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Studies in Thai Flora
Sterculiaceae in Thailand

CHAMLONG PHENGKLAI*

In 1990, one research funds on taxonomic botany for a period of 3 months was granted by the **Danish National Science Research** to the author to undertake a thorough study on the Sterculiaceae of Thailand, as this family yields some valuable timber trees, foods and fibre material. The study of this family come to completion under the various abroad meetings which support by Thai Government and other to permit the author stay longer after meeting

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การศึกษาและวิจัยพรรณไม้วงศ์ไม้ปอสำโรง (Sterculiaceae) ของไทย

เป้าหมายและวัตถุประสงค์

เพื่อนำผลการวิจัยไปเรียบเรียงจัดทำหนังสือพรรณไม้ของประเทศไทย และในปัจจุบันประเทศไทยกำลังรณรงค์ส่งเสริมด้านการปลูกสวนป่า เพื่อเพิ่มพื้นที่สีเขียวให้มากพอที่จะรักษาสมดุลย์ธรรมชาติ จำเป็นที่จะต้องหาชนิดพันธุ์พืชที่โตเร็ว ขยายพันธุ์ง่าย สามารถขึ้นได้แทบทุกสภาพพื้นที่ และเนื้อไม้สามารถเป็นวัตถุดิบป้อนโรงงานอุตสาหกรรมได้อย่างดี จึงต้องทำการศึกษาและวิจัยเกี่ยวกับชนิดพันธุ์โดยรีบด่วน เพื่อที่จะได้นำชนิดที่เหมาะสมไปปลูกให้เข้ากับสภาพของแต่ละพื้นที่ต่อไปและเหนือสิ่งอื่นใดของการวิจัยที่แสดงชนิดพันธุ์ที่แน่นอนของไทยนี้จะใช้เป็นหลักอ้างอิงในการรักษาสิทธิประโยชน์ในทรัพยากรธรรมชาติของประเทศได้เป็นอย่างดี

สรุปผลของการวิจัย

การศึกษา-วิจัยเกี่ยวกับชนิดพันธุ์ของวงศ์ไม้ปอสำโรง ผลเป็นที่สรุปได้ว่า วงศ์ไม้ปอสำโรง ในประเทศไทย มี 21 สกุล รวม 58 ชนิด กับ 6 สายพันธุ์

ในจำนวนนี้เป็นพันธุ์ไม้ที่นำเข้ามาจากต่างประเทศอยู่ 2 สกุล รวม 3 ชนิด คือ สกุลโกโก้ (*Theobroma*) พันธุ์ไม้ที่นำเข้ามาคือโกโก้ *Theobroma cacao* Linn. และสกุลดอกพุดตาน (*Dombeya*) พันธุ์ไม้ที่นำเข้ามาคือ พุดตานสุรินทร์ *Dombeya acutangula* Cav. กับไฮแดรนเยียเทียม *Dombeya wallichii* (Lindl.) Benth. & Hook.f.

ส่วนที่เหลือเป็นพันธุ์ไม้ดั้งเดิมของประเทศไทยทั้งหมด และจากผลของการวิจัยได้มีการพบพันธุ์ไม้ใหม่ของประเทศ 6 ชนิด, ปรับเปลี่ยนเป็นสายพันธุ์ใหม่ 5 ชนิด, และยุบหรือลดชื่อพรรณไม้แต่เดิมลง 20 ชนิด คือ

1. **พบชนิดใหม่ของประเทศ** 6 ชนิด (new record to Thailand) คือ
   - 1.1 หงอนไก่ใบเล็ก *Heritiera formes* Buch.-Ham.
   - 1.2 หงอนไก่ป่า *Heritiera parvifolia* Merr.
   - 1.3 หงอนไก่ฟ้า *Heritiera macrophylla* Wall. ex Kurz
   - 1.4 โมพีภูเมี่ยง *Reevesia pubescens* Mast.
   - 1.5 ท้ายเภาขาว *Scaphium linearicarpum* (Mast.) Pierre
   - 1.6 ปอต๊อก *Sterculia urena* Roxb.
2. **ยุบชนิดและปรับเปลี่ยนตั้งเป็นสายพันธุ์ใหม่** 5 ชนิด (combination to new varieties) คือ
   - 2.1 *Helicteres gagnepainiana* Craib เป็น ***Helicteres lanceolata*** DC. var. ***gagnepainiana*** (Craib) Phengklai (ข้าวจี่ใบเล็ก)

2.2 *Pterospermum venustrum* Craib เป็น ***Pterospermum littorale*** Craib var. ***venustrum*** (Craib) Phengklai (สนั่น)

2.3 *Sterculia coccinea* Jack. เป็น ***Sterculia lanceolata*** Cav. var. ***coccinea*** (Jack.) Phengklai (ปอขนุน)

2.4 *Sterculia principis* Gagnep. เป็น ***Sterculia lanceolata*** Cav. var. ***principis*** (Gagnep.) Phengklai (ปอลิ้นงวง)

2.5 *Sterculia thorelii* Pierre เป็น ***Sterculia urena*** Roxb. var. ***thorelii*** (Pierre) Phengklai (ปอตาน)

3. ยุบชื่อเดิมลง 20 ชนิด (reduce to synonyms)

3.1 *Byttneria elegans* Ridl. เป็น ***Byttneria pilosa*** Roxb. (ป่านเขากวาง)

3.2 *Byttneria integrifolia* Lace เป็น ***Byttneria aspera*** Colebr. (สาเดื่อ)

3.3 *Byttneria siamensis* Craib เป็น ***Byttneria aspera*** Colebr. (สาเดื่อ)

3.4 *Commersonia platyphylla* Andr. เป็น ***Commersonia bartramia*** (Linn.) Merr. (ลังเค้า)

3.5 *Helicteres hirsuta* Lour. var. *oblonga* King เป็น ***Helicteres hirsuta*** Lour. (ขี้ตุ่น)

3.6 *Helicteres hirsuta* Lour. var. *vestita* King เป็น ***Helicteres hirsuta*** Lour. (ขี้ตุ่น)

3.7 *Helicteres parviflora* Ridl. เป็น ***Helicteres angustifolia*** Linn. (ปอขี้ไก่)

3.8 *Helicteres obtusa* Wall. ex Kurz เป็น ***Helicteres angustifolia*** Linn. (ปอขี้ไก่)

3.9 *Helicteres plebeja* Kurz เป็น ***Helicteres elongata*** Wall. ex Boj (ขี้อ้น)

3.10 *Helicteres vinosa* Craib เป็น ***Helicteres hirsuta*** Lour. (ขี้ตุ่น)

3.11 *Heritiera khidii* Kosterm. เป็น ***Heritiera simplicifolia*** (Mast.) Kosterm. (ชุมแพรกเขา)

3.12 *Pterocymbium siamensis* Kosterm. เป็น ***Pterocymbium tinctorium*** (Blanco) Merr. (ปออีเก้ง)

3.13 *Pterospermum jackianum* Wall. ex Mast. เป็น ***Pterospermum lanceaefolium*** Roxb. (พลากวาง)

3.14 *Pterospermum pierrei* Hance เป็น ***Pterospermum lanceaefolium*** Roxb. (พลากวาง)

3.15 *Sterculia angustifolia* Roxb. เป็น ***Sterculia balanghas*** Linn. (ปอขนุน)

3.16 *Sterculia balanghas* Linn. var. *angustifolia* (Roxb.) Mast. เป็น ***Sterculia balanghas*** Linn. (ปอขนุน)

3.17 *Sterculia balanghas* Linn. var. *mollis* Mast. เป็น ***Sterculia balanghas*** Linn. (ปอขนุน)

3.18 *Sterculia ornata* Wall. ex Kurz เป็น ***Sterculia villosa*** Roxb. (ปอตูบหูช้าง)

3.19 *Sterculia rubiginosa* Vent. เป็น ***Sterculia balanghas*** Linn. (ปอขนุน)

3.20 *Sterculia rubiginosa* Vent. var. *ensifolia* (Mast.) Ridl. เป็น ***Sterculia balanghas*** Linn. (ปอขนุน)

STERCULIACEAE

CHAMLONG PHENGKLAI*

Trees, shrubs and herbs, with stellate hairs or scales. Leaves simple, palmate or digitate compound, alternate or spirally arranged. Stipules mostly caducous. Inflorescence cymose, panicle or solitary. Flowers with unisexual or bisexual, 5-merous, regular; petals alternate with the sepals or petals absent. Stamens and pistils often on the gynandrophore. Stamens 5-many, free or united, anthers basifixed or dorsifixed, 2-locular, opening length-wise. Staminodes present or absent. Ovary superior, 1-many-locular; locule 1-many ovules; style subulate or branched, stigma lobed or pointed. Fruit a capsule, winged or wingless, 1-many-seeded. Seeds winged or wingless.

