

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

V¹⁾. *Manilkara* Adanson em. Gilly in the Far East

by

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Manilkara Adanson em. Gilly, Trop. Woods 73, 1943, 1—22 — *Manilkara* Adanson, Fam. 2, 1763, 166; Dubard, Ann. Mus. col. Mars. 23, 1915, 6; Baehni, Candollea 7, 1938, 394—508; Lam, Blumea 4, 2, 1941, 323; Lam, Blumea 5, 1, 1942, 41 — *Manilkara* Rheede, Lam in Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 238; Lam, l. c., sér. 3, 8, 1927, 481 — *Manyl-kara* Rheede, Hort. Mal. 4, 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, 1904, 55 — *Delastrea* A. DC, Prodr. 8, 1844, 195 — *Labramia* A. DC, l. c. 672 — *Mimusops* L., sect. *Euternaria* Engl., l. c., p.p. (except sect. *Muriea*) — *Northia* (not of Hook. f.) sensu Lam, l. c. 1925, 241 and 1927, 481, p.p.; Lam, Bern. P. Bish. Mus. Bull. 141, 1936, 163 — *Northiopsis* Kanehira, Bot. Mag. Tokyo 47, 1933, 677; Lam, l. c. 1941, 343; Lam, l. c. 1942, 43 — *Faucherea* Lec., Bull. Mus. hist. nat. 26, 1920, 248 — *Achras* L., Sp. Pl., 1753, App. 1190; Loeffling, Iter. Hisp., 1758, 186; Lam, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 218; Lam, l. c., sér. 3, 8, 1927, 476; Little, Brittonia 7, 1948, 48.

Laticiferous trees. Leaves alternate, coriaceous, often obovate with rounded tip, stipules caducous; midrib impressed or crested above, prominent below, secondary and tertiary nerves parallel, secondary ones hardly stronger than tertiary nerves, the latter slender, descending from margin, often stretchedly and minutely reticulate. Inflorescences axillary, clustered, many-florous. Flowers hermaphrodite, pedicellate, pedicel often incrassate when fruiting. Calyx with 2 whorls of 3 lobes each. Corolla with 6 lobes, each of them with 2 dorsal or lateral segments which are sometimes reduced or wanting. Stamens 6, epipetalous, inserted in the row of the staminodes, anthers dehiscing extrorsely. Staminodes 6, petaloid, alternipetalous, ovate, acuminate, usually dentate or lobed. Ovary 6—14-celled, cells 1-ovuled, ovules axile, anatropous to campylotropous. Fruit a dryish berry, 1—6-seeded; seeds compressed to terete, pear-shaped to oblong ellipsoid, scar basiventral or almost basal, large to small, wide to narrow, oblong to linear, with the hilum at the apical and the micropyle at the basal end; testa crustaceous; albumen copious, cotyledons foliaceous, thin, ovate, radicle long exserted, cylindrical.

¹⁾ I—III in Blumea VI, 3, 1952, pp. 547—595; IV in the present issue, pp. 364—400.

Type species: *Manilkara kauki* (L.) Dubard.

Distr.: About 75 species in all tropical countries, viz c. 30 in America, c. 35 in the African region and some 15 in Australasia and the Pacific.

In 1941 Lam c.s. published a study on this genus, in which particular reference was made to the Far Eastern species. Since then some important publications on the genus were edited. The most outstanding of these is a paper by Gilly, in which the generic limits were discussed. Gilly's most important conclusion was that *Achras* had to be united with *Manilkara*. The two genera have been placed by Lam, 1939 (Rec. Trav. bot. néerl. 36, 1939, 524) respectively in the subfamily *Sideroxyloideae* (*Achras*) and *Mimusopoideae* (*Manilkara*), but in 1941 both genera were inserted in one tribe *Manilkareae*, including moreover, *Northiopsis* etc. On p. 349 Lam states: "the most striking feature (in the *Manilkareae*) is the tendency of the reduction of both dorsal appendages and staminodes ... Both reductions are, generally speaking, independent from each other. For instance, staminodes are small to very small in *Faucherea*, *Northiopsis* and *Northia*, wanting in ... and occasionally *Manilkara*". After discussing the relations between *Manilkara*, *Achras*, *Northia*, *Northiopsis* and *Faucherea*, Lam concludes: "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".

Gilly, however, as was said, arrived at the conclusion that *Achras* had to be united with *Manilkara*. As his paper of 1943 does not give full details towards this conclusion, Gilly kindly forwarded us some pictures from his (then unpublished) thesis. From these figures it is obvious that gradating series of his "fusion triads" (= one sepal with 2 appendages) can be established in which the two appendages are being reduced so far as to ultimately leading to the conditions found in the subgenera *Euachras* Gilly and *Nisperoa* Gilly in which no appendages at all are found. By kind consent of the author we are allowed to publish those details in which this series is shown (Fig. 1). Because of the intermediate position of the subgenus *Manilkariopsis* (in which the petal is smaller than the two dorsal appendages) we agree that *Achras* cannot be maintained as generically distinct from *Manilkara* sensu stricto.

