The Sapotaceae of Thailand

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ABSTRACT. A study of Thai Sapotaceae recorded nine genera and 45 species including 12 endemic and two introduced species. The largest genus is *Madhuca* with 16 species. Seven new records of *Madhuca floribunda*, *M. motleyana*, *Manilkara littoralis*, *Palaquium hispidum*, *P. impressinervium*, *P. maingayi* and *P. ottolanderi* from Thailand and a new record of *Pouteria grandifolia* for Cambodia are added. New synonyms for *Diploknema siamensis*, *Madhuca dongnaiensis*, *M. thorelii*, *Palaquium garrettii*, *P. sukoei*, *Xantolis burmanica* and *X. cambodiana* are also established. Keys to genera and species are presented.

The following synopsis of the Sapotaceae is presented as a precursor to the account of this family for the Flora of Thailand. A list of specimens examined is given at the end of the paper.

TAXONOMIC ACCOUNT

SAPOTACEAE

Trees or rarely shrubs, usually with latex; leaves simple, spirally arranged or distichous and alternate; flowers mostly bisexual, rarely unisexual, fascicled, axillary, rarely solitary or forming panicles; calyx of 1 or 2 whorls of free or partly fused sepals; corolla gamopetalous, lobed or divided to the base into 3 segments; stamens inserted near the top of corolla tube, in a single whorl; staminodes absent or present; disk annular or absent; ovary superior; locule usually 1-ovuled; fruits fleshy, 1-many-seeded.

52 genera and ca. 1,100 species, widely distributed in the tropics. Nine genera and 45 species in Thailand.

KEY TO THE GENERA

1. Calyx biseriate with 4, 6 or 8 sepals
 2. Sepals 4
  3. Leaves nearly always spirally arranged; tertiary venation usually oblique or reticulate — **3. Madhuca**
  3. Leaves alternate and distichous; tertiary venation parallel to the secondary veins — **7. Payena**
 2. Sepals 6 or 8
  4. Sepals 6
   5. Stamens 6 — **4. Manilkara**
   5. Stamens 12 or more — **6. Palaquium**
  4. Sepals 8 — **5. Mimusops**

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1. Calyx uniseriate with 5 sepals
 6. Staminodes absent **1. Chrysophyllum**
 6. Staminodes present
  7. Pedicel more than 15 mm long **2. Diploknema**
  7. Pedicel less than 15 mm long
   8. Corolla tubular or cyathiform with ± erect lobes. Stamens fixed within or at top of tube and included **8. Pouteria**
   8. Corolla rotate or tubular with spreading lobes. Stamens fixed at top of tube and exserted **9. Xantolis**

1. CHRYSOPHYLLUM

L. [Gen. Pl. ed. 1: 361. 1737], Sp. Pl. 1: 192. 1753; Gen. Pl. ed. 5: 88. 1754; DC., Prodr. 8: 156. 1844; Benth. & Hook., Gen. Pl. 2: 653. 1876; Engl., Bot. Jahrb. Syst. 12: 519. 1890; Nat. Pflanzenfam. 4(1): 147. 1891; Nat. Pflanzenfam., Nachtrag. 278. 1897; Vink, Blumea 9: 21. 1958; Aubréville, Notul. Syst. (Paris) 16: 223. 1961; Baehni, Boissiera 11: 71. 1965; Pennington, Gen. Sapot.: 216. 1991; Verdcourt & Meijer in Fl. Ceylon 9: 401. 1995.— *Donella* Pierre ex Baillon, Hist. Pl. 11: 294. 1891; Lecomte, Bull. Mus. Hist. Nat. (Paris) 22: 388. 1916; Aubréville, Notul. Syst. (Paris) 16: 246. 1961.

Two species, including one cultivated, in Thailand.

KEY TO THE SPECIES

1. Mature leaves pubescent on lower surface. Stigma minute, not lobed **2. C. cainito**
1. Mature leaves glabrous on lower surface. Stigma distinctly lobed **1. C. roxburghii**

1. Chrysophyllum cainito L., Sp. Pl. 1: 192. 1753; DC., Prodr. 8: 157. 1844; Merr., En. Philipp. III, 3: 288. 1923; Lewis, Veg. Prod. Ceylon 245. 1934; Vink, Blumea 9: 26. 1958; Worthington, Ceylon Trees 303. 1959; Pennington, Gen. Sapot.: 224. 1991; Verdcourt & Meijer in Fl. Ceylon 9: 403. 1995.

T h a i l a n d.— Cultivated throughout the country.

D i s t r i b u t i o n.— Tropical America; cultivated throughout the tropics.

V e r n a c u l a r.— Mak nam nom (หมากน้ำนม) (North-eastern); sata appoen (สตาร์แอปเปิ้ล) (Central); Star Apple.

U s e s.— Ripe fruits edible.

N o t e.— *Chrysophyllum cainito* is distinguished from *C. roxburghii* by its broader leaves, with sericeous pubescence on the lower surface and its larger fruit.

2. Chrysophyllum roxburghii G. Don, Gen. Gard. Syst. Dict. 4: 33. 1838; Thwaites & Hooker, En. Pl. Zeyl. 174. 1860; Kurz, For. Fl. Burma 2: 118. 1877; C.B. Clarke in Fl. Br. Ind. 3: 535. 1882; Trimen, Handb. Fl. Ceylon 3: 76. 1895; Brandis, Ind. Trees: 423. 1906; Ridl., Fl. Mal. Pen. 2: 257. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz. Sér. 3, 7: 187. 1925, except syn. *C. curtisii* King & Gamble; Lewis, Veg. Prod. Ceylon: 244. 1934; H.R. Fletcher in Fl. Siam. En. 2: 352. 1938; Worthington, Ceylon Trees: 305. 1959;

Verdcourt & Meijer in Fl. Ceylon 9: 404. 1995.— *C. acuminatum* Roxb., Fl. Ind. ed. Carey & Wall. 2: 345. 1824, non Lam. 1794.— *Nycterisition lanceolatum* Blume, Bijdr. 12: 676. 1826.— *Chrysophyllum javanicum* Steud., Nom., ed. 2: 359. 1840.— *C. lanceolatum* (Blume) DC., Prodr. 8: 162. 1844; Vink, Blumea 9: 28. 1958; Ng in Tree, Fl. Mal. 1: 396, f. 3. 1972; Pennington, Gen. Sapot.: 221. 1991, non Casar. 1843.— *Donella roxburghii* (G. Don) Pierre ex Lecomte, Fl. Gén. I.-C. 3: 897, f. 98. 1930.— *D. lanceolata* (Blume) Aubréville., Fl. C.L.V. Sapotacées: 64, pl. 11, 1–4. 1963.— *Chrysophyllum lanceolatum* (Blume) DC. var. *stellatocarpon* P. Royen, Blumea 9: 32. 1958.

T h a i l a n d.— EASTERN: Nakhon Ratchasima (Katok, Bukanun); PENINSULAR: Chumpon (Ko Tao); Surat Thani (Ko Samui, Bang Bao); Krabi (Ko Pipi); Trang (Khao Chong).

D i s t r i b u t i o n.— Sri Lanka, India, Indo-China, S. China, Hong Kong, West Malaysia, Sumatra, Java (type), Riouw, Billiton.

E c o l o g y.— In evergreen forest, along stream, ca. 100–500 m.

V e r n a c u l a r.— Khi phueng (ขี้ผึ้ง) (Eastern); nam phueng (น้ำผึ้ง), hua tao (หัวเต่า) (Peninsular).

N o t e.— *Chrysophyllum roxburghii* is recognised by its glabrous leaves, slightly 5-winged fruit and unlobed stigma.

2. DIPLOKNEMA

Pierre, Arch. Néerl. Sci. Exact. Nat. 19: 103. 1884; Engl., Nat. Pflanzenfam. 4(1): 134. 1890; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3,7: 182. 1925; op. cit. Sér. 3,8: 463. 1927; P. Royen, Blumea 9: 75. 1958; Aubréville, Adansonia n.s. 3: 336. 1963; Baehni, Boissiera 11: 104. 1965; Ng in Tree Fl. Mal. 1: 396. 1972; Pennington, Gen. Sapot.: 162. 1991.— *Mixandra* Pierre [Pierre ex Planchon, Etud. Prod. Sapot.: 26. 1888, nom. nud.] Not. Bot. Sapot.: 2. 1890; Dubard, Rev. Gen. Bot. 20: 195. 1908.

One species in Thailand.

Diploknema siamensis H.R. Fletcher, Kew Bull. 1937: 379. 1937; in Fl. Siam. En. 2: 360. 1938; P. Royen, Blumea 9: 85, f. 7. 1958; Pennington, Gen. Sapot.: 164. 1991.— *Madhuca grandifolia* H.R. Fletcher, op. cit. 1937: 376. 1937; op. cit. 2: 358. 1938; P. Royen, op. cit. 10: 32. 1960, syn. nov.

T h a i l a n d.— PENINSULAR: Chumphon (Siepyuan, type: *Kerr* 16260 BK, K); Phangnga (Khao Katakwam, type of *Madhuca grandifolia*: *Kerr* 18408 BK, BM, E, K-3 sheets).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In evergreen forest, ca. 20–400 m.

N o t e.— Fletcher (1937) described *Diploknema siamensis* based on a single flowering specimen (*Kerr* 16260), and *Madhuca grandifolia* on fruiting material (*Kerr* 18408). However, as Royen (1960) suggested, these two specimens are indistinguishable

in almost every aspect of leaf morphology,. Moreover, *Kerr* 18408 has warty fruits and five calyx lobes (determined by the scars on the fruit) typical of *D. siamensis*. Therefore, I consider these two taxa to be conspecific.

3. MADHUCA

Hamilton ex Gmelin, Syst. 2: 773, 779. 1791; Merr., En. Philipp. 3, 3: 276. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 152. 1925; op. cit. Sér. 3, 8: 443. 1927; P. Royen, Blume 10: 1. 1960; Aubréville, Fl. C.L.V. Sapotacées: 22. 1963; Baehni, Boissiera 11: 34. 1965, pro parte; Ng in Tree Fl. Mal. 1: 401. 1972; Pennington, Gen. Sapot.: 154. 1991.— *Aesandra* Pierre (*Aïsandra* corr. Airy Shaw, Kew Bull. 1963: 460.), Not. Bot. Sapot.: 1. 1890; Dubard, Rev. Gen. Bot. 20: 204. 1908; van Bruggen, Blumea 9: 139. 1958; Aubréville, op. cit. 18; Baehni, op. cit. 29, syn. nov.

Sixteen species in Thailand, including nine endemic species.