A family of 60 genera and about 700 species widely distributed in the tropics. Twenty-one genera, 58 species and 6 varieties including 2 introduced genera and 3 species occur in Thailand.

KEY TO THE GENERA
(based on fruits)

1. Fruit indehiscent
 2. Fruit a samara, winged or ridged
  3. Leaves slightly serrate, simple — **1. Mansonia**
  3. Leaves or leaflets entire, simple or digitate compound — **2. Heritiera**
 2. Fruit a tubular capsule, wingless, many-seeded — **3. Theobroma**
1. Fruit dehiscent
 4. Fruit membranaceous bark, with conspicuous nerves
  5. Fruit in a follicle. Leaves entire
   6. Fruit with hook or spur at the backside — **4. Pterocymbium**
   6. Fruit without hook or spur at the backside
    7. Fruit with one seed at base. Leaves cordate or ovate — **5. Scaphium**
    7. Fruit with two seeds at upper margin of the envelope. Leaves 3(–5)-lobed — **6. Firmiana**
  5. Fruit in a dense cyme. Leaves dentate or serrate — **7. Dombeya**
 4. Fruit leathery or woody, with indistinct nerves
  8. Seed winged
   9. Fruit smooth or with 7–10 longitudinal grooves or ridges
    10. Fruit smooth, open one sidedly; seeds arranged horizontally. Leaves entire — **8. Pterygota**
    10. Fruit with 7–10 longitudinal grooves, open into 7–10 parts; seeds arranged vertically. Leaves serrate or crenate — **9. Eriolaena**
   9. Fruit with 5 longitudinal grooves or ridges

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11. Fruit obovate or conical capsule, not exceeding 4 by 1.5 cm **10. Reevesia**
11. Fruit a tubular, ovate, oblong or elliptical capsule, not less than 4.5 by 2 cm **11. Pterospermum**
8. Seeds wingless
12. Fruit with wings, spiny tubercles or stiff hairs
13. Fruit with wings or spiny tubercles
14. Fruit with longitudinal wings **12. Abroma**
14. Fruit with spiny tubercles **13. Byttneria**
13. Fruit with stiff hairs
15. Fruit globose **14. Commersonia**
15. Fruit oblong **15. Helicteres**
12. Fruit wingless
16. Leaves dentate or serrulate
17. Fruit with 5 longitudinal lobes
18. One stylar remnant on top of fruit. Leaves narrowly lanceolate **16. Pentapetes**
18. Five stylar remnants on top of fruit. Leaves ovate to cordate **17. Melochia**
17. Fruit with 2 valves **18. Waltheria**
16. Leaves entire
19. Fruit pyriform, globose or turbinate, 5 longitudinal grooves, breaking into 5 parts
20. Leaves cordate or oval **19. Kleinhovia**
20. Leaves elliptic, oblong to oblong-lanceolate **20. Leptonychia**
19. Fruit reniform, smooth, breaking along the upper suture **21. Sterculia**

KEY TO THE GENERA
(based on flowers)

1. Flowers with only sepals
2. Stamens up to 10, if so leaves digitately compound
3. Staminal column on calyx base. Inner part of calyx hairy or glabrous **21. Sterculia**
3. Staminal column on wheel-like base
4. Calyx hairy inside **2. Heritiera**
4. Calyx glabrous inside
5. Staminal column hairy atleast on the lower half **4. Pterocymbium**
5. Staminal column glabrous **5. Scaphium**
2. Stamens 15 or more
6. Calyx infundibuliform **6. Firmiana**
6. Calyx divided nearly to base **8. Pterygota**
1. Flowers with sepals and petals
7. Stamens and pistil on a gynandrophore
8. Sepals united
9. Flowers in terminal, corymbose panicles **10. Reevesia**
9. Flowers in axillary, solitary or shortly helicoid cymes **15. Helicteres**
8. Sepals free
10. Flowers paniculate
11. Leaves ovate to elliptic-oblong, slightly serrate **1. Mansonia**
11. Leaves heart-shaped or oval, entire **19. Kleinhovia**
10. Flower solitary **11. Pterospermum**
7. Stamens and pistil free
12. Sepals united
13. Ovary 5-locular, style 5 **17. Melochia**
13. Ovary 1-locular, style 1 **18. Waltheria**
12. Sepals free
14. Flowers in a cymes, 10 flowers or more
15. Stamens 10–15 **7. Dombeya**

15. Stamens up to 5
  16. Stamens and staminodes unite near base forming a membranous tube **13. Byttneria**
  16. Stamens and staminodes free **14. Commersonia**
14. Flowers solitary or in cymes up to 5 flowers
  17. Petals free, oblong or spathulate
    18. Petals oblong and slightly cuneate at base. The base of filaments united into a membranous tube covering the ovary and style **9. Eriolaena**
    18. Petals spathulate with concave claw near base. The base of filaments free, not enclosed the ovary and style **12. Abroma**
  17. Petals united or free
    19. Petals united, crateriform
      20. Tip of lobes with an appendage **3. Theobroma**
      20. Tip of lobes without appendage **16. Pentapetes**
    19. Petals free, cuneiform or obovate **20. Leptonychia**

1. MANSONIA

Drumm., J. Linn. Soc. 37: 250. 1905.

Tree. *Leaves* simple, alternate, slightly serrate. *Flowers* 5-merous bisexual, in a short panicle, axillary or at the end of twigs. *Sepals* and *Petals* present, petals free. *Stamens* 10, united into a slender gynandrophore, surrounding the ovary. *Staminodes* 5 in between stamens and ovary. *Ovary* 5, free, alternate with staminodes; each locule with a curved and narrow style, stigma simple and narrow, many ovules. *Fruit* an ellipsoid, samara.

A genus of about 5 species mainly in Asia and Africa, only one species has been recorded from Thailand.

Mansonia gagei Drumm., J. Linn. Soc. 37: 250. 1905. Brand. Ind. Trees: 701. 1906.

T h a i l a n d.— EASTERN: Nakhon Ratchasima; SOUTH-EASTERN: Prachin Buri, Rayong; SOUTH-WESTERN: Prachuap Khiri Khan; CENTRAL: Saraburi; PENINSULAR: Nakhon Si Thammarat.

D i s t r i b u t i o n.— India, Burma (type).

E c o l o g y.— In dry evergreen to moist deciduous forests, on limestone hills; altitudes 100–400 m. Flowering: August–October; fruiting October–January.

V e r n a c u l a r.— Chan chamot (จันทน์ชะมด), chan (จันทน์), chan khaao (จันทน์ขาว), chan phamaa (จันทน์พม่า) (South-eastern & South-western).

U s e d.— Wood usually used for handicrafts; essential oil from wood for cosmetics and purfume. The dry wood is aromatic.

2. HERITIERA

Ait. Hort. Kew, ed. 1.3: 456. 1789; Kosterm., Reinwardtia 4.4: 466. 1959; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 139. 1984.— *Balanopteris* Gaertn., Fruct. 2: 94. tt. 98, 99.

1791.— *Tarrietia* Bl., Bijdr.: 227. 1825.— *Atuna* Raf., Sylv. Tell.: 153. 1838.— *Fometica* Raf. l.c.: 75. 1838.

Tree. *Leaves* simple or digitate compound, alternate or spiral arrangement, entire margin. *Flowers* small, axillary or upper leaf scar, in panicles, unisexual; male and female are similar the later slightly larger. *Sepals* 5, united at base. *Petals* absent. *Male flowers* 8–10 stamens, on a globose head at the end of a slender staminal column. *Ovary* (4–) 5(–6) locular, each locule with one ovule; styles stout and short. *Fruits* a samara, indehiscent.

A genus of about 35 species mainly in the tropical of Africa, Indomalaysian Australia. Only 7 species have been recorded from Thailand.

