — *Schima mollis* Thiselton Dyer 1874; Kurz, 1874, 1877; Szysz., 1895, prob.; Melch., 1925.

Schima villosa Hu, 1938.

Gordonia sp. Griff., 1854.

Schima noronhae (nou Reinw. ♂ Bl.) *scnsir* Brandis, 1906 p.p.

NEPAL. 000— 1500m, Wallich (Lit.; type of *Gordonia wallichii* DC), l.n. chilauni, Hamilton (Lit.). — BHOTAN. Up to 1300 m, most common tree in West, less common in East, Bhotan (Lit.). — INDIA. S i k k i m: 600—1500 m, l.n. makriah chilauni, Hookerf. (Lit.); Daijeeling and Jalpaigun, 300—1800m, very common, abundant in the foothills, quite scarce a few miles out from the foot of the hills (Lit.). Assam: 600—1200m, common, sometimes gregarious, Wallich and other collectors (Lit.); Khasia Mis., 600—1200 m, Wallich (Lit.), Griffith and other collectors (Lit.). Chittagong: 600—1200 m, Wallich and other collectors (Lit.). Manipui; Ching Sow, 2100m, Watt 11718 (Lit.). — BURMA. Upper Burma, Ruby Mines, Thityabin, 900—1800m, (Lit.); Ava, Taong-donff, Wallich 1458 (Lit.; type of *Gordonia mollis* Wall.); Khakyen Hills, Pensee, Anderson (Lit.); Bhamo, in forest, Griffith (Lit.). — CHINA. Yiinnan: Tsing-Pien Hsien, 1300m, on rocky hill, H. T. Tsai 60763 (Lit.; type of *Schima vitlona* Hu).

4b. var. *khasiana* (Dyer) Bloembergen, *comb. nov.*—Fig. A 4b.

Lamina strongly serrate; nerves not forked. *Pedicels* stout, 18 mm long. *Flowers* up to 6.25 cm in diameter.

According to literature this variety is a tree with white bark. It occurs from 1200—2250 m above sealevel.

It is evidently a mountain form, but does not have all the typical characters of subspecies *monticola*; at any rate this is not obvious from literature. It is also possible, that it is merely a much more serrate form of the variety *wallichii*.

Schima khasiana Dyer, 1874; Szysz., 1895; Brandis, Ind. Trees 59. 1906; Melch., 1925.

Gordonia superba (nou Card. & Champ.) *sensu* Hook. f. & Thoms. ex Thiselton Dyer in Hook. l., Fl. Br. Ind. 1: 289. 1874, in syn.

INDIA. Khasia Mts., 1200—1800m, Wallich, Griffith, and other collectors (Lit.). — BURMA. Upper Burma, Hills E of Bhamo, 1800—2250 m, common (after Brandis, Ind. Trees 700. 1906).

5. Subsp. *oblata* (Roxb.) Bloembergen, *comb. nOV.*—Figs. AS, F 5-8, G 1-5 & 7-8, H 1, 3-7, & 10-11.

Petiole 5—36 mm long. *Lamina* 4.5—24 cm long, 2—9 cm wide, elliptic to lanceolate, mostly oblong or oblong-lanceolate, mostly glabrous, sometimes, especially along the midrib or entirely, soft-hairy, thinly tomentose, villose or appressedly silky-hairy, often wax coated, chartaceous to mostly thin-coriaceous; margin more or less, often rather strongly, crenate to serrate, rarely completely entire or subentire; nervation sunken to strongly and coarsely prominent, but mostly rather prominent; nerves not rarely forked. *Pedicels* 12—50 mm long, 1—3 mm thick, not rarely quadrangular and curved or nodding. *Flowers* 20—40 mm in diameter (rarely 5.5 cm in diameter, for instance Van Steenis 5961). *Fruit* 12—19 mm long, 6—25 mm in diameter. (Description according to literature and abundant herbarium specimens from Sumatra.)

This subspecies is extremely complex-polymorphous and there is some difference between its polymorphy in the continental and in the Sumatra part of its area. In the former region the lamina is mostly oblong to lanceolate, up to 13 cm long, coriaceous to thick-coriaceous; the fruit 11—13mm in diameter; and occasionally forms occur with completely entire and strongly serrate leaf-margins. In the Sumatra part of its area its lamina is up to 24 cm long, mostly oblong, chartaceous to mostly thin-coriaceous; its fruit up to 22 mm in diameter; and occasionally conspicuous forms occur with small, narrow, wide, and with large leaves as well as with strongly crenate, serrate, entire or nearly entire leaf-margins, with sunken (6%) or strongly and coarsely prominent (11%) nervation, with thick-coriaceous (5%), and with conspicuously hairy (7.5%) lamina.

According to notes on the herbarium-labels and literature this subspecies is a tree up to 39 m high (on the continent up to 24 m) and a bole up to 85 cm in diameter. It occurs from 150—1800 m above sealevel in Sumatra, from 50—2000 m in continental southeastern Asia, in forests, and is often common and scattered, sometimes gregarious. It has also been found in secondary forests, alang-alang, scrub-jungle, and is sometimes cultivated. It is often used as timber for building houses, and sometimes also for bridges and prahus.



FIG. G. *Schima wailichii*, leaf-shapes, laminae 1—5 and 7—8 from below, 6 from above, 0.5 X 1—5 and 7—8 subsp. *oblata*; 6, subsp. *noronhut*: var. *norovhae*. — After bb.15548 (1); S.W.K./I-18 (2); bb.622(5 I.S.); Teysmann 655HB (4); bb.B196 (5); Lorzing B747, cultivated (C); bb.6435 (↗); bb.5479 («).

Transitional forms to subspecies *bancana*- are the numbers T.B.239 and T.B.227 from Palembang- Highlands, 800 m above sealevel; on one and the same twig they have completely entire, undulate, and dentate leaves.

Gordouia oblata Roxb., 1814, nomen nudum, 1832. — *Schima oblata* (Eoxb.) Kurz, 1870, 1874.

Schima antherisosa Korth., 1839-42; Walp., 1845; Miq., 1859, 1862; Szysz., 1895; Melch. 1925.

Gordonia floribunda Wall., 1828, nomen nudum; cr Griff., 1854.

Sckima hypoglaucua Miq., 1862, 1868; Szysz., 1895.

Schima sulcinervia Miq., 1868; Melch., 1925.

Schima brevipes Craib, 1915, 1925; Melch., 1925.

Gordonia sp. Griff., 1854, prob.

Sckima crenata(non Korth.) sensu Miq., 1859, p.p., 1862 (with var. *pedicellosa*), 1868; Kurz, 1870; Thiselton Dyer in Hook, f. Pl. Br. Ind. 1: 289. 1874, p.p.; Kurz, 1877; Van Eeden, Houts. N.O.I., 3e Druk, 23. 1905, p.p.; Merr., 1921, p.p.; Craib, 1925, p.p.

Schima norovhae (non Reinw. ex Bl.) sensu Kurz, 1874, 1877; Szysz., 1895, p.p.; Gamble, 1902; Ridl., 1901, 1903; Van Eeden, 1905, p.p.; Brandis, Ind. Trees 60, 1906, p.p.; Koord.-Schum., 1914 (var. *crenata*); Ridl., 1922 (exclusive of var. *rigida*); Melch., 1925, p.p.?.; Craib, 1925, p.p.; Heyne, 1927, p.p.; Burk., 1935, saltern p.p.; Corner, 1940, saltern p.p.

Schima bancana (non Miq.) sensu Kurz, 1874, 1877; Szysz., 1895.

Schima wallickii [non (DC.) Korth.] aensu Szysz., 1895, p.p.; Craib, 1925.

