

**NOTE ON THE SAPOTACEAE-MIMUSOPOIDEAE IN GENERAL AND
ON THE FAR-EASTERN MANILKARA-ALLIES IN PARTICULAR**

by

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MANILKARA ADANSON

Manilkara ADANSON, Fam. II, 1763, 166; PIERRE & URBAN, Symb. Antill. 5¹, 1904, 162 (as a subgenus); DUBARD, Ann. Mus. Col. Mars. 23, 1915, 6; LECOMTE, Bull. du Muséum, 1917, 35 and in Notul. Syst. 3, 1918, 340; BRITTON & WILSON, Scient. Surv. Porto Rico & Virg. Isl. VI, 1, 1925, 72; H. J. LAM, Bull. Jard. Bot. Buitenz., Sér. III, 7, 1925, 238 and 8, 1927, 481; BENOIST, Arch. Bot. 5, Mém. 1, 1931, 241; HUTCHINSON & DALZIEL, Fl. W. Trop. Afr. II, 1, 1931, 14; CHEVALIER, Rev. Bot. appl. & Agric. tropic. 12, 1932, 261, 350; STANDLEY, Trop. Woods 31, 1932, 45; LEMEE, Dictionn. Pl. Phanér. IV, 1932, 291; EYMA, Rec. Trav. Bot. néerl. 33, 1936, 205 — *Manyl-kara* RHEEDE, Hort. Mal. IV, 1673, 53, t. 25 — *Mimusops* L., sect. *Ternaria* DC., Prodr. 8, 1844, 203; as a subgenus in ENGLER, Monogr. Afr. Pfl. fam. und Gatt. 8, Sap., 1904, 55 — *Delastrea* A. DC. in DC., Prodr. VIII, 1844, 195 — *Labramia* A. DC., l. c. 672 — *Mimusops* L., sect. *Euternaria* ENGL., l. c. p. p. (except § *Muriea*) — *Northia* (not of HOOK. f.) sensu H. J. LAM, l. c. 1925, 241 and 1927, 481, pro parte; H. J. LAM, Bern. P. Bish. Mus. Bull. 141, 1936, 163.

Trees with hard and often reddish wood and sympodial branchlets; stipules caducous or none; leaves more or less coriaceous, often obovate with rounded apex, lower side often lighter coloured than upper one, with sclereids (f. LECOMTE); tertiary nerves very slender and numerous, in general parallel to the secondary ones which are hardly more conspicuous, often with a minute reticulation between; inflorescences axillary, fasciculate; sepals in two rows of 3 each; petals 6, with narrowed base inserted on a corolla-tube as long as or shorter than the petals, each of them with two dorsal appendages which are mostly about as long as

the petals and of the same shape but often narrower and more acute, rarely much shorter (about $\frac{1}{2}$ or less in *M. kanosiensis* and *M. vitiensis*); stamens 6, epipetalous; staminodes 6 alternipetalous and in the same row as the stamens, differently shaped, broadly ovate, acuminate to small or subulate, irregularly dentate or fimbriate, trifid or bifid, sometimes scalelike, very rarely reduced to none (*M. fasciculata*, *vitiensis*); ovary 15—6-celled, pubescent, but sometimes surrounded by a glabrous adnate disc; cells 1-ovuled, ovules ventrally or basiventrally attached; fruit drupaceous, but pericarp often rather dry, 6—1-seeded; scar of the seed ventral or basiventral, long and narrow or rarely larger and ovate (*fasciculata*) or circular (*M. Bojeri*, *dissecta*, *Eickii*); albumen abundant, the cotyledons thin. About 74 species in all tropical countries, of which about 25 in Central America, about 34 in the African region and some 15 in Asia-Polynesia.

Key to the Far-Eastern species (cf. Table II, p. 353).

- 1 a. Leaves minutely tomentose or sericeous and therefore pale underneath 2
- b. Leaves entirely glabrous, the two surfaces of the same colour, though sometimes of different shades 5
- 2 a. Leaves small, $2\frac{1}{2}$ — $7\frac{1}{2}$ by $1\frac{1}{2}$ — $3\frac{1}{2}$ cm, densely crowded at the tips of the branchlets, with narrow base, petioles 1—2 cm long; fruit not longer than 1 cm, scar on the seed circular. *Pacific Isl.* 1. *M. dissecta*, var. β Pancheri
- b. Leaves larger, 5—13 by $3\frac{1}{2}$ — $8\frac{1}{2}$ cm, petioles $1\frac{1}{2}$ — $5\frac{1}{2}$ cm 3
- 3 a. Leaves elliptic-ovate to somewhat obovate, little broader in the upper half than in the lower, base broadly acute to subrotundate; flowers 0.9—1.0 cm long, the pistillum 1.5 cm with the style well exsert; petals 0.9 cm long, tube 0.3 cm; ovary 9—7-celled. *Fiji* 2. *M. Smithiana*
- b. Leaves mostly distinctly obovate with narrow base and broad upper half 4
- 4 a. Leaf-base acute to rotundate, basal angle 75° — 180° ; nerves ascending at an angle of 60° — 70° ; flower buds ovoid, 0.6—0.7 cm long, the pedicels not gradually incrassate at top; appendages as long as petals, staminodes 0.35 — 0.5×0.15 — 0.3 cm; ovary with distinct glabrous annular disc at base, 7—6-celled. *S. E. Asia—Australia* 3. *M. Kauki*
- b. Leaf-base always acute, basal angle 80° — 90° ; nerves ascending at an angle of 45° — 50° ; flower buds club-shaped, borne upon gradually incrassate pedicels and about 1 cm long; appendages about $\frac{2}{3}$, as long as petals; staminodes 0.25 — 0.4×0.1 — 0.15 cm; ovary without disc, 6-celled. *C. and N. Celebes* 4. *M. celebica*
- 5 a. Flowers small, calyx 0.4—0.7 cm long 6
- b. Flowers larger, calyx 0.8—1.4 cm long 10
- 6 a. Secondary nerves, though faint, distinguishable from the tertiary ones and at the margin archingly joined 7
- b. Nervation striate, all nerves about as faint, close to the margin united to form a distinct intramarginal nerve 8

- 7 a. Leaves $2\frac{1}{2}$ — $7\frac{1}{2}$ by $1\frac{1}{2}$ — $3\frac{1}{2}$ cm, obovate with narrow base; pedicels $1\frac{1}{2}$ —2, in fruit $2\frac{1}{2}$ —3 cm; ovary 6-celled, with glabrous disc; fruit not longer than 1 cm; scar on the seed small and circular. *W. Pacific Isl.* 1. *M. dissecta*, var. α *typica*
- b. Leaves $3\frac{1}{2}$ —11 by $2\frac{1}{2}$ — $6\frac{1}{2}$ cm, oblong or ellipsoid to slightly obovate with broad base; pedicels 0.8—0.9 cm long; ovary 12—9(—6)-celled, with glabrous disc; fruit 1— $1\frac{1}{2}$ cm long; scar on the seed oblong. *Continental Asia* 5. *M. hexandra*
- 8 a. Leaves obovate with narrow base, nerves ascending at an angle of 60° — 70° ; appendages about as long and broad as the petals; staminodes broad and dentate or denticulate; fruit about $1\frac{1}{2}$ by 1 cm, scar on the seed oblong. *Caroline Isl.* 6. *M. udoido*
- b. Leaves oblong or elliptic or slightly obovate, base not conspicuously narrower; nerves ascending at an angle of 70° — 80° 9
- 9 a. Staminodes ovate or ovate-oblong, the apex with some teeth; appendages probably about $\frac{2}{3}$ of the length of the petals, lanceolate-oblong. *Philippines, C. Celebes, N. Moluccas* 7. *M. Merrilliana*
- b. Staminodes filiform, sometimes wanting; appendages subulate, about $\frac{3}{4}$ as long as the petals. *New Guinea* 8. *M. fasciculata*
- 10 a. Leaves obovate, the base rounded or slightly subcordate, the apex broad and usually emarginate, petioles 1.2—1.8 cm, pedicels 2.5—3.5 cm long; appendages as long as the petals, about 0.7 cm. *India* 9. *M. Roxburghiana*
- b. Leaves elliptic or oblong to oblong-obovate, the base acute or subrotundate, the apex subrotundate or obtuse, sometimes somewhat emarginate; pedicels 1.5—2.5 cm long; appendages $\frac{1}{6}$ — $\frac{2}{3}$ as long as the petals 11
- 11 a. Leaves 5—9 by $3\frac{1}{2}$ —5 cm, apex rotundate and often slightly smarginate; petioles 1— $2\frac{1}{2}$ cm long; calyx 1 cm, petals 0.65 cm long; ovary with glabrous disc. *Papua* 10. *M. kanosiensis*
- b. Leaves $7\frac{1}{2}$ —13 by 3—5 cm, apex obtuse; petioles 2— $5\frac{1}{2}$ cm long; flower-buds oblong and acute; calyx 1.1—1.4 cm, petals 1.0—1.3 cm long; ovary without disc. 12
- 12 a. Secondary nerves ascending at an angle of about 85° , tertiary nerves about 3 between each pair of secondary ones; pedicels incrassate towards the top, the bud about $1\frac{1}{2}$ by 1 cm; petals 1.1—1.3, the appendages 0.75 cm long, staminodes 0.3—0.6 by 0.2—0.3 cm; ovary 9-celled. *Samoa* 11. *M. samoensis*
- b. Secondary nerves ascending at an angle of about 70° , tertiary nerves mostly one between each pair of secondary ones; pedicels less incrassate towards the bud, which measures about 1 by 0.3—0.4 cm; petals 1—1.2, the appendages 0.25 cm long, staminodes, if any, 0.2 by 0.2 cm; ovary 6-celled. *Fiji* 12. *M. vitiensis*

Incompletely known:

13. *M. emarginata* (Hawaii), 14. *M. Kurziana* (Burma), 15. *M. littoralis* (Farther India).

1. *M. dissecta* (L. F.) DUBARD, Ann. Mus. Col. Mars. 23, 1915, 13; GUILLAUMIN, Journ. Arn. Arb. 13, 1932, 15 — *Achras dissecta* L. F. (not of FORST.), Suppl. 1781, 210 — *Mimusops dissecta* R. Br. (not of

BUCH.-HAM.), Prodr. 1810, 204 and 531 (in obs.); HEMSLEY, Journ. Linn. Soc. Bot. 30, 1895, 183 (sub *Mimusops Kauki*) — *Mimusops Pancheri* BAILL., Bull. Mens. Soc. Linn. Par. 114, 1891, 907 — *Manilkara Pancheri* (BAILL.) DUB., l. c. 1915, 12 — Fig. 1.

A moderate-sized tree with heavy gnarled trunk and dense foliage. Young branchlets terete, 0.2—0.4 cm thick, older ones densely scarred and 0.5—0.6 cm thick. *Leaves* estipulate, densely crowded at the tips of the branchlets, coriaceous and bright green with a semitransparent edge when alive, very rigid and brittle when dry and very dark brown or brown on both sides (var. α) or with a pale underside (var. β), glabrous from the beginning (var. α) or with a more or less persistent pale indumentum at the lower surface and more or less glabrescent afterwards (var. β), obovate with cuneate base and rounded or rarely subacute, often slightly emarginate apex, 2.5—7.7 by 1.5—3.8 cm, petioles 0.8—1.8 cm, slender, sulcate above. Midrib somewhat depressed above, prominent below; secondary nerves hardly conspicuous, 8—12, ascending at an angle of about 65°, straight or nearly so, not very close to the margin faintly archingly joined; tertiary nerves consisting of a more or less longitudinally stretched reticulation parallel to the secondary ones, extending even beyond the marginal arches. *Flowers* axillary, densely crowded between the leaves, 1—3 in an axil, the pedicels curved downwards, more or less tomentose to almost glabrous, in flower 1.7—2.1 (var. α)—2.7 (var. β) cm, in fruit 2.5—2.8 (var. α)—3.7 (var. β) cm long, slightly incrassate below the ovoid obtuse bud and particularly below the fruit; flowerbuds about 0.5 cm long. *Sepals* 3 + 3, greyish or pale-brown tomentose without, glabrous within, the outer ones obtusely triangular and about 0.5—0.65 by 0.25—0.35 cm, inner ones ovate or ovate-oblong and 0.5—0.7 by 0.2—0.4 cm. *Corolla* glabrous, the tube about 0.1 cm long, the 6 petals oblong and obtuse, 0.45—0.55 by 0.1—0.15 cm, appendages narrower and subulate, little shorter than the petals, 0.25—0.45 by 0.06—0.15 cm. *Stamens* 6, the filaments terete, broader at base and 0.2—0.3 cm long, anthers acuminate and versatile, 0.2—0.3 cm long; *staminodes* ovate-acuminate with irregularly undulate or dentate margin, 0.1—0.2 by 0.06—0.1 cm. *Ovary* semiglobose to subconical, 6-angulate and 6-celled, pubescent, with a shallow glabrous adnate disc at the base, contracted into a glabrous truncate style of about 0.6—0.8 cm long; ovules basiventrally attached. *Fruit* 1-seeded, pulverulent but glabrescent, the sepals reflexed, ovoid to subglobular and 0.6—1 by 0.5—0.7 cm (var. α) or oblong and 0.9—1 by 0.45—0.5 (var. β), pericarp apparently dry and very thin,

crowned by the style at the apex. *Seed* with a very thin testa (0.015 cm thick), oval and $0.6-0.75 \times 0.5 \times 0.35-0.4$ cm or more oblong and $0.9 \times 0.4 \times 0.4$ cm, sometimes with 3 more or less pronounced ribs on the ventral side, scar basiventral to almost basal, elliptic, $0.3-0.35$ by $0.2-0.22$ cm; albumen abundant, surrounding the thin cotyledons and the short and blunt but not exert radicle.