KEY TO THE SPECIES

1. Leaves digitately, compound. Samara with a spathulate wing
 2. Leaflets with acuminate to cuspidate apex; sparsely hairy on both sides. Fruiting body up to 1 cm long **1. H. sumatrana**
 2. Leaflets with acute or obtuse apex; glabrous on both sides. Fruiting body not less than 2 cm long **2. H. javanica**

1. Leaves simple
 3. Samara with a longitudinal ridge. Leaves with faintly secondary nerves and veins
  4. Fruiting body up to 2 by 1 cm; epicarp dull. Pistil and stamens on an even, slender column **3. H. formes**
  4. Fruiting body not less than 5 by 3 cm; epicarp shining. Pistil and stamens on a broad base column, then narrowed on the upper half **4. H. littoralis**
 3. Samara with wing or wing-like. Leaves with prominent secondary nerves and veins
  5. Samara with a fish-tail wing, up to 2 cm long. Leaves oblong. Petiole up to 4 cm long
   6. Fruiting body up to 2 by 1 cm, glabrous. Leaves glaucous on lower surface. Bud ellipsoid. Column 1.5 mm long, with pellucid dots along limb **5. H. parvifolia**
   6. Fruiting body not less than 4 by 3 cm, covered with brown indumentum. Leaves with brownish indumentum on lower surface. Bud globose. Column 2 mm long, without pellucid dots **6. H. macrophylla**
  5. Samara with a spathulate wing, not less than 8 cm long. Leaves elliptic. Petiole not less than 5 cm long. Fruiting body up to 3 by 2 cm, glabrescent. **7. H. simplicifolia**

1. Heritiera sumatrana (Miq.) Kosterm., Reinwardtia 4.4: 524. 1959.— *Tarrietia sumatrana* Miq., Fl. Ind. Batt.: 165. 1860.— *T. perakensis* King, J. As. Soc. Bengal. 60.2: 77. 1891.— *T. curtisii* King, 1.c.: 78. 1891.

T h a i l a n d.— SOUTH-EASTERN: Trat; PENINSULAR: Surat Thani, Nakhon Si Thammarat, Yala.

D i s t r i b u t i o n.— Malay Peninsula, Indonesia (type).

E c o l o g y.— Scattered in evergreen forest; altitude 50–800 m. Fruiting between May–June.

V e r n a c u l a r.— Siatcho (เสียดช่อ), ngonkai tatum (หงอนไก่ตาตุ่ม), siat khaang (เสียดค่าง) (Peninsular); chum phraek khaao (ชุมแพรกขาว) (South-eastern).

U s e s.— Wood is suitable for interior construction and plywood.

2. Heritiera javanica (Bl.) Kosterm., Reinwardtia 4.4: 521. 1959.— *Tarrietia javanica* Bl., Bijdr.: 227. 1825; Gagnep. in Fl. Gén. I.-C. 1: 482. 1911; Craib in Fl. Siam. En. 1: 170. 1925.— *T. cochinchinensis* Pierre, Fl. For. Cochinch.: t. 205. 1889.

T h a i l a n d.— SOUTH-EASTERN: Chanthaburi, Trat; PENINSULAR: Ranong, Surat Thani, Trang, Narathiwat.

D i s t r i b u t i o n.— Vietnam, Laos, Malay Peninsula, Indonesia (type), Philippines.

E c o l o g y.— Scattered in evergreen forest; altitude up to 100 m. Flowering from January–April, fruiting from February–May.

Vernacular.— Chum phraek (ชุมแพรก), thong suk (ทองสุก), loma (โลมา), siat cho (เสียดช่อ) (Peninsular).

U s e s.— Wood is suitable for interior construction plywood and particleboard.

3. Heritiera fomes Buch.-Ham. in Syme, Embassy ed. 2.3: 319. 1800; Mast. in Fl. Br. Ind. 1: 363. 1874; Kosterm., Reinwardtia 4.4: 490. 1959.

T h a i l a n d.— PENINSULAR: Ranong, Trang.

D i s t r i b u t i o n.— India Andamans (type), Burma.

E c o l o g y.— Scattered in back mangrove; altitude up to 10 m. Flowering September–October, fruiting October–December.

V e r n a c u l a r.— Ngonkai bailek (หงอนไก่ใบเล็ก), duhun bailek (ดุหุนใบเล็ก) (Peninsular).

4. Heritiera littoralis Ait. Hort. Kew, ed. 1.3: 546. 1789; Mast. in Fl. Br. Ind. 1: 363. 1874; Kurz, Fl. Burma 1: 140. 1877; Gagnep. in Fl. Gén. I.-C. 1: 483. 1911; Ridl., Fl. Mal. Pen. 1: 279. 1922; Craib in Fl. Siam. En. 1: 170. 1925; Kosterm., Reinwardtia 4.4: 473. 1959; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 140. Fig. 39. 1984.

T h a i l a n d.— CENTRAL: Samut Prakan; SOUTH-EASTERN: Rayong, Chanthaburi, Trat; PENINSULAR: Ranong, Surat Thani, Phangnga, Krabi, Trang, Satun, Narathiwat.

D i s t r i b u t i o n.— East India Islands (type), Srilanka, Burma, Cambodia, Vietnam, Malay Peninsula, Indonesia, Australia, East Africa.

E c o l o g y.— Common in back mangrove in tidal areas; altitude up to 10 m. Flowering from April–November, fruiting from May–December.

V e r n a c u l a r.— Ngonkai thale (หงอนไก่ทะเล) ngonkai (หงอนไก่) (Central, South-eastern & Peninsular), khai khwaai (ไข่ควาย), duhun baiyai (ดุหุนใบใหญ่) (Peninsular).

U s e s.— Timber used for post, ribs of a wooden boat, wheels of carts, tool handles and interior construction.

5. Heritiera parvifolia Merr., J. Arn. Arb. 6: 137. 1925; Kosterm., Reinwardtia 4.4: 508. 1959; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 140. Fig. 39. 1984.— *Tarrietia parvifolia* Merr & Chun, Sunyatsenia 2: 281. 1935.

T h a i l a n d.— NORTHERN: Sukhothai; CENTRAL: Nakhon Nayok.

D i s t r i b u t i o n.— China (Hainan, type), India, Burma.

E c o l o g y.— By stream in evergreen forest, on rocky ground; altitude 100–600 m. Flowering during September–November, fruiting during November–January.

V e r n a c u l a r.— Ngonkai paa (หงอนไก่ป่า) (Central).

N o t e.— This species in a new record to Thailand. Firstly found in budding stage by Prof. Dr. Smitinand at Sarika Waterfall. The other samples had been collected from Khao Luang National Park, Sukhothai in young fruiting stage.

6. Heritiera macrophylla Wall. ex Kurz, J. As. Soc. Bengal 42.2: 61. 1873; in Fl. Burma 1: 141. 1877; Gagnep. in Fl. Gén. I.-C. 1: 485. 1911; Kosterm., Reinwardtia 4.4: 502. 1959.

T h a i l a n d.— NORTHERN: Chiang Rai (Doi Tung).

D i s t r i b u t i o n.— India, Burma (type), China (Hainan), Indochina.

E c o l o g y.— Scattered in hill evergreen forest; altitude 1000–1600 m. Flowering and fruiting during November to January; defoliating in budding stage.

V e r n a c u l a r.— Ngonkai faa (หงอนไก่ฟ้า) (Northern).

N o t e.— This species is a new record to Thailand. Firstly found in flowering and fruiting stage by the late Mr. C. Charoenphol.

7. Heritiera simplicifolia (Mast.) Kosterm., Reinwardtia 4.4: 514. 1959.— *Tarrietia simplicifolia* Mast. in Fl. Br. Ind. 1: 362. 1874; Ridl., Fl. Mal. Pen. 1: 278. 1922.— *Heritiera khidii* Kosterm., Reinwardtia 5.4: 380. 1961.

T h a i l a n d.— NORTHERN: between Phrae and Uttaradit.

D i s t r i b u t i o n.— Malay Peninsula (type), Indonesia, Philippines.

E c o l o g y.— In evergreen forest, altitude 800–1000 m; on well-drained soil. Flowering and fruiting between December–April.

V e r n a c u l a r.— Chumphraek khao (ชุมแพรกเขา) (Northern).

U s e s.— Wood is very durable, used for furniture, tool handles and the interial construction.

3. THEOBROMA

Linn., Gen. ed. 1: 351. 1737 et Sp. Pl.: 782. 1753; Benth. & Hook.f., Gen. Pl. 1: 219. 1867.— *Cacao* Gaertn., Fruct. 2: 190. t. 122. 1791.

Small tree. *Leaves* simple, alternate, entire. *Flowers* 5-merous, bisexual, 1-many on twigs. *Sepals* and *petals* present, free. *Stamens* 5, free, alternate with 5 staminodes. *Ovary* 5-locular; locule with many ovules. *Style* and *stigma* simple. *Fruit* tubular, indehiscent. *Seeds* many.

A genus of about 30 species mainly in tropical America. A species yielding cocoa is cultivated in Thailand.

Theobroma cacao Linn., Sp. Pl.: 782. 1753; Craib in Fl. Siam. en. 1: 180. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 169. Fig. 48. 1984.