KEY TO THE SPECIES

1. All sepals glabrous inside
 2. Petioles less than 1.5 cm long. **16. M. thorelii**
 2. Petioles at least or more than 1.5 cm long
  3. Pedicels less than 7 mm long **12. M. rupicola**
  3. Pedicels at least or more than 7 mm long
   4. Stamens 12. Ovary with 6 locules **4. M. esculenta**
   4. Stamens 19–22. Ovary with 10–12 locules **8. M. malaccensis**
1. Sepals at least with some parts pubescent inside
 5. Style pubescent in the lower half
  6. Stamens 28. Mature leaves woolly on lower surfaces **11. M. punctata**
  6. Stamens 24. Mature leaves sparsely short adpressed hairs or glabrous on lower surfaces **13. M. smitinandii**
 5. Style glabrous
  7. Stamens at least 26
   8. Ovary pubescent **7. M. krabiensis**
   8. Ovary glabrous
    9. Mature leaves woolly on lower surfaces **10. M. pierrei**
    9. Mature leaves sparsely tomentose or glabrous on lower surfaces
     10. Corolla lobes 10. Ovary with 6 locules. **2. M. chiangmaiensis**
     10. Corolla lobes 12–17. Ovary with 10–14 locules.
      11. Corolla lobes 12–14. Style more than 2 cm long. Secondary veins in 20–23 pairs **3. M. dongnaiensis**
      11. Corolla lobes 15–17. Style less than 2 cm long. Secondary veins in 6–16 pairs **14. M. stipulacea**
7. Stamens up to 20
 12. Corolla lobes pubescent outside
  13. Stamens and ovary glabrous **9. M. motleyana**
  13. Stamens and ovary pubescent **5. M. floribunda**
 12. Corolla lobes glabrous outside
  14. Pedicels and style less than 8 mm long. Stamens 15–16 **6. M. klackenbergii**
  14. Pedicels and styles more than 8. Stamens 19–20
   15. Mature leaves glabrous on lower surface. Leaf apex obtuse or rounded **15. M. takensis**
   15. Mature leaves pubescent on lower surface. Leaf apex obtusely acuminate **1. M. chai-ananii**

1. Madhuca chai-ananii P. Chantaranothai, Nord. J. Bot. 18: 494. 1998.

T h a i l a n d.— PENINSULAR: Surat Thani (Khao Phra Rahu, type: *Smitinand, Sleumer et al.* 1153 K, L).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— Alt. 200 m.

N o t e.— *Madhuca chai-ananii* superficially resembles *M. rufa* from Malaysia, but differs in having a longer petiole and pedicel, a larger number of stamens, corolla lobes and ovary cells, and a glabrous exterior to the corolla.

2. Madhuca chiangmaiensis P. Chantaranothai, Nord. J. Bot. 18: 493. 1998.

T h a i l a n d.— Northern: Chiang Mai (type: *Rock* 1552 A, K).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In mixed deciduous forest, ca. 420 m.

N o t e.— This very distinct species is known only from a single collection from Chiang Mai province (N2).

3. Madhuca dongnaiensis (Pierre) Baehni, Candollea 7: 416. 1938.— *Aesandra dongnaiensis* Pierre, Not. Bot. Sapot.: 2. 1890.— *Payena dongnaiensis* (Pierre) Engl., Nat. Pflanzenfam. Nachtrag. 272. 1897.— *Bassia dongnaiensis* (Pierre) Lecomte, Fl. Gén. I.-C. 3: 904, f. 100. 1930.— *Madhuca grandiflora* H.R. Fletcher, Kew Bull. 1937: 376. 1937; in Fl. Siam. En. 2: 358. 1938; P. Royen, Blumea 10: 49. 1960, syn. nov.— *Diploknema dongnaiensis* (Pierre) Pennington, Gen. Sapot.: 164. 1991.

T h a i l a n d.— SOUTH-EASTERN: Sa Kaeo, Prachin Buri (Krabin, Khao Chakan), Chanthaburi (Na-arng), Trat (Dan Chumporn, type of *Madhuca grandiflora*: *Kerr* 17659 BK, BM, E, K).

D i s t r i b u t i o n.— Vietnam (type).

E c o l o g y.— In evergreen, secondary, open deciduous or scrub forest, 50–300 m.

V e r n a c u l a r.— Ma sang (มะซาง) (Central); lamut sida (ละมุดสีดา) (South-eastern).

N o t e.— *Madhuca dongnaiensis* is, as far as known, endemic to southeastern Thailand and southern Vietnam. It is easily recognized by having narrowly elliptic or oblanceolate leaves. *Kerr* 9760 has smaller leaves than other material.

4. Madhuca esculenta H.R. Fletcher, Kew Bull. 1937: 375. 1937; in Fl. Siam. En. 2: 358. 1938; P. Royen, Blumea 10: 64. 1960.

T h a i l a n d.— NORTHERN: Phitsanulok (Pamak); SOUTH-EASTERN: Trat (Ko Chang, type: *Kerr* 6931 BK, BM, E, K).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In deciduous forest, along streams, 100–300 m.

V e r n a c u l a r.— Lamut sida (ละมุดสีดา) (South-eastern).

U s e s.— Ripe fruit edible.

N o t e.— Only two collections of *Madhuca esculenta* have been made since 1924.

5. Madhuca floribunda (Pierre) H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 182. 1925; Aubréville, Fl. C.L.V. Sapotacées: 34. 1963.— *Dasyaulus floribundus* Pierre ex Dubard, Bull. Mus. Hist. Nat. 13: 457. 1907.— *Payena floribunda* (Pierre) Lecomte, Fl. Gén. I.-C. 3: 910, f. 101. 1930; P. Royen, Blumea 10: 112. 1960.

T h a i l a n d.— NORTH-EASTERN: Ubon Ratchathani (Buntharik).

D i s t r i b u t i o n.— Vietnam (type).

E c o l o g y.— In pine forest, 270 m.

N o t e.— *Madhuca floribunda* is close to *M. thorelii*, differing by having the pubescence on the outside of the corolla tube and on the inside of the apical part of the sepals. Thai material has shorter pedicels, 8–10 mm (vs 15–16 mm) than that from Vietnam. In other respects there are no apparent differences.

6. Madhuca klackenbergii P. Chantaranothai, Nord. J. Bot. 18: 494. 1998.

T h a i l a n d.— NORTH-EASTERN: Nong Khai (Bueng Karn-Nong Nasaeng, type: *Smitinand* 10062 BKF, C, K, P), Surin.

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In secondary forest, 100–130 m.

N o t e.— *M. klackenbergii* is closely related *M. floribunda*, but differs in having glabrous ovary, shorter pedicel and transverse tertiary nervation.

7. Madhuca krabiensis (Aubré.) P. Chantaranothai, Novon 8: 230. 1998.— *Aesandra krabiensis* Aubréville, Dansk Bot. Ark. 23: 519. 1968.— *Diploknema krabiensis* (Aubré.) Pennington, Gen. Sapot.: 164. 1991.

T h a i l a n d.— PENINISULAR: Krabi (Laem Nang, type: *Hansen & Smitinand* 12352 C, K), Phangnga (Khao Chong Lat).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— On seashore.

N o t e.— *Madhuca krabiensis* is closely related to *M. ridleyi* H.J. Lam but it differs in having the pubescence on the inside of the corolla tube between the stamens, woolly filaments, a few scattered hairs on the anthers, and by its obtuse or shortly notched and deflexed leaf apex.

8. Madhuca malaccensis (C.B. Clarke) H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 167. 1925; op. cit. Sér. 3, 8: 449. 1927; H.R. Fletcher in Fl. Siam. En. 2: 358. 1938; P. Royen, Blumea 10: 44. 1960; Ng in Tree Flora Mal. 1: 407. 1972; Pennington, Gen. Sapot.:

158. 1991.— *Payena malaccensis* C.B. Clarke in Fl. Br. Ind. 3: 547. 1882.— *Bassia malaccensis* (C.B. Clarke) King & Gamble, J. As. Soc. Beng. Pl. 2, Nat. Hist. 74(2): 180. 1906; Ridl., Fl. Mal. Pen. 2: 268. 1923.

T h a i l a n d.— PENINSULAR: Nakhon Si Thammarat (Lan Saka), Pattani (Khao Kalakiri), Narathiwat (Tomoh, Waeng).

D i s t r i b u t i o n.— Malaysia (type), Singapore, Sumatra, Bangka, Siantan, Borneo.

E c o l o g y.— In evergreen forest, ca. 800 m.

N o t e.— *Madhuca malaccensis* is distinct from most other Thai *Madhuca* species in being densely reddish brown pubescence on the corolla tube and along the mid-line outside of the lobes. *Kerr* 14953 has smaller and more narrowly elliptic leaves than other specimens. This species is restricted to the southern Thailand.

9. Madhuca motleyana (de Vriese) Baehni, Boissiera 11: 37. 1965; Pennington, Gen. Sapot.: 158. 1991.— *Isonandrsa motleyana* de Vriese, Natuurk. Tijdschr. Ned.-Indie 21: 308. 1860.— *Bassia motleyana* (de Vriese) C.B. Clarke in Fl. Br. Ind. 3: 546. 1882; Ridl., Fl. Mal. Pen. 2: 271. 1923.— *Ganua motleyana* [mottleyana] (de Vriese) Pierre ex Dubard, Rev. Gen. Bot. 20: 202. 1908; van den Assem, Blumea 7: 382, f. 8. 1953.

T h a i l a n d.— PENINSULAR: Krabi (Khao Pra Bang Kram), Narathiwat (Sungai Padee-Pawai).

D i s t r i b u t i o n.— West Malaysia, Sumatra, Riau, Belitong and Borneo (type).

E c o l o g y.— In evergreen or peat swamp forests, 0–80 m.

V e r n a c u l a r.— Sa tieo (สะเตียว) (Peninsular).

N o t e.— *Madhuca motleyana* is easily recognised from other Thai *Madhuca* species in the arched connections bweteen the secondary veins that form an intramarginal vein.

10. Madhuca pierrei (Williams) H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 182. 1925; op. cit. Sér. 3, 8: 463. 1927; H.R. Fletcher in Fl. Siam. En. 2: 359. 1938; P. Royen, Blumea 10: 42. 1960; Aubréville, Fl. C.L.V. Sapotacées: 27, pl. 3, f. 5. 1963; Pennington, Gen. Sapot.: 158. 1991.— *Bassia pierrei* Williams, Bull. Herb. Boiss., Sér. 2, 5: 226. 1905; Lecomte, Fl. Gén. I.-C. 3: 903. 1930.— *Bassia thoreliana* Pierre ex Lecomte, op. cit. 3: 994. 1930.— *Madhuca lecomtiana* H.J. Lam, Gard. Bull. Str. Settl. 9: 102. 1935.— *Mixandra butyracea* Pierre var. *pierrei* (William) Chev., Rev. Bot. Appl. 23: 147. 1943.

T h a i l a n d.— EASTERN: Nakhon Ratchasima (Chantuek); SOUTH-WESTERN: Ratchaburi (Ban Pong), Phetchaburi, Prachuap Khiri Khan (Sam Roi Yot); CENTRAL: Chai Nat (Khao Tamamun), Saraburi (Phukae), Bangkok (cultivated); PENINSULAR: Chumphon (Ko Tao, Lang Suan, Tha Chana), Surat Thani (Bangbao, Kian Sa), Nakhon Si Thammarat (Tha Khanon), Phatthalung (Sak), Satun (Tola), Pattani (Ban Sai Khao).

D i s t r i b u t i o n.— Cambodia and Laos (type).

E c o l o g y.— In bamboo, evergreen or dry evergreen forest, savannah or limestone hill, 5–400 m.

V e r n a c u l a r.— Ma khet (มะเค็ด) (Northern); ma sang (มะซาง), sang (ซาง) (Central).

U s e s.— Ripe fruit edible.

N o t e.— *Madhuca pierrei* is characterised by the cordate or rounded leaf base with unequal sides and the woolly tomentose pubescence on the lower surface of the leaf. *Kerr* 1124 has smaller leaves than the other specimens examined.

11. Madhuca punctata H.R. Fletcher, Kew Bull. 1937: 378. 1937; in Fl. Siam. En. 2: 359. 1938; P. Royen, Blumea 10: 92. 1960; Pennington, Gen. Sapot.: 158. 1991.

T h a i l a n d.— NORTHERN: Lamphun (type: *Kerr* 3153 BM, E, K).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In deciduous forest, ca. 330 m.

N o t e.— *Madhuca punctata* is easily recognised because of the cuneate leaf base and pale yellowish brown woolly pubescence on the lower surface of the leaf. This species is known only from the single type collection cited by Fletcher (1937).