In a proposal for the conservation of *Manilkara* Adans. (1763) against *Achras* L. (1753) by Lam and van Royen (Taxon 2, 5, 1953, 112) the generic name *Manilkara* has been accepted as the correct name but the Paris Congress of 1954 still has to approve of this proposal. Gilly rejects the name *Achras* L. as a nomen confusum, but it was pointed out by Little (Brittonia 7, 1948, 48) that *Achras* L. has been correctly published and is certainly not a nomen confusum. Its first description has been given by Linnaeus in 1753 and has been emended by Loeffling (Iter Hisp., 1758, 186). On these grounds it became necessary for us to propose the above-mentioned conservation, contrary to Gilly who, in search for the next validly published generic name after *Achras*, found the generic name *Manilkara* and consequently used this name, changing the well-known

Achras zapota L. into *Manilkara zapotilla* (Jacq.) Gilly. When our proposal is accepted the well-known *Achras zapota* L. has to be named *Manilkara zapota* (L.) van Royen.

Extrapolating Gilly's idea about the possible evolution of the "fusion triads" we inserted *Northiopsis* as well as *Faucherea* in *Manilkara*. In *Northiopsis* and *Faucherea* no appendages on the petals are present and we may assume these as being reduced in a trend of evolution from petals with appendages towards those without these appendages (Fig. 1).

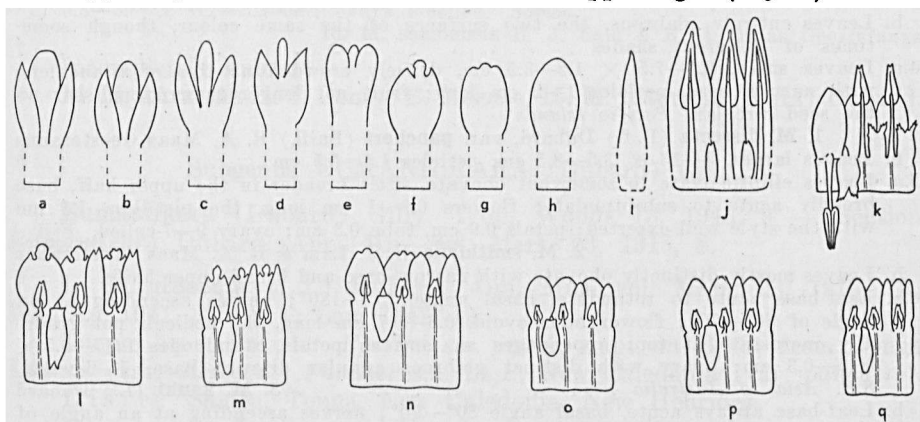


Fig. 1. — a—h. Development of "fusion triads" in the genus *Manilkara*, a—b. subgenus *Eumanilkara*, c—e. subgenus *Manilkariopsis*, f—g. subgenus *Euachras* (including *Achras zapota* L.), h. subgenera *Euachras* and *Nisperoa* — i—j. *Manilkara hoshinoi* (Kan.) van Royen, i. petal outside, j. corolla inside — k. *Manilkara calcicola* Gilly — l—q. variability within *Manilkara zapota* (L.) van Royen, l—m. from Mexico, n—p. from British Honduras, q. from Nicaragua.

Combining these genera with *Manilkara* we do not need to emendate Gilly's concept of *Manilkara* again as in his description the characters of *Northiopsis* and *Faucherea* are included.

Northia seychellana Hook. f., the single species left in *Northia* after excluding *Northia fasciculata* is regarded to constitute a separate genus on account of its exalbuminous seeds, the large scar and its highly reduced staminodes.

Gilly's interpretation and terminology of various flower-parts does not seem an improvement. He distinguished between a 3-merous "calyx" (outer sepals), a 3-merous "corolla" (inner sepals, which are anything but petaloid) and the above-mentioned "fusion triads" (comprising the corolla and its appendages). We see no reason why this terminology should be preferred above the traditional one of a biseriate calyx being found in many Sapotaceae genera.

The Far-Eastern species, including the cultivated *Manilkara zapota*, belong to two subgenera, *Eumanilkara* and *Euachras*. These sections are characterized respectively by petals with appendages and petals without appendages.

In the following the publication of Lam and cooperators in *Blumea* 4, 2, 1941 is abbreviated as Lam c.s. 1941, and in *Blumea* 5, 1, 1942, as Lam 1942.

Key to the Far-Eastern species.