T h a i l a n d.— Cultivated as an ornamental in the Central and plantation in the Peninsular.

D i s t r i b u t i o n.— South America (type) and cultivated widely in Asia.

V e r n a c u l a r.— Ko ko (โกโก้) (Central).

U s e s.— Seeds yield cocoa of the commerce.

4. PTEROCYMBIUM

R. Br. in Benn., Pl. Jav. Rar.: 219. t. 45. 1844. Kosterm., Reinwardtia 1.1: 41. 1950.

Tree. *Leaves* simple, spirally arranged, entire margin. *Flowers* 5-merous, unisexual, axillary or terminal. *Sepals* united at base. *Male flowers* with 8–10 stamens, on a globose head at the end of a slender staminal column. *Female flowers* with 5 free ovaries one each; with 2 ovules; style curved, free; stigma swollen and curved towards the base of style. *Fruit* a follicle, boat-shaped with a hook, membranous, early dehiscing. *Seed* 1–2, ovoid or ellipsoid.

A genus of about 15 species mainly in tropical Asia; 2 species have been recorded from Thailand.

KEY TO THE SPECIES

1. Mature leaves glabrous. Sepals up to 2 cm long	**1. P. tinctorium**
1. Mature leaves densely pubescent on lower surface. Sepals not less than 2 cm long	**2. P. macranthum**

1. Pterocymbium tinctorium (Blanco) Merr., Philip. Gov. Lab. Bur. Bull. 27: 24. 1905; Kosterm., Reinwardtia 1.1: 43. 1950.— *Heritiera tinctoria* Blanco, Fl. Filip.: 653. 1837.— *Pterocymbium javanicum* R. Br. in Pl. Jav. Rar.: 219. t. 45. 1844; Ridl., Fl. Mal. Pen. 1: 276. 1922.— *Sterculia campanulata* Wall. ex Mast. in Fl. Br. Ind. 1: 362. 1874; Kurz, Fl. Burma 1: 139. 1877; Craib in Fl. Siam. En. 1: 165. 1925.— *Pterocymbium campanulatum* Pierre, Fl. For. Cochinch.: t. 195. 1889.— *Pterocymbium columnare* Pierre, 1.c.: t. 195. b. 1889.— *Pterocymbium siamensis* Kosterm.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— India, Malay Peninsula, Indo-China, Indonesia, Philippines

(type).

E c o l o g y.— In tropical lowland forest to upper mix deciduous forest; altitudes 5–800 m. Flowering and fruiting at the same time between January–April; shedding leaves before blooming.

V e r n a c u l a r.— Po-i-keng (ปออีเก้ง), khaang hung (คางฮุง), po kradaang (ปอกระด้าง), po khi haet (ปอขี้แฮด), po khi kai (ปอขี้ไก่), po khi liat (ปอขี้เลียด), po thong (ปอทอง) (Northern); po khi lin (ปอขี้ลิ้น), po daan (ปอดาน), po khi khoi (ปอขี้ขอย), po khi lin (ปอขี้ลิ้น) (North-eastern); kham rong (คำโรง), po khi taek (ปอขี้แตก) (Eastern); bong (บง), kaphong yai (กะพงใหญ่), oi chaang (อ้อยช้าง), mi khamraam (หมีคำราม), meng (เหม่ง) (South-eastern); pong (ปง), malong (มะโหลง) (Peninsular).

U s e s.— Wood whitish for plywood, boxes; bark mixed with dye to keep a fast colour.

2. Pterocymbium macranthum Kosterm., Reinwardtia 6: 295. 1962.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang; SOUTH-WESTERN: Kanchanaburi.

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

E c o l o g y.— In Moist upper mixed deciduous to dry evergreen forest; altitudes 100–800 m. Flowering and fruiting at the same time, between January–March, shedding leaves before blooming.

V e r n a c u l a r.— Po kradaang (ปอกระด้าง), po khi liat (ปอขี้เลียด), po-i-keng (ปออีเก้ง) (Northern).

U s e s.— Wood used for plywood.

5. SCAPHIUM

Schott & Endl., Melet. Bot.: 33. 1832; Endl., Gen. Pl.: 994. 1840; Kosterm. J. Sci. Res. Indo. 2.1: 3. 1953.

Tree. *Leaves* simple, spirally arrangement, entire margin. *Flowers* 5 merous, unisexual, in short panicle, axillary or terminal. *Sepals* present, united at base. *Stamens* in male flowers 8–10, on a globose head at the end of a slender staminal column. *Ovary* in female flowers 5, free; each locule with 2 ovules; style subulate, free; stigma simple and pointed. *Fruit* a follicle, boat-shaped and membraneous, early dehiscing. *Seed* 1(–2), ovoid or ellipsoid.

A genus of about 6 species mainly in the tropic of Asia, 2 species have been recorded from Thailand.

KEY TO THE SPECIES

1. Leaves heart-shaped, base deeply cordate. Inflorescence lax — **1. S. linearicarpum**
1. Leaves ovate to ovate-oblong, base obtuse to truncate. Inflorescence erect. — **2. S. scaphigerum**

1. Scaphium linearicarpum (Mast.) Pierre, Fl. For. Cochinch.: 193. 1889; Ridl., Fl. Mal. Pen. 1: 275. 1922; Kosterm., J. Sci. Res. Indo. 2.1: 9. 1953.— *Sterculia linearicarpa* Mast. in Fl. Br. Ind. 1: 360. 1874.

T h a i l a n d.— PENINSULAR: Nakhon Si Thammarat (Chawang).

D i s t r i b u t i o n.— Malay Peninsula (type), Indonesia.

E c o l o g y.— In tropical lowland forest, altitudes 10–100 m. Flowering unknown; fruiting December–February.

V e r n a c u l a r.— Thai phao khaao (ท้ายเภาขาว) (Peninsular).

U s e s.— Wood used for plywood. Seed used for food and medicine.

N o t e.— This species is a new record to Thailand, firstly found at Chawang, Nakhon Si Thammarat by S. Thaworn (682).

2. Scaphium scaphigerum (G. Don) Guib. & Planch., Hist. Nat. Dro. Sim., 7ed., 3: 632. 1876. Kosterm., J. Sci. Res. Indo. 2.1: 3. 1953.— *Sterculia scaphigera* Wall., Cat. no. 1130: 1828 (nom. nud.) ex G. don, Gen. Syst. 1: 517. 1831.

T h a i l a n d.— SOUTH-EASTERN: Chanthaburi, Trat; PENINSULAR: Ranong, Phuket, Nakhon Si Thammarat, Trang, Satun, Yala.

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

E c o l o g y.— In evergreen forest, near limestone, altitudes 50–400 m. Flowering December to February. Fruiting February to May.

V e r n a c u l a r.— Phung thalaai (พุงทะลาย) (Central); samrong (สำรอง) (South-eastern); thaai phao (ท้ายเภา), priang (เปรียง), prong (โปรง) (Peninsular).

U s e s.— Wood for plywood. Seed used for food and medicine.

6. FIRMIANA

Marsigli in Saggi, Padov. 1: 106. 1786; Kosterm., Reinwardtia 4.2: 281. 1957.

Tree. *Leaves* simple, tri-lobed or cordate; margin entire or undulate. *Flowers* unisexual or bisexual, sometimes in cymes or panicles, with few to many flowers, terminal and axillary. *Bracts* awl-shaped, + 1 cm long, caduceous. *Sepals* 5, more or less united at the base, hairy on both sides. *Petal* absent. *Stamens* 15–25, in groups on a column covering the pistil; anthers 2-lobed, extrose. *Ovary* superior 5-locular, each locule kidney-shaped, with 2–4 ovules; styles 5, free. *Capsules* 5, hanging, oblong, dehiscing into paperly values. *Seed* 2.

A genus of about 15 species, mainly in Africa and Asia; three species in Thailand.

KEY TO THE SPECIES

1. Inflorescences in clump-like cymes. Calyx divided to or nearly to the base; inside with tufts of long hairs, outside with dirty white or yellowish indumentum **1. F. kerrii**
1. Inflorescences in panicles, 5–15 cm long. Calyx tubular or funnel-shaped; inside with or without tufts of long hairs, outside with bright red or orange-red indumentum
 2. Leaves densely soft hairy on lower surface. Stamens 25, 5 in each group **2. F. pallens**
 2. Leaves glabrescent on lower surface, except along nerves. Stamens 15, 3 in each group **3. F. colorata**

1. Firmiana kerrii (Craib) Kosterm., Reinwardtia 5(4): 389. 1961.— *Sterculia kerrii* Craib, Kew Bull. 1915: 424; in Fl. Siam. En. 1: 167. 1925.