BURMA. Pegu: Rangoon District, *Heifer* 762 (Lit.; *Schima cvenata* sensu Kurz); Moulmein, in forests, abundant, *Griffith* (Lit.; type of *Gordonia floribunda* Griff.); Mergui, in mountain forests, *Griffith* (Lit.). Tenasserim: Martaban to Penang: 450—1200 m, common in the eng (*Dipt erocar pus tuberculatus*) and pine forests of the lower hills, l.n. panma, *Heifer* 763 (Lit.; *Schima noronhae* sensu Kurz), up to 900m, *Brandis* (Lit.; *Schima bancana* sensu Kurz). — SIAM. Payap: Chiengmai, 360m, deciduous jungle, *Kerr* 2501 (Lit.; type of *Schima brevipes* Craib); Doi Sutep, 660m, *Kerr* 4688 (Lit.), *Kerr* 1083 (Lit.); Lampun, Me Li, 630m, semi-evergreen jungle, *Win it* 102 (Lit.); Doi Pahom Pok, Muong Pang, ± 2000 m, open evergreen forest, *Kerr* 51.93 (Lit.). Surat: Ban Dawn, Hui Sai, *Pumjabukkana* 860 (Lit.); Kaw Pangan, *Robinson* 5758 (Lit.). Puket: Trang and Krabi, *Vanpruk* 625 (Lit.); Setul, Bukit Raja Wang, *Ridley* 15155 (Lit.); shores of Takuapa, mainland, *Kloss* 6017 (Lit.). Pattani: Yala, under 50m, scrub jungle, *Kerr* 7252 (Lit.); Betong, G. Ina, ± 1200m, evergreen forest, *Kerr* 7591 (Lit.). — MALAY PENINSULA. In mountain forests from 600 m and upwards, common on all ranges, but rarely in the low country (Lit.)- K e d a h: Langkawi Is.: S. Batu Asap, *Honiff* 15505 (Lit.); Kuah, without collector (Lit.). P. Penang: *Hunter* (Lit.; type of *Gordonia oblata* Roxb.); Nurpakna highlands, 300m., *Nur* 2418 (BO). Perak: G. Tnas, *Wray* (Lit.); Thaiping Hills (Lit.). Selangor: Bukit Hitam, *Kelsall*(Lit.). — SUMATRA. Atjeh: Takin#eun Subdivision: near Takingeun (Takengon), 1275m, in forest, common, *Van Steenis* 5961 (BO); near Redelong, 1300 m, in forest, common, scattered, l.n. gerupal, *bb.12265* (FIB); Bur ni Lintang, 1800 m, in mountain forest, *Van Steenis*

0307 (BO). Gajo Luëus: near G. Agosan, 1800m, in forest, rare, scattered, l.n. kaju kontut (7), *bb.22418* (BO, FIB), l.n. regen (?), *bb.22419* (BO, FIB), l.n. kaju gelima (?), *bb.2M20* (BO, FIB). East Coast: Upper Deli Division: without exact locality, *Hontvester Medan 21a, 21b* (BO). Karo Lands: 1400m, *Houtvesterij Sum. Oostkust 8* (BO); N of Berastagi, 1350 m, in forest, common, *Lot-zing 6812* (BO); E of Siosar, 1350—1575m, in grass-wilderness, scattered, *Lorzing 8610* (BO); Sigaranggarang, near Lao Kawar (G. Sinabun), 1500 m, in forest, rather common, scattered, l.n. kapal kuling, *bb.5448* (BO, FIB); near Lao Kawar, 1600m, in forest, rather common, scattered, l.n. perawas, *bb.8644* (BO, FIB); near Tongkoh, 1600m, in forest, rather common, gregarious, l.n. simertelu, *bb.8352* (FIB); Toradja, 1300m, in forest, very common, gregarious, l.n. kapal kuling, *bb.8358* (FIB); near Pantjorbatu, east-foot of G. Sibuatan (NW of Lake Toba), 1400 m, in forest, not rare, *Lorzing 7144* (BO); Forest Reserve G. Sibuatan, l.n. martelu, *bb.1542* (FIB); near Pantjorbatu, Forest Reserve G. Sibuatan, 1500 m, in forest, rather common, scattered, l.n. daling daling, *bb.4933* (BO, FIB); Delengkutu, near Raja, 1400—1450 m, not rare, *Lorzing 7086* (BO); near Raja Huwala, 1200 m, in forest, very common, scattered, l.n. perapak perapak, *bb.29167* (BO, FIB); Marihatkula, Sibabuloteng Reserve, 800 m, in forest, rather common, gregarious, l.n. simartelu, *bb.2912* (FIB); Partajupan, l.n. oerapak, *bb.2183* (FIB), l.n. simartelu, *bb.2184* (FIB); Bongbongan, l.n. api api, *bb.2186* (FIB); Girsang, 1200 m, in forest, rather common, scattered, l.n. simartelu, *bb.8525* (BO, FIB). Asahan Division: saddle and break-through of Asahan R., 1100m, in forest, abundant, l.n. simartolu, *Lorzing 10048* (BO); Tapanuli: Tutupan, *Yates 2291* (BO). Batak Lands: Toba Highlands Subdivision: between Nassau and Naugat on the Batu Menumpak (near border East-Coast), 800—1200m, in secondary and primary forest, rather abundant, l.n. semartolu, *Lorzing 7961* (BO); near Bahhapal, 1000m, in forest, very rare, scattered, l.n. simartolu, *bb.853-9* (BO, FIB); near Pandumaan, 900m, in forest, very common, l.n. simartolu, *bb.5691* (BO, FIB); near Pansurbatu, 900 m, in forest, very common, gregarious, l.n. simartolu tali, *bb.6207* (BO, FIB). Dairi Lands Subdivision: near Dellong, 1066m, in forest, rare, few together, l.n. dalung dalung, *bb.15553* (BO, FIB), l.n. simartolu, *bb.15344* (BO, FIB). Silindung Subdivision: near Batunadud, Nature Reserve Doloksaut, 1350 m, in secondary forest, rather common, l.n. simartolu, *bb.3842* (BO, FIB); near Pansurnatolu, 1300m, in forest, rather common, scattered, l.n. simartolu, *bb.5254* (BO, FIB); near Silantom, 1040m, in forest, rather common, scattered, l.n. perapak, *bb.6226* (FIB); near Gontingbiat, 1400m, in forest, rather common, scattered, l.n. parapak, *bb.6435* (BO, FIB). Padangsidempuan Division: Padanglawas Subdivision: near Purbasinomba, 230m, in forest, very common, gregarious, l.n. simartolu, *bb.5683* (BO, FIB); near Parbatua, 800m, in forest, very common, gregarious, l.n. simartolu, *bb.5686* (BO, FIB). Angkola and Sipirok Subdivision: without exact locality, 1100 m, in forest, common, l.n. simartolu, *bb.6151* (FIB); Mandsurana, 1529m, in forest, common, l.n. simartolu, *bb.4174* (BO, FIB). West coast: G. Merapi, *Korthals* (Lit.; type of *Schima antherisosa* Korth). Lubuk-sikaping Division: Pambangan, 600m, in forest, rare, scattered, l.n. sunting abu, *bb.5510* (FIB). Agam Division: Malalak, 1000m, in forest, common, l.n. bangka bukit, *bb.6657* (BO, FIB); Tg. Bungo (Bt. Tapus), in forest, rare, scattered, l.n. madang miang, *bb.3975* (BO, FIB). Limapuluh Kota Division: Mudikkiki, 825m, in forest, very common, scattered, l.n. madang kaladi, *bb.3984, 5475* (BO, FIB); l.n. topih, *bb.5479* (BO, FIB); Pajakumbuh, l.n. madang bungka, *Teysmann 53* (— 655HB);