12. Madhuca rupicola (King & Gamble) H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 175. 1925; Ridl., Fl. Mal. Pen. 5: suppl. 319. 1925; H.J. Lam, op. cit. Sér. 3, 8: 454. 1927; H.R. Fletcher in Fl. Siam. En. 2: 358. 1938; P. Royen, Blumea 10: 49, f. 9. 1960.— *Bassia rupicola* King & Gamble, J. As. Soc. Beng. 74(2): extra nr. 17, 183. 1905; Ridl., op. cit. 2: 269. 1923.

T h a i l a n d.— PENINSULAR: Phatthalung (Tamote), Songkhla (Ban Prakaup).

D i s t r i b u t i o n.— Malaysia (type).

E c o l o g y.— In evergreen forest, ca. 100 m.

V e r n a c u l a r.— Paduwa (เปาดูวา) (Peninsular); pu du wa (ปูดูวา) (Malay/Songkhla).

N o t e.— *Madhuca rupicola* is similar to *M. laurifolia* (King & Gamble) H.J. Lam and *M. penangiana* (King & Gamble) H.J. Lam. From the former it is easily distinguished by the sericeous pubescence on the pedicel, as well as the sparse, reddish-brown pubescence on the branchlets. It also has glabrous petioles. From *M. penangiana* it is distinguished by its sparse, ferruginous hairs on the outside of the apical part of the tube and by its shorter pedicels. Ng (1972) placed *M. rupicola* under *M. laurifolia* because there was a range of intermediate states of the pedicel and flower indumentum but I prefer to retain *M. rupicola* as a distinct species.

13. Madhuca smitinandii P. Chantaranothai, Nord. J. Bot. 18: 496. 1998.

T h a i l a n d.— PENINSULAR: Surat Thani (Ta Khanon, Khao Lak, type: *Smitinand* 11556 AAU, BKF, C, E, K).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In evergreen forest, on limestone hills, 100–200 m.

V e r n a c u l a r.— Kunlakhao (กุลเขา) (Peninsular).

N o t e.— Although similar to *Madhuca chai-ananii*, *M. smitinandii* consistently differs in having tomentum on the lower half of the style as well as more stamens and ovary cells.

14. Madhuca stipulacea H.R. Fletcher, Kew Bull. 1937: 378. 1937; in Fl. Siam. En. 2: 359. 1938; P. Royen, Blumea 10: 58. 1960; Pennington, Gen. Sapot. 159. 1991.

T h a i l a n d.— NORTHERN: Chiang Mai (Hot-Doi Tao, Doi Suthep, Mae Kong, en route to Mae Chaem, type: WINIT 1295 BK, E, L), Lamphun (Mae Li, Mae O), Lampang (Chae Son), Phrae (Sung Men), Uttaradit, Tak (Lan Sang).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In mixed deciduous forest, along streams, 270–600 m.

V e r n a c u l a r.— Kra bong khong (กระบองคอง), kik (กิ๊ก), ma sang phae (มะซางแพ) (Northern); pho lae do (เผาะแลโด) (Karen/Chiang Mai).

N o t e.— *Madhuca stipulacea* is perhaps most closely related to the Cambodian species *M. lecomtei* (Aubrév.) P. Chantaranothai which differs markedly in having a darkish brown pubescence on the calyx and shorter corolla lobes and filaments. This species is restricted to northern Thailand.

15. Madhuca takensis Aubréville, Dansk Bot. Arkiv 23: 193. 1965.

T h a i l a n d.— NORTHERN: Tak (type: *Sørensen, Larsen & Hansen* 6660 C, K).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In dry deciduous forest, 200 m.

N o t e.— *Madhuca takensis* is distinguished by its long petioles, a single flower in the axils of leaves, 19 stamens, 9 corolla lobes and a 7-locular ovary. This species is known only from the type.

16. Madhuca thorelii (Dubard) H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 182. 1925; op. cit. Sér. 3, 8: 462. 1927; P. Royen, Blumea 10: 103. 1960; Aubréville, Fl. C.L.V. Sapotacées: 35, pl. 5, f. 7. 1963.— *Dasyaulus thorelii* Dubard, Bull. Mus. Hist. Nat. 13: 458. 1907.— *Payena cambodiana* Lecomte, Fl. Gén. I.-C. 3: 909. 1930.— *P. thorelii* (Pierre) Lecomte, op. cit. 3: 910. 1930.— *Madhuca kerrii* H.R. Fletcher, Kew Bull. 1937: 377. 1937; in Fl. Siam. En. 2: 358. 1938; P. Royen, op. cit. 10: 90, f. 19. 1960, syn. nov.— *M. cambodiana* (Lecomte) Li, J. Arn. Arb. 24: 368. 1943; P. Royen, op. cit. 60, f. 11. 1960; Aubréville, op. cit. 36, pl. 5, f. 8–10. 1960, syn. nov.

T h a i l a n d.— NORTH-EASTERN: Nong Khai (Phu Wua); Mukdahan (Phu Hin Turb); EASTERN: Surin (Sangkhla, type of *Madhuca kerrii Kerr* 8317 BM, E); Si Sa Ket (Kantaralak); Ubon Ratchathani (type: *Thorel* 2755 P).

D i s t r i b u t i o n.— Cambodia.

E c o l o g y.— In open deciduous, light evergreen forest or savannah, 100–670 m.

V e r n a c u l a r.— Duea kai (เดือยไก่) (North-eastern, Eastern); pa kiam (ปาเกี้ยม) (Khmer/Surin); sa kam (สะก๊ำ) (Suai/Surin).

N o t e.— Examination of the type specimens of *Madhuca thorelii* (*Thorel* 2755), *M. cambodiana* (*Poilane* 14095) and *M. kerrii* (*Kerr* 8317) shows that these taxa are conspecific.

4. MANILKARA

Adanson, Fam. Pl. 2: 166. 1763, nom. cons.; Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille, Sér. 3, 3: 1. 1915; H.J. Lam, Blumea 4: 323. 1941; Aubréville, Fl. C.L.V. Sapotacées: 11. 1963; Ng in Tree Flora Mal. 1: 413. 1972; Pennington, Fl. Neotrop. 52, Sapotaceae 42. 1990; Gen. Sapot.: 128. 1991; Verdcourt & Meijer in Fl. Ceylon. 9: 359. 1995.— *Achras* L. [Gen. Pl. ed. 1: 365, no. 914. 1737], Sp. Pl. 2: 1190. 1753; Gen. Pl. ed. 5: 497, no. 1093. 1754; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 218. 1925; op. cit. Sér. 3, 8: 476. 1927.— *Sapota* Miller, Gard. Dict. Abr. ed. 4. 1754.

Four species in Thailand, including one cultivated.

KEY TO THE SPECIES

1. Corolla lobes divided into 3 segments
 2. Mature leaves glabrous on lower surface
  3. Pedicels less than 20 mm long — **1. M. hexandra**
  3. Pedicels more than 20 mm long — **3. M. littoralis**
 2. Mature leaves sericeous on lower surface — **2. M. kauki**
1. Corolla lobes not divided into segment — **4. M. zapota**

1. Manilkara hexandra (Roxb.) Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille, Sér. 3, 3: 9, f. 2. 1915; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 269. 1925; Lecomte, Fl. Gén. I.-C. 3: 881. 1930; H.R. Fletcher in Fl. Siam. En. 2: 362. 1938; H.J. Lam, Blumea 4: 332, f. 1–5. 1941; P. Royen, Blumea 7: 408. 1953; Aubréville, Fl. C.L.V. Sapotacées: 12, pl. 1, f. 11–14. 1963; Pennington, Gen. Sapot.: 133. 1991; Verdcourt & Meijer in Fl. Ceylon. 9: 362. 1995.— *Mimusops hexandra* Roxb., Pl. Corom. 1: 16, t. 15. 1795; C.B. Clarke in Fl. Br. Ind. 3: 549. 1882; Brandis, Ind. Trees 425, f. 163. 1906.— *Manilkara emarginata* H.J. Lam, op. cit. 3,7: 241. 1925.

T h a i l a n d.— EASTERN: Nakhon Ratchasima (Chantuek); SOUTH-WESTERN: Kanchanaburi (Khao Pattavee, Salak Pra), Phetchaburi (Huai Yang), Prachuap Khiri Khan (Hua Hin, Khao Tao, Kan Kradai, Pran Buri); CENTRAL: Bangkok (cultivated in temple area); SOUTH-EASTERN: Sa Kaeo (Aran Prathet); Prachin Buri (Krabin); Chon Buri (Sriracha, Tung Brong, Sattahip, Khao Khiao); PENINSULAR: Chumphon (Ko Tao), Surat Thani (Ko Ngua Talam, Ko Ang Thong, Thale Noi), Phangnga (Ko Yao Yai).

D i s t r i b u t i o n.— Sri Lanka, India (type), Bangladesh, Myanmar, Indo-China, China (Hainan).

E c o l o g y.— In evergreen and savanah-like dry deciduous forests, and scattered along beaches or seashores, sea level to 100 m.

V e r n a c u l a r.— Ket (เกด) (Central); Milky Tree.

U s e s.— Ripe fruit edible. Wood hard and used for posts in village houses.

N o t e.— *Manilkara hexandra* is distinct in having six corolla lobes, each of which is divided into three segments. It also has glabrous leaves and short pedicels.

2. Manilkara kauki (L.) Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille, Sér. 3, 3: 9, f. 1–2. 1915; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 239. 1925; op. cit. Sér. 3, 8: 481. 1927; H.J. Lam, Blumea 4: 329, 340, f. 1–3. 1941; P. Royen, Blumea 7: 405. 1953; Aubréville, Fl. C.L.V. Sapotacées: 14, pl. 1, f. 7–10. 1963; Ng in Tree Flora Mal. 1: 414. 1972; Pennington, Gen. Sapot.: 133. 1991.— *Mimusops kauki* L., Sp. Pl. 1: 349. 1753; Brandis, Forest Fl. 292. 1874; C.B. Clarke in Fl. Br. Ind. 3: 549. 1882; Trimen, J. Linn. Soc. 24: 140. 1888; Fl. Ceylon 3: 87. 1895; Ridl., Fl. Mal. Pen. 2: 278. 1923.— *M. browniana* Benth., Fl. Austr. 4: 285. 1869.

T h a i l a n d.— CENTRAL: Bangkok (cultivated).

D i s t r i b u t i o n.— Sri Lanka (type), Myanmar, Indochina, Malesia and N Australia.

E c o l o g y.— Wild but uncommon along the coast, occasionally cultivated

V e r n a c u l a r.— Lamut thai (ละมุดไทย), lamut sida (ละมุดสีดา) (Central).

U s e s.— Ripe fruit edible.

N o t e.— *Manilkara kauki* is most closely related to *M. hexandra*, but is easily recognised by the silky white pubescence on the lower surface of the leaf.

3. Manilkara littoralis (Kurz) Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille, Sér. 3, 3: 11. 1915; H.J. Lam, Blumea 4: 343. 1941; P. Royen, Blumea 7: 411. 1953; Pennington, Gen. Sapot.: 134. 1991.— *Mimusops littoralis* Kurz, J. As. Soc. Beng. Pt. 2, Nat. Hist. 45: 138. 1876, For. Fl. Burma 2: 123. 1877; C.B. Clarke in Fl. Br. Ind. 3: 549. 1882; Brandis, Ind. Trees: 426. 1906.

T h a i l a n d.— PENINSULAR: Phangnga (Similan islands).

D i s t r i b u t i o n.— India (Andamans, Nicobars) and Myanmar (Tenasserim).

E c o l o g y.— Scattered along beaches, sea level.

V e r n a c u l a r.— Lamut-pa (ละมุดป่า) (Peninsular).