T h a i l a n d.— NORTHERN: Chiang Mai.

D i s t r i b u t i o n.— Endemic to Thailand (*Kerr 2866*, Doi Chiang Dao-type).

E c o l o g y.— Scattered on rocky limestone ridges; altitude 900–1800 m. Flowering and fruiting during January–March.

V e r n a c u l a r.— Po tap (ปอตั๊บ) (Northern).

U s e s.— Wood used for concrete molds and core of plywood.

2. Firmiana pallens (Wall. ex King) Stearn in Blatt. & Mill., Some Beautiful Ind. Tree: 80. 1955; Kosterm., Reinwardtia 5(4): 387. 1961.— *Sterculia pallens* Wall. ex King, J. As. Soc. Bengal 60.2: 73. 1891.— *Sterculia fulgens* Wall. ex Mast. in Fl. Br. Ind. 1: 360. 1874; Kurz, Fl. Burma 1: 139. 1877.— *Erythropsis fulgens* (Wall. ex Kurz) Ridl., Fl. Mal. Pen. 1: 227. 1922.— *Firmiana fulgens* (Wall. ex Mast.) Corner, Ways. Trees Mal. 1: 610. 1940.

T h a i l a n d.— EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Kanchanaburi, Sai Yok.

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

E c o l o g y.— Scattered in deciduous forest; altitude 100–200 m. Flowering & fruiting during January–March; leafless in flowering stage.

V e r n a c u l a r.— Po khaao (ปอคาว) (South-western).

U s e s.— Wood used for making concrete molds and core of plywood.

3. Firmiana colorata (Roxb.) R. Br. in Benn. & R. Br., Pl. Jav. Rar.: 235. 1844; Kosterm., Reinwardtia 4.2: 285. 1957.— *Sterculia colorata* Roxb., Pl. Corom. 1: 26. t. 25. 1795; Mast. in Fl. Br. Ind. 1: 359. 1874; Kurz, Fl. Burma 1: 138. 1877; Gagnep. in Fl. Gén. I.-C. 1: 459. 1911; Craib in Fl. Siam. En. 1: 166. 1925.— *Erythropsis colorata* (Roxb.) Burk., Gard. Bull. S.S. 5: 231. 1931; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 137. fig. 38. 1984.— *Erythropsis roxburghiana* Schott & Endl., Melet. Bot.: 33. 1832.— *Firmiana rubriflora* Kosterm., Reinwardtia 6: 293. fig. 12. 1962.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang, Lamphun; NORTH-EASTERN: Loei, Sakon Nakhon; CENTRAL: Saraburi; SOUTH-EASTERN: Chon Buri; PENINSULAR: Chumphon, Nakhon Si Thammarat, Phangnga, Pattani, Ranong, Surat Thani, Yala.

D i s t r i b u t i o n.— India (type), Malay Peninsula, China.

E c o l o g y.— Scattered in deciduous forest; altitude 300–1400 m. Flowering and fruiting during March–June; leafless in flowering stage.

V e r n a c u l a r.— Po faai (ปอฝ้าย), po khaao (ปอขาว) (Northern); u-lok (อุโลก) (Central); kaapee (กาปี), po chet (ปอเจ็ด) (Peninsular).

U s e s.— Wood used for making concrete molds and core of plywood.

7. DOMBEYA

Cav., Diss. 121. t. 38: 41. 1787; Benth. & Hook. f. Gen. Pl. 1: 221. 1867.

Shrub to small tree. *Leaves* simple, cordate, spirally arranged, dentate or serrate margin. *Flowers* 5-merous, bisexual, crowded in axillary and terminal umbellate or helicoid cymes. *Petals* and *sepals* present, free. *Stamens* 10–15, free or united near base; staminodes 5, in the same row and twice longer than stamens. *Ovary* sessile, ovoid, hairy, (2–)3(–5) locular, each locule with 2(–3) ovules; style slender, thicken toward apex; stigma 3–5 segments. *Fruit* dehiscent.

A genus of about 50 species mainly in Africa. Two species are cultivated in Thailand for ornamental.

N o t e.— *Dombeya acutagula* Cav., Diss: 123 t. 38 f2. 1787 and *D. wallichii* (Lindl.) Benth. & Hook. f., Gen. Pl. 1: 221. 1867, are often found in the gardens. The former species is easily recognized by the flowers, ca 10 cm diam. and the latter up to 2 cm diam.

8. PTERYGOTA

Schott & Endl., Melet. Bot.: 32. 1832.

Tree. *Leaves* simple, spirally arranged, entire margin. *Flowers* 5-merous, unisexual, in a panicle. *Petals* absent, sepals present, free or nearly. *Stamens* (8–)20, surrounded the sterile ovary, anther sessile. *Ovary* 5, free, globose, surrounded by 5 groups of staminodes; each locule with one short and outwardly curved style, many ovules, stigma globose. *Fruits* woody, dehiscing along sutures. Seed winged.

A genus of about 20 species mainly in Asia, only one species has been recorded from Thailand.

Pterygota alata (Roxb.) R. Br. in Benn., Pl. Jav. Rar.: 234. 1867; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 114. Fig. 31. 1984.— *Sterculia alata* Roxb., Pl. Corom. 3: 84. t. 287. 1819; Mast. in Fl. Br. Ind. 1: 360. 1874; Kurz, Fl. Burma 1: 134. 1877; Gagnep. in Fl. Gén. I.-C. 1: 466. 1910.

T h a i l a n d.— NORTHERN: Tak; SOUTH-EASTERN: Chanthaburi, Trat; SOUTH-WESTERN: Prachuap Khiri Khan; PENINSULAR: Surat Thani, Yala.

D i s t r i b u t i o n.— India (type), Burma, South China, Vietnam, Malay Peninsula.

E c o l o g y.— In evergreen forest; altitudes 40–900 m. Flowering and fruiting during December–March.

V e r n a c u l a r.— Tut e-wot (ตูดอีโหวด), mabin (มะบิน) (Northern); tong ching (ตองจิง), then ot phen (เถรอดเพล), hua ling (หัวลิง), aai waen (อ้ายแหวน) (South-western); ngon kai yai (หงอนไก่ใหญ่) (South-eastern); nom saao (นมสาว), hua kaa (หัวกา) (Peninsular).

U s e s.— Wood yellowish-white, used for plywood facing.

9. ERIOLAENA

A. DC. in Mem. Mus. Par. 10: 102. 1823; Benth. & Hook. f., Gen. Pl. 1: 220. 1867.— *Eriochlaena* Spreng., Syst. 3: 123. 1826.— *Wallichia* A. DC. in Mem. Mus. Par. 10: 104. 1823.— *Jackia* Spreng., Syst. 3: 85. 1826.— *Schillera* Reichb. Consp.: 204. 1828.— *Gumsia* Buch.-Ham. ex Wall., Cat.: sub n. 1173. 1832.— *Microlaena* Wall. Cat.: n. 1173. 1832.— *Microchlaena* Wight & Arn., Prod.: 70. 1834.

Tree. *Leaves* simple, ovate or cordate; the margin serrate, double serrate or crenate. *Flowers* bisexual, in cymes, one to many flowered, terminal and axillary. *Bracts* with 3 horn-like lobes, 1.5–3 by 1–1.5 cm, accrescent as a fruiting calyx in fruit. *Sepals* 5, united in bud, later free, narrow lanceolate, hairy on both sides. *Petals* 5, oblong cuneate, alternate to sepals. *Stamens* many, all fertile, covering the pistil; anthers 2-lobed, extrorse. *Ovary* sessile, 7–10-locular, each with many ovules; style simple with 7–10 spreading lobes. *Capsules* ovate-oblong, woody, with distinct longitudinal grooves as many as the locules, dehiscent; seeds winged.

A genus of about 17 species mainly in the Asia, one species has been recorded from Thailand.

Eriolaena candollei Wall., Pl. As. Rar., 1: 57. 1829; Mast. in Fl. Br. Ind. 1: 370. 1874; Kurz, Fl. Burma 1: 148. 1877; Gagnep. in Fl. Gén. I.-C. 1: 506. 1911; Craib in Fl. Siam. En. 1: 177. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 166. 1984.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang, Phrae; CENTRAL: Saraburi; SOUTH-WESTERN: Kanchanaburi.

D i s t r i b u t i o n.— Burma (type), Phutan, Laos, China.

E c o l o g y.— Common in mixed deciduous forest; 300–1200 m altitude. Flowering during February to May; fruiting from June to December.