- 1.a. Petals without appendages . . . Subgenus *Euachras* 2
- b. Petals with appendages Subgenus *Eumanilkara* 3
- 2.a. Leaves 9—18.8 × 5.5—9.2 cm; petioles stout, 2.5—4.2 cm; secondary nerves 24—30; petals 1.8—2 cm; anthers 0.5—0.6 cm; ovary 6-celled; seeds c. 3.8 cm. *Samoa and Caroline Islands* 12. *M. hoshinoi* (Kan.) van Royen
- b. Leaves 5—12 × 1.8—5.5 cm; petioles slender, 1.5—3 cm; secondary nerves 18—21; petals 0.3—0.6 cm; anthers 0.15—0.3 cm; ovary 12—10(—6)-celled; seeds 1.6—2.3 cm. *Cultivated* 13. *M. zapota* (L.) van Royen
- 3.a. Leaves minutely tomentose or sericeous and therefore pale underneath 4
- b. Leaves entirely glabrous, the two surfaces of the same colour, though sometimes of different shades 7
- 4.a. Leaves small, 2.5—7.5 × 1.5—3.5 cm, densely crowded at tips of branchlets, with narrow base, petioles 1—2 cm long; fruit not longer than 1 cm, scar on the seed circular. *Pacific Islands*
 1. *M. dissecta* (L.f.) Dubard, var. *pancheri* (Baill.) R. A. Maas Geesteranus
 - b. Leaves larger, 5—13 × 3.5—8.5 cm, petioles 1.5—5.5 cm 5
- 5.a. Leaves elliptic-ovate to somewhat obovate, little broader in the upper half, base broadly acute to subrotundate; flowers 0.9—1 cm long, the pistillum 1.5 cm with the style well exerted; petals 0.9 cm, tube 0.3 cm; ovary 9—7-celled. *Fiji*
 2. *M. smithiana* H. J. Lam & R. A. Maas Geesteranus
 - b. Leaves mostly distinctly obovate with narrow base and broad upper half 6
- 6.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 to Australia* 3. *M. kauki* (L.) Dubard
- b. Leaf-base always acute, basal angle 80°—90°; nerves ascending at an angle of 50°—60°; flower buds club-shaped, c. 1 cm, borne upon gradually incrassate pedicels; appendages c. 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 and Banggai*
 4. *M. celebica* H. J. Lam
- 7.a. Flowers small, calyx 0.4—0.7 cm long 8
- b. Flowers larger, calyx 0.8—1.4 cm long 11
- 8.a. Secondary nerves, though faint, distinguishable from the tertiary ones and at the margin archingly joined 9
- b. Nervation striate, all nerves about as faint, close to the margin united to form a distinct but intramarginal nerve 10
- 9.a. Leaves 2.5—7.5 × 1.5—3.5 cm, obovate with narrow base; pedicels 1.5—2, in fruit 2.5—3 cm; ovary 6-celled, with glabrous disc; fruit not longer than 1 cm; scar on the seed small and circular. *W. Pacific Islands*
 1. *M. dissecta* (L.f.) Dubard, var. *dissecta*
 - b. Leaves 3.5—11 × 2.5—6.5 cm, oblong or ellipsoid to subobovate with broad base and a more or less distinctly emarginate tip; pedicels 0.8—0.9 cm; ovary 12—9(—6)-celled, with glabrous disc; fruit 1—1.5 cm long; scar on the seed oblong. *Continental Asia* 5. *M. hexandra* (Roxb.) Dubard
- 10.a. Staminodes thick and scale-like deltoid or subtruncate with undulate margin, sometimes with 1—3 protracted teeth; fruit c. 1.5 × 1 cm; scar on the seed oblong, 0.8 × 1.8 cm. *Caroline Islands* 6. *M. udoido* Kanehira
- b. Staminodes membranous, filiform, subulate or ovate to oblong with some teeth, sometimes wanting; fruit 2—3.3 × 1.8—2.1 cm. *Philippines, Celebes, N. Moluccas, New Guinea* 7. *M. fasciculata* (Warb.) H. J. Lam & R. A. Maas Geesteranus
- 11.a. Leaves obovate, the base rounded or slightly subcordate, the tip broad and usually emarginate; petioles 1.2—1.8 cm; pedicels 2.5—3.5 cm; appendages as long as the petals, about 0.7 cm. *India* 8. *M. roxburghiana* (Wight) Dubard
- b. Leaves elliptic or oblong to oblong-obovate, the base acute or subrotundate, the tip subrotundate or obtuse, sometimes somewhat emarginate; pedicels 1.5—2.5 cm long; appendages 1/2—2/3 as long as the petals 12
- 12.a. Leaves 5—9 × 3.5—5 cm, tip rounded and often slightly emarginate; petioles 1—2.5 cm; calyx 1 cm, petals 0.65 cm; ovary with glabrous disc. *New Guinea and Tanimbar Islands* 9. *M. kanosiensis* H. J. Lam & B. Meeuse

- b. Leaves 7.5—13 × 3—5 cm, tip obtuse; petioles 2—5.5 cm; flowerbuds oblong and acute; calyx 1.1—1.4 cm; petals 1—1.3 cm; ovary without disc . . . 13
- 13.a. Secondary nerves ascending at an angle of c. 70°, tertiary nerves mostly one between each pair of secondary ones; pedicels less incrassate towards the bud, which measures c. 1 × 0.3—0.4 cm; petals 1—1.2 cm, the appendages 0.25 cm; staminodes, if any, 0.2 × 0.2 cm; ovary 6-celled. *Fiji*
11. *M. vitiensis* (H. J. Lam & E. van Olden) B. Meeuse
- b. 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 1.5 × 1 cm; petals 1.1—1.3 cm, the appendages 0.75 cm; staminodes 0.3—0.6 × 0.2—0.3 cm; ovary 9-celled. *Samoa*
10. *M. samoensis* H. J. Lam & R. A. Maas Geesteranus

Incompletely known:

14. *M. kurziana* H. J. Lam & B. Meeuse, 15. *M. littoralis* (Kurz) Dubard.

Subgenus EUMANILKARA (Dubard) Gilly.

Eumanilkara (Dubard) Gilly, Trop. Woods 73, 1943, 9 — Section *Eumanilkara* Dubard, Ann. Mus. col. Mars. 23, 1915, 8.

1. *M. dissecta* (L.f.) Dubard, Ann. Mus. col. Mars. 23, 1915, 13; Lam c.s. 1941, 325, f. 1; Lam 1942, 42.

Type specimen: *Forster s.n.* in K, dupl. in B, S, from Tonga Islands (var. *dissecta*); *Pancher s.n.* in P, New Caledonia (var. *pancheri*).