U s e s.— Wood used for gum-stocks in the Andamans.

N o t e.— *Manilkara littoralis* is distinguished by its longer pedicels. It was formerly known only from India and Myanmar but its range is now extended to peninsular Thailand.

4. Manilkara zapota (L.) P. Royen, Blumea 7: 410. 1953; Pennington, Gen. Sapot.: 135. 1991.— *Achras zapota* L., Sp. Pl. 2: 1190. 1753; Kurz, For. Fl. Burma 2: 118. 1877; C.B. Clarke in Fl. Br. Ind. 3: 534. 1882; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 218. 1925; op. cit. Sér. 3, 8: 476. 1927; H.R. Fletcher in Fl. Siam. En. 2: 355. 1938.— *Manilkara zapotilla* (Jacq.) Gilly, Trop. Woods 73: 6. 1943.

T h a i l a n d.— Cultivated throughtout the country.

D i s t r i b u t i o n.— Native to South America (Surinam-type) and widely cultivated throughout the tropics.

V e r n a c u l a r.— Lamut (ละมุด), lamut farang (ละมุดฝรั่ง) (General); cha wa ni lo (ชวานิลอ) (Malay/Yala, Pattani); Sapodilla Plum.

U s e s.— Ripe fruit edible.

N o t e.— *Manilkara zapota* is a common cultivated fruit tree. It differs from the three Thai *Manilkara* species by its undivided corolla lobes and pubescent petioles.

5. MIMUSOPS

L., Sp. Pl. 1: 349. 1753; Gen. Pl. ed. 5: 165. 1754; Dubard, Ann., Inst. Bot.-Géol. Colon. Marseile, Sér. 3, 3: 46. 1915; Pennington, Gen. Sapot.: 120. 1991; Verdcourt & Meijer in Fl. Ceylon 9: 356. 1995.

One species in Thailand.

Mimusops elengi L., Sp. Pl. 1: 349. 1753; Kurz, For. Fl. Burma 2: 123. 1877; C.B. Clarke in Fl. Br. Ind. 3: 548. 1882; Brandis, Ind. Trees 425. 1906; Ridl., Fl. Mal. Pen. 2: 278. 1923; Lecomte, Fl. Gén. I.-C. 3: 879, f. 95. 1930; H.J. Lam, Bull. Jard. Bot. Buitenz. Sér. 3,7: 234. 1925; H.R. Fletcher in Fl. Siam. En. 2: 362. 1938; P. Royen, Blumea 6: 594. 1952; Aubréville, Fl. C.L.V. Sapotacées: 16. 1963; Pennington, Gen. Sapot.: 123. 1991; Verdcourt & Meijer in Fl. Ceylon 9: 356. 1995.— *M. parvifolia* R. Br., Prodr. 531. 1810.— *M. elengi* var. *longepedunculata* Blume in Bruck, Ann. Jard. Bot. Buitenz. 5: 61. 1886.— *M. elengi* var. *typica* forma *longepedunculata* (Blume) H.L. Lam, op. cit. Sér. 3, 7: 235. 1925.— *M. elengi* var. *parvifolia* (R. Br.) H.J. Lam, op. cit. Sér. 3, 7: 236. 1925; H.R. Fletcher, op. cit. 2: 362. 1938.— *M. elengi* var. *brevifolia* H.J. Lam, op. cit. Sér. 3, 7: 236. 1925.

T h a i l a n d.— Found in all provinces, a very common cultivated tree in temples; also wild in the south and west.

D i s t r i b u t i o n.— India, Sri Lanka and S.E. Asia.

E c o l o g y.— In evergreen forest, 0–350 m, or cultivated as a shade or ornamental tree.

V e r n a c u l a r.— Kaeo (แก้ว), sang dong (ซางดง) (Northern); phikun (พิกุล) (Central); phikun pa (พิกุลป่า), phikun khao (พิกุลเขา), phikun thuean (พิกุลเถื่อน) (Peninsular); Bullet Wood.

U s e s.— Ornamental. All parts of tree used in native medicine. Ripe fruit edible but astringent.

N o t e.— Wild specimens of *Mimusops elengi* tend to have smaller and narrower leaves than the cultivated ones.

6. PALAQUIUM

Blanco, Fl. Filip. 403. 1837; ed. 2, 282. 1845; Bruck, Ann. Jard. Bot. Buitenz. 5: 22. 1886; Engl., Bot. Jahrb. Syst. 12: 511. 1890; Nat. Pflanzenfam. 4(1): 135. 1890; Nat. Pflanzenfam., Nachtrog. 271. 1897; Dubard, Bull. Soc. Bot. France 56, Mim 16: 1. 1909; Bull. Mus. Hist. Nat. (Paris) 15: 379. 1909; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 14. 1925; op. cit. Sér. 3, 8: 387. 1925; P. Royen, Blumea 10: 432. 1960; Aubréville, Fl. C.L.V. Sapotacées: 49. 1963; Ng in Tree Flora Mal. 1: 415. 1972; Pennington, Gen. Sapot.: 148. 1991.

Ten species in Thailand, including two endemics.

KEY TO THE SPECIES

1. Mature leaves glabrous or only sparsely hairy along midrib and secondary veins on lower surface
 2. Ovary entirely pubescent
  3. Corolla entirely glabrous
   4. Anthers glabrous. Tertiary veins reticulate — **4. P. impressinervium**
   4. Anthers hairy. Tertiary veins transverse — **1. P. garrettii**
  3. Corolla pubescent outside
   5. Leaf apex obtusely acuminate. Filaments glabrous — **10. P. sumatranum**
   5. Leaf apex rounded, obtuse or retuse. Filaments woolly — **8. P. rostratum**
 2. Ovary pubescent on the upper half — **2. P. hansenii**
1. Mature leaves pubescent on lower surface
 6. Mature leaves with sparse appressed hairs or sericeous on lower surface
  7. Mature leaves with sparse appressed hairs. Ovary glabrous — **6. P. obovatum**
  7. Mature leaves sericeous. Ovary pubescent — **9. P. sukoei**
 6. Mature leaves densely woolly on lower surface
  8. Ovary glabrous — **5. P. maingayi**
  8. Ovary pubescent
   9. Sepals not folded. Corolla tube pubescent inside. Fruits globose — **3. P. hispidum**
   9. Sepals 3-folded. Corolla tube entirely glabrous. Fruits oblong-ovoid — **7. P. ottolanderi**

1. Palaquium garrettii H.R. Fletcher, Kew Bull. 1937: 374. 1937; in Fl. Siam. En. 2: 356. 1938; P. Royen, Blumea 10: 544. 1960.— *P. koratense* H.R. Fletcher, op. cit. 1937: 374. 1937; in op. cit. 2: 356. 1938; P. Royen, op. cit. 10: 550. 1960, syn. nov.

T h a i l a n d.— NORTHERN: Chiang Mai (Doi Suthep, Doi Pha Khao, type: *Garrett* 113 ABD, BM, E, K 2 sheets, L 2 sheets); NORTH-EASTERN: Loei (Phu Kradueng); EASTERN: Nakhon Ratchasima (Khao Laem, type of *P. koratense*: *Kerr* 9966 ABD, BK, BM, E, K); PENINSULAR: Trang (Kantang).

D i s t r i b u t i o n.— Endemic.

V e r n a c u l a r.— Chik nom (จิกนม) (Peninsular).

E c o l o g y.— In deciduous or evergreen forest, 50–1,300 m.

N o t e.— *Palaquium garrettii* shows affinity to *P. sumatranum*, from which it differs in having a rounded midrib on the lower leaf surface and a glabrous style. Fletcher (1937), differentiated *P. koratense* from *P. garrettii* by its smaller number of stamens,

larger flowers and longer filaments. However, there is a range of intermediate states in stamen number and *P. koratense* merely represents an extreme form of the spectrum of variation in *P. garrettii*. Flowers of *Maxwell* 88–11 usually have 18–19 stamens but some have four calyx lobes and four petals with 12 stamens.

2. Palaquium hansenii P. Chantaranothai, Nord. J. Bot. 18: 365. 1998.

T h a i l a n d.— PENINSULAR: Chumphon (Ngao waterfall), Ranong (Khao Tihin, Muang Len, type: *Hansen & Smitinand* 11929, C, K, L 2 sheets).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In dry dipterocarp forest, common along stream, 160 m.

N o t e.— *Palaquium hansenii* is immediately distinguished from other species in the genus by the lower number of locules per ovary (3–4 vs 6).

3. Palaquium hispidum H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 63, f. 12. 1925; Heyne, Nutt. Pl. Ind. ed. 2, 2: 1236. 1927; H.J. Lam, op. cit. Sér. 3, 8: 400. 1927; Heyne, op. cit. ed. 3, 1. 1236. 1950; P. Royen, Blumea 10: 460. 1960; Ng in Tree Flora Mal. 1: 421. f. 9. 1972.— *P. hispidum* Lam var. *typicum* and *grandiflorum* H.J. Lam, op. cit. Sér. 3, 7: 65. 1925; op. cit. Sér. 3, 8: 400. 1927.

T h a i l a n d.— PENINSULAR: Phatthalung, Trang (Khao Chong), Satun (Khuan Kalong).

D i s t r i b u t i o n.— West Malaysia (Pahang-type), Sumatra, Borneo.

E c o l o g y.— In evergreen forest, 50 m.

V e r n a c u l a r.— Chik nom (จิกนม).

N o t e.— *Palaquium hispidum* is most closely allied to *P. maingayi* and *P. ottolanderi*. It differs from the former in having long pedicels and from the latter in having the fruits more or less rounded and the sepals not folded.

4. Palaquium impressinervium Ng, Gard. Bull. Sing. 24: 7, f. 1. 1969 (sphalm *impressionervium*); Ng in Tree Flora Mal. 1: 422, f. 9. 1972.

T h a i l a n d.— PENINSULAR: Ranong (Khao Phota Luang Khaeo); Satun (Kuan Kalong); Pattani (Bukit).

D i s t r i b u t i o n.— West Malaysia (type).

V e r n a c u l a r.— Phikun (พิกุล) (Peninsular).

E c o l o g y.— In evergreen forest, 50–900 m.

N o t e.— *Palaquium impressinervium* is distinct in having a grooved nervation on the upper surface of the leaf, entirely glabrous anthers and style and transverse tertiary veins. *Smitinand* 7107 tends to have much shorter pedicels (6–8 mm long vs 14–16 mm long) and a shorter style (2 mm long vs ca. 8 mm long) than other species.

5. Palaquium maingayi (C.B. Clarke) King & Gamble, J. As. Soc. Beng. 74(2): extra no. 17, 191. 1905; Ridl., Fl. Mal. Pen. 2: 273. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 72. 1925; op. cit. Sér. 3, 8: 402. 1927; P. Royen, Blumea 10: 482. 1960; Ng in Tree Flora Mal. 1: 423, f. 9. 1972; Pennington, Gen. Sapot.: 151. 1991.— *Dichopsis maingayi* C.B. Clarke in Fl. Br. Ind. 3: 543. 1882.— *Croixia maingayi* (C.B. Clarke) Baehni, Boissiera 11: 110. 1965.

T h a i l a n d.— PENINSULAR: Narathiwat (Tomoh-Khao Ri Chao).

D i s t r i b u t i o n.— West Malaysia (type).

E c o l o g y.— In evergreen forest, 600 m.

N o t e.— *Palaquium maingayi* appears to be most closely related to *P. clarkeanum* King & Gamble, *P. hispidum* Lam and *P. ottolanderi* Koord. & Valeton. The four species are similar in the form of the indumentum on the lower surface of the leaf. *P. maingayi* is distinguished from *P. clarkeanum* by the smaller flower, broadly ovate sepals and light brown woolly pubescence. *P. maingayi* is distinguished from the last two by the shorter pedicels that are 8–11(–13) mm long (vs pedicels 15–32 mm long). Fletcher (1938) placed *Lakshnakara* 751, which comprises flowers and a fragmented young leaf, under *P. clarkeanum*.