type of *Schima suleinervia* Miq.) (BO); Uluair, 1100 m, in forest, very rare, scattered, l.n. madang miang, *bb.6707* (FIB), 970m, in forest, very rare, scattered, l.n. madang miang, *bb.6595* (BO, FIB), 1000m, in forest, common, scattered, l.n. madang miang, *S.W.K./III 19* (FIB), 1000 m, in forest, rather common, scattered, l.n. madang miang, *bb.2902* (FIB); G. Malintang, NW slope, 1100m, in forest, *Biwemeijer 3624*, (BO). Tanahdatar Division: Kandang malabung, 500m, in young forest, rare, scattered l.n. madang sirah putjuk, *bb.6085* (BO, FIB); Kubu, Andalas, 900m (?), in forest, very common, gregarious, l.n. madang mungkar, *bb.5196* (BO, FIB); Muara, in forest, rare, scattered, l.n. madang bungkar, *hb.90i3* (BO, FIB), 596m, in forest, common, scattered, l.n. madang bungkar, *bb.6051* (BO, FIB); Pilawas, 300m, in forest, rather common, scattered, l.n. madang bungkar, *bb.6066* (FIB); between Batusangkar and Si djujung, 250 m, in secondary forest, l.n. madang bungkar, *Koorders 10444, 15771* (BO); Sawahlunto, Ranteh, l.n. madang bungkar, *Ham. s.n.* (BO); Padangsisubuk, 400m (?), l.n. madang bungkar, *Boschwizen x.n.* (BO); Sungaidareh (Batas Tjuli), 1200 m, in forest, rather common, scattered, l.n. madang kladi hitam daun, *S.W.K./II 12* (BO, FIB), 1204 m, in forest, rather common, scattered, l.n. madang keladi, *bb.5512* (BO, FIB). Solok Division: Solok, l.n. tamasu, tamansu, tambasu, *without collector s.y.* (BO); Lubuksulasih, 985 m, in forest, very common, l.n. tamasu udang, *bb.5771* (BO, FIB), 1150m, in forest, common, scattered, l.n. tamasu, *bb.6542* (BO, FIB); G. Batukunit, 435m, l.n. madang bungkar, *Koorders 106680* (BO). Painan Division: Barungbarungberlantai, 430 m, in forest, very rare, scattered, l.n. tamangsu, *bb.4003* (BO, FIB), in forest, very common, scattered, l.n. tamangsu, *S.W.K./I B* (BO, FIB); Duku, 150m, in forest, very rare, scattered, l.n. tambangsu, *bb.3109* (BO, FIB), in forest, very common, scattered, l.n. kalek gundjo, *bb.3117* (BO, FIB), in forest, very rare, scattered, l.n. kalek saga, *bb.Slld* (BO, FIB). Kerintji Division: G. Indrapura, Air Lebo, 1200 m, in forest, common, scattered, l.n. madang api api, *bb.18753* (BO, FIB), 1300m, in forest, rather common, scattered, l.n. kerto (?), *bb.18754* (BO, FIB). Bengkulu: Lebong Subdivision: near Tandjongratoe, 900m, in mountain forest, scattered, l.n. saru, *bb.1971* (FIB); Samalako, 900m, in forest, l.n. balam kataiju, *bb.2885* (FIB); near Lebong, 1000m, common in secondary growth on stone lahar Beriti, *bb.15548* (BO, FIB), *de Voogd 1156* (BO). Kroe Subdivision: near Wajtenong, 1000m, cultivated, l.n. medang tjeruh, *bb.15726* (BO, FIB). Palembang: Pase mahan Lands Subdivision: Pematangjawi, 800m, in old forest and devastated areas, common, scattered, l.n. tjiru hitam, *T.B.239* (FIB); Pematangbesar (Pasemahan Reserve), 800m, in forest and devastated areas, common, l.n. tjiru putih, *T.B.227* (FIB).

6. Subsp. **bancana** (Miquel) Bloembergen, *comb. nov.*—Figs. A 6, H 2, 8 9 & 12 13 11 2

Petiole 7—25 mm long. *Lamina* 2.7—25 cm long, 1.5—7.7 cm wide, elliptic to lanceolate, mostly oblong, glabrous, sometimes wax coated, chartaceous to thick coriaceous mostly thin coriaceous nervation with thin nerves and faintly prominent, sometimes sunken or somewhat strongly prominent; margin always completely entire. *Pedicels* 12—45 mm long, 1—3 mm thick. *Flowers* 18—3 mm in diameter. *Fruit* 6—14 mm long, 9—19 mm in diameter. (Description after the herbarium specimens mentioned below.)



FIG. *H. Schima wallichii*, leaf-shapes, laminae from below, 0.5 x ; 1, 3—7, and 10—11, subsp. *oblata*; 2, 8—9, and 12—13, subsp. *bavcana*. — After bb.5448 (1); Endert 5S (2); bb.2902 (3); bb.6207 «); 29167 (J); Nur 2418 (6); lb.4174 (7); GUSDORF 42 (S); GUSDORF 15S (9); LORZING 10048 (10); hh.15344 (11); Ja.2936 (12); 5 Bit. 45 (13).

This subspecies is not very polymorphous and in some characters about midway between subspecies *uoronha-e* and *oblata*. Dispersed forms **occur with** conspicuously narrow-lanceolate, small (especially in Lampung), or with large and wide, laminae, as well as with thick-coriaceous laminae.

According to notes on the herbarium-labels this subspecies is a tree reaching a height up to 40 m, with a bole up to 70 cm in diameter. It occurs from 5—800 m above sealevel, but is most frequent below 200 m and one of the most common trees, often gregarious in secondary forests; in primary forests it is extremely rare or perhaps lacking. Everywhere in its region it is extremely common in along along and other barren areas, which is a peculiar ecological behaviour not found in the other subspecies to such degree. Ender *(in Tectona* 13: 144. 1920) was the first to draw attention to this typical behaviour. The wood is used as a timber for building houses, not rarely bridges, and sometimes prahus.

Sehima bancana Miq., 1868; Melch., 1925; Heyne, 1927.

Sehima wallickii [wow (DC.) Korth.] *mevsv* Choisy, 1854 (var. *obtusafa*); Miq., 1859, p.p.; 1862, p.p., 1868; Dyer, 1874, p.p.; Van Eeden, Houts. N.O.I., 3e Druk, 1905, prob.; Melch., 1925, prob. p.p.

Sehima noronhae (von Reinw. *ex* Bl.) *sensu* Choisy, 1854, p.p.; Miq., 1859, p.p., 1862.

SUMATRA. Cultivated: Forest Reserve Djanglapa (Java), in Maribaja forest, from Lampung, 50—100 m, l.n. seru, *de Voogd*, 11 (BO), 100 m, l.n. seru, *Ja.2936*, 5263, 5267, 5273 (FIB). Palembang: without exact locality, *bb.3676* (FIB), l.n. seru, "*Heyne*" *s.n.* (BO). Palembang Lowlands Division: Musi-hilir Subdivision: Muara-pundjung, 20 m, in forest, rare, scattered, l.n. seru, *bb.8264-* (FIBt. Banjuasin Regions Subdivision: S. Rengit, young forest, common, l.n. seru, *bb.23988* (FIB); Pedamaran, 10 m, in old secondary forest, common, l.n. seru, *Ender* 314 (BO, FIB); Kajuagung, in rubber estate, l.n. seru, *de Voogd* .96 (BO). Palembang Highlands Division: Lematang-hilir Subdivision: Tandjungagung, 187m, in old forest, very common, gregarious, l.n. seru, *bb.8248* (FIB); Darma, 122m, young forest, very common, gregarious, l.n. tjuu, *bb.8239* (FIB). Lematang-hulu Subdivision: 150 m, common, l.n. seru (tjeru), *Lambach* 1803 (BO, FIB); Dei Selinsing (Tandjung reserve), in old forest and devastated areas, common, l.n. seru, *T.B.241* (FIB). Tebingtinggi Subdivision: Dempo, between Lematang and Ensikang R., 700m, in grass-wilderness, *Huitema* 96 (BO). Oga & Komering-hulu Division: Og-an-hulu Subdivision: Pagaragung, in secondary forest, common, l.n. tje'ru, *bb.5711* (FIB); Udjanmas, 200 m, in secondary forest, very common, gregarious, l.n. seru, *Ender* 53 (BO, FIB). Muaradua Subdivision: Tjikurai, 300m, in forest, *de Voogd* 53 (BO); Kisau, 798m, in old forest, very common, gregarious, l.n. tjekru, *bb.9215*, l.n. tjeheru, *bb.9626* (BO, FIB). Komering-hulu Subdivision: Martapura, in 3_ years old grass-wilderness, l.n. tjekru, *Bal* 34 (BO), in 30 years old grass-wilderness, l.n. sekru, *tial* 17 (BO), in 1 year old grass-wilderness, l.n. kaju seru, *Bal* 4-6 (BO), cultivated (seedling), *BoschPrSta*, *Register-no*, 2114 (BO). Lampung: Kotabumi, 25m, in forest, l.n. kaju kemiteru