V e r n a c u l a r.— Liang faai (เลียงฝ้าย), so sian (ซ้อเสี้ยน), liang khao (เลียงเขา), po liang (ปอเลียง) (Northern).

U s e s.— Wood used for tool and furniture and indoor construction.

10. REEVESIA

Lindl., J. Roy. Inst. 2.2: 190. 1827; Bot. Reg.: t. 1236. 1829; Anthony, Not. Roy. Bot. Gard. Edinb. 15: 121. 1926.

Shrub to small tree. *Leaves* simple, alternate to spirally arranged, entire margin. *Flowers* bisexual, in terminal corymbose panicles. *Sepals* 5, united at base. *Petals* 5, free, clawed. *Stamens* adnate to the gynandrophore, bearing a globose head of 10–15 sessile anthers. *Ovary* 5-locular; locule with 2 ovules; stigma with sticky fluid, lobed or pointed. *Fruit* an obovate woody capsule, with 5 longitudinal grooves. *Seeds* winged downwards.

A genus of about 15 species mainly in the temperate to South-China, only one species and one varieties has been recorded from Thailand.

KEY TO THE VARIETIES

1. Leaves densely pubescent and glaucous on lower surface; secondary nerves straight. Inflorescences up to 7 cm across. Petals hairy especially on the lower half outside. Style indistinct; stigma flattened with 5 lobes **1. R. pubescens**
1. Leaves glabrous or glabrescent; secondary nerves arched. Inflorescences not less than 8 cm across. Petals glabrous. Style distinct; stigma narrowed **1.1 R. pubescens var. siamensis**

1. Reevesia pubescens Mast. in Fl. Br. Ind. 1: 364. 1874; Anthony, Not. Roy. Bot. Gard. Edinb. 15: 124. 1926; Tardieu-Blot, Suppl. Fl. Gén. I.-C. 1: 415. 1945; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 154. Fig. 43. 1984.

T h a i l a n d.— NORTHERN: Phitsanulok (Phu Miang). This is a new record to Thailand, first found by Prof. K. Larsen (no. 997).

D i s t r i b u t i o n.— India (type), China, Laos.

E c o l o g y.— In hill evergreen forest; altitude 1000–1300 m. Flowering in July.

1.1 var. *siamensis* (Craib) Anthony, Not. Roy. Bot. Gard. Edinb. 15: 124. 1926; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 154. 1984.— *Reevesia siamensis* Craib, Kew Bull. 1924: 90; in Fl. Siam. En. 1: 170. 1925; Tardieu-Blot in Suppl. Fl. Gén. I.-C. 1: 414. 1945.

T h a i l a n d.— NORTH-EASTERN: Loei (Kerr 5797 type); EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Nakhon Nayok.

D i s t r i b u t i o n.— Endemic to Thailand.

E c o l o g y.— In old clearing along edge of evergreen forest; altitude 600–1300 m. Flowering between August–December; fruiting September–January.

V e r n a c u l a r.— Mori (ไมพี) (Eastern).

U s e s.— A beautiful tree with scented flowers worthwhile for ornamental purpose.

11. PTEROSPERMUM

Schreber, Gen. 2: 461. 1791; Benth. & Hook. f. Gen. Pl. 1: 220. 1867.— *Velaga* Adans., Fam. 2: 398. 1763.— *Sczegleewia* Trucz., Bull. Soc. Nat. Mosc. 31.1: 233. 1858.

Tree, *Leaves* simple, alternate or spirally arrangement. *Flowers* bisexual, axillary on upper leaf scars, rarely at terminal, not less than 5 cm across in blooming, 5 merous. *Petals* and *Sepals* present, free or nearly. *Stamens* (12–)15, surrounded the ovary on the top of gynandrophore. *Anthers* 2 celled, basifixed. *Staminode* 5. *Ovary* at the top of column, 5 locular, each locule with many ovules; styles slender; stigma with 5 linear lobes, spreading or twisted. *Fruits* wood with smooth or angulates, dehiscent into 5 parts. *Seed* winged.

A genus of about 40 species mainly in Asia, 9 species have been recorded from Thailand.

KEY TO THE SPECIES
(based on fruits)

1. Fruit not alate or angulate. Fruiting calyx persistant or caducous
 2. Leaves ovate, oblong, elliptic oblong or oblong lanceolate. Fruit tubular, fusiform to egg-shaped, up to 8 by 6 cm
  3. Leaves with strongly sagittate base, woolly on lower surface. Fruit tubular. Fruiting calyx persistant **1. P. semisagittatum**
  3. Leaves with slightly oblique base, spacelly then glabrescent on lower surface. Fruiting calyx caducous
   4. Fruit tubular. Leaves with serrate margin on the upper half **2. P. lanceaefolium**
   4. Fruit fusiform or egg-shaped. Leaves with entire margin **3. P. cinnamomeum**
 2. Leaves peltate. Fruit tubular, not less than 12 by 6 cm. Fruiting calyx persistant **4. P. grande**
1. Fruit alate or angulate. Fruiting calyx caducous
 5. Leaves elliptic, ovate, oblong to wedge-shaped
  6. Fruit with wavy alati or angulati
   7. Fruit ovate, alati waved up and down **5. P. littorale** and var.
   7. Fruit elliptical or oblong, alati waved left and right or plicate **6. P. pecteniforme**
  6. Fruit with straight alate or angulate
   8. Fruit oblong. Mature leaves broadly ovate or ovate oblong, not lobed toward apex **7. P. diversifolium**
   8. Fruit elliptical. Mature leaves more wedge-shaped, lobed toward apex **8. P. grandiflorum**
 5. Leaves peltate **9. P. acerifolium**

KEY TO THE SPECIES
(based on flowers)

1. Petals glabrous on both sides. Styles glabrous
 2. Leaves peltate
  3. Petals and Sepals not less than 8 by 2 cm. Buds ovate, bracts linear lanceolate and caducous **4. P. grande**
  3. Petals and Sepals up to 6 by 1 cm. Buds oblong
   3.1 Bud surrounded with 3 permanen squidty bracts **9. P. acerifolium**
   3.1 Bud surrounded with 3 caducous linear lanceolate bracts **5.2 P. littorale** var. **venustrum**
 2. Leaves ovate, oblong or wedge-shaped
  4. Leaves ovate or ovate oblong, not lobed toward apex. Bud surrounded with caducous linear lanceolate bracts. Petals and sepals up to 4 cm long **3. P. cinnamomeum**

4. Leaves wedge-shaped and lobed toward apex. Bud surrounded with 3 permanent squidty bracts. Petals and sepals not less than 4 cm long **8. P. grandiflorum**

1. Petals hairy on outer part. Styles hairy unless on the lower half

5. Buds surrounded with 3 permanent squidty bracts at base

6. Leaves with strongly sagittate base, woolly on lower surface. Petals not less than 4 by 1.5 cm. Stamens 12. Stigma 5, spreading **1. P. semisagittatum**

6. Leaves with slightly oblique base, sparcelly or glabrescent on lower surface. Petals up to 3.5 by 1 cm. Stamens 15. Stigma twisted **2. P. lanceaefolium**

5. Buds surrounded with 3 caducous linear lanceolate bracts. Stigma twisted

7. Petals and sepals up to 6 cm long

8. Petals and sepals not less than 4 cm long. Styles hairy all part **5. P. littorale**

8. Petals and sepals up to 2.5 cm long. Styles hairy on the lower half **6. P. pecteniforme**

7. Petals and sepals not less than 7 cm long. Styles hairy on the lower half **7. P. diversifolium**

1. Pterospermum semisagittatum Buch.-Ham. ex Roxb., Fl. Ind. 3: 160. 1832; Mast. in Fl. Br. Ind. 1: 368. 1874; Kurz, Fl. Burma. 1: 146. 1877; Gagnep. in Fl. Gén. I.-C. 1: 502. 1911; Craib in Fl. Siam. En. 1: 177. 1925.

T h a i l a n d.— NORTHERN: Mae Hong Son, Chiang Mai, Lampang, Uttaradit; NORTH-EASTERN: Loei, Sakon Nakhon; CENTRAL: Saraburi; SOUTH-EASTERN: Chanthaburi; SOUTH-WESTERN: Kanchanaburi.

D i s t r i b u t i o n.— India, Ceylon, Burma (Chittagong, type), Cambodia, Laos.

E c o l o g y.— In secondary and evergreen forest, altitude 100–300 m. Flowering between April–June, fruiting between May–September.