Var. α *typica* MAAS GEESTERANUS, nov. var. (*Achras dissecta*, l. c.) — Folia ab initio glabra, i. s. saepe fusca. Pedicelli florigeri subglabri 1.7—2.1 cm, fructigeri 2.5—2.8 cm longi. Fructus ovoidei vel subglobosi, $0.6-1 \times 0.5-0.7$ cm.

SAMOA: T. POWELL 187 (several sheets in Herb. Kew, fr. in Jun. 1877, flow. in Aug. 1878; nat. name: "pani" or "o le pani". Annotations by Rev. POWELL: "The trunk of this tree is gnarled, twisted and knotted, and grows "to a very large size 20—30 ft in circumference. It gives off very numerous "aerial roots which hang down and then grow into and unite with any part of "the trunk below with which they come in contact, and this to a great extent "is the cause of the gnarled knotted appearance: at about 6—8 ft up it gives "off large, sub-erect branches: it attains a height of only 20—30 ft. — A sticky "gum exudes from the bark when wounded and also spontaneously from the "young branches. The bark also yields a bright reddish-brown dye which the "natives use to tinge their hair and paint their siapo — Jan. 13th 1877."

TONGA — s. loc.: FORSTER s. n. (*type specimen* in Herb. Kew and Herb. Berl., flow.); Tonga Tabu: U. S. Explor. Exp. under Capt. WILKES (in Herb. Kew, y. fr.).

Remarks: During an earlier part of this investigation we disposed of another specimen, attributed with some doubt to var. α , viz.:

NEW CALEDONIA — Isle of Pines: PELLETIER 39 (nat. name: *bugni* [french pronunciation]). This specimen is, however, no longer available, so that it could eventually not be checked. It was sterile and — possibly consequently — the leaves are exceptionally large, viz. up to 13.2×5.9 cm. The specimen, if correctly identified, is of special interest since both varieties should then be found in New Caledonia.

Var. β *Pancheri* (BAILL.) MAAS GEESTERANUS (*Mim. Pancheri*, l. c.) — Folia subtus cum petiolis innovationibusque tomentosa, adulta subglabrescentia, i. s. saepe brunnea. Pedicelli florigeri pubescentes, 2.2—2.7, fructigeri 2.7—3.7 cm longi. Fructus oblongi, $0.9-1 \times 0.45-0.5$ cm.

NEW CALEDONIA — s. loc.: PANCHER s. n. (*type specimen* in Herb. Par.); Isle of Pines, Observatory: † COLL. († MILNE) 430 (Herb. Hookerianum in Herb. Kew; sea shore shrub, flow. in Dec. 1853); Ile des Pines: M. GERMAIN s. n., A° 1874—1876, reçu du R(év.) P(ère) GOUJON, in Herb. Par.; flow. and fr.; nat. name: *bunyi*) — Lifu: BALANSA 1821 (Herb. Par., fr.); between Tio and Nékété: ID. 3470 (Herb. Par., fr.).

Distribution: Samoa, Tonga, New Caledonia, New Hebrides (*Aneityum*, f. GUILLAUMIN, l. c.).

2. *M. Smithiana* H. J. LAM & MAAS GEESTERANUS, nov. spec. — *Fig. 2*
 — Arbor parva. Ramuli grisei, 0.4—0.7 cm crassi. *Folia* coriacea, estipulata ad ramulorum apices laxe conferta, e petiolis 2.5—4.5 cm longis sericeis supra sulcatis elliptico-ovata vel paulo obovata, basi late acuta ad subrotundata, apice rotundata, interdum brevissime obtuse acuminata, 7—11 cm longa, 3.5—6 cm lata, supra i. s. olivacea et glabra, subtus grisei-sericea. Costa supra sulcata, subtus prominens; nervi secundarii, paulo curvati, supra haud, subtus vix conspicui, 15—20, angulo 70°—75° adscendentes, prope marginem nervo intramarginali paulo arcuato juncti; nervi tertiarum 1(—3) gracillimi inter secundarios, reticulatione vix conspicua supra minutissime bullata. *Flores* in superiorum foliorum axillis solitariae vel bini; pedicelli recurvi cum sepalis griseo-ferrugineo-tomentosi, 1.5—2.2 cm longi, apice sensim incrassati. *Sepala* 3 + 3, intus subglabra, acuta, exteriora oblongo-lanceolata, 0.85—0.9 × 0.3—0.35 cm, interiora lanceolata, 0.95—1.0 × 0.25—0.3 cm. *Corolla* glabra, tubo 0.3 cm longo, petala 6 oblonga, obtusa, 0.9 × 0.25 cm, appendicibus lanceolatis acutis, 0.65—0.7 × 0.25 cm. *Stamina* 6, filamentis 0.5 antheris 0.4 cm longis; *staminodia* oblongo-ovata apice irregulariter dentata, 0.4—0.45 × 0.25 cm. *Ovarium* 7—9-loculatum, semiglobosum, pubescens, basi disco angusto glabro adnato cinctum, 0.25 cm altum, in stylum glabrum, 1.25 cm longum contractum; ovula hemi-anatropa loculi medio ventraliter affixa. *Fructus* ignotus.

A small tree. Branchlets greyish, 0.4—0.7 cm thick. *Leaves* stipulate, laxely conferted at the tips of the branchlets, coriaceous, glabrous and when dry olivaceous above, greyish sericeous below, elliptic-ovate or somewhat obovate, base broadly acute to subrotundate, apex rotundate, sometimes minutely bluntly acuminate, 7—11 × 3.5—6 cm, petioles 2.5—4.5 cm long, canaliculate above, greyish tomentose. Midrib sulcate above, prominent below; secondary nerves very faint, arising at an angle of 70°—75°, somewhat conspicuous below, 15—20, gently curved, near the margin flatly archingly joined into an intramarginal nerve; tertiary nerves 1(—3) between each pair of secondary ones still fainter, reticulation hardly conspicuous, very minutely bullate above. *Flowers* 1 or 2 in the uppermost leaf-axils, pedicels greyish-ferruginously tomentose as are the sepals, incrassate at apex, 1.5—2.2 cm long. *Sepals* 3 + 3, acute, subglabrous within, the outer ones oblong-lanceolate, 0.85—0.9 × 0.3—0.35 cm, the inner ones lanceolate and 0.95—1 × 0.25—0.3 cm. *Corolla* glabrous, tube 0.3 cm long, petals 6, oblong, obtuse, 0.9 × 0.25 cm, the appendages lanceolate, 0.65—0.7 × 0.25 cm. *Stamens* 6, the filaments filiform and 0.5 cm long,

anthers acute 0.4 cm; *staminodes* oblong-ovate with irregularly dentate apex, 0.4—0.45 × 0.25 cm. *Ovary* 9—7-celled, semiglobose, appressedly pubescent but for a shallow glabrous adnate disc at base, contracted into a glabrous subulate style of about 1.25 cm long; ovules ventrally affixed halfway up the cell, hemi-anatropous. *Fruit* unknown.

FLJI — Vanua Mbalavu, Malatta, forest, Southern limestone section, 0—100 m alt.: A. C. SMITH 1450 (*type specimen* in Herb. Bish. Mus. Honol. and Herb. Leiden; flow. March 29, 1934; tree 7 m high, corolla, filaments and staminodes white).

3. *M. Kauki* (L.) DUB., Ann. Mus. Col. Mars. 23, 1915, 9, fig. 1, 2; H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, 7, 1925, 239 and 8, 1927, 481 — *Mimusops Kauki* L., Sp. Pl. ed. I, 1753, 349 — *Achras dissecta* FORST. F., De Plant. Esc. 1786, 43 — For further references cf. the above-quoted papers — *Fig. 3*.

Trees up to 20 m high, with dense greyish foliage and white latex. Branchlets sympodially composed, terete, 0.25—0.5 cm thick, the older ones verrucose by leafscars. *Leaves* conferted at the tips of the branchlets, glabrous and shiningly dark green above, silvery glossy underneath by a very much appressed indumentum, the older ones dirty greyish, glabrescent and dull, rigid, broadly obovate, the base acute to almost rounded, basal angle 75° to almost 180°, apex sometimes emarginate, mostly rounded to obtuse or somewhat acute, 5—13 by 3.5—8.5 cm, petioles (1.6—)2—4(—5.5) cm, slender; midrib depressed above, prominent below; secondary nerves straight or mostly somewhat curved, faintly conspicuous, 12—18 on either side, angle 60°—70°, diminishing towards the apex, archingly joined near the margin, the tertiary ones still fainter and strictly parallel, with a very minute reticulation between. *Flowers* up to 1 cm long and broad, solitary or 2, rarely 3 together in the leaf-axils, the pedicels curved, 1.3—2.1, in fruit (1.3—)2—3.3 cm long, appressedly light-brown pubescent as are the sepals. Flower buds ovoid, obtuse, the pedicel not gradually incrassate below the bud. *Sepals* 3 + 3, acute, spreading, often reflexed in the fruit, sparsely pubescent or subglabrous within, the outer ones 0.6—0.75 by 0.35—0.45 cm, the inner ones 0.65—0.7 by 0.3—0.45 cm. *Corolla* light-yellow, glabrous, hardly exsert, the tube 0.15—0.3 cm long, petals lanceolate with subacute apex, 0.45—0.7 by 0.1—0.25 cm, appendages of same shape and dimensions. *Stamens* and staminodes equally long or the staminodes somewhat shorter, but shorter than the petals, filaments 0.2—0.3, the anthers 0.2—0.4 cm long, stout; *staminodes* ovate-acuminate with fimbriate or irregularly dentate margins, often more or less bifid at top, 0.35—0.5 × 0.15—0.3 cm. *Ovary* 8—6-celled, pubes-

cent but surrounded by a glabrous adnate disc, subabruptly narrowed into the filiform and glabrous style, which is 0.8—0.95 cm long and exerted above the corolla. *Fruit* ovoid, reddish or orange-brown, somewhat shining with pretty dry pericarp, 6—1-, mostly 3—2-seeded, 2.5—3.7 × 1.8—3.3 cm. *Seeds* ovate in cross-section or ± flattened, shiningly pale brown, rounded at apex, bluntly acute at base, 1.5—1.8(—2.25) × 0.8—1.2(—1.35) × 0.55—0.8(—1.05) cm, testa about 0.1—0.15 cm thick, crustaceous, the scar narrow, 0.65—1.1 × 0.15—0.25(—0.35) cm, situated in the lower half of the seed.

The following specimens may be cited in addition to those quoted formerly:

COCHIN CHINA, foot of Mt. Djal, prov. Chandoc: PIERRE 3260.

JAVA — s. loc.: DE VRIESE (Herb. Leid. 908.225—332, 333 and 340); VAN ROYEN (H. L. 908.225—321); BLUME (H. L. 908.225—330, 336, 354 and 355); KOORDERS 10142 β, 10143 β; Batavia, Tandjoengpriok: KUEHL & VAN HASSELT (H. L. 908.225—322); Batavia, Middelburg Isl.: HOOGEWERF; Banten, Pandeglang, Trouwerseiland, at sea coast: FOR. RES. INST. Ja. 2598.