halum, *Guadorf 197* (BO, FIB), l.n. kaju kemiteru hendak, *Guadorf 198* (BO, FIB). Menggala Subdivision: without exact locality, 10m, in forest, common, scattered, *Guadorf 42* (BO, FIB), *ibid.*, 20 m, l.n. kaju kemiteru hendak, *Guadorf .93* (BO, FIB); Menggala, 25 m, in forest, common, gregarious, l.n. kemateru, *bb.8005* (FIB); along Terbangi R., *Teysmann* (152HB) (BO); between Gunungsugih and Menggala, S of Terbangi-besar, l.n. kemeteru, *without collector s.n.* (BO); Gunungsugih, 30 m, in forest, common, scattered, l.n. kaju kemiteru hendak, *Guadorf 123* (BO), l.n. kaju kemiteru halum, *Guadorf 153* (BO, FIB). Sukadana Subdivision: Tjabang, 5 m, in forest, common, gregarious, l.n. seru, *bb.8363* (BO, FIB). Telokbetung Subdivision: Kotadalam, 50 m, in forest, common, l.n. kemateru, *bb.9607* (FIB); Mandah, 60 m, in secondary forest, common, gregarious, l.n. kemeteru, *bh.8874* (FIB); Tandjungkarang, in secondary forest, common, l.n. manteru or kemeteru, *Endert 1321* (BO, FIB). — BANGKA. Without exact locality: *Grashoff 16* (FIB); cultivated in Hort. Bog. *VI.C. 4* (BO). Muntok Subdivision: Majang, in forest, common, l.n. seru, *bb.7299* (BO); Lobok Besar, 5 m, primary forest, very common, scattered, l.n. seru, *bb.33961* (FIB). — BILITON. Without exact locality, l.n. seru, *bb.20004* (FIB); near Banten, 30m, in secondary forest, common, *Blt./1-41* (FIB), *Blt./1-44* to 48 (FIB), in old forest, rather common, *Blt./1-49* (FIB), in secondary forest, rather common, l.n. seru, *Blt./1-50* (FIB); G. Tadjau, near Begantong, l.n. seru, *van Alpen de Veer 4* (FIB); G. Tandan, cultivated, l.n. seru merak, *bb.33714* (FIB).

7. Subsp. *crenata* (Korthals) Bloembergen, *comb. nov.*

Petiole 5—33 mm long. *Lamina* 3.5—22 cm long, 1.7—8 cm wide, elliptic to lanceolate, sometimes obovate, glabrous, not rarely chartaceous to thin-, rarely thick-, coriaceous; nervation more or less prominent, sometimes sunken; lateral nerves sometimes irregularly far apart; margin always crenate to dentate. *Pedicels* 10—50 mm long, 1—2, rarely over the whole length, 3.5 mm, thick. *Flowers* 17—35 mm in diameter. *Fruit* 10—16 mm long, 12—20 mm in diameter. (Description after the herbarium specimens mentioned below.)

This subspecies is less polymorphous than subspecies *noronhae* and *cblata*; it is closest to subspecies *liukiensis*, which is, however, much more uniform in its narrow linear-lanceolate lamina.

7a. Var. *CRENATA*.—Figs. A 7a, C 12 & 15, 13-9, J 1-3.

Tree. *Petiole* 5—33 mm long. *Lamina* 3.5—22 cm long, on each branch generally longer than 6 cm; mostly thin- rarely thick-coriaceous, often chartaceous; nervation generally more or less prominent, sometimes sunken or nerves widely separated; margin mostly slightly, rarely more strongly, crenate-dentate. *Flowers* 17—35 mm in diameter.

This variety is rather complex-polymorphous and somewhat demonstrates the tendency to geographical variation and to split off mountain forms. In south-eastern Borneo, forms with rather conspicuously narrow-lanceolate laminae are dominant, in East Borneo, however, oblong to lanceolate, in British North Borneo, elliptic and oblong laminae are dominant.

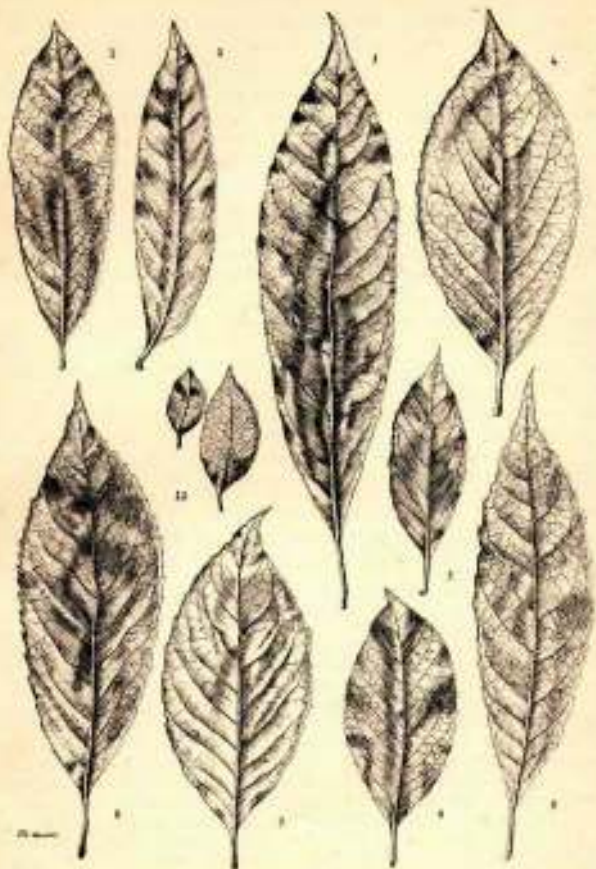


FIG. 1. *Schima mollis*, leaf-shapes, *lanceolata* from below, $\times 1.5$; 1—2, subsp. *brevis*; 3—4, subsp. *ovata* var. *ovata*; 10, subsp. *ovata* var. *puberula*. — After hb. 8054 (1); hb. 20004 (2); hb. 18618 (3); *Chroma* 25318 (4); hb. 2478 (5); hb. 8520 (6); hb. 5523 (7); Erdert 3021 (8); hb. 3544 (9); Kerner 23191 (10).

In all parts of its area scattered forms with small, in south-eastern and eastern Borneo forms with large, and often wide, in British North Borneo forms with conspicuously narrow, laminae occur. In south-eastern and eastern Borneo the flowers are rather small, 17—27 mm in diameter, the pedicels 10—43mm long, 1—2mm thick; in British North Borneo (Mt. Kinabalu) the flowers are 25—35 mm in diameter, the pedicels 18—50 mm long. The specimens Endert 3635 (East Borneo, 1200 m elevation) and Clemens 30216, 29318, 29931, 38312, and 32124 (Mt. Kinabalu, 1200—1500 m elevation) often have quadrangular petioles, thickened up to 1.5—3.5 mm over their whole length, and coriaceous to thick-coriaceous laminae: they form a transitional series to subspecies *-monticola*.