6. Palaquium obovatum (Griff.) Engl., Bot. Jahrb. Syst. 12: 511. 1890; Brandis, Ind. Trees: 425. 1906; Ridl., Fl. Mal. Pen. 2: 273. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 83, 257. 1925; op. cit. Sér. 3, 8: 408. 1927; Lecomte, Fl. Gén. I.-C. 3: 899, f. 99. 1930; H.R. Fletcher in Fl. Siam. En. 2: 356. 1938; P. Royen, Blumea 10: 453. 1960; Aubréville, Fl. C.L.V. Sapotacées: 51, pl. 7, f. 1–5. 1963; Ng in Tree Flora Mal. 1: 423, f. 9. 1972; Pennington, Gen. Sapot.: 151. 1991.— *Isonandra obovata* ['obovatis'] Griffith, Not. Pl. Asiat. 4: 293. 1854; Kurz, For. Fl. Burma 2: 120. 1877.— *Dichopsis obovata* C.B. Clarke in Fl. Br. Ind. 3: 542. 1882.— *Palaquium punctata* H.R. Fletcher, Kew Bull. 1937: 375. 1937; op. cit. 2: 357. 1938.

T h a i l a n d.— NORTHERN: Chiang Mai (Doi Suthep-Pui); SOUTH-EASTERN: Chanthaburi (Laem Sing, Klung), Trat (Ko Chang, Khao Saming); PENINSULAR: Chumphon (Ko Tao, Siep Yuan, Ta Sae, Langsuan), Ranong, Surat Thani (Ko Pa-ngan, Ban Klong, Bang Bao), Phangnga (Ko Yao Yai, Takuapa), Phuket (Rawi island, Kopha), Krabi, Satun (Tarutao, Adang island, Kuan Po), Trang (Kantang, Khao Chong), Songkhla (Hat Yai, Ko Kaeo, Ko Ma), Narathiwat (Kok Mai Rue, Khae Chana, Tak Bai).

D i s t r i b u t i o n.— India, Myanmar, Indo-China, West Malaysia (type), Borneo, Sumatra.

E c o l o g y.— In evergreen or dry dipterocarp forest, 0–300 m.

V e r n a c u l a r.— Khanun nok (ขนุนนก), sang (ซาง), yang khanun nok (ยางขนุนนก) (South-eastern); tieo phru (เตียวพรุ) (Peninsular); yak deng (ยักเดง), yue ra toh (ยือราโต๊ะ) (Malay/Pattani); yatu (ยาตู) (Yawee).

N o t e.— *Palaquium obovatum* is the commonest and one of the most widely distributed species in the genus. It is distinguished from the other Thai species by its

glabrous ovary and the tomentulose pubescence on the lower surface of leaves. *Haniff* 3836 is not *P. oxleyanum* Pierre var. *glabratum* King & Gamble, as Royen (1960) suggested. *P. oxleyanum* is pubescent on the inside of the sepals and on the ovary. It also has glabrous anthers. In contrast, *P. obovatum* has glabrous sepals and ovary and the anthers are pubescent.

7. **Palaquium ottolanderi** Koord. & Valeton, Bijdr. Boomsoorten Java 1: 146. 1894; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 64, 256. 1925; op. cit. Sér. 3, 8: 401. 1927; P. Royen, Blumea 10: 481. 1960; Ng in Tree Flora Mal. 1: 424, f. 9. 1972; Pennington, Gen. Sapot.: 151. 1991.— *Croixia ottolanderi* (Koord. & Valeton) Baehni, Boissiera 11: 110. 1965.

T h a i l a n d.— PENINSULAR: Satun (Kuan Kalong).

D i s t r i b u t i o n.— West Malaysia, Sumatra, Java (type).

E c o l o g y.— In evergreen forest, 50 m.

V e r n a c u l a r.— Chik nom (จิกนม) (Peninsular).

N o t e.— *Palaquium ottolanderi* is distinct in having a woolly pubescence on the lower surface of the leaf, 3-folded sepals and oblong-ovoid fruit. It differs from *P. gutta* by the woolly pubescence (vs lower leaf surface finely velvety), as well as longer pedicels (20–32 mm long vs 1.5–12 mm long), a longer corolla (12–16 mm long vs ca. 9 mm long) and oblong-ovoid fruit (vs fruit globose, elliptic or ovoid).

8. **Palaquium rostratum** (Miq.) Burck, Ann. Jard. Bot. Buitenz. 5: 39. 1886; Heyne, Nutt. Pl. Ned. Ind., ed. 1, 4: 24. 1917; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 40, 254. 1925; op. cit. Sér. 3, 8: 396. 1927; H.R. Fletcher in Fl. Siam. En. 2: 358. 1938; P. Royen, Blumea 10: 568. 1960; Ng in Tree Flora Mal. 1: 426, f. 9. 1972; Pennington, Gen. Sapot.: 152. 1991.— *Isonandra? rostrata* Miq., Fl. Ned. Ind., Eerste Bijr.: 581. 1861.— *Croixia rostrata* (Miq.) Baehni, Boissiera 11: 109. 1965.

T h a i l a n d.— PENINSULAR: Phuket (Ko Pha Ban Kiap), Krabi (Klong Ton).

D i s t r i b u t i o n.— West Malaysia, Sumatra, Borneo, Java, Celebes, Amboina.

E c o l o g y.— In evergreen forest, ca. 200 m.

V e r n a c u l a r.— Phi kun pa (พิกุลป่า) (Peninsular).

U s e s.— Ripe fruit edible.

N o t e.— *Palaquium rostratum* is distinguished by the sericeous pubescence on the outside of the basal parts of the corolla and along the mid-line of the corolla lobes.

9. **Palaquium sukoei** C.E.C. Fisch., Kew Bull. 1933: 365. 1933; P. Royen, Blumea 10: 574. 1960.— *Planchonella sericea* H.R. Fletcher, Kew Bull. 1937: 373. 1937; in Fl. Siam. En. 2: 355. 1938, syn. nov.

T h a i l a n d.— PENINSULAR: Phangnga (Khao Katawan, type of *Planchonella sericea*: *Kerr* 18503, BK, BM, E).

D i s t r i b u t i o n.— Myanmar (type), West Malaysia.

E c o l o g y.— In evergreen forest.

N o t e.— *Palaquium sukoei* is distinct from other Thai *PalaquiumI* species in having a sericeous pubescence on both leaf surfaces. *Planchonella sericea* was wrongly placed under *Planchonella*, a genus that was not accepted by Pennington (1991). Fletcher (1937) described the plant from a specimen which has immature floral buds. He also commented that the species was related to *Planchonella obovata* (R.Br.) H.J. Lam (now *Pouteria obovata* (R.Br.) Baehni). The Thai specimen agrees well with *Palaquium sukoei*.

10. Palaquium sumatranum Burck, Ann. Jard. Bot. Buitenz. 5: 34, t. 10, f. 9 & 10. 1886; H.J. Lam, Ann. Jard. Bot. Buitenz. Sér 3, 7: 39, 254. 1925; op. cit. Sér. 3, 8: 396. 1927; P. Royen, Blumea 10: 595. 1960.

T h a i l a n d.— PENINSULAR: Trang (Khao Chong).

D i s t r i b u t i o n.— Sumatra, Riouw, Borneo, Billiton, Java (type).

E c o l o g y.— In evergreen forest, 100 m.

V e r n a c u l a r.— Phikun pa (พิกุลป่า) (Peninsular).

N o t e.— *Palaquium sumatranum* is characterised by the pubescence on the outside of the corolla base and along the mid-line of the lobes, and by the strongly keeled midrib on the lower surface. So far, only one collection has been made in Thailand.

7. PAYENA

DC., Prodr. 8: 196. 1844; C.B. Clarke in Fl. Br. Ind. 3: 547. 1882; Engl., Nat. Pflanzenfam. 4(1): 132. 1890; Dubard, Rev. Gen. Bot. 20: 202. 1908; Ridl., Fl. Mal. Pen. 2: 261. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 130. 1925; op. cit. Sér. 3, 8: 430. 1927; A. Bruggen, Blumea 9: 89. 1958; Aubréville, Fl. C.L.V. Sapotacées: 45. 1963; Ng in Tree Fl. Mal. 1: 428. 1972; Baehni, Boissiera 11: 35. 1965; Pennington, Gen. Sapot.: 159. 1991.

Four species in Thailand.

KEY TO THE SPECIES

1. Mature leaves glabrous on lower surface
 2. Leaves ± lanceolate. Fruits ovoid with a long apical beak **2. P. lanceolata**
 2. Leaves oblong, obovate or elliptic. Fruits rounded or ellipsoid **3. P. lucida**
1. Mature leaves pubescent on lower surface
 3. Sepals 5–6.5 mm long. Pedicels 10–12 mm long **1. P. acuminata**
 3. Sepals 8.5–9 mm long. Pedicels 15–22 mm long **4. P. maingayi**

1. Payena acuminata (Blume) Pierre, Bull. Mens. Soc. Linn. Paris. 528. 1885; Merrill, Pl. Elm. Born., Univ. Calif. Publ. Bot. 15: 238. 1929; H.J. Lam in Backer, Fl. Java, Nooduitg. 7: 166–8. 1948; A. Bruggen, Blume 9: 100, f. 2. 1938; Ng in Tree Fl. Mal. 1: 429,

f. 11. 1972; Pennington, Gen. Sapot.: 160. 1991.— *Mimusops acuminata* Blume, Bijdr. Fl. Ned. Ind.: 672. 1825.— *Payena sericea* (Blume) H.J. Lam in Bull. Jard. Bot. Buitenz. Sér. 3, 7: 139, 261. 1925; op. cit. Sér. 3, 8: 439. 1927; H.R. Fletcher in Fl. Siam. Enu 2: 361. 1938.— *Madhuca acuminata* (Blume) Baehni, Boissiera 11: 36. 1965.

T h a i l a n d.— PENINSULAR: Narathiwat (Tomoh, Bukit Nasi).

D i s t r i b u t i o n.— Sumatra, West Malaysia, Java (type-Blume 239-L), Riau, Simalur, Borneo.

E c o l o g y.— In evergreen forest, ca. 180 m.

V e r n a c u l a r.— Cha kun (ชากุน), phikun pa (พิกุลป่า) (Peninsular); tan yong (ต้นหยง), ta yong (ตายง) (Malay/Pattani, Narathiwat).

N o t e.— *Payena acuminata* is similar to *P. maingayi* in having a sericeous pubescence on the lower leaf surface. It differs from *P. maingayi* in having smaller flowers.

2. Payena lanceolata Ridl., J. As. Soc. Straits 79: 93. 1918; Ridl., Fl. Mal. Pen. 2: 264. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 147. 1925; op. cit. Sér. 3, 8: 438. 1927; H.R. Fletcher in Fl. Siam. En. 2: 360. 1938; A. Bruggen, Blumea 9: 128. 1958; Ng in Tree Fl. Mal. 1: 430, f. 11. 1972; Penn, Gen. Sapot.: 160. 1991.— *P. leerii* sensu H.R. Fletcher, op. cit. 2: 360. 1938, non (Teijsm. & Binn.) Kurz. 1871.

T h a i l a n d.— NORTHERN: Chiang Mai (Doi Chiang Dao); PENINSULAR: Ranong, Surat Thani (Bangbao, Tha Phet), Nakhon Si Thammarat (Lan Saka), Trang (Khao Chong).