BALI — Prapatagoeng, frequent in rain forest on limestone, 100—300 m alt.: VAN STEENIS 7667, nat. n.: *sawo ketjip*.

SOEMBAWA — Kangga, 5 m alt.: FOR. RES. INST. bb. 12036, nat. n.: *sawo kala*.

BANDA — COLL. ? s. n.

NEW GUINEA — Papua, Western Div., Daru Isl.: BRASS 6443; Mabaduan: ID. ? 6476, common on granite slopes along coast.

N. AUSTRALIA — Warrior Isl.: LE GULLOU, A° 1841.

Distribution: Siam, Cochin China, Burma, Malay Peninsula, Sumatra (P. Weh), Java, Karimoendjawa, Madoera, Kangean, Bali, Boetoeng, Jolo (Phil. Isl.), Soembawa, Banda, New-Guinea, N. Australia (Torres Str.).

Remarks: Rather variable as to the shape of the leaves and the proportion of leaf-length and length of petioles (1.7—6.2, but mostly about 3); also regarding the situation and the dimensions of the seed scar. Remarkably broad scars were found in a cultivated specimen (Java, Tjipakoe, leg. OCHSE), in which they were 0.65—0.95 × 0.32—0.35 cm, but as perfectly normal seeds were also extant under the same number (scar 1.0 × 0.18 cm), this condition should not be overestimated. In a specimen from Warrior Isl. (leg. LE GULLOU) the only seed extant was exceptionally large, viz. 2.25 × 1.30 × 1.05 cm, the scar being 1.4 by 0.31—0.39 (broader above). The specimen BRASS 6467 from Papua is somewhat doubtful, being distinguished by small and relatively very broad leaves (about 6 × 4.5 cm) with very short petioles (about 1.5 cm) and short fruit pedicels (1.2—1.7 cm).

4. *Manilkara celebica* H. J. LAM, nov. spec. — *Fig. 4* — Arbor mediocris. *Folia* eis *Manilkara Kauki* similia, sed basi semper acuta (angulo basali 80° — 90°), apice rotundata vel paulo emarginata, 5.5—11.1 cm longa, 3.5—6.7 cm lata, petioli 1.6—3.6 cm longi; nervi angulo c. 40° — 50° adscendentes. *Alabastra* clavata, pedicellis gradatim incrassatis, pubescentibus, 1.4—1.5 cm longis. *Sepala* 3 + 3, pubescentia, oblongo-acuta, c. 1 cm longa, 0.4 cm lata. *Corolla* glabra, c. 0.8 cm longa, appendicibus dorsalibus c. $\frac{2}{3}$ petalorum longitudine. *Stamina* filamentis brevibus c. 0.5 cm longa; *staminodia* oblongo-lanceolata staminibus breviora, apice grossedentata. *Ovarium* usque ad basin pubescens, haud disco suffultum, 6-sulcatum, 6-loculatum, in stylum filiformem c. 0.9 cm longum contractum. *Fructus* ignoti.

A tree with white latex, about 25 m high, branchlets 0.4—0.5 cm thick, the older ones verrucose. *Leaves* crowded at the tips of the branchlets, estipulate, rigid, obovate, apex broadly rotundate or slightly emarginate, base acute (basal angle 80° — 90°), glabrous above, lower side with a sparse and appressed ferruginous silky indumentum, glabrescent, 5.5—11.1 by 3.5—6.7 cm, petioles 1.6—3.6 cm, slender; midrib depressed above, prominent below; secondary nerves very slender, about 13 on either side, straight or mostly somewhat curved, ascending at an angle of 40° — 50° , this angle diminishing towards the apex, close to the margin archingly joined, tertiary nerves, slightly fainter and 1—3 parallel between each pair of secondary ones, with a minute, longitudinally stretched reticulation between them. *Flowerbuds* obtusely club-shaped, the pedicel gradually incrassate, appressedly pubescent as is the calyx. Pedicels 1.4—1.5 cm long, one or two in a leaf axil. *Sepals* 3 + 3, oblong, acute, greyish tomentose without, brownish within, the outer ones 0.95—1.0 by 0.35—0.45 cm, the inner ones 0.9 by 0.35 cm. *Corolla* glabrous, tube about 0.08 cm, petals 6, obtusely oblong, about 0.7 by 0.3 cm, the dorsal appendages about two thirds their length, lanceolate with minutely undulate margins at base, and acute apex, 0.45—0.5 by 0.15 cm. *Stamens* 6, 0.45—0.5 cm long, with short filaments (0.15—0.2 cm long), anthers minutely apiculate, 0.35—0.4 by 0.1—0.15 cm; *staminodes* 6, oblong-lanceolate, 0.25—0.4 by 0.1—0.15 cm, margins undulate at base, the upper half with some irregular teeth. *Ovary* pubescent down to the base, without disc, 6-furrowed and 6-celled, contracted into the filiform style, which is 0.9—0.95 cm long. *Fruit* unknown.

CELEBES — Res. Manado, dist. Boalemo, na. Bilato, about 50 m alt.: FOR. RES. INST. bb. 16.979 (*type specimen*, Herb. Buitenz., Herb. Leiden; flow. in May; nat. [Gorontalo] name: *timboewolo*); same locality, 300 m alt., some specimens

together, in old dry forest on slope: Id. bb. 19.401 (tree, 24 m high, bole 11 m, diam. 0.73—0.54 m, nat. [Gorontalo] name: *timboalo*, ster.); Res. Manado, dist. Posso, nr. Kotamboea (Mawoeroto), 50 m alt., rather scarce, in dry old forest: FOR. RES. INST. bd. 19.637 (tree, 25 m high, bole 10 m, diam. 0.53—0.46 m, nat. [Bare'e] name: *komea*).

Remarks: A species closely related to *M. Kauki*, but distinctly different by its leaves with acute base and the small angle of the nerves, the club-shaped flowerbuds with incrassate pedicels, the longer sepals, the petal-appendages being shorter than the petals, the larger anthers, the narrow staminodes and the ovary without disc.

5. *M. hexandra* (ROXB.) DUB., Ann. Mus. Col. Mars. 23, 1915, 9, fig. 2; MERRILL, Lingn. Sc. Journ. 14, 1935, 47 — *Mimusops hexandra* ROXB., Pl. Corom. I, 1795, 16, t. 15; CLARKE in HOOKER F., Fl. Br. Ind. III, 1882, 549; BRANDIS, Indian Trees 1906, 425, fig. 163; COOKE, Fl. Bombay II, 1908, 95; GAMBLE, Fl. Pres. Madras IV, 1921, 766 — *M. indica* A. DC., Prodr. VIII, 1844, 205; WIGHT, Ic. Pl. IV, 1850, t. 1587 — Fig. 5.

A tree, up to 20 m high, with greyish bark, very hard and red wood and dense foliage. *Leaves* more or less crowded at the tips of the branchlets, estipulate, shiningly green on either side, rigid, entirely glabrous, oblong or ellipsoid to slightly obovate, base broadly acute to (sub)rotundate, apex rotundate and usually distinctly emarginate, 3.4—11 by 2.3—6.7 cm long, petiole short, sulcate above, 0.4—2.3 cm long; midrib depressed above, prominent below; secondary nerves 13—18, slender but conspicuous, straight, ascending at an angle of 65°—75°, near the margin high archingly joined, tertiary nerves 1 to 3 parallel between each pair of secondary ones, with a minute reticulation between. *Flowers* comparatively small, about 0.7 cm wide, 1—4 in the leaf-axils, pedicels 0.8—0.9 cm long, not elongate in fruit, glabrous or nearly so, as are the outer sepals. *Sepals* 3 + 3, deltoid, 0.4—0.45 cm long, the inner ones more tomentose and narrower. *Corolla* white, glabrous, tube 0.1 cm long, petals 6, lanceolate, 0.3—0.35 by 0.1 cm, the appendages slightly longer, 0.35—0.4 by 0.1 cm. *Stamens* 6, the filaments filiform and about 0.25 cm, the anthers acutely ovoid, about 0.2 cm long; *staminodes* 6, bifid or dentate, 0.25 cm long. *Ovary* furrowed, tomentose but with a shallow, glabrous disc, 12—9(—6)-celled, contracted into a filiform style of about 0.5 cm long. *Fruit* ovoid to subglobose, reddish-yellow, 1—1.4 cm long, (2- or) 1-seeded, pericarp rather dry. *Seeds* reddish-brown, flattened, 1—1.2 × 0.6 × 0.35 cm, scar basiventral, 0.5—0.6 × 0.1—0.18 cm, wider at top end, testa thin, about 0.02 cm.

Exsiccatae examined in Herb. Leiden (cultivated specimens excepted):

INDIA: Deccan Peninsula: LESCHENAUIT.

SIAM: ♀ COLL. 1996; KERR 16130.

COCHIN CHINA: Prov. Bien Hoa, Tri Huyen: Herb. PIERRE 3261; Baria, Mt. Dinh: Herb. PIERRE 3261.

INDO-CHINA: Annam: J. & M. S. CLEMENS 3200.

Distribution: In evergreen dry forests in Deccan Peninsula, Ceylon, Siam, Indo-China, Hainan (f. MERRILL, l. c.).

6. *M. udoido* KANEHIRA, Bot. Mag. Tokyo, 47, 1933, 677, in Fl. Micrones. 1933, 304, fig. 154 and in Journ. Dept. Agr. Kyushu Imp. Univ. 4, 1935, 388 — Fig. 6.

A medium-sized tree, 8–20 m high. Branchlets rather thick (0.4–0.8 cm) and scarred. *Leaves* crowded at the tips of the branchlets, estipulate, both sides the same colour when dry, entirely glabrous, very rigid, oblong-obovate to oblanceolate with cuneate to attenuate base and rounded (rarely slightly emarginate) to (in young specimens) acute apex, (3.5–) 7–10 (–13) by (1.7–) 2.5–4 (–5) cm, petioles (1.2–) 1.6–2.3 (–2.8) cm long, sulcate above. Midrib depressed above, prominent below. Nervation of the type of *M. calophylloides* and *fasciculata*, the secondary nerves (about 15) hardly stronger than the tertiary nerves, close to the margin united to form a distinct intramarginal nerve, all nerves straight or nearly so and striate, ascending at an angle of 60°–70°. *Flowers* solitary or 2–3 in the leaf-axils, the pedicels curved downward, glabrous and hardly or not incrassate towards the small, ovoid bud, 2.2–3.5 cm long. *Sepals* 3 + 3, ovate, broadly acute to subrotundate, minutely tomentose outside but glabrescent, glabrous within except the margin, 0.45–0.55 by 0.3 cm. *Corolla* glabrous, the tube thick, 0.1–0.2 cm long; petals 6, oblong with broadly acute tip, 0.35–0.42 by 0.12–0.15 cm, appendages acutely oblong, 0.3–0.35 by 0.1–0.15 cm. *Stamens* 6, the stout filaments about 0.2 cm long, the oblong anthers 0.2–0.25 cm; *staminodes* 6, thick and scale-like deltoid or subtruncate with undulate margin, sometimes with 1–3 protracted teeth, 0.1–0.2 by 0.1–0.15 cm. *Ovary* minutely pubescent, without disc, 6-furrowed, 6-celled, contracted into a rather short style of 0.5–0.7 cm long. *Fruit* 1-seeded, oblong, about 1.5 by 1 cm. *Seeds* oblong, pointed below, about 1.2 by 0.5 cm, the scar more than half as long as the seed and narrow, about 0.8 × 0.18 cm, testa for the genus very thin (0.02 cm).

CAROLINE ISLANDS — Palao Isl., no further locality: KRAEMER s. n. (ster. in Herb. Berl.); Ibid., Babelthaop, nr. Ngatkip, in forest, 100 m alt.: LEDERMANN

14491 (tree, 15—20 m high, with broad crown, flowers white, fragrant, fruit red, leaves dull green with yellowish green lower side and pale-yellow midrib, bark light-grey, buds on 6. 3. 1914, nat. name: *auduidh*; Herb. Berl.); same locality: Id. 14510 (large shrub, 1—1.5 m high, bark light-grey, latex extant, leaves shiningly dark green, ster.; Herb. Berl.); Ibid., Babeldaob: S. NISIDA 2776 (fl.; Herb. Leiden); Ibid., Girikiyai, forest, rare: M. TAKAMATSU 1751 (tree, flow. Apr.; Herb. Leid.).