According to notes on the herbarium-labels and to literature this variety is a tree reaching a height up to 47 m, with a bole up to 82 cm in diameter. It occurs in British North Borneo from 420—1500 m above sealevel, in south-eastern and eastern Borneo from 10—1200 m, but especially from 8—200 m. It has been found in the whole area in primary and secondary forest as well as in alang-alang and shrub thickets; in south-eastern and eastern Borneo it is often common and gregarious, and is also not rarely to be found along rivers and swamps. In south-eastern and eastern Borneo it is locally an important timber, at Pleihari most frequently used for building houses and not rarely for building prahus and furniture.

Schima crenata Korth., 1839-42; Walp., 1845; Miq., 1859, p.p.; Thiselton Dyer in Hook, f., Fl. Br. Ind. I: 288. 1874, p.p.; Van Eeden, Houts. N.O.I., 3e Druk, 23. 1905, p.p.; Merr., 1921, p.p.

Schima, noronkae (non Reinw. ex. Bl.) sensu Szysz., 1895, p.p.; Melch., 1925, p.p.

BORNEO. British North Borneo: Kinabalu: Dallas, 900m, Clemens 27100 (BO); "via Dusan," 900—1200m, in forest, *Clemens 26888, 26995* (BO); vicinity of Dallas, jungle slopes, 900—1500 m, *Clemens 26995bis* (BO); Tenompok, in Minitindok, 900—1200m, on top of wall, *Clemens 29651* (BO); Tenompok, 1500m, *Clemens 80198, S021G, 29318, 29981, 28312* (BO), jungle, *Clemens 28218* (BO); in Penibukan, cañon W of Penibukan, 1200m, jungle, *Clemens 3212J*, (BO). Sunsuron: Tambunan, 420 m, top of hill, l.n. sangud sangud (Busun), *B.N.B.Foy Dept. 38E8 Puasa* (BO). Southern & Eastern Division: Sampit Subdivision: Antjiabas, 10 m, in forest, very common, gregarious, l.n. lawari, *bb.11615* (FIB); Tehang, 12 m, in forest, very rare, scattered, l.n. tjinawari, *bb.10216* (FIB); Sebulu, 15m, in forest, common, scattered, l.n. lawari, *bb.7911* (BO, FIB), Martapura Subdivision: P. Lampei, *Koythals* (Lit.; type of *Schima crenata* Korth.) ; Riam-kanan, Guntunggawur, l.n. madang, *bb.1010* (FIB), *Ramli 2006* (BO, FIB); Rantaubalai, in forest, l.n. madang batu, *bb.H78* (BO, FIB); G. Talian, near Martapura, in forest, l.n. madang, *Lot Obi 2171* (BO), *bb.1180*. (FIB)., Pleihari Subdivision: without exact locality, l.n. madang, *Boschwezev tree-number 211* (BO) = *bb.985* (FIB), *treenumber 212* (BO); Badjuin (Padangguntung,

Duing), i.n. madang, madang pirawas, *Boschivezen treenumbr 214* (BO) = *bb.54.2*, *bb.538*, *bb.987* (FIB); Bentok, devastated area, I.n. madang betul, *Labohvi 18H* (BO); Ketapang, in forest, I.n. madang, *Labohm 1153* (BO); near Ketapang, Guntungbatu-bagong, I.n. madang pirawas, *Soeriadikerto 24S9* (BO) = *bb.1622* (FIB), I.n. madang, *Soeriadilerto 2S37* (BO); Batibati, I.n. madang gatal (= madang pirawas), *Labohm Sib* (BO); Sebahman, 8m, in forest, very common, gregarious, I.n. madang banju, *bb.5539* (BO, FIB); Pulausari, 50 m, in forest, common, gregarious, I.n. madang batu, *bb.12457* (BO, FIB); Lumbangr, Keratungan, near Satui, in forest, I.n. madang gatal, *Bachlan 1889* (BO). Upper Mahakam Subdivision: near Tepoh, *Jahevi 1698* (Exp. Nieuwenhuis) (BO). West Kutai Subdivision: G. Kemul, 1200m, in forest on ridge, rather common, *Endert 3621* (FIB), *3635* (BO, FIB); Batubong rapid, 20m, along river, in secondary forest, I.n. nikung, *Endert 2346* (FTB); Long Hut, 130—200 m, in forest, hilly country, rare, I.n. njihung, *Endert 2711*; Binanga, 40 m, in forest, common, scattered, I.n. medang batu, *bb.12360* (BO, FIB); Sebulu, 9 m, in secondary forest, along river, common, I.n. penagit, *bb. 15710* (BO, FIB), 10m, in forest, very common, gregarious, I.n. penagit, *bb.15744* (BO, FIB); Sabin-tulong, 10—20 m, along brook, in forest, rather common, I.n. penanga, *bb. 15812* (BO, FIB), *15818* (FIB); Kemlisi, 95m, along brook, in forest, very rare, I.n. madang pelaga, *bb.1667.9* (BO, FIB); Kereh (Besi), 30m, in forest, rare, I.n. madang pelaga, *bb.16697* (FIB); Laminresah, 15 m, along swamp in secondary forest, very rare, scattered, I.n. naga, *bb.29422* (BO, FIB); near Melak, on terrace, 80m, few trees in grass-wilderniss and in secondary forest, rather common, I.n. pelaga, *Posthumus 2081* (BO). East Kutai Subdivision: Sangkulirang. Palawan, 50m, in forest, common, scattered, I.n. bunga arum, *bb.11952* (BO, FIB); Pengandan (S. Bai), 30m, in forest, very rare, scattered, I.n. penagit, *bb.13011*, (BO, FIB); Karang (S), S. Bai, 12m, along brook, in forest, common, I.n. njatoh, *bb.14854*. (BO, FIB). Balikpapan Subdivision: Sepahu, 15 m, in old forest, rather common, scattered, I.n. madang sulau, *bb.24645* (BO, FIB). Pasir Subdivision: P. Bungur, 16m, in forest, very rare, scattered, I.n. madang gunung, *bb.9525* (BO, FIB); Long Ikis, 75 m, common, gregarious, *bb.9544* (BO, FIB); Teluk Warn, 60m, along brook, in forest, common, scattered, I.n. kapur naga, *bb.19978* (BO, FIB); Laburan-besar, 25m, along brook, in forest, common, I.n. kapur naga, *bb.20050* (BO, FIB). Pulu Laiit & Tanahbumbu Subdivision: Sebomban, Tanahbumbu, 25 m, scattered, I.n. madang gunung, *bb.2625* (BO, FIB); Tandjung Serdang (P. Laut), 25 m, along brook, in forest, very rare, I.n. madang biikau, *bb.14085* (BO, FIB); S. Paring (P. Lalit), 100 m, in old secondary forest, I.n. madang gatal, *bb.9520* (BO, FIB).

7b. Var. *pulgarensis* (Elmer) Bloembergen, *comb.nov.*—Figs. A 7b, 110.

Interlaced shrub. *Petiole* 0.5—2 cm long. *Lamina* up to G2 cm long, chartaceous; nerves and veins faintly prominent; margin faintly crenulate. *Flowers* probably small, 10—15 mm in diameter. (Description according to Elmer 13191 and literature).

According to notes on the herbarium-labels this variety is a shrub and until now has only been found on Mount Pulgar from 1100—1257 m above sealevel among mossy shrubs. It differs from the variety *crenata* in its peculiar small, chartaceous leaves and probably in its small flowers.

Schima pulgarensis Elm., 1913; Merr., 1923; Meleh., 1925.

Schima noronhae (mm Reinw. ex Bl.) sensu Men. & Rolfe, 1908.

PHILIPPINES. Palawan: Puerto Princesa (Mt. Pulgar), 1100—1275m (summit), in the mossy shrub on ridges, *Elmer 13101* (BO; type of *Schima pulgarensis* Elmer), *B.S.568* (*Foxworthy*) (Lit.), *For.Bur.S881* (*f1m-ran*) (Lit.).