Distr.: Samoa, Tonga, New Caledonia, New Hebrides.

Remarks: In the var. *dissecta* (= *typica* Maas Geesteranus) the appendages of the petals are sometimes lanceolate, membranous and shorter than the petals.

2. *M. smithiana* H. J. Lam & R. A. Maas Geesteranus, Lam c.s. 1941, 823, f. 2; Lam 1942, 42.

Type specimen: *A. C. Smith 1450* in BISH, dupl. A, L, US, Fiji — Vanua Mbalavu, Malatta, forest, southern limestone section, 0—100 m alt., tree, 7 m, fl. March, corolla, filaments and staminodes white.

Distr.: Fiji.

3. *M. kauki* (L.) Dubard, Ann. Mus. col. Mars. 23, 1915, 9, f. 1, 2; Lam, Ann. Jard. bot. Bzg, sér. 3, 7, 1925, 239; Lam, l.c., sér. 3, 8, 1927, 481; Lam c.s. 1941, 329 — *Mimusops kauki* L., Sp. Pl., 1753, 349; Stickmann in Linnaeus, *Amoenitates Acad.* 4, 1759, 122; Brandis, *Forest Fl.*, 1874, 292; Trimen, *J. Linn. Soc.* 24, 1888, 140; Trimen, *Fl. Ceylon* 3, 1895, 87 — *Mimusops browniana* Benth., *Fl. Austr.* 4, 1869, 285.

Type specimen: *Hermann 137* in BM, Ceylon, probably cultivated.

Distr.: Siam, Cochinchina, Burma, Malay Peninsula, Sumatra, Java, Karimundjawa, Madura, Kangean, Bali, Celebes, Butung, Yolo, Sumbawa, Banda, Ambon, Tanimbar Islands, New Guinea, Northern Australia. Thus far unknown from Borneo.

New collections:

- MALAY PENINSULA — Selangor, Batu Tiga Klang: *Milsum C.F. 6546* (SING), 11. Nov.

JAVA — without loc.: *Labillardière s.n.* (FI).

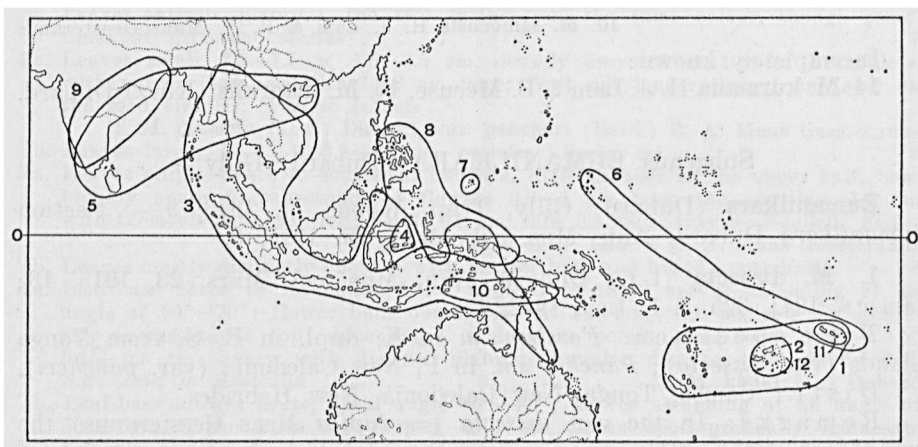
CELEBES — Manado, Poso, Tebebugis, alt. 5 m: *NIFS bb. 31903* (BO, L), March.

AMBON — without loc.: *Buwalda s.n.* (BO, L), fr.

TANIMBAR ISL. — Olilit, c. 20 m alt.: *NIFS bb. 24436* (BO, L), fr. April.

Remarks: Linnaeus in 1753 (Sp. Pl., p. 349) described two species in *Mimusops*, viz *M. elengi* and *M. kauki*, based on Hermann 138 and 137 in BM, respectively. The two species are quite distinct but *Mimusops kauki* appeared to be a species of *Manilkara*, as was first recognized by Dubard in 1915.

When trying to trace the identity of Linnaeus' species a remarkable incongruity can be pointed out in Linnaeus' references. *Mimusops elengi* L.



Distribution of the Far-Eastern species of the genus *Manilkara* — 1. *M. dissecta*, 2. *M. smithiana*, 3. *M. kauki*, 4. *M. celebica*, 5. *M. hexandra*, 6. *M. hoshinot*, 7. *M. udoido*, 8. *M. fasciculata*, 9. *M. roxburghiana*, 10. *M. kanosimensis*, 11. *M. samoensis*, 12. *M. vitiensis*.