Remark: The native name is "*udoido*" (KANEHIRA), or "*auduidh*" (LEDERMANN).

7. *M. Merrilliana* H. J. LAM, nov. nom. — *M. calophylloides* (MERR.) H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, 7, 1925, 240, 268 and 8, 1927, 481 — *Mimusops calophylloides* (not of BAILLON 1892 in CORDEMOY 1895) MERRILL, Phil. Journ. Sci., Sect. C, 10, 1915, 337 and Enum. Phil. Flow. Pl. III, 3, 1923, 288 — Fig. 7.

A lofty tree. Branchlets slender, 0.2—0.4 cm thick. *Leaves* stipulate, entirely glabrous, more or less conferted (but not many) at the tips of the branchlets, bright- to dark-brown when dry, rigid, somewhat shining above, dull below, oblong or oblong-obovate, apex rounded to slightly acute and shortly and bluntly acuminate, base cuneate to broadly acute, 5.2—12.5 (—16) by 2.4—5.5 (—6.3) cm, petioles 1—3 (—3.7) cm long; midrib depressed above, prominent below; secondary nerves not or hardly distinguishable from the tertiary ones, all nerves close together, about 20 to a cm, striate, with a longitudinally stretched reticulation, straight or very faintly curved, angle (60°—)70°—80°, uniting to form a distinct submarginal nerve about 0.1 cm from the edge of the leaf. *Flowers* solitary or two to three in the axils of the leaves (only buds known), minutely velvety tomentose, the pedicels hardly 1 cm long, gradually incrassate towards the bud, the ovoid buds 0.5 cm long. *Sepals* 3 + 3, acutely deltoid, the inner ones narrower. *Corolla* glabrous, petals 6, ovate, appendages (in young bud) probably about $\frac{2}{3}$ as long as the petals, narrowly oblong. *Stamens* 6; filaments broadened at base, the anthers in the bud sagittate, glabrous; *staminodes* ovate to oblong, with some (often 3) teeth. *Ovary* minutely appressedly pubescent, without disc, 7—6-celled, style short and stout, glabrous. *Fruit* (f. MERRILL) globose, 2—2.5 cm in diam., brown when dry, tipped by the very short style, glabrous, the pericarp brittle, 1—2-seeded. Seeds brown and shining, obtuse, about 1.5 by 1 cm, slightly compressed.

In addition to the specimens quoted earlier, the following exsiccatae have to be mentioned:

CELEBES — Celebes & Dependencies, Malili, nr. Laroei, 400 m. alt., on steep

slope in old forest: FOR. RES. INST. hb. 19.574 (tree, 40 m high, bole cylindrical, 30 m, diam. 1.24 m at a height of 1.8 m, latex white, abundant, nat. [loewoe] n.: *koemea*).

MOROTAI — W. Morotai, E. of Pilowo, G. Ligoir nr. Goegoeti, 100 m alt., old forest on limestone, several specimens together: H. J. LAM 3584 (tree, about 30 m high, bole cylindrical \pm 20 m, diam. 0.6—0.4 m, wood very hard, bark rough and dark brown; branchlets grey-brown; leaves bright green, above darker than below, the petiole and the midrib lighter; nat. [alifoeroe] n.: *ligoir*; latex abundant, white, sticky and thick; formerly identified as *Northia fasciculata* [WARB.] H. J. LAM).

Distribution: Philippines (Luzon, Samar, Mindanao), Celebes (Central), Morotai.

Remarks: It is a pity that the few specimens known of this interesting species bear no open flowers and that MERRILL's description does not mention the shape of the scar on the seed. As to the leaf characters, it is certainly related to *M. fasciculata*, but the dorsal appendages and the staminodes are much larger. Likewise, the distribution points to an alliance with that species, *M. Merrilliana* being probably one of those species which mark the Central Moluccas — Central Celebes — Philippines migration track (cf. H. J. LAM, *Blumea* 3, 1938, 144—146).

M. Merrilliana is a very high and stately forest tree; the field label of the Celebes specimen quoted above gives strikingly the same points which characterized the specimens, I observed myself in Morotai, where I measured a tree with a trunk of 1.80 m diam. at a height of 1.5 m. The ovary is minutely pubescent, not glabrous, as is mentioned by MERRILL.

8. *M. fasciculata* (WARB.) H. J. LAM & MAAS GEESTERANUS, nov. comb. — *Mimusops fasciculata* WARB., ENGL. Bot. Jahrb. 13, 1891, 401; KRAUSE, ENGL. Bot. Jahrb. 58, 1923, 486 — *Mimusops Teysmanni* PIERRE in DUBARD, Ann. Mus. Col. Mars. 23, 1915, 12, fig. 4 — *Northia fasciculata* (WARB.) H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, 7, 1925, 241, fig. 63 — *Fig. 8*.

A tree, about 15 m high. Branchlets rather thick (0.7—0.8 cm), rough. *Leaves* estipulate, many of them crowded at the tips of the branchlets, rather rigid, brown when dry (hardly darker above), oblong or elliptic to somewhat obovate, base acute or slightly attenuate, apex rounded, often somewhat emarginate, 10—13 by 5.2—7 cm, petioles long, 3—4.1 cm; midrib somewhat sulcate above, prominent below; secondary nerves very slender, 25—30, ascending at an angle of about 75°, straight or nearly so, near the margin united into a distinct

intramarginal nerve, the tertiary ones only slightly fainter, parallel and connected by a more or less longitudinally stretched reticulation, extending even beyond the intramarginal nerve. *Flowers* 2—5 in the upper leaf-axils, pedicels slender, 1.3—1.6, in fruit 2.2—3 cm long, cinereous white, as are the sepals outside. Outer 3 *sepals* narrowly deltoid, about 0.4 by 0.22 cm, acute, the inner 3 ones narrower and oblong-ovate. *Corolla* glabrous, the tube 0.13 cm long, petals 6, ribbon-shaped, 0.5—0.6 by 0.1 cm, apex subacute to somewhat truncate and denticulate, appendages subulate, 0.1 cm broad at base, \pm 0.4 cm long. *Stamens* 6, the filaments stout and 0.25 cm long, anthers 0.25 cm, acuminate; *staminodes*, if any, filiform, 0.2—0.3 cm long, 0.05 cm broad at base, often wanting. *Ovary* tomentose without a disc, 6-celled, contracted into a style which is 0.8—0.9 cm long. *Fruit* 1-seeded, obovoid with rather dry pericarp, 2.7—3.3 by 1.8—2.1 cm. *Seeds* with a very thick and hard testa, 2.2—2.7 \times 1.4—1.6 \times 1.1—1.3 cm, testa 0.2 cm thick, scar basiventral, ovate, about 1.2—1.5 \times 0.75—0.8 cm.

Distribution: W. New Guinea, Kai Isl. (f. KRAUSE).

9. *M. Roxburghiana* (WIGHT) DUB., Ann. Mus. Col. Mars. 23, 1915, 10, fig. 3 — *Mimusops Roxburghiana* WIGHT, Ic. Pl. IV, 1850, t. 1588; CLARKE in HOOKER F., Fl. Brit. Ind. III, 1882, 548; BRANDIS, Indian Trees, 1906, 425; J. S. GAMBLE, Fl. Pres. Madras IV, 1921, 766 — *Manilkara Roxburghiana* (WIGHT) PARKER, Ind. Forester 57, 1931, 489.

A large tree. *Leaves* rigid, glabrous, ovate or slightly obovate, not crowded at the tips of the branchlets, rounded or slightly subcordate at base, often somewhat emarginate at apex, about 7.5 by 4.5 cm, petioles 1.2—1.8 cm. *Flowers* 2—4 in a leaf-axil, pedicels about 2.5—3.5 cm long, almost glabrous. *Sepals* 3 + 3, triangular-lanceolate, mealy-tomentose, about 0.8—0.9 cm long. *Corolla* about 1 cm long, with a comparatively long tube (0.3 cm, f. DUBARD); petals 6, oblong-lanceolate, appendages more acute and as long as the petals. *Stamens* 6 with filiform filaments and ovoid anthers; *staminodes* 6, slightly longer than the filaments, ovate to oblong, irregularly dentate. *Ovary* 9—? celled. *Fruit* globose, depressed above, 6—3-seeded, about 1.2 cm in diam. *Seeds?*

Distribution: India, Western Deccan Peninsula (Nilgiri, Anamalais), in dry forests.

Remarks: No specimens examined. Incompletely known to us. WIGHT's picture shows 8-merous as well as 6-merous flowers but CLARKE and DUBARD mention 6 as the number of calyx and corolla, although that of the staminodes is sometimes given as 6—8 (also for

M. hexandra). Nothing is known to us concerning the venation type and the seed-scar.

10. *M. kanosiensis* H. J. LAM & B. MEEUSE, nov. spec. — *Fig. 9* — Arbor parva. *Folia* haud conspicue ad ramulorum apices conferta, estipulata, glabra, coriacea, obovata, basi acuta, apice rotundata, saepe paulo emarginata, 5—9 cm longa, 3.3—4.8 cm lata, petioli 1.2—2.7 cm longi. Costa media subtus prominens. Nervi secundarii pergraciles, c. 12—15, angulo 60°—70° adscendentes, prope marginem nervo intramarginalem subarcuatim conjuncti, tertiarum paralleli reticulatione minuta. *Flores* 0.9—1.2 cm longi, axillares, 1—3 in axilla, pedicelli 1.5—1.8 cm longi, cum calycibus minute adpresse pubescentes. *Sepala* 3 + 3 deltoideo-lanceolata, acuta 1—1.1 cm longa, interiora angustiora. *Corollae* glabrae haud exsertae tubus 0.2 cm longus, petala 6 oblongo-lanceolata obtusa, 0.6—0.7 cm longa, 0.2—0.25 cm lata, appendicibus dorsalibus lanceolatis, c. 0.35 cm longis. *Stamina* 6, filamentis solidis 0.1 cm longis; antheris oblongis, 0.3 cm longis; *staminodia* 6 lata, irregulariter dentata, acuminata, c. 0.3 × 0.15 cm. *Ovarium* perminute pubescens, basi disco glabro adnato cinctum, subabrupte in stylum subulatum 1.2—1.8 cm longum contractum, (7—)6-loculatum. *Fructus* ignoti.

A small tree with white latex, about 7 m high. Branchlets 0.3—0.5 cm thick. *Leaves* not conspicuously conferted at the tips of the branchlets, estipulate, dark brown when dry, coriaceous, not very rigid, glabrous, obovate with acute base and rounded or slightly emarginate apex, 5—9 by 3.3—4.8 cm, petioles 1.2—2.7 cm long. Midrib depressed above, prominent below, secondary nerves 12—15, straight or slightly curved, very slender, ascending at an angle of 60°—70°, near the margin more or less archingly joined, tertiary ones hardly conspicuous, parallel, 1—3 between each pair of secondary nerves, with a minute reticulation between. *Flowers* 1—3 in the axils of the uppermost leaves, pedicels minutely appressedly tomentose, as are the sepals outside, 1.5—1.8 cm long. *Sepals* 3 + 3, pale grey-green, the outer ones acutely triangular and about 1.1 by 0.5, the inner ones acutely oblong and about 1 by 0.35 cm. *Corolla* pale greenish white, glabrous, the tube about 0.2 cm long, thick, the 6 petals obtusely oblong, about 0.65 × 0.2—0.25, the appendages slightly more than half as long, 0.35 by 0.1 cm with long tapering tip. *Stamens* 6, the stout filaments about 0.1 cm long, the oblong and subacute anthers 0.3 cm; *staminodes* 6, with thick basis and fan-like blade with irregularly dentate margin and a long protracted acumen, about 0.3 × 0.15 cm. *Ovary* very minutely pubescent, older ones glabrescent, at base surrounded by a glabrous

more or less undulate or angular adnate disc, (7—)6-celled, sub-abruptly contracted into the long and subulate style, which is 1.2—1.8 cm long and often slightly curved. Ovules basiventrally attached. *Fruit* unknown.

NEW GUINEA — Papua, Kanosia, edge of mangrove swamp, sea level: C. E. CARR 11237 (*type specimen* in Herb. Leid., flow. in Febr.).