8. Subsp. **monticola** (Kurz) Bloembergen, *comb. nov.*—**Figs. A 8, C 9 & 11, J4a-c.**

Petiole 10—20(—37.5) mm long, 3—4 mm thick.¹ *Lamina* 6—19 cm long, 4—7 cm wide, elliptic to lanceolate, sometimes ovate, glabrous, conspicuously thick-coriaceous; nervation sunken or slightly prominent; margin always crenate to coarsely crenate-serrate. *Pedicels* 15—50 mm long, 3—10 mm thick (!) and swollen over their whole length, when dried sometimes sharply 2-keeled, with roundish prophylls 6—7 mm long and 10mm wide. *Flowers* 4.5—7cm in diameter; sepals often small, sometimes large, up to 3.5—5 mm long, 4.5—8 mm wide and sometimes, just as in the outermost petal, entirely silky-hairy outside. *Fruit* 15—16 mm long, 19—24 mm in diameter. (Description after the herbarium specimens mentioned below from Mt. Kinabalu and according to literature.)

The material from three separate places from continental south-eastern Asia and that from Mount Kinabalu show rather important differences, the Kinabalu form having 4—10 mm thick, two-keeled pedicels, up to 10 mm wide prophylls, and 4.5—8 mm wide sepals, the continental form having 3—4 mm thick pedicels, much narrower prophylls and sepals (except Forrest 8341 with 6—8 mm wide sepals). The Kinabalu numbers Clemens 32704 and 34149, with 2—4 mm thick pedicels and coriaceous laminae, represent a transitional series with some mountain forms of the variety *crenata* of subspecies *erenata*; Clemens 30934 (Mt. Kinabalu) is a form with small leaves.

According to notes on the herbarium-labels and literature this subspecies is a tree reaching a height up to 18 m, with a bole up to 30 cm in diameter. It occurs from 1200—2160 m above sealevel mostly in more or less stunted forests, sometimes also in jungle.

Schima monticola Kurz, 1874, 1877; Szysz., 1895.

Schima vorauhae var. *rigida* Ridl., 1922.

Schima forrestii Airy-Shaw, 1936.

CHINA. Yunnan: open situations on the hills to east of Teng-yueh, lat. 25° N, 1800m, *Forrest 8341* (Lit.; type of *Schima forrestii* Airy-Shaw). — BURMA. Martaban: Nattoung Hills of Martaban, 1800—2160m, on the highest crests, in the stunted hill forest, (Lit.; type of *Schima monticola* Kurz). — MALAY PENINSULA. Pahang: G. Tahan, 1500—1650m, *Ridley* (Lit.; type of *Schima noronhae* var. *rigida* Ridl.). — BORNEO. British North Borneo: Kinabalu: ridge above camp Penibukan, by trail, 1200—1500 m, *Clemens 31105, 31987* (BO); near camp

Penibukan, 1200 m, *Clemens 3093b* (BO); Marai Parai, near camp, 1500 m, in low jungle, *Clemens 33197* (BO); *ibid.*, hiUrige N of Kinatak R., 1500 m, *Clemens 32435* (BO); Mt. Nunkok, 1200—1500 m, forest, ridge, *Clement, 32701*, (BO); Penataran basin, hill N of river, 1500m, *Clemens 34149* (BO).



FIG. 9. *Schima mollisii*, leaf-shapes, laminae front below except 13, 0.5 \times : 1—2, subsp. *erecta* var. *erecta*; 10—11, subsp. *mollecula*; 3—5, subsp. *brevifolia*. — After 15,966 (J); Lat. Old 2171 (2); 15,32457 (4); *Clemens 32435* (10—11); *Clemens 32444* (3); *Clemens 32937* (5); *Clemens 28801* (7); *Clemens s.s.* (8); *Clemens 23110* (9).

9. Subsp. **brevifolia** (Hook, f.) Bloembergen, *comb. nov.*—Piss. A 9), C 8 & 10, J 5-9.

Leaves strongly crowded on the twigs. *Petiole* very short, 2—3 (sometimes 4—5) mm long. *Lamina* always very short, 2.5—5(—8) cm long, 2—3.9 cm wide, roundish ovate to obovate, shortly acuminate to the obtuse apex or with rounded apex, glabrous, thin-coriaceous; lateral nerves often widely separated and sunken to slightly prominent; margin mostly completely entire, sometimes finely crenate (one specimen). *Pedicels* 12—18 (—25) mm long, 2—3.5 mm thick over the whole length. *Flowers* 36—50 mm in diameter, white to purplish sometimes; sepals 2.5—5 mm long,

4—8 mm wide. *Fruit* 12—15 mm long, 16—21 mm in diameter. (Description mainly after the herbarium specimens mentioned below and also according to literature.)

This subspecies is characterized by its short petiole and short lamina. It has the thickened petiole of subspecies *monticola*. Clemens *s.n.* has finely crenate laminae. Clemens 32637 and 32444, from 1650 m elevation, with 4—5 mm long petioles, and Clemens 32444, moreover, with laminae up to 8 cm and pedicels up to 25 mm long, form transitions to subspecies *monticola*.

Van Steenis (*in* Tijdschr. kon. aardrijksk. Genootsch. 55: 764, 781. 1938) mentioned *Schima brevifolia* from Sumatra [Atjeh, Mt. Losir, Van Steenis 8636 (BO), Mt. Kemiri, Van Steenis 9653 (BO)]. However, his specimens differ from *Schima*. by having nearly sessile flowers, five prophylls which gradually transgrade into the five sepals and these, in turn, into the five petals; extrors (?) anthers; a stigma parted into five portions (or five separate styles?); and oblong, ellipsoidal fruits. The specimens are too scanty for correct determination but they belong either to *Laplacea* H.B.K. or *Gordonia* Ellis.

According to notes on the herbarium-labels and literature subspecies *brevifolia* is a tree reaching a height up to 18 m, with a bole up to 45 cm in diameter; it is rarely shrub-like. It occurs from 1650—3300 m above sealevel, and probably much higher; up to the present it has been found only on crests and along ridges in forests or grass-wildernesses.

Gordonk brevifolia Hook, f., 1860; Walp., 1808; Eurk., 1917. ~ *Schima brevifolia* (Hoof, f.) Stapf, 1893, 1894; Gibbs, 1914; Merr., 1921; Melch., 1925. — *Schima noronhae* subsp. *brevifolia* (Hook, f.) Steen., 1936.

BORNEO. British North Borneo: Kinabalu: Mt. Nunkok, summit-crest, 1650 m, *Clemens* 32637 (BO); rim of Penataran basin crest, Matutura ridge divide, 1650 m, *Clemens* 32444 (BO); abundantly on the banks of the Kadamaian at the Paka-paka Cave, and in low forest at 2850 m, after Gibbs, *Low* (Lit.; type of *Gordonia brevifolia* Hook.f.), 2400—3000 m, *Hariland* 1126, 1127 (Lit.), 2700—3000 m, in sheltered forest, *Gibbs* 4271 (Lit.), *Haslam* (Lit.); Paka, in low jungle, 3150m, *Clemens* 2S9S1 (BO), 3300m, bush, *Clemens* (BO); Paka Cave, *Clemens* 111557 (BO); Upper Kinabalu, 1800—4050m, *Clemens* 27110 (BO).

Species excludendae

Schima excelsa Blume, Cat. Gew. Buitenz. 80. 1823, nomen nudum.

This species is *Gordonia exceha* Blume, Bijdr. Fl. Ned. Ind. 3e Stuk: 150. 1825.

Sehima stellata Pierre ex Laness., PI. util. Colon, franc. 205. 1886; Pierre, Fl. for. Cochinch. 2: pi. 122. 1887; Pitard in Lee, Fl. gen. Indo-Chine 1: 352. 1910; Melch. in Engl. & Pr., PflFam., 2. Ausg., 21: 139. 1925.