is according to the author identical with the specimen pictured by Breyne (Cent. 1, 1677, 20, t. 8). *Mimusops kauki* L., however, which is based on Linnaeus, Fl. Zeyl., 1748, no 137, is according to him identical with the specimen described by Burman (Thes. Zeyl., 1737, 133) and by Hermann (Mus. Zeyl., 1717, 23, 39). Burman, however, bases himself on the same publication and figure by Breyne which according to Linnaeus is identical with *Mimusops elengi* L.. The matter gets still more confused since Linnaeus, Fl. Zeyl., under no 137, refers to Burman, Thes. Zeyl. p. 133. As has been pointed out above Burman based himself on Breyne, so this part of Linnaeus' no 137 refers to *Mimusops elengi* L. but the description which Linnaeus adds refers to *Mimusops kauki* L.. In 1753 Linnaeus distinguishes the two species on one detail only, viz "foliis alternis remotis" for *Mimusops elengi* L. and "foliis confertis" for *Mimusops kauki* L., basing himself on the material of Hermann, resp. the numbers 138 and 137 of the latter's collection from Ceylon. This, however, is not clearly stated by Linnaeus and subsequently Brandis (Forest Fl., 1874, 292) and Trimen (Fl. Ceylon 3, 1895, 87) have clarified this difficulty. We therefore have to accept *Mimusops elengi* L. and *M. kauki* L. as valid species based on material preserved in the British Museum (Natural History), though from Linnaeus' references some doubt about the identity of the species might arise. *Manilkara kauki* is not known from Ceylon in a wild state.

The genus *Manilkara* was described by Adanson in 1763 (Fam. 2, p. 166) without a single species. The first specific epithets related to *Manilkara* are those from Dubard in 1915, the oldest specific epithet being *kauki* L. By some authors *Manilkara balata* (Aublet) Dubard has been regarded as the oldest combination in *Manilkara*, based on *Achras balata* Aublet (Hist. Pl. Guian. Fr. 1, 1775, 309). Aublet bases his species on material from Mauritius (Isle-de-France) in the Jussieu herbarium and points out that it is identical with Rheede's figure of *Manyl-kara* (Hort. Malab. 4, 1673, 53, t. 25). Pierre (Bull. Soc. linn. Paris 64, 1885, 506) considers Aublet's reference to an Asiatic species erroneous and introduces the name *Mimusops balata* (Aublet) Pierre for an American species. Dubard finally recognized this species as belonging to *Manilkara*, using the name *Manilkara balata* (Aublet) Dubard (Ann. Mus. col. Mars. 23, 1915, 19) and adding some synonyms. Chevalier (Rev. bot. appl. & agric. trop. 12, 1932, 267) was the first to recognize this confusion as he was able to consult the first manuscript left by Aublet and the material of *Achras balata*. Contrary to what has been stated by Pierre and Dubard, Chevalier came to the conclusion that *Achras balata* Aublet is not a *Manilkara* but represents *Mimusops commersonii* Engler. The type material (Aublet 308 in Paris) consists of three specimens on one sheet, two of which represent *Manilkara bidentata* (A, DC) Chevalier, the third being *Mimusops commersonii* Engler and this specimen is regarded by Chevalier as the type of *Achras balata* Aublet.

4. *M. celebica* H. J. Lam, Lam c.s. 1941, 331, f. 4.

Type specimen: *NIFS* bb. 16979 in BO, dupl. in L, Celebes, Manado, distr. Boalema, near Bilato, c. 50 m alt., fl. May.

Distr.: Celebes and Banggai.

New collections:

CELEBES — Manado, Boalema, alt. c. 150 m, old forest, stony, clayey soil: *van Gabel* 34 (= *NIFS* bb. 32523) (BO, L), common tree c. 27 m, fr. green, Aug.; ibidem: *van Gabel* 30 (= *NIFS* bb. 32365) (BO, L), fairly common, tree c. 20 m, fr. greenish brown, Aug., nat. name: amibolo; ibidem, Luwuk, Siuna: *NIFS* bb. 30152 (BO, L); ibidem, Poso, Udele, alt. c. 75 m: *NIFS* bb. 31489 (BO, L).

BANGGAI — Siuwa, alt. 100 m: *NIFS* bb. 31840 (BO, L); ibidem, Huhak, alt. c. 60 m: *NIFS* bb. 31885 (BO, L), young fl., April.

Remarks: In Lam's description the angle between the secondary nerves and the main rib is stated to be 40°–50°; on studying the type specimen and the new collections given above, however, this angle rather seems to vary between 50° and 60°. In its sterile parts, i.e. the leaves, this species is therefore relatively easy to distinguish from sterile specimens of *M. kauki*, the latter showing an angle of 60°–70°.

Since fruiting material has been found we are able to complete the description of this species. The description has been based on *van Gabel* 34:

Pedice of fruit stout, 1.3–2.5 cm, gradually incrassate at top, adpressedly pubescent. Fruit pyriform, globose to subobovate, sometimes slightly 5-angled, 1.6–2 × 1.6–2.4 cm, crowned by a short remnant of the style; pericarp dry, solid; seeds 2 or 3, pyriform, oval to round in cross-section, shining, pale brown, 1.2–1.8 × 0.8–1 × 0.6–0.8 cm, testa relatively thin, crustaceous, scar narrow, c. 0.9 × 0.1 cm, basiventral, sometimes with a surrounding darker coloured region.

5. *M. hexandra* (Roxb.) Dubard, Ann. Mus. Col. Mars. 23, 1915, 9, f. 2; Kerr, Florae siamensis enum. 2, 4, 1938, 263; Lam c.s. 1941, 332, f. 5 — *M. emarginata* H. J. Lam, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 241; Lam c.s. 1941, 342; Neal, Pac. Science 1, 1947, 243.

Neotype specimen: *Hooker & Thompson s.n.* (L), Malabar, fl. Distr.: Deccan Peninsula, Bengal, Ceylon, Siam, Indochina, Hainan.

New collections:

BENGAL — without loc.: *Stocks s.n.* (S); near Calcutta: *Helper s.n.* (S), fl.