11. *M. samoensis* H. J. LAM & B. MEEUSE, nov. spec. — *Fig. 10* — Arbor? Ramuli verrucosi. *Folia* nonnulla ad ramulorum apices conferta estipulata, i. s. fusca, coriacea, glaberrima, ± concoloria, oblonga, basi ± late acuta ad subrotundata, apice obtusa, 7.5—13.5 cm longa, 3.2—5.1 cm lata, petioli supra sulcati 2.3—3.6 cm longi. Costa media supra paulo depressa, subtus prominens. Nervi secundarii in foliis adultis inconspicui, c. 15, recti, angulo c. 85° de costa adscendentes, tertiarii gracillimi paralleli, reticulatione perminute areolata supra conspicua. *Flores* in foliorum axillis solitarii vel bini, pedicellis ferrugineo-tomentosis, 1.5—1.9 cm longis, alabastra anguste oblonga acuta c. 1.5 cm longa 0.5 cm lata versus sensim incrassatis, saepe reflexis. *Sepala* 3 + 3, oblongo-lanceolata, exteriora ferrugineo-tomentosa, interiora sericea, omnia intus apice sparse pubescenti excepta glabra, 1.1—1.4 × 0.35—0.5 cm. *Corollae* glabrae tubus 0.2 cm altus, petala 6 late lineata, 1.1—1.3 cm longa, 0.2 cm lata, obtusa vel acuta, appendicibus e basi ± 0.2 cm latis sensim angustatis, usque ad 0.75 cm longa. *Stamina* 6, filamentis basi dilatatis, apice filiformibus, 0.6—0.75 cm longis, antheris acuminatis c. 0.5 cm longis; *staminodia* oblongo-ovata, irregulariter dentata vel subtrifida, 0.3—0.6 cm longa, 0.2—0.3 cm lata. *Ovarium* conicum adpresse pubescens, 9-loculatum, 0.25 cm altum, in stylum glabrum 1.3—1.8 cm longum sensim contractum; ovula basiventraliter affixa. *Fructus* ignoti.

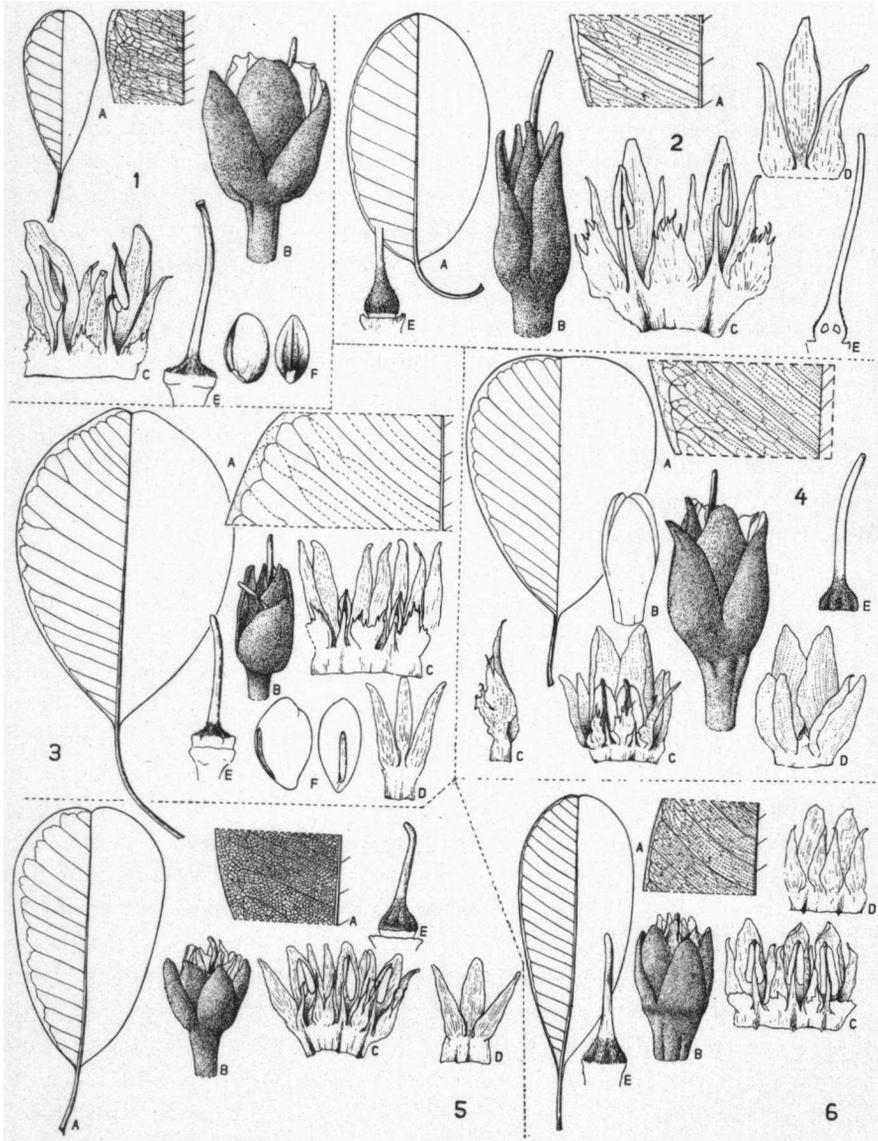
A tree? Branchlets about 0.5 cm thick, scarred. *Leaves* entirely glabrous, coriaceous and rigid, dark brown when dry, estipulate, rather conferted at the tips of the branchlets, oblong, base ± broadly acute to subrotundate, apex blunt, 7.5—13.5 cm long, 3.2—5.1 cm broad, the petioles sulcate above and 2.3—3.6 cm long. Midrib depressed above, strongly prominent below; secondary nerves hardly conspicuous in adult leaves, about 15, arising at an angle of about 85°, near the margin faintly and broadly archingly joined, tertiary nerves about 3 between each pair of secondary ones, but still fainter, an areolate and very minutely bullate reticulation conspicuous above. *Flowers* one or two in a leaf-axil, the pedicels and the outer sepals ferruginously tomentose, pedicels 1.5—1.9 cm long, curved downwards, incrassate

towards the buds which are narrowly oblong and acute and about 1.5 cm long and 0.5 cm in diam. *Sepals* 3 + 3, oblong-lanceolate, the outer ones about 1.25×0.45 , the inner ones 1.5×0.35 , inner ones sericeous outside, all sepals glabrous inside except near the apex where they are sparsely pubescent. *Corolla* glabrous, the tube 0.2 cm high, petals 6, ribbon-shaped and about 1.3×0.2 cm, appendages 0.2—0.25 cm broad at base, tapering into a filiform apex, 0.5—0.75 cm long. *Stamens* 6, the filaments broad at base, filiform at apex, 0.6—0.75 cm long, anthers acuminate, about 0.5 cm long; *staminodes* oblong-ovate, irregularly dentate or subtrifid, $0.3\text{--}0.6 \times 0.2\text{--}0.3$ cm. *Ovary* conical, without disc, appressedly pubescent, 9-celled, 0.25 cm high, gradually contracted into the stout style, which is 1.3—1.8 cm long; ovules basiventrally attached. *Fruit* unknown.

SAMOA: Rev. S. J. WHITMEE 226 (*type specimen* in Herb. Kew).

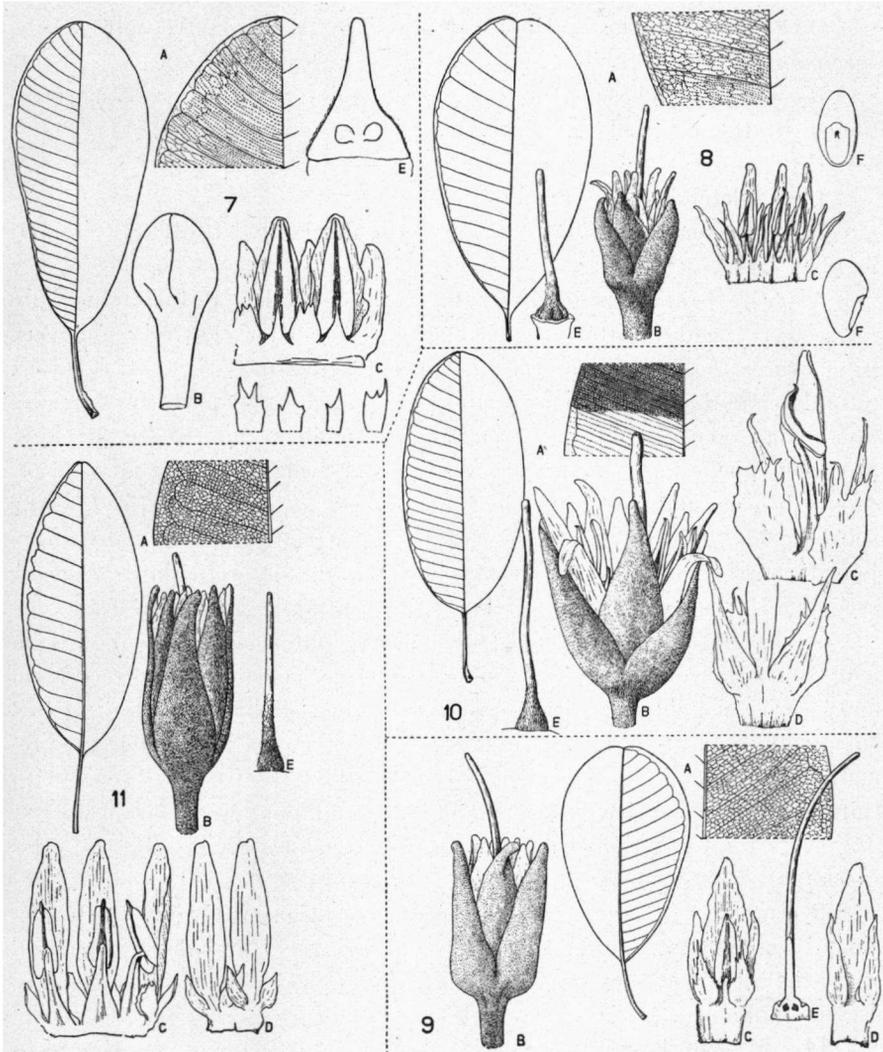
12. *M. vitiensis* (H. J. LAM & E. VAN OLDEN) B. MEEUSE, nov. comb. — *Northia vitiensis* H. J. LAM & E. VAN OLDEN, B. P. Bish. Mus. Bull. 141, 1936, 163, fig. 83 — *Fig. 11*.

A small tree, about 7 m high. Branchlets slender, greyish. *Leaves* estipulate, crowded (but not many) at the tips of the branchlets, entirely glabrous, pale greyish green but the young ones dark brown when dry, rigid, elliptic- or oblong-obovate, base broadly acute to subrotundate, apex obtuse, 9—12 by 3.5—5 cm, petioles slender, sulcate above, 2—4.5 cm long. Midrib depressed above, strongly prominent below; secondary nerves very faint, about 13—15, ascending at an angle of about 70° , straight or nearly so but slightly sinuate, near the margin rather high archingly joined; tertiary nerves mostly one between each pair of secondary ones, still fainter, with a minute but distinct reticulation between. *Flowers* 1 or 2 in the axils of the leaves, the pedicels 1.5—2.5 cm long, sparsely tomentose and slightly incrassate towards the narrowly oblong and acute buds, which are about 1 cm long and 0.3—0.4 cm across. *Sepals* 3 + 3, sparsely tomentose without, oblong-lanceolate, 1.1—1.2 by 0.25 (inner)—0.35 cm, the inner ones thinner and with woolly margins. *Corolla* white, tube 0.15—0.2 cm long, petals 6, oblong obtuse, $1\text{--}1.2 \times 0.2\text{--}0.25$ cm, appendages about 0.25 by 0.1 cm, lanceolate. *Stamens* 6, the filaments stout and broadened at base, 0.4 cm long, anthers oblong, apex mucronulate, base sagittate, 0.35 cm long; *staminodes*, if any, thin and ovoid or almost circular with denticulate margins, about 0.2×0.2 cm, but the two halves folded together, often wanting. *Ovary* narrow, minutely



del. C. MULDER & C. MARKS.

MANILKABA — Fig. 1, *M. dissecta* (Powell 187) — 2, *M. Smithiana* (type spec.) — 3, *M. Kauki* (H.L. 908.225—321) — 4, *M. celebica* (type spec.) — 5, *M. hexandra* (Pierre 3261, Tri Huyen) — 6, *M. udoido* (Nisida 2776) — 7, *M. Merrilliana* (Ponce 22834, type spec.) — 8, *M. fasciculata* (cult. Hort. Bog.