This is *Craibiodendron stellatum* (Pierre) W. W. Smith in Kew Bull. 1914: 129 (Ericaceae); Airy-Shaw in Kew Bull. 1936: 498.

Sehima galpimi Galpin (in Mem. bot. Surv. S. Air. 12: 41. 1926) is a printing error for *Sehima galpinii* Galpin.

LIST OF COLLECTOR NUMBERS

The subspecies and varieties are referred to by means of their number in bold type.

Non-personal and anonymous

Bos(ch)bouwproefstation (Forest Research Institute, Bogor, Java) : *bb-numbers*: 538, 542, 985, 987, 1010, 1180 = 7a; 1542 = 5; 1622 = 7a; 1971, 2183, 2184, 2186 = 5; 2478, 2625 = 7a; 2835, 2902, 2912, 3109, 3117, 3119, 3676, 3842, 3975, 3984, 4003, 4174, 4933, 5196, 5254, 5448, 5475, 5479, 5510, 5512 = 5; 5539 = 7a; 5683, 5686, 6691, 5771, 6051, C066, 6085, 6151, 6207, 6226, 6435, 6542, 6595, 6657, 6707 = 5; 7299 = 6; 7911 = 7a; 8005, 8239, 8264, 8348 = 6; 8352, 8358 = 5; 8363, 8374 = 6; 8525, 8539, 8644 = 5; 8711 = 6; 9043 = 5; 9215 = 6; 9520, 9525, 9544 = 7a; 9607, 9626 = 6; 10216, 11615, 11952, 12360 = 7a; 12265 = 5; 12457, 13014, 14085, 14854 = 7a; 15344, 15353, 15548, 15726 = 5; 15740, 15744, 15812, 15818, 16679, 16697 = 7a; 18753, 18754 = 5; 19978 = 7a; 20004 = 6; 20056 = 7a; 22418, 22419, 22420 = 5; 23983 = 6; 24645 = 7a; 29167 = 3; 29422 = 7a; 33714 = 6; 33961 = 6; *Blt/1-numbers*: 41, 44, 45, 46, 47, 48, 49, 50 = 6; *E(ndert)-numbers*: 53, 314, 1321 = 6; 2346, 2711, 3621, 3635 = 7a; *Ja.-numbers*: 875, 1092, 1193, 1194, 1317, 1497, 1910, 1911, 1939, 1940, 2339, 2882, 2883 = 3a; 2936 = 6; 3411, 3416, 3500, 3664, 3808, 3899, 4008, 4071, 4492, 4495, 5206 = 3a; 5263, 5267, 6273 = 6; 5279, 5341, 5383, 5384, 5385, 5386, 5387, 5388, 5389, 5390, 5391, 5392, 5393, 6394, 5403, 5412, 5419, 5420, 5421, 5422, 5423, 5424, 5425, 5426, 5427, 5428, 5431, 5432, 5433, 5434, 5441, 5442, 5473, 5474, 5475, 5476, 5484, 5485, 5486, 5487, 5488, 5489, 5490, 5491, 5492, 5493, 5553, 5598, 5612, 5624, 5627, 5628, 5651, 5652 = 3a; *Register-numbers*: 1844, 2067 = 3a; 2114 = 6; *S.W.K.II-numbers*: 1-18, 11-12, 111-19 = 5; *T.B.-numbers*: 227, 239, = 5; 241 = 6; *Boschwezen* (Indonesia) : *s.n.* = 5; *Boschwezen* treenumber 211, 212, 214 = 7a; *British North Borneo Forestry Department* 3848 (Puasa) — 7a; *Bureau of Science* (Manila) 568 (Foxworthy) = 7b; 1257 (Ridley) = 3a.

Forestry Bureau (Manila) : 3881 (Curran) = 7b.

Hortus Bogoriensis (cultivated in —) : VI. C. 4 = 6; VI. C. 91-91a, VI. C. 240 = 3a; *Houtvester Medan*: 21a, 21b = 5; *Houtvesterij Sumatra's Oostkust* 8 = 5.

Native Collector 869, 1642, 2290 = 3a.

Sun Yat Sen University Field No.: 6496 (Chun) = 3b.

Without Collector = 3b; 5; *without collector s.n.* = 3a; 5; 6.

Personal

Abel = 3b; Van Alphen de Veer 4 — 6; Anderson ~ *in*.

Backer sn., 1639, 1912, 2216, 9000, 10270, 11152, 14234, 14901, 17071, 22670, 25978, 26023, 26128 = 3a; Bakhuizen van den Brink 1728, 3529, 3784, 4713, 5033, 532(j), 7571 = 3a; Bal 17, 34, 46 — 6; Beccari 1650 = 3a; Bijhouwer 257 — 3a; Binnendijk? *s.n.* = 3a; Blume s.c. = 3a; Bock von Rosthmn 134, 212, 258, 630 = 3b; Brandis = 5; Bruggeman 3718 — 3a; Biinnemeier 3624 = 5; Burck 21, 129 = 3a.

Champion = 3b; Chen Hsi Cheng 1944 = 3b; Ching 3281, 8020, 8523 = 3b; Chun (Sun Yat Sen Univ. F. no.) 6496 = 3b; Chung 3425 = 3b; Clemens *s.n.* = 9; 10557 = 9; 20971 = 3a; 26338, 26995, 26995bis, 27100 = 7a; 27110 = 9; 28218, 28313 = 7a; 28991 = 9; 29318, 29651, 29931, 30198, 30216 = 7a; 30934, 31105, 31987 = 8; 32124 = 7a; 32435 = 8; 32444, 32637 = 9; 32704, 33197, 34149 = 8; Curran (For. Bur.) 3881 = 7b.

Dachlan 1889 = 7a; Denkei- 24 = 3a.

Elmer 13191 = 7b; Enoh 205 = 3a; Endert, ace Boschbouwproefstation.

Fan & Li 59, 360 = 3b; Forbes 330, 463a, 601 (709), 1073 = 3a; Ford = 3b; Forrest 8341 = 8; Foxworthy 247, 365 = 3a; (B. Sci.) 568 = 7b.

Gibbs 4271 = 9; Grasboff 16 = 6; Griffith = 4a; 4b; 5; Gusdorf 42, 93, 123, 153, 197, 198 = 6.

Haan (De—) 14 = 3a; Hahn = 3a; Hallier 408, B.1860, B.2340, B.2447, B.2479 = 3a; Ham *s.n.* = 5; Hamar de la Brethoniere 5806 — 3a; Hamilton = 4a; Haniff 15505 = 5; Harmand = 3a; Hasiam = 9; H. Hattori = 1; Haviland 1120, 1127 = 9; Heifer 762, 763 = 5; Heude = 3b; "Heyne" *s.n.* = 6; Hooker f. = 4a; Huitema 96 = 6; Hunter = 5.

Jaheri 1698 (Exp. Nieuwenhuis) = 7a.