V e r n a c u l a r.— Khaam khua (ขามค้วะ), ham khua (ห้ำค้วะ), ham faan (ห้ำฟาน), ham maa (ห้ำม้า), ham hok (ห้ำฮอก), khanaan (ขนาน) (Northern); kranuan (กระนวล), kanaan (กะนาน) (North-eastern); ham rok (ห้ำรอก) (Eastern); kanaan (กะหนาน) (Pninsular).

U s e s.— Wood for fuelwood.

2. Pterospermum lanceaefolium Roxb., [Hort. Bengal.: 50. 1814 (nom. nud.)] Fl. Ind. ed. 2.3: 163. 1832; Mast. in Fl. Br. Ind. 1: 368. 1874; Gagnep. in Fl. Gén. I.-C. 1: 504. 1911; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 179. Fig. 49. 1984.— *P. jackianum* Wall. ex Mast., l.c.: 367. 1874; Gagnep., l.c.: 501. 1911; Ridl., Fl. Mal. Pen. 1: 283. 1922; Craib in Fl. Siam. En. 1: 176. 1925.— *P. pierrei* Hance J. Bot. 15: 329. 1877; Gagnep., l.c.: 499. 1911; Craib l.c.: 177. 1925.— *P. insulare* Pierre, Fl. For. Cochinch.: t. 180. Fig. B. 1888.

T h a i l a n d.— NORTHERN: Tak, Phitsanulok; SOUTH-EASTERN: Chanthaburi, Trat; PENINSULAR: Ranong, Phangnga, Krabi, Nakhon Si Thammarat, Trang, Songkhla, Yala.

D i s t r i b u t i o n.— India (type), Burma, South China, Malay Peninsula.

E c o l o g y.— In evergreen forest, altitude 30–100 m. Flowering October–December, fruiting January–April.

V e r n a c u l a r.— Phlaa kwaang (พลากวาง), taa kwaang (ตากวาง), phlaa yuan (พลายวน), phlong taa pet (พลองตาเป็ด), khanaan (ขนาน) (Peninsular).

U s e s.— Wood for fuelwood.

3. Pterospermum cinnamomeum Kurz, J. As. Soc. Bengal. 43.2: 120. 1874 (nomen) et Fl. Burma 1: 147. 1877; Craib in Fl. Siam. En. 1: 175. 1925.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang; EASTERN: Chaiyaphum, Nakhon Ratchasima.

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

E c o l o g y.— In dry evergreen to moist upper mixed deciduous forest, usually on limestone, altitude 100–300 m. Flowering between January–March, fruiting February–May.

V e r n a c u l a r.— Tong tao (ตองเต่า) (Peninsular); chaa lot (จ้าหลอด), tong tao khon (ตองเต่าขน), soi phaao (สร้อยพ้าว), nang kua dong (หนังก้วะดง) (Northern).

U s e s.— Wood for fuelwood.

4. Pterospermum grande Craib, Kew Bull. 1924: 88; et in Fl. Siam. En. 1: 176. 1925.

T h a i l a n d.— Mae Hong Son (Muang Pai, Doi Kiu Lom, type: Kerr 5497).

D i s t r i b u t i o n.— Laos.

E c o l o g y.— In old clearing and mixed deciduous forest. Flowering between January–March, fruiting February–May.

V e r n a c u l a r.— Saam tao (สามเต้า), tong mom (ตองม่อม) (Northern).

U s e s.— Wood for fuelwood.

5. Pterospermum littorale Craib, Kew Bull. 1912: 147, et in Fl. Siam. En. 1: 176. 1925.

5.1 var. *littorale*

T h a i l a n d.— NORTHERN: Chiang Mai, Phitsanulok; NORTH-EASTERN: Loei; CENTRAL: Bangkok, Nonthaburi; SOUTH-EASTERN: Chon Buri, Rayong, Chon Buri, Sriracha, type: (Kerr 2097), Trat; SOUTH-WESTERN: Kanchanaburi, Prachuap Khiri Khan; PENINSULAR: Ranong, Surat Thani, Krabi, Nakhon Si Thammarat, Phatthalung, Yala.

D i s t r i b u t i o n.— Endemic to Thailand.

E c o l o g y.— In old clearing and mixed deciduous forest, altitude 100–1000 m. Flowering between September–December, fruiting November–March.

V e r n a c u l a r.— Ka naai (กะหนาย), yuan plaa (ขวนปลา) (Peninsular); khanaan (ขนาน) (South-eastern); champaa thet (จำปาเทศ), champee khaek (จำปีแขก) (Central).

5.2 var. *venustrum* (Craib) Phengklai, *comb. nov.*— *P. venustrum* Craib, Kew Bull. 1924. 89, et in Fl. Siam. En. 1: 177. 1925.

T h a i l a n d.— NORTHERN: Phitsanulok, Nakhon Thai (Kerr 5873: type).

D i s t r i b u t i o n.— Endemic to Thailand.

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

V e r n a c u l a r.— Sanan (สนั่น) (South-western); hamyaao (ห่ายาว) (North-eastern).

U s e s.— Wood for fuelwood.

6. Pterospermum pecteniforme Kosterm., Reinwardtia 6: 296. f. 14. 1962.

T h a i l a n d.— PENINSULAR: Ranong, Surat Thani, Ko Samui, (Put 674: type), Phangnga, Yala.

D i s t r i b u t i o n.— Ceylon, Malay Peninsula.

E c o l o g y.— Near by sea in beach or scrub forest, altitude 5–30 m. Flowering between June–August, fruiting July–October. The fruits still remained over the year.

V e r n a c u l a r.— Yu (ยู) (Peninsular).

U s e s.— Wood for fuelwood.

7. Pterospermum diversifolium Bl., Bijdr.: 88. 1825; Mast. in Fl. Br. Ind. 1: 367. 1874; Gagnep. in Fl. Gén. I.-C. 1: 500. 1911; Ridl., Fl. Mal. Pen. 1: 282. 1922; Craib in Fl. Siam. En. 1: 176. 1925.

T h a i l a n d.— CENTRAL: Saraburi, Nakhon Nayok; SOUTH-EASTERN: Chon Buri, Chanthaburi; PENINSULAR: Surat Thani, Trang, Narathiwat.

D i s t r i b u t i o n.— India, Malay Peninsular, Indonesia (type), Vietnam.

E c o l o g y.— In evergreen and old clearing forest, altitude 50–800 m. Flowering between February–April, fruiting March–May. Fruits still remained over the year.

V e r n a c u l a r.— Lam paang (ลำป้าง), khanaan (ขนาน), lok paang (ลกป้าง), lueang naa (เหลืองนา) (South-eastern); saa la paang (สาละป้าง), salak kaphaat (สลักกะพาด), champaa thet (จำปาเทศ) (Central); champee khaek (จำปีแขก), baa yo (บาโย), paa yu (ปายู), ma yo (มะโย), yu (ยู), lo (ล่อ) (Peninsular).

U s e s.— Timber for interior construction and fuelwood.

8. Pterospermum grandiflorum Craib, Kew Bull. 1913: 67; et in Fl. Siam. En. 1: 176. 1925.

T h a i l a n d.— NORTHERN: Chiang Mai (Doi Suthep, type: Kerr 5895); NORTH-EASTERN: Loei; SOUTH-WESTERN: Uthai Thani.

D i s t r i b u t i o n.— Endemic to Thailand.

E c o l o g y.— In dry evergreen and moist upper mixed deciduous forest, altitude 500–1000 m. Flowering between October–December, fruiting November–

February. Fruits still remained over the year.

V e r n a c u l a r.— Sa tao (สะเต้า) (Northern).

U s e s.— Timber for interior construction and fuelwood.

9. Pterospermum acerifolium Willd., Sp. Pl. 3: 729. 1880; Mast. in Fl. Br. Ind. 1: 368. 1874; Kurz, Fl. Burma 1: 145. 1877; Craib in Fl. Siam. En. 1: 175. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 173. 1984.

T h a i l a n d.— NORTHERN: Chiang Mai, Phrae; NORTH-EASTERN: Phetchabun, Khon Kaen; PENINSULAR: Krabi, Narathiwat.

D i s t r i b u t i o n.— India (type), Burma, South China.

E c o l o g y.— In evergreen forest, altitude 50–400 m. Flowering February–April; fruiting March–June.

V e r n a c u l a r.— Champaa khaek (จำปาแขก), tongtao (ตองเต้า), potao (ปอเต้า), potup huchaang (ปอตูบหูช้าง), sanaan dong (สนานดง), saak kathao (สากกะเท้า) (Northern); salak kaphaat (สลักกะพาด) (Central); kanaan pling (กะหนานปลิง), hukhwaai (หูควาย) (South-western).

U s e s.— Timber for interior construction and fuelwood.