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sub IV. B. 19) — 9, *M. kanosiensis* (type spec.) — 10, *M. samoensis* (type spec.) — 11, *M. vitiensis* (type spec.) — In all figures: A. leaf and nervation; B. flower or flowerbud; C. part of corolla inside so as to show the stamens and the staminodes; D. part of corolla outside so as to show the appendages; E. ovary and style; F. seed.

pubescent, more or less 6-furrowed, 6-celled, gradually contracted into a tapering style of 1.2—1.3 cm long. *Fruit* unknown.

Distribution: Fiji (on sea cliff: A. C. SMITH 1461, *type specimen* in Herb. Leid.).

Remark: The ovary is pubescent, not glabrous, as was mentioned in the original description.

Incompletely known are:

13. *M. emarginata* H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, 7, 1925, 241.

A tree? Branchlets glabrous, the *leaves* crowded at their tips, subcoriaceous, i. s. dark-brown, above darker than below, entirely glabrous, \pm obovate, the broad base minutely contracted into the petiole, apex rotundate and always emarginate, 4.7—8.7 by 3.3—6.4 cm, petioles canaliculate above, stout, 1—2 cm long. Midrib sulcate above, strongly prominent below; secondary nerves 15—17, very slender but conspicuous, in the middle of the leaf arising at an angle of 75° , in the leaf-base of 90° , in the apex of 55° , near the margin archingly joined; tertiary nerves very regularly and minutely reticulate. *Flowers* unknown. *Fruit* glabrous, 2—4 in the leaf-axils or their scars, the pedicels 1 cm long. *Sepals* 3 + 3, the outer ones deltoid, 0.4 cm long and glabrous on either side, the inner ones narrower, 0.5 cm long, sericeous outside with scarious margins, glabrous within. *Fruit* oblong-ellipsoid, 1.7—1.8 \times 0.7—0.8 cm, at the apex bearing the remainder of the style, 1-seeded. *Seed* small, 1.3 \times 0.6 \times 0.3 cm, with thin testa, the scar basiventral, lanceolate and narrow.

Distribution: Hawaii Isl., Oahu (CURRAN 132, *type specimen*).

Remark: During our recent investigations the type specimen was not at hand (nor any other); therefore the comparison with the other species was difficult, the more so since flowers are as yet unknown.

14. *M. Kurziana* H. J. LAM & B. MEEUSE, nom. nov. — *Mimusops parvifolia* KURZ, Prelim. Rep. For. Veg. Pegu, App. A, LXXIV, 1875, nomen and For. Fl. Brit. Burma II, 1877, 124 — *Manilkara parvifolia* (KURZ) H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, 7, 1925, 269.

The specific name *parvifolia* is invalidated by *Manilkara parvifolia* (RADLK.) DUB. (= *Mimusops parvifolia* RADLK. 1882 non *Mim. parvifolia* R. BR. 1810 which is *Mim. Elengi* L. 1753 var. *parvifolia* [R. BR.] H. J. LAM 1925) from the Bahamas.

Small tree, young shoots tomentose. *Leaves* ovate or obovate, glabrous, acute at base, somewhat emarginate at apex, petioles about 1.2 cm long. *Flowers* like those of *M. Kauki*, pedicels long and glabrous. *Sepals* 3 + 3, *petals* linear-lanceolate.

Distribution: Burma.

Remarks: Very incompletely known. No specimen examined by us.

15. *M. littoralis* (KURZ) DUBARD, Ann. Mus. Col. Mars. 23, 1915, 11 — *Mimusops littoralis* KURZ, Journ. As. Soc. Beng. 45², 1876, 138 and For. Fl. Brit. Burma II, 1877, 123; CLARKE in HOOKER F., Fl. Brit. Ind. III, 1882, 549; BRANDIS, Indian Trees, 1906, 426.

A large tree, up to 25 m high, all parts quite glabrous, branchlets very thick and scarred. *Leaves* crowded at the tips of the branchlets, obovate to obovate-oblong, thin-coriaceous, more or less acute or cuneate at base, apex blunt and usually emarginate, 6.2—18.5 by ?—9 cm, petioles 1.2—2.4 cm; lateral nerves crowded with a minute reticulation between. *Flowers* small, solitary in the leaf-axils, pedicels 1.2—1.8, in fruit up to 3.5 cm, almost glabrous. *Calyx* about 0.5 cm long, *sepals* 3 + 3, ovate and rather blunt. Appendages to the 6 *petals*, as long as or slightly longer (and broader) than these. *Stamens* 6, *staminodes* 6, scale-like and denticulate. *Ovary* tawny-pubescent, 9-celled (f. DUBARD). *Fruit* depressedly globose, 2.5—3.5 cm in diam., 6—5-seeded, the *seeds* flattened, about 1.2 cm long, scar basiventral.

Distribution: Tenasserim, Andamans, Nicobars, Cocos I.

Remarks: Not examined by us. According to DUBARD the species is closely related to *M. hexandra*, according to CLARKE it is allied to *M. Kauki*. Unfortunately the species is insufficiently known.

During a short stay at the Paris Herbarium in January 1937 I made an annotation that the two specimens, preserved there under the name of *M. littoralis*, are probably conspecific with *M. hexandra*.

NORTHIOPSIS KANEHIRA

Northiopsis KANEHIRA, Bot. Mag. Tokyo 47, 1933, 677.

Trees of the description of *Manilkara*, but without dorsal appendages to the petals.

Thusfar monotypic. The only species bears flowers which are exceptionally large for the group, much larger than in *Manilkara samoensis*, the *Manilkara*-species with the largest flowers, but they are considerably smaller than those of *Northia seychellana*.

Remarks: During the elaboration of the Malaysian Sapotaceae, the result of which was published in 1925, the senior author considered WARBURG's *Mimusops* (now *Manilkara*) *fasciculata* a new species of *Northia*, *N. fasciculata* (WARB.) H. J. LAM on account of the very scanty petal-appendages, the often wanting staminodes and the large oval scar on the seed. At the time it was overlooked that, apart from the very large leaves, flowers and fruit, the very large seed-scar and the long corolla-tube, *Northia* is exalbuminous, whilst *Manilkara fasciculata* is provided with a copious albumen, as, in fact, all *Manilkara*-species are.

In 1932 KANEHIRA described a tree from the Carolines, pointing out that, according to LAM's arrangement of the genera his new species would fall under *Achras* except for its having 6 instead of 10—12 carpels. As its vegetative characters, however, were resembling those of *Northia* and *Manilkara*, he took it that his species should rather belong to one of these genera. Although any trace of dorsal appendages was wanting, it was decided that the species could be best inserted in *Northia*, since in that genus these organs show a certain tendency to be reduced in size. It was then named *Northia Hoshinoi* KAN.

Little more than a year afterwards, however, KANEHIRA found that the vegetative characters of *Northia Hoshinoi* are very different from those of *Northia* proper (giving no further arguments), on account of which he established a new genus *Northiopsis*, comprising one species now named *Northiopsis Hoshinoi* (KAN.) KAN., which was also mentioned in his studies on the flora of Micronesia.

As will be discussed more circumstantially underneath, we have come to the conclusion that it provisionally seems the most practical, although probably not the most logical procedure to follow KANEHIRA's opinion and to maintain *Northiopsis* as a separate genus.

Northiopsis Hoshinoi (KAN.) KAN., Fl. Micrones. 1933, 302, fig. 152, Bot. Mag. Tokyo 47, 1933, 677 and Journ. Dept. Agr. Kyushu Imp. Univ. 4, 1935, 388 — *Northia Hoshinoi* KAN., Bot. Mag. Tokyo 46, 1932, 489.

A moderate-sized tree, 10—18 m high, trunk up to 1.2 m in diam. Branchlets very thick (0.8—0.9 cm) and scarred. Leaves crowded at the tips of the branchlets, coriaceous, entirely glabrous, not very rigid, estipulate, both sides light-brown, the young ones darker, when dry, elliptic-ovate, base broadly acute, basal angle about 90°, apex somewhat broader and often shortly and bluntly acuminate, (9—) 12—17 (—18.8)

by 5.5—9.2 cm, petioles stout, 2.5—4.2 cm long, sulcate above; midrib depressed above, strongly prominent below; secondary nerves very slender, straight, ascending at an angle of 70°—80° (in the apex somewhat less), 24—30 (—35, *type spec.*), near the margin faintly archingly joined; tertiary nerves very faint, about 3 between each pair of secondary ones and parallel to them, with a hardly conspicuous reticulation between. *Flowers* solitary or 2 in the leaf-axils, the pedicels and the calyx outside glossy golden-brown tomentose, pedicels short, in flower 0.7—1 (—2, *type spec.*) cm long, in fruit up to 1.5 cm and very much incrassate (0.3—0.4 cm thick), buds oblong, about 1.5 cm long and 0.6 cm across. *Sepals* 3 + 3, acutely oblong-elliptic, the outer ones 1.5—1.7 by 0.65—0.7 cm, the inner ones 1.5—1.7 by 0.35—0.4 cm, all silvery sericeous inside. *Corolla* white, glabrous, tube 0.2—0.25 (—0.4, *type spec.*) cm; petals 6, 1.75—2 by 0.4—0.6 cm at base, acute; appendages none. *Stamens* 6, the filaments filiform and somewhat flattened, glabrous (in the *type specimen* villose), 1—1.6 cm long, anthers acutely oblong-lanceolate, 0.5—0.6 cm long; *staminodes* acutely triangular to filiform or deeply bifid, 0.25—0.5 by 0.075—0.1 cm. *Ovary* pubescent as is the lower half of the tapering style, which is 1.8—2.5 cm long, the ovary 6-celled, 0.25—0.3 cm high, without disc. *Fruit* globular, 3—4 cm in diam., crowned by the base of the style; pericarp thick, but apparently rather dry. *Seeds* acutely pointed at apex, blunt at base, with a more or less sharp ventral keel, testa very hard and thick (0.15 cm), about 3.8 × 1.6 × 1.1 cm, the scar basiventral, pyriform, elongate-ovate, 1.6 × 0.7—0.8 cm; albumen abundant, surrounding the thin cotyledons and the pointed radicle.

CAROLINE ISLANDS — Ponape, Kolonia: HOSHINO 2138 (flow. & fr. March 1933).

SAMOA — Savaii: CHRISTOPHERSEN (E. STEHLIN) 2660 (ster., Sept. 1931, in Herb. Oslo and Herb. Honolulu; nat. name: *pau*; wood used for making war-clubs); nr. Falealupo, in forest, alt. 5 m: CHRISTOPHERSEN 3319 (tree, ster. Nov. 1931; in Herb. Honolulu; nat. name: *pau*).

Remarks: Although the Samoa specimens are sterile, their vegetative characters are so strikingly those of the Ponape specimen, that I hardly doubt, whether the identifications are correct.

Discussion.

The *Mimusopoideae*, as a subfamily of the Sapotaceae (cf. H. J. LAM, *Rec. Trav. bot. néerl.* 36, 1939, 524), are characterized by cyclical flowers and by the possession of dorsal appendages to the petals and of staminodes. The two first-named characters seemed more

important to recent investigators than the staminodes, on account of which this group was formerly inserted by A. ENGLER in the *Palaquieae-Sideroxylinae*, which also possess staminodes but have an acyclical calyx and are missing the appendages.