D i s t r i b u t i o n.— West Malaysia (type), Sumatra.

E c o l o g y.— In evergreen forest, 50–1000 m.

V e r n a c u l a r.— Kun (กุน), cha kun (ชากุน), phikun nok (พิกุลนก) (Peninsular).

N o t e.— *Payena lanceolata* is distinguished by its more-or-less lanceolate leaf shape and ovoid fruit with a long apical beak. *Hansen & Smitinand* 12417 differs from the other specimens by being pubescent on the outside of the corolla tube and along the mid-line of the corolla lobes.

3. Payena lucida (G. Don) DC., Prodr. 8: 197. 1844; C.B. Clarke in Fl. Br. Ind. 3: 547. 1882; Ridl., Fl. Mal. Pen. 2: 263. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 145, 262. 1925; op. cit. Sér. 3, 8: 431, f. 14, 1927; H.R. Fletcher in Fl. Siam. En. 2: 360. 1938; A. Bruggen, Blumea 9: 111. 1958; Ng in Tree Fl. Mal. 1: 433, f. 11. 1972; Penn, Gen. Sapot.: 160. 1991.— *Mimusops lucida* DC. [Wallich, Cat. No. 4147. 1828, nom. nud.] ex G. Don, Gen. Hist. 4: 35. 1837.— *Payena paralleloneura* Kurz, J. As. Soc. Beng. 40(2): 70. 1871; C.B. Clarke, op. cit. 548; Brandis, Ind. Trees 427. 1906; H.J. Lam, op. cit. Sér. 3, 7: 151. 1925; op. cit. Sér. 3, 8: 443. 1927; H.R. Fletcher, op. cit. 2: 361. 1938.— *P. punctata* H.R. Fletcher, Kew Bull. 1937: 379. 1937; op. cit. 2: 361. 1938.— *Madhuca lucida* (Wall. ex G. Don) Baehni, Boissiera 11: 36. 1965.

T h a i l a n d.— NORTHERN: Chiang Mai (Doi Chiang Dao), Phrae (Huai Rai); NORTH-EASTERN: Phetchabun (Bo Tai); PENINSULAR: Ranong (Kraburi), Surat Thani (Ko Samui), Phangnga (Ko Yao Yai), Trang (Khao Chong), Satun (Tarutao, Adang, type of *P. punctata*: Kerr 14027 ABD, BM, E, K), Songkhla (Ban Pien), Pattani (Khao Kalakiri), Narathiwat (Waeng, Tomoh-Ban Pari).

D i s t r i b u t i o n.— Myanmar, Andamans, West Malaysia (type), Sumatra, Bangka, Borneo.

E c o l o g y.— In evergreen forest or along edge of deciduous forest, 50–550 m.

V e r n a c u l a r.— Phikun suan (พิกุลสวน), phikun nok (พิกุลนก), kun yai (กุลใหญ่), kun nok (กุลนก), phikun thuen (พิกุลเถื่อน) (Peninsular).

U s e s.— Timber.

N o t e.— *Payena lucida* may be confused with *P. lanceolata*, but is easily separated by the characters shown in the key. *Phusomsaeng* 139 differs from other material by having a ferruginous tomentum on the outside of the corolla tube and mid-line of the corolla lobes. It also has sparsely hairy anthers.

4. Payena maingayi C.B. Clarke in Fl. Br. Ind. 3: 547. 1882; Ridl., Fl. Mal. Pen. 2: 262. 1923; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 133. 1925; op. cit. Sér. 3,8: 442. 1927; A. Bruggen, Blumea 9: 104. f. 3. 1958; Ng in Tree Fl. Mal. 1: 433, f. 11. 1972; Penn Gen. Sapot.: 160. 1991.— *P. grandiflora* Ridl., J. As. Soc. Straits 61: 28. 1912.— *Diploknema grandiflora* (Ridl.) H.J. Lam, op. cit. 3, 7: 185. 1925; op. cit. Sér. 3, 8: 363. 1927.— *Madhuca maingayi* (C.B. Clarke) Baehni, Boissiera 11: 36. 1965.

T h a i l a n d.— PENINSULAR: Trang (Khao Chong).

D i s t r i b u t i o n.— West Malaysia (type).

E c o l o g y.— In primary forest, ca. 400 m.

U s e s.— Timber, firewood.

N o t e.— *Payena maingayi* is a distinctive species, easily recognised by its large flowers and sericeous pubescence on the lower surface of leaves. It is very common in the Malay Peninsula. *Maxwell* 85–270 is the first record of this species from Thailand. This specimen has smaller leaves than those on Malaysian material.

8. POUTERIA

Aublet, Hist, Pl. Guiane 1: 85, pl. 33, excl. fruit. 1775; Engl., Nat. Pflanzenfam. 4(1): 141. 1890; Nat. Pflanzenfam., Nachtrag. 275. 1897; Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille Sér. 2, 10: 30. 1912; Baehni, Candollea 7: 481. 1938; Boissiera 5: 144. 1941; Candollea 9: 147. 1942; Boissiera 11: 48. 1965; Hermann-Erlee & P. Royen, Blumea 8: 452. 1957; Aubréville, Adansonia n.s. 1: 150. 1962; Penn, Fl., Neotrop. 52, Sapotaceae 247. 1990; Gen. Sapot.: 184. 1991.— *Planchonella* Pierre, Not. Bot. Sapot.: 34. 1890, nom. cons.; Dubard, Compt. Rend. Hebd. Séances Acad. Sci. 772. 1911; Ann.

Inst. Bot.-Géol. Colon. Marseille Sér. 2, 10: 41. 1912; H.J. Lam, Bull. Jard. Bot. Buitenz. Sér. 3, 7: 193. 1925; op. cit. Sér. 3, 8: 467. 1927; P. Royen, op. cit. 8: 235. 1957; Aubréville, op. cit. n.s. 1: 185. 1962; Baehni, Boissiera 11: 66. 1965, pro parte.

Four species in Thailand.

KEY TO THE SPECIES

1. Mature leaves glabrous on the lower surface	
2. Leaves less than 16 cm long. Pedicel more than 4 mm long	**1. P. firma**
2. Leaves more than 16 cm long. Pedicel less than 4 mm long	**2. P. grandifolia**
1. Mature leaves pubescent on the lower surface or with a few scattered hairs	
3. Tertiary veins transverse. Fruits puberulous, 2–4 cm in diameter	**3. P. malaccensis**
3. Tertiary veins reticulate. Fruits glabrous, 1 cm in diameter	**4. P. obovata**

1. Pouteria firma (Miq.) Baehni, Candollea 9: 284. 1942; Penn, Gen. Sapot.: 198. 1991.— *Chrysophyllum firmum* Miq., Fl. Ind. Batav., Suppl. 579. 1861.— *Sideroxylon firmum* (Miq.) Pierre ex Burck, Ann. Jard. Bot. Buitenz. 5: 17. 1886.— *Beccariella firma* (Miq.) Pierre, Not. Bot. Sapot.: 30. 1890.— *Planchonella firma* (Miq.) Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille Sér. 2, 10: 59. 1912; H.R. Fletcher in Fl. Siam. En. 2: 353. 1938; Wyatt-Smith, Research Pamphlet 4: 56. 1954; P. Royen, Blumea 8: 316. 1957; Ng in Tree Fl. Mal. 1: 435, f. 13. 1972.

Thailand.— PENINSULAR: Songkhla (Khao Kaeo).

Distribution.— Malesia (Bangka-type), New Guinea, Solomons.

Ecology.— In evergreen forest, 500 m.

Uses.— Wood is used for timber and furniture. Together with betel it is chewed against spruce.

Note.— *Pouteria firma* is easily recognised by its close tertiary veins that are transverse to the secondary ones. The Thai specimen has much smaller leaves and shorter pedicels than the one from Bangka (*Anta* 233) (6–8 mm long vs 14–15 mm long).

2. Pouteria grandifolia (Wall.) Baehni, Candollea 9: 332. 1942; Herrmann-Erlee & P. Royen, Blumea 8: 482. 1957.— *Sideroxylon grandifolium* Wall. in Roxb., Fl. Ind. ed. Carey 2: 348. 1824; DC., Prodr. 8: 178. 1844; Kurz, Fl. Br. Burma 2: 117. 1877; C.B. Clarke in Fl. Br. Ind. 3: 536. 1882; Engl., Engl. Bot. Jahrb. 12: 517. 1890; Engl. & Prantl, Nat. Pflanzenfam. 4(1): 144. 1897.— *Planchonella grandifolia* (Wall) Pierre, Not. Bot. Sapot.: 36. 1890.— *Lucuma grandifolia* (Wall.) Dubard, Ann. Mus. Col. Marseille 20: 19. 1912.— *Sideroxylon regium* Wall, Cat. No. 4156. 1831, nom. nud.— *Planchonella kerrii* H.R. Fletcher, Kew Bull. 1937: 371. 1937.— *Pouteria kerrii* (H.R. Fletcher) Baehni, op. cit. 9: 313. 1942.

Thailand.— NORTHERN: Chiang Mai; PENINSULAR: Krabi (Ao Luk).

Distribution.— India (Assam-type), Myanmar, Cambodia.

Ecology.— In evergreen forest, 100 m.

N o t e.— Material from southern Thailand has smaller leaves and fewer secondary veins than that from northern Thailand. *Pouteria grandifolia* had previously been known only from Assam, Myanmar and southern Thailand. *Martin* 1554 is the first record from Cambodia. It tends to have much smaller leaves than the Thai specimens.

3. Pouteria malaccensis (C.B. Clarke) Baehni, Candollea 9: 302. 1942; Herrmann-Erlee & P. Royen, Blumea 8: 463. 1957; Ng in Tree Fl. Mal. 1: 438, f. 14. 1972; Pennington, Gen. Sapot.: 199. 1991.— *Sideroxylon malaccense* C.B. Clarke in Fl. Br. Ind. 3: 537. 1882; Engl. & Prantl, Nat. Pflanzenfam., Nachtrag. 4(1): 277. 1897; King & Gamble, J. As. Soc. Beng. 74: 161. 1906–1909; Gamble, Kew Bull. 1907: 109. 1907; Ridl., Fl. Mal. Pen. 2: 258. 1923.— *Fontbrunea malaccensis* (C.B. Clarke) Pierre, Not. Bot. Sapot.: 32. 1890.— *Lucuma malaccensis* (C.B. Clarke) Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille Sér. 2, 10: 19. 1912; H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 7: 231. 1925; op. cit. Sér. 3, 8: 478. 1927; Wyatt-Smith, Manual Mal. Timber Trees 4: 16. 1954.— *Xantolis malaccensis* (C.B. Clarke) Baehni, Boissiera 11: 23. 1965.

T h a i l a n d.— SOUTH-EASTERN: Chantaburi (Phrieu); PENINSULAR: Ranong (Klong Na Ka), Phangnga (Khao Phota Luang Khaeo).

D i s t r i b u t i o n.— West Malaysia, Sumatra, Riouw, Lingga, Sulawesi, New Guinea.

E c o l o g y.— In evergreen forest, 20–50 m.

N o t e.— *Pouteria malaccensis* can be distinguished from other members of the genus by its densely reddish-brown tomentum at the tips of branchlets, younger leaves and fruits. The tomentum on the fruits and leaves is easily rubbed off except around the midrib and secondary veins.