Kakak 131 = 3a; Kanehira 1325 = 3b; Kawakami 1188 = 3b; Kelsall = 5; Kerr 1083, 2501, 4688, 5193 = 5; 6845 = 3a; 7252, 7591 = 5; 8344, 8344a, 8344b, 8950 = 3a; Kloss 6617 = 5; Konishi 17001 = 3b; Koorders: *a-uimbers* (numbered trees): 1197, 1314, 1316, 1321, 2001, 2153, 2251, 2326, 2352. 2359, 2360, 2441, 3005, 3051, 3081, 3143, 3234, 3237, 3238, 3254, 3257, 3262, 3268, 3305, 3351 = 3a; *aa-numbers* (numbered trees): 2441 = 3a; *other numbered trees marked with*: "I.W.", "II.W." = 3a; *jl-immbers*: 1318, 1319, 8190, 8253, 8254, 8255, 8256, 8257, 8258, 8259, 8260, 8261, 8262, 8263, 8264, 8265, 8266, 8267, 8268, 8269, 8270, 8271, 8272, 8273, 8274, 8276, 8277, 8278, 8279, 8280, 8281, 8282, 8283, 8284, 8285, 8287, 8288, 8289, 8290, 8291, 9918, 10125 = 3a; 10444, 10668 = 5; 10999, 11362, 11363, 11364, 11365, 11366, 12136, 12137, 12138, 12219, 12253, 12300, 12312, 12361, 12362, 12603, 12619, 12642, 13278, 13856, 13881, 13940, 13985, 14113, 14157, 14172, 14316, 14318, 14325, 15299, 15302, 15303, 15542, 15564, 15574, 15581 = 3a; 15771 = 5; 24356, 25622, 25676, 25677, 25700, 25731, 25776, 26759, 27981, 32182, 32450, 32717, 32719, 32720, 32750, 33029, 33031, 33270, 34276, 36712, 37289, 39577, 39628, 39643, 41757, 41788, 41812, 41931, 41934, 41939, 41944, 41981, 47825, 47826 = 3a; Korthals = 5; 7a; Kramer 5806a = 3a; Kudo & Sasaki 15142, 15286, 15342 = 3b.

Labohm 31b, 1153, 1834, = 7a; Lam 2258 = 3a; Lambach 1203 = 6; Lamont = 3b; Levine 601, 1513 = 3b; Lobb = 3a; LörzinE 1975, 6447 = 3a; 6812, 7086, 7144, 7961, 8610, 10048 = 5; Los 5806a, 5806b = 3a; Lot Obi 2171 = 7a; Low = 9.

Matsumura = 2; Matuda 1323, 1324 = 3b; Merrill 10156, 10690, 11052 = 3b; Millet — 3b; De Monchy 81 = 3a; Monterie 16 = 3a; Mori 692, 1932 = 3b.

Nakahara = 2; 17003 = 3b; Nur 2418 = 5.

Owatari = 3b.

Pételot 2338, 8847 = 3a; Pierre, 579, 1413 = 3a; Ploem **S.J.L.** = 3a; Posthumus 2081 = 7a; Popta 64 = 3a; Price 1412 = 2; Van Pruk 625 = 5; Puasa (B.N.B. For. Dept.) 3848 = 7a; Purnjabukkana 860 = 5.

Ramli 2006 = 7a; Ridley = 8; (B. Sci.) 1257 = 3a; 15155 = 5; Robinson 6758 = 5.

Sasaki 17016 = 3b; Scheffer *s.n.* = 3a; Schmidt 870 = 3a; Schflrer & Henry 366, 659 = 3b; Simida 24120 = 3b; Van Slooten 90 = 3a; J. J. Smith & Rant 86 = 3a; Soeriadikerto 2337, 2429 = 7a; Soewarta 144 = 3a; Van Steenis 2010 = 3a; 5691-, 6307 = 5; 11753, 12686 = 3a; Steward & Cheo 539, 842 = 3b; Suzuki 11764, 20723 = 3b; Synge 1614 = 3a.

Tanaka = 2; Tashiro = 2; Teysmann 152HB = 6; 53 (655HB) = 5; Thorel = 3a; Timmer 6333 = 3a; Tsai 60763 = 4a; Tsui 206 = 3b.

Uchiyama = 1; Uhl 6543 = 3a.

Visser Smits (De —) *s.n.* = 3a; De Voogd 11 = 6; 12 = 3a; 33, 96 = 6; 1156 = 5.

Wallich = 4a; 4b; 1458 = 4a; Watt 6718 = 4a; Wilson 4805 = 3b; Winckel 394², 1396[?] = 3a; Wind W. **VIII** = 3a; Winit 102 = 5; Wisse 902 = 3a; Wray = 5.

Yajima = 2; Yamamoto 1931 = 3b; Yajima = 2; Yates 2291 = 5.

INDEX TO VERNACULAR NAMES

The subspecies and varieties are referred to by means of their number in bold type. The numbers between brackets indicate how many times the names occur in the lists of specimens. The 'oe' has been changed into 'u.' Abbreviation: k. = kaju (tree, wood). Although placed at the end, this abbreviation really belongs before the words it accompanies: "gelima, k." stands for "kaju gelima."

api api (1) = 5.

balam kataiju (1) = 5; bangka bukit (1) = 5; bunga arum (1) = 7a.

chilauni (1) = 4a.

daling daling (1) = 5; dalung dalung (1) = 5.

gadol (1) = 3a; gelima, k. (1) = 5; gerupal (1) = 5.

himetsubaki (1) = 1; himetubaki (1) = 3b; huru honeng (1) = 3a; h. katjang (1) = 3a; h. manuk (2) = 3a; h. puspa (2) = 3a.

iju (1) = 2.

kalek gundjo (1) = 5; k. saga (1) = 5; kapal kuling (2) = 5; kapur naga (2) = 7; kemateru (2) = 6; kemeteru (1) = 6; kemetru (1) = 6; kemetru (1) = 6; kemiteru, k. (1) = 6; k. halum, k. (2) = 6; k. hendak, k. (2) = 6; kemiteru hendak, k. (1) = 6; kerto (1) = 5; kigetis (1) = 3a; kontut, k. (1) = 5.

lawari (2) = 7a.

madang (6) = 7a; m. api api (1) = 5; m. bakau (1) = 7; m. banju (1) = 7a; m. batu (2) = 7a; m. betul (1) = 7a; m. bungka (1) = 5; m. bungkar (6) = 5; m. bongkar (1) = 5; m. gatal (3) = 7a; m. gunung (2) = 7a; m. kaladi (2) = 5; m. keladi (1) = 5; m. kladi hitam daun (1) = 5; m. miang (5) = 5; m. mungkar (1) = 5; m. pelaga (1) = 7a; m. pirawas (3) = 7; m. sirih putjuk (1) = 5; makriah chilauni (1) = 4a; raanteru (1) = 6; martelu (1) = 5; medang api api (1) = 5; m. batu (1) = 7a; **m. pelaga (1) = 7a**; m. tjeruh (1) = 5; m. sulau (1) = 7a.

nag-a (1) = 7a; nihung (1) = 7a; njatoh (1) = 7a; nj. baian (1) = 7; njihung (1) = 7a.

pan-ma (1) = 5; parakpak (1) = 5; pelaga (1) = 7a; penaga (1) = 7; penagit (3) = 7a; penanga (1) = 7a; perakpak (1) = 5; perapak (1) = 5; perapak-perakpak (1) = 5; perawas (1) = 5; puspa (92) = 3a; p. beureum (7) = 3a; p. bodas (12) = 3a; p. gedē (1) = 3a; p. hedjau (1) = 3a; p. honeng (1) = 3a; p. merah (1) = 3a; p. merang (31) = 3a; p. putih (2) = 3a; puspa (11) = 3a; puspo (3) = 3a.

regen (1) = 5.

sang-soe (1) = 3a; sangud-sangud (1) = 7a; saru (1) = 5; sekru (1) = 6; semartolu (1) = 5; seru (19) = 6; seru, k. (1) = 6; s. merak (1) = 6; sima himetubaki (1) = 3b; simartelu (3) = 5; simartolu (10) = 5; s. tali (1) = 5; simertelu (1) = 5; simertolu (1) = 5; sunting abu (1) = 5.

tamangsu (2) = 5; tamansu (1) = 5; tamasu (2) = 5; t. udang (1) = 5; tam-bangsu (1) = 5; tambasu (1) = 5; tjerehu (1) = 6; tjekru (1) = 6; tjeru (1) = 6; tje'ru (1) = 6; tjiu (1) = 6; tjinawari (1) = 7a; tjiu-hitam (1) = 5; t. putih (11) = 5; topih = 5.

wuru kaworo (1) = 3a.

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