Ever since DUBARD and LECOMTE (l.l. c.c. sub *Manilkara*) the trimerous and the tetramerous types of the subfamily have been considered to have their typological centres in the largest genera, *Manilkara* ADANSON and *Mimusops* L. respectively. The discriminating characters of these genera are:

	Manilkara	Mimusops
flower type	trimerous, very rarely tetramerous (cf. Note 1)	tetramerous
calyx	two whorls of 3 sepals, sepals mostly relatively broad;	two whorls of 4 sepals, sepals mostly relatively long and narrow;
corolla	tube with 6 petals, appendages mostly entire and about as large as the petals, rarely much smaller;	tube with 8 petals, appendages entire or lacinate, as large as or somewhat smaller than the petals;
stamens	6 epipetalous	8 epipetalous
staminodes	6 alternipetalous, mostly lacinate, dentate of fimbriate, bifid or trifid, mostly glabrous and erect with the stamens or patent with the petals, very rarely reduced to none	8 alternipetalous, always entire, often pubescent and incurved so as to cover the pistillum
carpels	15—6	8
ovules	ventrally affixed in the lower half of the cell to almost or completely basal	basally affixed
scar on the seed	usually basiventral, relatively long and narrow, on the basal half of the scar, rarely broader and ovate or circular and almost basal (cf. Note 2)	small and circular and almost basal, rarely somewhat elongate or ellipsoid (cf. Note 2)
leaves	often crowded at the tips of the branchlets, with sclereids and a very dense striate nervation (cf. Note 3)	mostly not conspicuously crowded, without sclereids, and mostly with a rather lax nervation

Notes to the above statement:

1. Two African species seem to be variable as to the number of their flower parts, viz. *M. spiculosa* (HUTCH. & CORB.) H. J. LAM, nov. comb.¹⁾, which is 3- or 4-merous, and *M. umbraculigera* (HUTCH. & CORB.) H. J. LAM, nov. comb.¹⁾, in which there may be 5, 3 + 3 or 4 + 4 sepals (cf. *Labourdonnaisia* and the remarks under *M. Roxburghiana*). From the description of the species mentioned we were inclined to conclude that the other characters are those of *Manilkara* rather than of *Mimusops*. Although the two genera meet, as it were, in these species, we prefer to keep them apart, even if other characters are more or less overlapping as well, such as the shape of the scar, the incision of the appendages, etc. These characters, each overlapping with its own pattern, hardly seem, however, to affect the separation of the two fundamental types. To a certain degree, it is a matter of taste, whether or not the two genera should be combined, but in a group of closely related yet strongly diversified plants, it seems preferable to narrow the limits. And if, as we deem justified, the two tribes *Manilkareae* and *Mimusopeae* should be distinguished as such, we cannot help keeping the two main genera apart as well. The subdivision is primarily typological, a method which was introduced in the splendid papers of BAILLON and DUBARD. In both tribes homologous variations occur, such as genera with and such without albumen, with basal and with ventral seed-scar, with lacinate and with entire appendages, with Mimusopoid and with Manilkaroid staminodes, etc.

2. An unusually large scar is found in *Mimusops Letestui* LEC. and in *Mimusops ? congolensis* DE WILD., an exceptionally small one in *Manilkara Eickii* (ENGL.) H. J. LAM¹⁾, *M. Bojeri* (A. DC.) H. J. LAM¹⁾ and *M. dissecta* (L. f.) DUB. It is obvious that in this subfamily — as in others — BAEHNI's *Pleurotraumae* and *Basitraumae* meet (CH. BAEHNI, Candollea 7, 1938, 504).

3. The character of sclereids in the leaves was first mentioned by LECOMTE. It needs thorough examination in most of the species.

The other genera of the subfamily, as accepted by me, represent variations on these types, forming the tribes of the *Manilkareae* and of the *Mimusopeae* respectively. Of these the *Manilkareae* display the greatest diversity. In addition, *Manilkara* as a genus seems to be more variable than *Mimusops*, whilst it also covers by far the most exten-

¹⁾ Cf. Appendix.

sive area. I am therefore inclined to consider the trimerous type the comparatively most primitive one. The difference between the two as to this point is, however, very slight. Both types show certain connections with the *Madhucoideae* (cyclical but without staminodes) as well as with the acyclical 5-merous *Sideroxyloideae*, as regards the latter connection, the *Manilkareae* through *Lecomtedoxa-Lemonniera*, the *Mimusopeae* through *Butyrospermum*. As, moreover, transitional forms are known to link the trimerous and the tetramerous type, it may be suggested that either they have sprung from common ancestors or at any rate represent remarkably convergent types.

It must be emphasized here, that my knowledge of these genera is mostly based upon literature except insofar as the Far-Eastern species are concerned. It is therefore very well possible that on closer investigation another arrangement of the species into genera will prove to be more satisfactory. For our present purpose, however, viz. to get an insight into the potentialities and the tendencies to be found in this subfamily, the knowledge thus obtained seemed sufficient and the delimitation of the genera given here should be considered a working scheme rather than a suggestion to be accepted. The genera are (alphabetical order):

M a n i l k a r e a e: *Achras* L. (3 spec. trop. America) — *Faucherea* H. LEC. (4 spec. Madagascar) — *Labourdonnaisia* BOJ. (2 or more spec. Madagascar and Mascarene Isl., insufficiently known) — *Lecomtedoxa* PIERRE (2 species W. Africa) — *Letestua* H. LEC. (1 spec. W. Africa) — *Manilkara* ADANS. (incl. *Labramia* A. DC.) (\pm 74 spec., of which \pm 25 spec. trop. America, \pm 34 spec. trop. Africa, 15 spec. Far East and Pacific Islands) — *Mahea* PIERRE (1 spec. S.E. Africa) — *Microappendicula* ENGL. (as a section of *Manilkara*) (1 spec. W. Africa) — *Murica* HART. (3 spec. E. and S.E. Africa, 1 spec. Cuba and Haïti) — *Northia* HOOK. F. (3 spec. Seychelles) — *Northiopsis* KAN. (1 spec. Caroline Isl. and Samoa). Total: 11 genera with \pm 96 species.

M i m u s o p e a e: *Baillonella* PIERRE (incl. *Dumoria* CHEV.) (4 spec. W. Africa) — *Butyrospermum* KOTSCHY (2 spec. W. and C. Africa) — *Inhambanella* ENGL. (as a section of *Mimusops*; insufficiently known) (1 spec. S.E. Africa) — *Mimusops* L. (incl. *Imbricaria* COMMERS.) (about 57 spec. Africa, 1 spec. Far-East to W. Pacific) — *Vitellariopsis* BAILL. (1 spec. E. Africa; insufficiently known). Total: 5 genera with \pm 66 species.

The grand total is 16 genera with 162 species. Of these 14 genera

with 116 species occur in the African region (11 genera and all species endemic); America possesses 3 genera with 29 species (1 genus and all species endemic), the Far-East 3 genera with 17 species (1 monotypic genus very closely related to *Manilkara* and all species endemic). Only one genus, *Manilkara*, is pantropical, two others are found in two continents, viz. *Mimusops* (mostly Africa and 1 species in the Far-East) and *Muriea* (3 spec. E. Afr., 1 spec. Cuba and Haiti). The centre of the whole group is therefore indisputably the African region.

Table I (see page 350) gives a survey of the principal discriminating characters of the genera mentioned.

In the *Manilkareae* a most striking feature is the tendency of the reduction of both dorsal appendages and staminodes (if this should be called a reduction at all). Both reductions are, generally speaking, independent from one another. For instance, staminodes are small to very small in *Faucherea*, *Northiopsis* and *Northia*, wanting in *Muriea*, *Letestua*, *Labourdonnaisia* and occasionally *Manilkara*. The petal-appendages, on the other hand, are reduced in size or number in *Lecomtedoxa*, *Microappendicula* and *Labourdonnaisia*, very small or vanishing in *Mahea*, *Northia* and in certain Far-Eastern *Manilkara*-species and entirely lacking in *Achras*, *Faucherea* and *Northiopsis*. In both cases the relation with the other *Manilkareae* is proved beyond doubt by many characters such as the number of flower parts, the type of flower and nervation, the leaf-anatomy, the general habit, etc. Yet the lacking of the dorsal appendages have led the older investigators astray, as it induced ENGLER and DUBARD to insert *Achras* in the *Sideroxylinae*, whilst this genus typologically undoubtedly is a member of the *Manilkara*-group (the insertion of *Butyrospermum* in the *Mimusopeae* is, on the other hand, doubtful), not less than *Faucherea* and *Northiopsis*, whose true nature was correctly interpreted from the beginning.

Particularly in regard to these three genera, *Achras* in Tropical America, *Faucherea* in Madagascar and *Northiopsis* in the Western Pacific, an interesting problem is arising both in the field of evolutionary development and in that of nomenclature. All are closely allied to the circumtropic *Manilkara*, whose area includes those of the small genera which have probably originated from it. In brief, we may point out the relations in the following way:

1. The American *Manilkara* have their appendages mostly as long as, or somewhat longer or shorter than the petals; in a few

TABLE I.

Genus	Sepals	Petals	Dorsal (lateral) appendages	Stamens	Staminodes	Carpels	Albumen	Scar on the seed ¹⁾	Testa ²⁾
Manilkareae									
Lecontodoxa	2(-1)+3-2	5-4(-3)	[5-4(-3)]X(2-1)	5-4(-3)	5-4(-3)	5	(+)	4	2-3
Manilkara (cf. p. 346)	3+3	6	6X2 (mostly entire)	6	6 (mostly dentate)	15-6	+	(2-)3	(3-)-2(-1)
Muricea	3+3	6	6X2	6+6	—	6	+	5	2f
Letestua	3+3	18-12	(18-12)X2	18-12	—	18	+	4	2
Northia	3+3	6	6X2, small and dentate or none	6	very small and scale-like	6	—	5	1
Micro- appendicula	3+3	6	6 alt. pet.	6	6 (type of Mimusops)	6-5	?	3 or 4f (on acc. of ov.)	?
Mahea	3+3	6	none or (6-0)X2 very small	none (♀ flowers)	6+6 (subulate)	6	?	3 or 4f (on acc. of ov.)	?
Achras	3+3	6	—	6	6 (petaloid, dentic.)	12-7	+	4	2
Faucherea	3+3	6	—	6	6, sometimes one or two with a small anther (denticul. or subentire)	7-6	+	3	2
Northiopsis	3+3	6	—	6	6 (subulate or bifid, small)	6	+	3	1-2
Labourdonnaisia	3+3 or 4+4	6 or 8	12-6 or 16-8	10-17	—	6 or 8	+	1	1-2f
Mimusopese									
Butyrospermum	4(-5) +4(-5)	8-10	none	8-10	8-10 (denticul.)	8-10	—	(4)-5	2
Mimusops (cf. p. 346)	4+4	8	8X2 (entire or 2-7-fid)	8	8 (entire)	8	+	2(-3)	2
Baillonella	4+4	8	8X2 (entire)	8	8 (entire)	8	—	5-6	1
Inhambanella	4+4	?	?	?	?	?	—	4-5	2
Vitellariopsis	4+4	8	8X2 (small)	8	8 (entire)	8	—	5	2

¹⁾ Scar: 1. large, basal; 2. small, circular, basal or basiventral; 3. basiventral (lower half of seed), elongate, narrow to broad; 4. long and narrow, occupying the whole ventral side of the seed; 5. occupying about 1/3, and 6. more than 1/3, of the surface of the seed.

²⁾ Testa: 1. very thick and bony; 2. thick or hard, crustaceous; 3. thin or soft.

cases they are $\frac{2}{3}$ or $\frac{1}{2}$ as long (*M. bahamensis* [J. G. BAKER] H. J. LAM & B. MEEUSE, nov. comb.¹) and *M. Sideroxylon* [PIERRE] DUB. respectively); they are mostly entire or sometimes bifid. The corolla-tube is relatively long, about $\frac{1}{2}$ — $\frac{1}{3}$ of the total length of the corolla (except in *M. Riedleana* [PIERRE] DUB. and in *M. nitida* [URB.] DUB.); the staminodes are ovate- or oblong-lanceolate or subulate, dentate or bifid. I do not know of any species possessing a glabrous annular disc around the base of the ovary.

There are no transitions towards *Achras*, where the appendages are wanting. The other flower and vegetative characters are entirely within the range of the American *Manilkara* and there is no disc, but the staminodes are petaloid, the fruit are large and fleshy and the seeds flattened and with a long and narrow ventral scar.

2. The African (continental and insular) *Manilkara* have their appendages as long as or slightly shorter than the petals; they are entire or 2—7-fid. The corolla-tube is short, about $\frac{1}{6}$ — $\frac{1}{4}$ ($-\frac{1}{3}$) of the total length of the corolla; the staminodes are ovate-triangular, subulate, bifid or trifid. A glabrous annular disc adnate to the base of the ovary is known in some species, viz. in *M. densiflora* (ENGL.) H. J. LAM, nov. comb.¹), and in *M. Schweinfurthii* (ENGL.) DUB. The scar on the seed is apparently mostly of the usual type, but in *M. Eickii* (ENGL.) H. J. LAM, nov. comb.¹) and in *M. Bojeri* (A. DC.) H. J. LAM, nov. comb.¹) it is small and circular as in *Mimusops*.

There are no transitions towards *Faucherea*, in which the appendages are wanting, whilst the staminodes are conspicuous but often small (and sometimes with small anthers). There are no other essential differences from the African *Manilkara* but the flowers are exceptionally small (corolla 0.13—0.3 cm). None of the species possesses, apparently, a disc.

It may be recalled here that *Northia* from the Seychelles, shows a strong reduction of both appendages and staminodes. As has been mentioned above, this genus is, however, quite apart, among other features, by its long corolla-tube, its enormous seed-scar, its very thick testa and its lack of albumen.