INDOCHINA — without loc.: *Poilane 1986* (or *2986* ?) (P).

HAINAN — Ngai district, on roadside, dry sandy soil, level land: *Lau 501* (B, NY), woody, fl. light yellow, Sept.; ibidem, seaside, in mixed woods: *Wang 34889* (NY, S), fl. Oct.

Remarks: Miss Neal was kind enough to inform us that a cultivated tree, near Honolulu, in the Foster Garden and collected by her (*Neal s.n.* [BISH, L], fr. Sept., fl. Febr., tree, c. 8 m, spreading 15 m, trunk near base c. 50 cm diam., lvs nitidous, dull green above, lighter below, sap juicy) is almost certainly the same from which the type-specimen of *M. emarginata* was taken (*Curran 132*). This tree, which was shown to Dr Lam during a visit to Honolulu in 1949, undoubtedly represents *M. hexandra*.

The leaves in *Hooker & Thompson s.n.* are up to 14.5 cm long, blade up to 12 cm; sepals up to 0.6 cm.

As no type specimen could be traced a neotype has been indicated from material which is found in the same area as Roxburg indicates in his publication (Pl. Corom. 1, 1795, 16, t. 15).

6. *M. udoido* Kanehira, Bot. Mag. Tokyo 47, 1933, 677; Lam c.s. 1941, 333, f. 6; Lam 1942, 42.

Lectotype specimen: *Nisida 2129* (FU), Palau Islands, Aimi-rük, fl. Nov.

Distr.: Caroline Islands.

Remarks: As the lectotype specimen does not include fruits, *Kanehira 1925* (FU), fr. Aug., is proposed here for the "type-specimen" of the fruits.

7. *M. fasciculata* (Warb.) H. J. Lam & R. A. Maas Geesteranus, Lam c.s. 1941, 335, f. 8; Lam 1942, 42 — *M. merrilliana* H. J. Lam Lam c.s. 1941, 334, f. 7; Lam 1942, 42.

Type specimen: *Warburg s.n.* (B), New Guinea, Sigar, on coast of McCluer Bay, on dry slopes, fl.

Neotype specimen: *Kostermans 255* (= *NIFS* bb. 33925) in L, dupl. in BO, Morotai, Tobelo, primary forest, young tree, fr. green (to?) dark red.

Distr.: Luzon, Samar, Mindanao, Celebes, Banggai, Morotai, Obi, Misool, Kai, New Guinea, Meos Num, Waigeo, Japen.

New collections:

SAMAR — Mt Calbiga, forest, alt. 300 m: *Sulit 6412* (A, L), fr. green May, nat. name: petraragan.

CELEBES — Malili, distr. Tabarno, clayey soil, steep country, alt. c. 500 m: *Reppie 4* (= *NIFS* bb. 32357) (BO, L), fairly common, nat. name: kumea; ibidem: *Reppie 40* (= *NIFS* bb. 32599) (BO, L), nat. name: kumia batu; Kolonedale distr., Busanga, alt. c. 100 m: *NIFS* bb. 31519 (BO, L); Kasiruta, near Nanoang: *NIFS* bb. 23216 (BO, L).

BANGGAI — Sampaka, alt. c. 300 m: *NIFS* bb. 31835 (BO, L), young fl., Nov.; Tuntung, alt. c. 170 m: *NIFS* bb. 31881 (BO, L), April.

MOROTAI — without loc.: *Tangkilisan* s.n. (BO, L), tree, 40 m, fr. green, nat. name: ligoweer; ibidem: *Tangkilisan* 153 (= *NIFS* bb. 33841) (BO, L), tree, 30 m, buttressed, nat. name: liguer; ibidem, alt. c. 40 m: *Kostermans* 255 (= *NIFS* bb. 33925) (BO, L), fr. green, July.

OB1 — South Obi, Woi, c. 30 m alt.: *NIFS* bb. 23831 (BO, L).

MISOOL — without loc.: *Eykman* Inst. s.n. (BO, L), young fr., Dec.

WAIGEO — Urbinasopon, alt. c. 2 m, on limestone: *Versteegh* 11 (= *BW* 1) (L), fl. fr. Nov., tree, c. 35 m, fl. buds green, nat. name: smer.

MEOS NUM — without loc.: *NIFS* bb. 30981 (A, BO, L), young fl. Oct.

JAPEN — without loc., alt. c. 200 m: *NIFS* bb. 30640 (A, BO, L), fr. Sept.; ibidem: *NIFS* bb. 30666 (A, BO, L), fr.; ibidem: *NIFS* bb. 30983 (A, BO), mature fr. Oct.; ibidem, alt. c. 250 m: *NIFS* bb. 30469 (BO, L), fr. Sept.

NEW GUINEA — Kokas, sea level: *NIFS* bb. 22270 (BO, L), Febr.; Hollandia, coastal plain N. of Hollandia, alt. c. 50 m: *NIFS* bb. 25079 (BO, L), July; Hollandia, Berap: *NIFS* bb. 28966 (BO, L), Aug.; Waren: *Kanehira & Hatusima* 14182 (A), fr. April; Tobie Isl.: *Barclay* s.n. (BM); Mimika, Kamarè (Uta), alt. 2 m: *NIFS* bb. 32943 (= *Lundquist* 224) (BO), tree, 19 m, nat. name: trotó.