4. Pouteria obovata (R. Br.) Baehni, Candollea 9: 324. 1942; Pennington, Gen. Sapot.: 199. 1991.— *Sersalisia obovata* R. Br. Prodr. 530. 1810.— *Sideroxylon attenuatum* DC., Prodr. 8: 178. 1844.— *Achras obovata* (R. Br.) Benth. & F. Muell, Fl. Austr. 4: 283. 1869.— *Planchonella obovata* (R. Br.) Pierre, Not. Bot. Sapot.: 36. 1890; P. Royen, Blumea 8: 368. 1957; Aubréville, Fl. C.V.L. Sapotacées: 86, pl. 14, 1–4. 1963; Ng in Tree Fl. Mal. 1: 437,. f. 13. 1972.— *Planchonella obovata* H.J. Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 8: 473. 1927; H.R. Fletcher in Fl. Siam. En. 2: 353. 1938; Corner, Wayside Trees Malaya 603. 1940; Wyatt-Smith, Research Pamphlet 4: 55. 1954.— *Sideroxylon ferrugineum* Hook. & Arn., Bot. Capt. Beechy's Voyage 6: 266, t. 55. 1841; Lecomte, Fl. Gén. I.-C. 3: 892. 1930.

T h a i l a n d.— CENTRAL: Samut Prakan, Bangkok; SOUTH-EASTERN: Chon Buri (Nong Nam Khiao, Sriracha); Rayong (Ban Pe), Trat (Ko Chang, Ko Salak); PENINSULAR: Chumphon (Ko Tao), Ranong (Kapoe, Ko Payam, Kraburi), Surat Thani (Ko Samui, Ko Pa-ngan, Nong Wai), Phuket, Trang (Ko Libong), Satun, Songkhla (Kao Seng, Hat Yai, Saba Yoi), Pattani (Khao Kalakiri), Narathiwat (Khao Tan Yong).

D i s t r i b u t i o n.— India to Australia (type), Solomons, Liukiu, Bonin, Marianus, Carolines, Formosa, Seychelles, Hainan.

E c o l o g y.— In evergreen forest or along beach, 0–200 m.

V e r n a c u l a r.— San khwan (สันขวาน) (Northern); kong kang bok (โกงกางบก) (South-eastern); ung kai (อุ้งไก่) (Central); nga sai (งาไซ), pho a-sai (โพอาศัย), phang ka bok (พังกาบก), ma din sai (มะดินทราย), thi rai (ทีไร) (Peninsular); chan thit so (จันทิตสอ) (General).

U s e s.— The wood is suitable for cabinet making, carving and turned articles. A decoction of the leaves is drunk for stomachache and for pains in the chest. After heating over a fire the bark is sometimes chewed. Crushed leaves are used as a poultice on the loins for lumbago.

N o t e.— *Pouteria obovata* is a variable species in terms of leaf shape and the most widely distributed species in the genus. It is distinguished from the other species by its shining upper surfaces of the leaf when dry.

9. XANTOLIS

Ref., Sylva Tellur. 36. 1838; P. Royen, Blumea 8: 207. 1957; Aubréville, Fl. C.L.V. Sapotacées: 74. 1963; Baehni, Boissiera 11: 21. 1965, pro parte.

Three species in Thailand.

KEY TO THE SPECIES

1. Flowers at the tip of brachyblasts	**3. X. siamensis**
1. Flowers axillary	
2. Staminode margin fimbriate-tomentose	**1. X. burmanica**
2. Staminode margin entire or serrate	**2. X. cambodiana**

1. Xantolis burmanica (Collett & Hemsl.) P. Royen, Blumea 8: 223. 1957; Penn, Gen. Sapot.: 254. 1991.— *Sideroxylon burmanicum* Collett & Hemsl., J. Linn. Soc. 28: 82. 1891.— *Planchonella burmanica* (Collett & Hemsl.) H.J. Lam, Bull. Jard. Bot. Buitenz., Sér 3, 7: 267. 1925; H.R. Fletcher in Fl. Siam. En. 2: 353. 1938.— *Planchonella lenticellata* H.R. Fletcher, Kew Bull. 1937: 371. 1937; in op. cit. 2: 354. 1938.— *Planchonella punctata* H.R. Fletcher, op. cit. 1937: 372. 1937; in op. cit. 2: 355. 1938.— *Pouteria? burmanica* (Collett & Hemsl.) Baehni, Candollea 9: 367. 1942.— *Pouteria? lenticellata* (H.R. Fletcher) Baehni, Candollea 9: 367. 1942.— *Pouteria? punctata* (H.R. Fletcher) Baehni, op. cit. 9: 369. 1942.— *Xantolis burmanica* var. *lenticellata* (H.R. Fletcher) P. Royen, op. cit. 8: 226, f. 7. 1957, syn. nov.

T h a i l a n d.— NORTHERN: Chiang Mai (Fang, Doi Chiang Dao, type of *Planchonella lenticellata Kerr* 5555 BK, K; Doi Komi, Doi Suthep-Pui, Samoeng, type of *Planchonella punctata*: *Kerr* 6392 K), Lampang, Phrae; NORTH-EASTERN: Phetchabun (Nam Nao); Loei (Dan Sai); SOUTH-EASTERN: Chanthaburi (Tap Sai).

D i s t r i b u t i o n.— Myanmar (type).

E c o l o g y.— In dipterocarp-oak, pine and mixed evergreen, evergreen or deciduous forest, ca. 100–1000 m.

V e r n a c u l a r.— Ma nom nang (มะนมนาง) (Northern); tan sian (ตานเสี้ยน), nom phrasi (นมพระสี) (North-eastern).

N o t e.— *Xantolis burmanica* is characterised by the fimbriate-tomentose margins of the staminodes. *Maxwell* 90–531 has tomentose pubescence on the lower margin of the petal lobes, whereas other specimens have a glabrous margin. I have examined both var. *burmanica* and var. *lenticellata* and conclude that the variation between them does not warrant the recognition of separate taxa.

2. Xantolis cambodiana (Pierre ex Dubard) P. Royen, Blumea 8: 228. 1957; Aubréville, Fl. C.L.V., Sapotacées: 76. 1963; Pennington, Gen. Sapot.: 254. 1991.— *Planchonella cambodiana* Pierre, Not. Bot. Sapot.: 36. 1890, nom. nud.; Pierre ex Dubard, Notul. Syst. (Paris) 2: 85. 1911; H.R. Fletcher in Fl. Siam. En. 2: 353. 1938.— *Sideroxylon cambodianum* (Pierre ex Dubard) var. *thorelii* Lecomte, Fl. Gén. I.-C. 3: 894. 1930.— *Pouteria cambodiana* (Pierre ex Dubard) Baehni, Candollea 9: 370. 1942.— *Xantolis cambodiana* var. *thorelii* (Lecomte) P. Royen, op. cit. 8. 230. 1957, syn. nov.

T h a i l a n d.— NORTHERN: Chiang Mai (Chom Thong, Doi Tao), Lampang, Phrae, Tak; EASTERN: Ubon Ratchathani (type of *Sideroxylon cambodianum* var. *thorelii*: *Thorel* S.N. P).

D i s t r i b u t i o n.— Cambodia (type), Vietnam.

E c o l o g y.— In dipterocarp or open deciduous forest, ca. 300–475 m.

V e r n a c u l a r.— Tan nom (ตานม), nom nang (นมนาง) (Northern).

U s e s.— Wood used in construction, ripe fruit edible and a decoction of wood, roots and leaves used to stimulate the flow of milk in women and cattle.

N o t e.— Var. *thorelii* should not be accepted as a separate variety because it differs only by the lanceolate leaves with attenuate apices. *Maxwell* 90–60 has longer pedicels and larger flowers than the other Thai specimens.

3. Xantolis siamensis (H.R. Fletcher) P. Royen, Blumea 8: 220, f. 6. 1957; Penn, Gen. Sapot.: 254. 1991.— *Planchonella siamensis* H.R. Fletcher, Kew Bull. 1937: 373. 1937; in Fl. Siam. En. 2: 355. 1938.— *Pouteria? siamensis* (H.R. Fletcher) Baehni, Candollea 9: 372. 1942.

T h a i l a n d.— SOUTH-WESTERN: Kanchanaburi (type: *Kerr* 10124 BK, K, L).

D i s t r i b u t i o n.— Endemic.

E c o l o g y.— In open scrub, ca. 50 m.

V e r n a c u l a r.— Tan sian (ตานเซี่ยน) (South-western).

N o t e.— *Xantolis siamensis* is easily recognised by having the flowers on short shoots. The species is known only from the type collection and may be exceedingly rare or even extinct.

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Pennington, T.D. 1991. The Genera of Sapotaceae. Whitstable Litho, Whistable, Kent.

Royen, P. van. 1960. Revision of the Sapotaceae of the Malaysian area in a wider sense. XXIII. *Palaquium* Blanco. Blumea 10: 432–609.

SPECIMENS EXAMINED

Chrysophyllum cainito L.
Din 381 (BKF); *A.F.G. Kerr* 8173 (BK, BM, K, L), 9864 (BM, E, K), 12564 (BM), 18883 (BM, E, K), s.n. (BM); *T. Smitinand* 2888 (BKF), 4110 (BKF).

C. roxburghii G.Don
J.F. Maxwell 71-472 (BK), 92-154 (E), *Songrat & P. Sirirugsa* 11 (C).

Diploknema siamensis H.R. Fletcher
A.F.G. Kerr 16260 (BK, K), 18408 (BK, BM, E, K 3-sheets).

Madhuca chai-ananii P. Chantaranothai
T. Smtinand & H. Sleumer et al. 1153 (K, L).

M. chiangmaiensis P. Chantaranothai
J.F. Rock 1552 (A, K).

M. dongnaiensis (Pierre) Baehni
A.F.G. Kerr 9760 (ABD, BKF, BM, E, K), 17659 (BK, BM, E, K), 19856 (BKF, BM, K); *C. Phengklai* 6518 (BKF); *Put* 201/397 (BKF, L).

M. esculenta H.R. Fletcher
A.F.G. Kerr 6931 (BK, BM, E, K), 8911 (BKF, BM, E, K).

M. floribunda (Pierre) H.J. Lam
H. Koyama, H. Terao & T. Wongprasert T-30718 (BKF); *C. Phengklai et al.* 3611 (A, BKF).

M. klackenbergii P. Chantaranothai
T. Smitinand 10062 (BKF, C, K, P).

M. krabiensis (Aubre.) P. Chantaranothai
B. Hansen & T. Smitinand 12352 (C, K).

M. malaccensis (C.B. Clarke) H.J. Lam
A.F.G. Kerr 14953 (BK, BM, E, K); *M.C. Lakshanakara* 749 (BK, BM, E, K); *J.F. Maxwell* 86-150 (A, AAU, L); *T. Smitinand* 10922 (BKF, L).

M. motleyana (de Vriese) Baehni
C. Niyomdham 2014 (BKF); *C. Niyomdham & W. Ueachirakan* 1759 (BKF, K), 1931 (BKF, K); *A. Premrasmi* 11 (K).

M. pierrei (Williams) H.J. Lam
A.F.G. Kerr 4352 (BM, E, K), 9994 (BK, BM, E, K), 10944 (ABD, BK, BM, K), 10998 (BK, BM, K), 11061 (BK, BM, E, K), 11124 (BK, BM, E, K), 13864 (BK, BM, K), 15053 (ABD, BK, BM, E, K), 18186 (BK, BM), 19261 (BM, E, K), 19659 (BK, BM, E, K); *A. Marcan* 2128 (BM, K, L); *Pierre* 3229 (K, P); *D. Thaworamas* 1 (L); *L. Williams* 17146 (L), 17150 (A, L), 17222 (K, L).