3. The Far-Eastern *Manilkara* are partly of the same type as the American and African ones, partly they show, besides other variations, homologous to those in the American and African species, reductions to various degrees of both appendages and staminodes. In

¹) Cf. Appendix.

some species (*M. Kauki*, *dissecta*, *Smithiana* and *kanosiensis*) there is a glabrous adnate disc, and in 1 species (*M. dissecta*) the scar on the seed is of the *Mimusops*-type, in another (*M. fasciculata*) it is large and oval. This character, however, is still insufficiently known in several species.

As to the reductions of appendages and staminodes, *Table II* (see page 353) may give further information together with some other data. The incompletely known species have been left out.

As appears from this statement the general proportion of the appendages to the petals gradually decrease from the continent eastward; only *M. dissecta* (W. Pacific) has a more normal proportion. In *M. fasciculata* the appendages are very scanty, reason why this species was formerly (erroneously) included in *Northia*, the more so as the equally minute staminodes are sometimes wanting.

These conditions would undoubtedly make us insert *Northiopsis Hoshinoi* in *Manilkara*, if not the character of the wanting appendages was, in the case of *Faucherea* (and to a lesser degree also of *Achras*) a justified criterion to keep those genera apart.

The problem is quite characteristic for the particularly reticulate taxonomy of this natural order. The present case presents one of those examples of convergent evolution, the Sapothaceae are so well provided with. The reduction of the petal-appendages has apparently independently occurred in the three regions of the *Manilkara*-area, Tropical America, the African region and the Far-East. In the present case the evolutionary phase extant greatly hampers a satisfactory subdivision by its gradual and diversified appearance. In those species, in which the reduction has reached a stage, which may, morphologically speaking, be called the loss of a character, it has induced the establishment of such genera as *Achras*, *Faucherea* and *Northiopsis* and it may be asked whether it would be justified to combine those three genera with identical floral diagrams into one single tritopically evolved genus.

We have hesitated a long time before taking a decision. Taxonomically speaking, the combination of at least *Faucherea* and *Northiopsis* (*Achras* being well distinguished by its fruit and seed characters) seemed logical enough. However, whilst *Faucherea* is well apart from the African *Manilkara*-species, *Northiopsis* is connected by a series of gradual transitions with the Far-Eastern ones. Moreover, it shows, in its vegetative characters, a closer relation to such American species as *Manilkara bidentata* (A. DC.) CHEV., *M. Sidero-*

TABLE II (dimensions in cm).

	Distrib.	Calyx	Corolla			Staminodes	Proportion Append. Petals
			tube	petals	appendages		
Manilkara							
hexandra	Asia Cont.	0.4-0.45	0.1	0.3-0.35×0.1	0.35-0.4×0.1	0.25 (bifid)	> 1
Roxburghiana	India	0.8-0.9	0.3	0.7×0.15	0.7×0.1	0.15×0.1 (dentic.)	1
Kauki	Asia to Austr.	0.6-0.75	0.15-0.3	0.45-0.7×0.1-0.25	0.45-0.7×0.1-0.25	0.35-0.5×0.15-0.3 (denticulate)	1
udoido	Carol. Is.	0.5	0.1-0.2	0.35-0.42×0.12-0.15	0.3-0.35×0.1-0.15	0.1-0.2×0.1-0.15 (dentate)	1/5
dissecta	W. Pac.	0.5-0.7	0.1	0.5×0.15	0.4×0.1	0.1-0.2×0.06-0.1 (dentate)	1/5
fasciculata	N. Guinea, Kai	0.4	0.2	0.5-0.6×0.1	0.4×0.1	0.2-0.3 (filiform) or none	1/4
celebica	C. & N. Cel.	0.9-1	0.08	0.7×0.3	0.45-0.5×0.15	0.25-0.4×0.1-0.15 (dentate)	1/5
Smithiana	Fiji	0.85-1.0	0.3	0.9×0.25	0.65-0.7×0.25	0.4-0.45×0.25 (denticulate)	1/5
Merrilliana	Phil., Cel., Moluccas	0.5 (bud)	short	x	1/5 x	1/5 x (dentate).	1/5
samoensis	Samoa	1.1-1.4	0.2	1.1-1.3×0.2	0.75×0.2	0.3-0.6×0.2-0.3 (denticulate)	1/5
kanosiensis	Papua	1.0	0.2	0.65×0.2-0.25	0.35×0.1	0.3×0.15 (dentic.)	> 1/5
vitiensis	Fiji	1.1-1.2	0.15-0.2	1.0-1.2×0.2-0.25	0.25×0.1	0.2×0.2 (dentic.) or none	1/5-1/5
Northopsis							
Hoshinoi	Carol., Samoa	1.5-1.7	0.2-0.4	1.8×0.5	none	0.2-0.4×0.1 (lance, entire or bifid)	-

xylo (PIERRE) DUB. and *M. nitida* (URB.) DUB. than to the Madagascarian *Faucherea*. Under these conditions it is extremely difficult to find a logical taxonomical position and a logical name for the single species of *Northiopsis*. If *Faucherea* and *Northiopsis* would be combined, the incongruity arises of an illogically discontinuous generic area, as well as of the circumstance that one of the geographically isolated species would be much closer related to *Manilkara* than to the other species of its genus. If *Manilkara* would be chosen to harbour it, there is no reason to leave *Faucherea* out; and if *Faucherea*, well distinguished from the African *Manilkara* would be inserted, it is the Liberty Hall here and many other smaller genera would claim admittance to a very broadly conceived *Manilkara*, which would undoubtedly need a subdivision into sections. In this mess we have felt, and still feel at a loss. Probably only a botanist, living some ten or hundred thousands of years later (if botanists still are roaming then) may be more lucky (or not) when put face to face with this group of plants. Under these conditions we preferred to leave things mostly as they were, to accept the statement of an unaccomplished evolution and to choose any of the arbitrary ways out of the labyrinth, i. e. to maintain KANEHIRA's *Northiopsis* until better times arrive.

APPENDIX

List of new combinations, other than those,
mentioned in the systematic part.

MANILKARA

M. Adolfo-Friederici (ENGL. & KRAUSE) H. J. LAM, nov. comb. — *Mimusops Adolfo-Friederici* ENGL. & KRAUSE, ENGL. Bot. Jahrb. 49, 1913, 392 — Lower Congo.

M. altissima (ENGL.) H. J. LAM, nov. comb. — *Mimusops altissima* ENGL., Mon. Afr. Pfl. Fam. u. Gatt. VIII, 1904, 55 — E. Africa.

M. bahamensis (J. G. BAKER) H. J. LAM & B. MEEUSE, nov. comb. — *Achras bahamensis* J. G. BAKER in HOOK., Ic. Pl. 18, 1888, t. 1795 — *Manilkara parvifolia* (not of H. J. LAM, 1925) (RADLK.)

DUB., Ann. Mus. Col. Mars. 23, 1915, 16 — *Mimusops parvifolia* (not of R. BR., 1810 nor of KURZ, 1877) RADLK., Sitz. Ber. Ak. Wiss. München 12, 1882, 344 and in PIERRE & URBAN in URBAN, Symb. Ant. 5, 1904, 171 — *Sloanea emarginata* L., Sp. Pl. Ed. I, 1753, 512 — *Mimusops emarginata* (L.) BRITTON, Torreya 11, 1911, 128; H. J. LAM, B. P. Bish. Mus. Bull. 141, 1936, 163 — *Manilkara emarginata* (not of H. J. LAM, 1925) (L.) BRITTON & P. WILSON, Sc. Surv. Porto Rico & Virg. Isl. 6, 1926, 366 — Bahamas.

M. Bequaertii (DE WILD.) H. J. LAM, nov. comb. — *Mimusops Bequaerti* DE WILD., Rev. Zool. Afr. III, 1919, 26 and in Pl. Bequaert. III, 1925, 147 — Congo.

M. Bojeri (A. DC.) H. J. LAM, nov. comb. — *Labramia Bojeri* A. DC., Prodr. VIII, 1844, 672; DUBARD, Ann. Mus. Col. Mars. 23, 1915, 58 — Madagascar.

M. Casteelsii (DE WILD.) H. J. LAM, nov. comb. — *Mimusops Casteelsi* DE WILD., Pl. Bequaert. III, 1925, 152 — Congo.

M. Dawei (STAFF) H. J. LAM, nov. comb. — *Mimusops Dawei* STAFF, Journ. Linn. Soc. 37, 1906, 523 — Uganda.

M. densiflora (ENGL.) H. J. LAM, nov. comb. — *Mimusops densiflora* ENGL., Pflanzenw. Ost-Afr., C, 1895, 307 and l. c. 1904, 63 — E. Africa: Zanzibar coast region.

M. Doeringii (ENGL. & KRAUSE) H. J. LAM, nov. comb. — *Mimusops Doeringii* ENGL. & KRAUSE, ENGL. Bot. Jahrb. 49, 1913, 391 — Togo.

M. dukensis (ENGL. & KRAUSE) H. J. LAM, nov. comb. — *Mimusops dukensis* ENGL. & KRAUSE, l. c. 1913, 391 — Cameroon.

M. Eickii (ENGL.) H. J. LAM, nov. comb. — *Mimusops Eickii* ENGL., Mon. Afr. Pfl. Fam. u. Gatt. VIII, 1904, 60 — E. Africa: W. Usambara.

M. excisa (URB.) H. J. LAM, nov. comb. — *Mimusops excisa* URB., Symb. Ant. V, 1908, 459 — Jamaica.

M. Fischeri (ENGL.) H. J. LAM, nov. comb. — *Sideroxylon Fischeri* ENGL., Pflanzenw. Ost-Afr., C, 1895, 307 — *Mimusops Fischeri* (ENGL.) ENGL., l. c. 1904, 64 — E. Africa: Massai region.

M. frondosa (HIERN) H. J. LAM, nov. comb. — *Mimusops frondosa* HIERN, Catal. Afr. Pl. Welwitsch III, 1898, 645; ENGLER, l. c., 1904, 56 — W. Africa: Angola.

M. Guillotii (HOCHR.) H. J. LAM, nov. comb. — *Mimusops Guillotii* HOCHR., Ann. Cons. et Jard. Bot. Genève XI—XII, 1908, 83 — E. Madagascar.

M. ilendensis (ENGL.) H. J. LAM, nov. comb. — *Mimusops ilendensis* ENGL., l. c. 1913, 393 — Cameroon.

M. kribensis (ENGL.) H. J. LAM, nov. comb. — *Mimusops kribensis* ENGL., l. c. 1913, 393 — Cameroon.

M. Macaulayae (HUTCH. & CORB.) H. J. LAM, nov. comb. — *Mimusops Macaulayae* HUTCH. & CORB., Kew Bull. 1920, 329 — N. Rhodesia.

M. Menyhartii (ENGL.) H. J. LAM, nov. comb. — *Mimusops Menyhartii* ENGL., l. c. 1904, 63 — S.E. Africa: Zambezi region.

M. propinqua (S. MOORE) H. J. LAM, nov. comb. — *Mimusops propinqua* S. MOORE, Journ. Linn. Soc. 37, 1905, 177 — C. Africa.

M. rufula (MIQ.) H. J. LAM, nov. comb. — *Mimusops rufula* MIQ. in MART., Fl. bras. 7, 1863, 44 — Brazil.

M. Salzmannii (A. DC.) H. J. LAM, nov. comb. — *Mimusops Salzmannii* in DC., Prodr. VIII, 1844, 205 — Brazil.

M. Seretii (DE WILD.) H. J. LAM, nov. comb. — *Mimusops Seretii* DE WILD., Fedde's Repert. 13, 1914, 377 — Congo.

M. spiculosa (HUTCH. & CORB.) H. J. LAM, nov. comb. — *Mimusops spiculosa* HUTCH. & CORB., l. c. 1920, 331 — Rhodesia.

M. umbraculigera (HUTCH. & CORB.) H. J. LAM, nov. comb. — *Mimusops umbraculigera* HUTCH. & CORB., l. c. 1920, 331 — S. Rhodesia.

MIMUSOPS

M. Lecomtei H. J. LAM, nov. nom. — *Mimusops silvestris* LEC., Bull. Mus. Hist. Nat. Par. 28, 1922, 88 (not *M. sylvestris* S. MOORE 1911).

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Synonyms in italics; an asterisk denotes a new species.

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