Remarks: As Warburgh's material probably is burnt in the Berlin Herbarium it is proposed here to use *Kostermans* 255 as a neotype specimen. As it bears fruits only, *NIFS* bb. 31835 is used for a typus florum.

As can be seen from the synonymy *Manilkara merrilliana* and *M. fasciculata* have been united. The differences given in the key on page 325 of Lam's paper (Lam c.s. 1941) are insufficient and in analysing the abundant material before us, we are no longer able to keep the two species apart. The nervation of the leaves, as well as the shape and size of both staminodes and appendages show a series of transitions in which it is impossible to find a gap of any substance. Neither did the distribution present any correlation with certain characters. Yet it must be pointed out that a large-leaved and a small-leaved form may be distinguished, the former having (in bud) 2—3 mm long staminodes, the latter possessing (in bud) 1—1.5 mm long staminodes, being of the same shape in either groups. Since, however in the buds of the large-leaved form staminodes both 1—1.5 mm and 2—3 mm long were found, this character, already a minor one by itself, seems insufficient to justify the distinction of two varieties. This why we decided that *M. fasciculata* and *M. merrilliana* have to be regarded as conspecific.

8. *M. roxburghiana* (Wight) Dubard, Ann. Mus. col. Mars. 23, 1915, 10, f. 3; Lam c.s. 1941, 336.

Type specimen: *Wight* 1740 (K), Annamallay, without loc., fl. Dec.

Distr.: India, Western Deccan Peninsula.

Remarks: We were fortunate enough to examine the type specimen and may add the following details to the description of Wight:

Branchlets subsericeous. Leaves 5.5—7.5 × 2—4.5 cm, midrib subcanaliculate above, prominent below, secondary nerves 9—12 on either side, distinct, arching near the margin, tertiary nerves more or less conspicuous, irregularly undulating, but sometimes entirely fading into the reticulate nervation between secondary nerves; petioles subcanaliculate. Pedicel submentose at top. Sepals 0.7—1 cm, inner sepals membranous along the margins. Corolla 0.7—1.1 cm, tube 0.3—0.4 cm, segments up to 0.6 cm,

appendages as long as or slightly longer than petals, 0.5—0.7 cm. Staminodes 0.3—0.4 cm. Ovary 8-celled.

9. *M. kanosiensis* H. J. Lam & B. Meeuse, Lam c.s. 1941, 337, f. 9.

Type specimen: *Carr 11237* (L), New Guinea, Papua, Kanosia, edge of mangrove swamp, sea level, fl. Febr.

Distr.: New Guinea and Moluccas.

New collections:

TANIMBAR ISL. — Jamdena, between Cape Ilgnei and Otimmer: *NIFS* bb. 24311 (BO, L), fl. March; ibidem: *Buwalda 4321* (BO, L), fl. brown-yellow outside, yellowish inside, March.

Remarks: The following may be added to the description of Lam and Meeuse: Tube up to 0.4 cm long, appendages up to 0.65 cm; filaments 0.2—0.3 cm long, anthers 0.4—0.5 cm long.

NIFS bb. 24311 shows the following details: Petioles up to 2 cm long. Secondary nerves up to 18. Segments of petals up to 1 cm long, appendages up to 0.4 cm long, margin sometimes serrate; staminodes up to 0.4 cm long.

The record from the Moluccas is the first one outside New Guinea.

10. *M. samoensis* H. J. Lam & R. A. Maas Geesteranus, Lam c.s. 1941, 338, f. 10; Lam 1942, 42.

Type specimen: *Whitmee 226* (K), Samoa.

Distr.: Samoa.

11. *M. vitiensis* (H. J. Lam & E. van Olden) B. Meeuse, Lam c.s. 1941, 339, f. 11; Lam 1942, 42.

Type specimen: *A. C. Smith 1461* (L), Fiji, on sea cliff.

Distr.: Fiji.

Subgenus EUACHRAS Gilly.

Euachras Gilly, *Trop. Woods* 73, 1943, 17.

12. *M. hoshinoi* (Kanehira) van Royen, nov. comb. — *Northiopsis hoshinoi* (Kan.) Kan., Lam c.s. 1941, 344; Lam 1942, 43; Glassman, Bern. P. Bish. Mus. Bull. 209, 1952, 88 — *Northia hoshinoi* Kan., Bot. Mag. Tokyo 46, 1932, 489 — *Fig. 1, i—j*.

Type specimen: *Hoshinoi 2138* (FU), Caroline Islands, Ponape, Kolonia, fl. fr. March.

Distr.: Samoa and Caroline Islands.

13. *M. zapota* (L.) van Royen, nov. comb. — *Achras zapota* L., Sp. Pl., 1753, App. 1190; Lam, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 218; Lam, Bull. Jard. bot. Bzg, sér. 3, 8, 1927, 476; Chun & Benemerito, Sunyatsenia 6, 3/4, 1946, 263, pl. 43 — *Manilkara zapotilla* (Jacq.) Gilly, *Trop. Woods* 73, 1943, 6; Cronquist, Bull. Torr. Bot. Cl. 72, 6, 1945, 550. — *Fig. 1, l—q*.

Neotype specimen: *Splitgerber 243* (L), Suriname, without loc., common, tree, 6—12 m, fl. yellow, fl. fr. Dec.

Distr.: This species, a native of South America, is being cultivated throughout the tropics.