M. rupicola (King & Gamble) H.J. Lam
A.F.G. Kerr 15836 (BK, BM, E, K 2-sheets); J.*F. Maxwell* 87-471 (A, AAU, L).

M. smitinandii P. Chantaranothai
A.F.G. Kerr 12327 (BM 2-sheets); *T. Smitinand* 11556 (AAU, BKF, C, E, K).

M. stipulacea H.R. Fletcher
B.N. 2205 (AAU, BKF, K, L); *A.F.G. Kerr* 4772 (BK, BM, E, K, L), 5898 (BK, BM, E, K); *T. Santisuk* 984 (A, BKF, PSU); *Wanikul* 43 (BKF, L); *Winit* 1295 (BK, E, K), L), 1562 (BK, BKF, K, L).

Madhuca takensis Aubre.
Th. Sørensen, K. Larsen & B. Hansen 6660 (C, K).

M. thorelii (Dubard) H.J. Lam
A.F.G. Kerr 8261 (BK, BM, L), 8317 (BM, E, K); *H. Koyama, H. Terao & T. Wongprasert* T-30718 (BKF); *J.F. Maxwell* 76-198 (AAU, BK, L); *G. Murata et al.* T-50775 (A), T-50791 (A, BKF); *C. Phengklai et al.* 3611 (BKF), *Thorel* 2755 (P).

Manilkara hexandra (Roxb.) Dubard
C.F. van Beusekom et al. 4059 (BKF, C, L); *D.J. Collins* 185 (ABD, E, K 3-sheets), 1129 (ABD, BK, BM, K); *Hamid* 3797 (K); *B. Hansen & T. Smitinand* 12394 (BKF, C, L); *A.F.G. Kerr* 2091 (BM, K), 4429 (E), 8048 (BK, BM, K), 9816 (BK, BM, K), 12531 (BK, BM, K), 12689 (AAU, BK, BM, E, K), 16130 (BK, BM, K, L), s.n. (BM), s.n. (BM); *K. Larsen, T. Smitinand, E. Warncke* 1320 (AAU, L); *K. Larsen et al.* 8312 (C, L); *A. Marcan* 336 (ABD, BM, K), 2441 (BM, K); *J.F. Maxwell* 76-657 (AAU, BK, L), s.n. (AAU, L), s.n. (BK, L); *C. Phengklai* 1982 (BKF, C, K, L*); C. Phengklai et al.* s.n. (A); *Put* 283 (BK, BM, K), 1996 (AAU, BK, BM, K, L), 2262 (BK, BM, K); *T. Santisuk* s.n. (BKF); *T. Smitinand* 1475 (BKF); *L. Williams* 17183 (L).

M. kauki (l.) Dubard
A.F.G. Kerr 4429 (BM, E, K); *A. Marcan* 1907 (BM, K).

M. littoralis (Kurz) Dubard
W. Ueachirakan 482 (BKF).

M. zapota (L.) P. Royen
D.J. Collins 321 (K); *A.F.G. Kerr* 10684 (BK, BM, K); *A. Marcan* 304 (BM); *T. Shimizu et al. T*-19432 (C, L); *R. Zimmermann* 161 (BM, K, L, S).

Mimusops elengi L.
Ampai 116 (BKF); *Bjoernland & Schumacher* 113 (C); *D. Bunpheng* 26 (BKF); *Din* 308 (BK); *G.W. Groff* 132 (A, K 2-sheets), 6117 (A, K); *A.J.G.H. Kostermans* 730 (A, K, L); *A.F.G. Kerr* 3997 (BM, K), 4429 (K), s.n. (BM); *M.C. Lakshanakara* s.n. (BK); *A. Marcan* 265 (BM, K), 417 (ABD, BM), 446 (BM, K 2-sheets); *J.F. Maxwell* 70-5 (AAU, BK), 71-303 (AAU, L); *Palee* 28 (A, E); *C. Phengklai* 307 (K); *A. Premrasamee* s.n. (BKF); *Put* 2378 (BK, BM, E, K); *Rabil* 216 (BM, E, K 2-sheets); *R. Schomburgk* 114 (K), 1859 (K); *T. Smitinand* 2832 (AAU, BKF, E, K, L), 7107 (BKF); *Vanpruk* s.n. (BKF); *R. Zimmermann* 47 (BM, K, L, S); 1899 (K).

Palaquium garrettii H.R. Fletcher
H.B.G. Garrett 113 (ABD, BM, E, K 2-sheets, L 2-sheets); *A.F.G. Kerr* 9966 (ABD, BK, BM, E, K 2-sheets); *J.F. Maxwell* 88-111 (AAU, BKF, L); *W. Na Nakorn* 9 (L); *T. Smitinand* 1959 (BKF, L 2-sheets).

P. hansenii P. Chantaranothai
B. Hansen & T. Smitinand 11929 (C, K, L 2-sheets); *H. Koyama, H. Terao & T. Wongprasert T*-33719 (A, BKF).

P. hispidum H.J. Lam
Luang-dee 257 (BKF); *B. Nimanong et al.* 1628 (C, K, L).

P. impressinervium Ng
R. Geesink, T. Hattink & Ch. Charoenphol 7433 (AAU, BKF, C, K, L); *Put* 3611 (BM, K, L); *T. Smitinand* 7107 (BKF, L).

P. maingayi (C.B. Clarke) King & Gamble
M.C. Lakshanakara 751 (ABD, BK, BM, E, K).

P. obovatum (Griffith) Engl.
K. Bunchai & T. Smitinand 10 (BKF, K, L); *C.S.S.* 346 (K); *Ch. Charoenphol, K. Larsen & E. Warncke* 4947 (AAU, K, L); *G. Congdon* 1000 (A, AAU), 1190 (A); *A.F.G. Kerr* 6804 (BM, BKF, K), 9240 (BM, K

2-sheets), 9259 (ABD, BK, BM, K 2-sheets), 11626 (ABD, BK, BM, K), 12746 (ABD, BK, BM, E, K), 13815 (BK, BM, K), 14006 (BM, K), 15932 (A, BM, K, L), 16028 (BM, K), 16245 (ABD, BM, K, L), 17333 (ABD, BM, K), 18640 (ABD, BM, E, K), s.n. (BM); *Haniff* 3836 (K); *J.F. Maxwell* 86-251 (A, L), 90-1103 (AAU); *Nikosol* 8 (BKF, L); *C. Niyomdham* 690 (C); *C. Niyomdham et al.* 1137 (A, C, K, L), 1163 (BKF, C, K, L); *S. Phusomsaeng* 218 (BKF, C, K, L); *Put* 512 (A, BM, K 2-sheets), 573 (BK, BM, K 2-sheets), 815 (ABD, BK, BM, E, K), 1739 (ABD, BM, K); *Rabil* 24 (BM, K); *T. Ruenggeaim* 28 (BKF, C, K, L); *T. Santisuk* 743 (C, K, L); *D.D. Soejarto, T. Santisuk, K. Taylor & N. Nantasan* 5923 (A); *Vanpruk* 947 (K); *L. Williams* 17114 (K, L).

Palaquium ottolanderi Koord. & Valeton
T. Smitinand 7102 (BKF), 7164 (BKF).

P. rostratum (Miq.) Burck
Haniff & Nur 2726 (K); *A.F.G. Kerr* 14441 (ABD, BM, K).

P. sukoei C.E.C. Fisch.
A.F.G. Kerr 18503 (BK, BM, E, K).

P. sumatranum Burck
S. Boonkird 70 (BKF, L).

Payena acuminata (Blume) Pierre
M.C. Lakshanakara 648 (ABD, BK, BM, E, K 2-sheets).

P. lanceolata Ridl.
B. Hansen & T. Smitinand 12417 (BKF, C, E, K, L); *R. Geesink, P. Hiepko & C. Phengklai* 8208 (AAU, K, L); *J.F. Maxwell* 86-150 (A, AAU, L); *S. Phusomsaeng & S. Pinnin* 327 (K, L); *T. Santisuk* 678 (E, K, L); *T. Smitinand* 12166 (BKF); *L. Williams* 8519 (L), 17037 (BKF, K, L), 17110 (A, BKF, K, L); S.N. 5276 (L).

P. lucida (G.Don) DC.
G. Congdon 1040 (A); *A.F.G. Kerr* 5245 (ABD, BM, E, K), 12576 (ABD, BK, BM, E, K), 14027 (ABD, BM, E, K), 14845 (ABD, BM, E, K 2-sheets), 20375 (BM, E); *M.C. Lakshanakara* 394 (BK, E, K), 669 (BK, BM, E, K); *J.F. Maxwell* 89-119 (AAU, BKF), 89-366 (AAU, BKF, L 2-sheets); *S. Phusomsaeng* 92 (C, L), 139 (BKF, K, L); *Put* 3611 (C); *L. Williams* 17113 (A, K, L 2-sheets), 17115 (BKF, K, L 2-sheets), 17192 (K 3-sheets, L).

P. maingayi C.B. Clarke
J.F. Maxwell 85-270 (L).

Pouteria firma (Miq.) Baehni
A.F.G. Kerr 15958 (BK, BM, K 2-sheets).

P. grandifolia (Wall.) Baehni
A.F.G. Kerr 19372 (K); *M.A. Martin* 1554 (K); *J.F. Maxwell* 91-362 (A).

P. malaccensis (C.B. Clarke) Baehni
R. Geesink, P. Hiepko & C. Phengklai 7699 (K); *C. Niyomdham* 1244 (BKF, E, K, L); *C. Niyomdham, Kubat & Aajchompoo* 1441 (BKF, E, K, L); *T. Smitinand & E.C. Abbe* 6275 (K).

P. obovata (R. Brown) Baehni
Ammandale s.n. (K); *D.J. Collins* 156 (K), 996 (BK, BM, K), 1965 (BK, BM, K); *R. Geesink, T. Hattink & C. Phengklai* 6603 (K); *B. Hansen & T. Smitinand* 12411 (K), 12547 (K); *Haniff & Nur* 4396 (K); *A.F.G. Kerr* 6900 (BK, BM, K), 10055 (BK, BM, K), 12282 (BK, BM, K 2-sheets), 12637 (BK, BM, K), 12748 (BK, BM, K), 12801 (BM 2-sheets, K 2-sheets), 13024 (BM, K), 14785 (A, BK, BM, K), 15043 (BK, BM, K 2-sheets), 15094 (BK, BM, K), 15094*A* (BM, K), 15914 (BK, BM, K), 16643 (BK, BM, K), 16837 (BK, BM, K), 19052 (A, BK, BM); *A. Marcan* 1927 (K), 1311 (K); *J.F. Maxwell* 85-77 (A), 85-538 (A), 85-925 (A); *Put* 795 (BK, BM, K), 2713 (BK, BM, K), s.n. (BK, BM); *J. Schmidt* s.n. (C); *T. Smitinand* 287 (A), 5736 (BKF); *D.D. Soejarto, T. Santisuk, K. Taylor & N. Nantasan* 5998 (A).

Xantolis burmanica (Collett & Hemsl.) P. Royen
C.F. van Beusekom et al. 4794 (C); *Bunchuay* 988 (BKF, K); *A.F.G. Kerr* 5555 (K), 5809 (K), 6392 (K), 9602 (BK, BM, K); *J.F. Maxwell* 89-545 (BKF), 89-691 (A), 90-436 (A), 90-531 (A); *T. Smitinand* 497 (A); *T. Smitinand, Poore & Robbins* 7813 (BKF); *Vanpruk* 469 (K); *Winit* 1587 (K).

X. cambodiana (Pierre ex Dubard) P. Royen
D. Bourcke s.n. (K 2-sheets); *Bunnak* 3069 (BKF); *J.F. Maxwell* 90-60 (A), 90-518 (A); *Smiteiri* 1 (A); *Thorel* s.n. (P); *Winit* 848 (BKF, K).

X. siamensis (H.R. Fletcher) P. Royen
A.F.G. Kerr 10124 (BK, K, L).