Remarks: The synonymy of this species is rather complicated, but it has been unraveled partly by Gilly, to whom we may refer here. However, as is pointed out by Lam and van Royen in *Taxon* 2, 5, 1953, 112 the name *Achras zapota* L. is not a nomen nudum and therefore the name

given above is to be regarded as the correct one. Though in the Linnean Herbarium in London a specimen of *Achras zapota* is present no details about habitat, collector etc. are indicated and therefore a neotype have been selected, the more so as Linnaeus himself did not indicate a specimen on which his species has been based.

Incompletely known.

14. *M. kurziana* H. J. Lam & B. Meeuse. Lam c.s. 1941. 342.

Type specimen: *Kurz 624* in ?

Distr.: Burma.

15. *M. littoralis* (Kurz) Dubard, Lam c.s. 1941, 343 — *Mimusops littoralis* Kurz, J. As. Soc. Beng. 45, 1876, 138.

Type specimen: *Helfer 3613* in P ?

Distr.: Tenasserim, Andamans, Nicobars, Cocos Island.

M. kurziana and *M. littoralis* both seem to be very closely related to *Manilkara hexandra* and might as well be conspecific, but as no material could be found this question is left open.

New names and combinations in extra-malaysian species.

16. *Manilkara laciniata* (Lec.) van Royen, nov. comb. — *Faucherea laciniata* Lec., Bull. Mus. hist. nat. 26, 1920, 251, f. 3 — Madagascar.

17. *Manilkara nato-lahy* van Royen, nom. nov. — *Labourdonnaisia hexandra* Lec., Bull. Mus. Hist. nat. 25, 1919, 54 — *Faucherea hexandra* (Lec.) Lec., l. c. 1920, 248 — Madagascar.

As the specific epithet *hexandra* has been used already by Roxburgh (1795) for a species of *Mimusops* which was transferred by Dubard in 1915 to *Manilkara* it became necessary to adopt a new specific epithet.

18. *Manilkara cordifolia* van Royen, nom. nov. — *Faucherea parvifolia* Lec., l. c. 1920, 251, f. 4 — Madagascar.

The specific epithet *parvifolia* could not be used here as Radlkofer in 1908 described a *Mimusops parvifolia* which was subsequently transferred by Dubard (1915) to *Manilkara*.

19. *Manilkara thouvenotii* (Lec.) van Royen, nov. comb. — *Faucherea thouvenotii* Lec., l. c. 1920, 248 — Madagascar.

Index of collectors' numbers.

The numbers between brackets indicate the number of the species.

Barclay s.n. (7) — Buwalda s.n. (3); 4321 (9) — BW 1 (7) — Carr 11237 (9) — Curran 132 (5) — Eykman Inst. s.n. (7) — Forster s.n. (1) — van Gabel 30 (4); 34 (4) — Helfer s.n. (5); 3613 (15) — Hermann 137 (3) — Hooker & Thompson s.n. (5) — Hoshinoi 2138 (12) — Kanehira 1925 (6) — Kanehira & Hatusima 14182 (7) — Kostermans 255 (7) — Kurz 624 (14) — Labillardière s.n. (3) — Lau 501 (5) — Lundquist 224 (7) — Milsum CF 6546 (3) — Neal s.n. (5) — NIFS bb. 16979 (4); 22270 (7); 23216 (7); 23831 (7); 24311 (9); 24436 (3); 25079 (7); 28966 (7); 30152 (4); 30469 (7); 30640 (7); 30666 (7); 30981 (7); 30983 (7); 31489 (4); 31519 (7); 31835 (7); 31840 (4); 31881 (7); 31885 (4); 31903 (3); 32357 (7); 32365 (4); 32528 (4); 32599 (7); 32943 (7); 33841 (7); 33925 (7) — Nisida 2129 (6) — Pancher s.n. (1) — Poilane 1986 (2986 ♀) (5) — Reppie 4 (7); 40 (7) —

A. C. Smith 1450 (2); 1461 (11) — Splitgerber 243 (12) — Stocks s.n. (5) Sulit 6412 (7) — Tangkilisan s.n. (7); 153 (7) — Versteegh 11 (7) — Wang 34889 (5) — Warburg s.n. (7) — Whitmee 226 (10) — Wight 1740 (8).

Index.

The numbers behind the names indicate the number of the species. New names and combinations are denoted by an asterisk, synonyms in *italics*.

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<i>parvifolia</i> Lec.	18	<i>merrilliana</i> H. J. Lam	7
<i>thouvenotii</i> Lec.	19	*nato-lahy van Royen	17
<i>Labourdonnaisia hexandra</i> (Lec.) ...	17	<i>roxburghiana</i> (Wight) Dub. ...	8
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<i>cmarginata</i> H. J. Lam	5	R. A. Maas Geesteranus ...	2
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Geesteranus	7	<i>vitiensis</i> (H. J. Lam & E. van	
<i>hexandra</i> (Roxb.) Dubard	5	Olden) B. Meeuse	11
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<i>kanosiensis</i> H. J. Lam &		<i>zapotilla</i> (Jacq.) Gilly	13
B. Meeuse	9	<i>Mimusops browniana</i> Benthams	3
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<i>kurziana</i> H. J. Lam &		<i>Northia hoshinoi</i> Kanehira	12
B. Meeuse	14	<i>Northiopsis hoshinoi</i> (Kan.)	
		Kanehira	12