12. ABROMA

Jacq., Hort. Vind. 3: t.1. 1776; Benth. & Hook. f., Gen. Pl. 1: 224. 1867.— *Ambroma* Linn. f., Suppl.: 341. 1781.

Shrub. *Leaves* simple, cordate, sometimes lobed, slightly serrate to entire. *Flowers* bisexual, in few-flowered cymes, opposite the leaves. *Sepals* 5, free or connate near the base. *Petals* 5, with a concave claw; limbs spoon-shaped, clefted. *Stamens* 10, forming a corona with 5 recurve lobes; a pair of stamens, one fertile and one sterile in each sinus of the lobes, opposite to the petals; *anthers* 2-lobes, extrorse. *Ovary* sessile, 5-locular; each locule with many ovules; style simple with 5-lobed stigma. *Capsule* conical with 5 longitudinal wings, dehiscing septicidally into 5 valves; seeds many, wingless.

A genus of about 2 species in the tropics, one species has been recorded from Thailand.

Abroma angusta Linn. f., Suppl.: 341. 1781 (Ambroma); Mast. in Fl. Br. Ind. 1: 375. 1874; Gagnep. in Fl. Gén. I.-C. 1(5): 513. Fig. 50. 1910; Ridl., Fl. Mal. Pen. 1: 286. 1922; Craib in Fl. Siam. En. 1: 179. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 181. Fig. 52. 1984.

T h a i l a n d.— NORTHERN: Chiang Rai, Lampang, Lamphun, Phrae; CENTRAL: Krung Thep (Bangkok); SOUTH-EASTERN: Chanthaburi; SOUTH-WESTERN: Kanchanaburi; PENINSULAR: Narathiwat.

D i s t r i b u t i o n.— India (type), China, Malay Peninsula, Indonesia, Philippines, Australia.

E c o l o g y.— Common by stream in evergreen forest; altitude 50–500 m. Flowering and fruiting during June–September.

V e r n a c u l a r.— Thian dam luang (เทียนดำหลวง), laai thong (ล่ายทง), mon hok (หมอนฮอก) (Northern); thian dam (เทียนดำ) (Central); ta-poh a-su (ตาเปาะอาซู) (Peninsular).

U s e s.— The stems and seeds are used in the local medicine.

13. BYTTNERIA

Loefl., Iter. Hisp.: 313. 1758.— *Buettneria* Loefl., Iter. Hisp.: 313. 1758; Benth. & Hook. f. Gen. Pl. 1: 225. 1867.— *Chaetaea* Jacq., En. Pl. Carib. 2: 291. 1830.— *Pentaceros* G.F.W. Mey, Prim. Fl. Esseq.: 136. 1818.— *Telfairia* Newm. ex Hook., Bot. Misc. 1: 291. 1830.

Climbers or scandent shrubs. *Leaves* simple, alternate; usually lobed at apex; margin dentate, serrate or entire. *Flowers* bisexual, small, in axillary or terminal umbel-like cymes. *Sepals* 5, free or nearly so. *Petals* 5, with a concave claw, the limb produced into a long strap-shaped, 2-cleft appendage. *Stamens* 5, connate below into a membranous tube, free above, opposite the petals, and staminode 5, opposite the sepals; anthers 2-lobed, extrose. *Ovary* sessile, 5-locular, each locule with 2 ovules; style simple or 5-cleft. *Fruit* a globose capsule with spiny tubercles, septicidaly 5-values breaking away from a central column; seed one, wingless.

A genus of about 70 species mainly in the tropics; four species are represented in Thailand.

KEY TO THE SPECIES

1. Leaves tri-lobed, margin dentate, double serrate or serrulate
   2. Margin dentate or double serrate. Fruits totally glabrous — **1. B. andamanensis**
   2. Margin serrulate. Fruits with spiny tubercles hairy — **2. B. pilosa**
1. Leaves ovate-oblong or hart-shaped, margin entire
   4. Leaves ovate-oblong, base truncate or obtuse. Fruits with spiny tubercles sparsely hairy — **3. B. echinata**
   4. Leaves hart-shaped, base cordate. Fruits with spiny tubercle glabrous — **4. B. aspera**

1. Byttneria andamanensis Kurz, J. As. Soc. Bengal. 40.2: 47. 1871 et Flora 54: 277. 1871; Mast. in Fl. Br. Ind. 1: 377. 1874; Kurz, Fl. Burma 1: 152. 1877; Craib in Fl. Siam. En. 1: 180. 1920.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— Burma (type), India.

E c o l o g y.— Common on rocky ground or in old clearings, by streams; altitude 50–700 m. Flowering and fruiting during July to September.

V e r n a c u l a r.— Rahung khruea (ระหุ่งเครือ) (Eastern); kai ploi (ไก่ปล่อย) (Central); yaan man daeng (ย่านมันแดง) (Peninsular).

2. Byttneria pilosa Roxb., Hort. Bengal. 1814 et Fl. Ind. ed. 2: 381. 1824; Mast. in Fl. Br. Ind. 1: 337. 1874; Kurz, Fl. Burma 1: 151. 1877; Gagnep. in Fl. Gén. I.-C. 1: 516. 1911; Craib in Fl. Siam. En. 1: 181. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 185, Fig. 54. 1984.— *Byttneria elegans* Ridl., J. Str. Br. Roy. As. Soc. 57: 25. 1911; Craib in Fl. Siam. En. 1: 181. 1925.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— Burma (type), China, India, Laos, Malay Peninsula.

E c o l o g y.— Common in old clearing or scrub forest; altitude 50–500 m. Flowering and fruiting during September–February.

V e r n a c u l a r.— Paan khao kwaang (ป่านเขากวาง) (Northern); cho-tui (ช่อตุ่ย) (Karen/South-western).

3. Byttneria echinata Wall. ex Kurz, Fl. Burma 1: 151. 1877; Gagnep. in Fl. Gén. I.-C. 1: 520. 1911; Craib in Fl. Siam. En. 1: 181. 1920.

T h a i l a n d.— NORTH-EASTERN: Nakhon Phanom; EASTERN: Mukdahan; CENTRAL: Saraburi.

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

E c o l o g y.— Scattered in mixed deciduous and scrub forest; altitude 30–200 m. Flowering and fruiting during April–June.

V e r n a c u l a r.— Maak-khee-on (หมากขี้อ้น) (Eastern).

4. Byttneria aspera Colebr. in Roxb., Fl. Ind. ed. Carey 2: 383. 1824; Gagnep. in Fl. Gén. I.-C. 1: 519. 1911; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 186, Fig. 54. 1984.— *Byttneria grandifolia* A. DC., Prodr. 1: 486. 1824.— *Byttneria integrifolia* Lace, Kew Bull. 1915: 396; Craib in Fl. Siam. En. 1: 181. 1925.— *Byttneria siamensis* Craib, Kew Bull. 1920: 300.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang, Mae Hong Son, Phrae; EASTERN: Chaiyaphum; SOUTH-EASTERN: Chanthaburi, Trat.

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

E c o l o g y.— Common in old clearing or opened space; altitude 100–700 m. Flowering and fruiting during June–December.

V e r n a c u l a r.— Saa duea (สาเดื่อ) (Northern); thurian thao (ทุเรียนเถา), thurian chup (ทุเรียนจุ๊บ) (South-eastern).

14. COMMERSONIA

Forst., Char. Gen. Pl.: 43. t. 22. 1776; Benth. & Hook. f., Gen. Pl. 1: 226. 1867.

Small tree. *Leaves* simple, ovate; margin double serrate or serrate. *Flowers* bisexual, in bi-furcate cymes, axillary and terminal. *Sepals* 5, free. *Petals* 5, linear,

with broad base. *Stamens* free; 5 fertile opposite to petals, and 5 sterile opposite to sepals; anther 2-lobed, extrose. *Ovary* sessile, 5-locular, each locule with many ovules; style 5, swollen and united at base; stigmata 5, rounded. *Capsule* globose, covered with stiff hairs, dehiscent. *Seeds* many, wingless.

A genus of about 8 species mainly; in South-East Asia, Australia, only one species in Thailand.

Commersonia bartramia (Linn.) Merr., Int. Rumph.: 362. 1917; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 188. Fig. 55. 1984.— *Muntingia bartramia* Linn., Amoen. Acad. 4: 124. 1759.— *Commersonia echinata* Forst., Char. Gen. Pl.: 44. t. 22. 1776.— *Commersonia platyphylla* Andr., Bot. Rep.: t. 603. 1797; Mast., Fl. Br. Ind. 1: 378. 1874; Ridl., Fl. Mal. Pen. 1: 288. 1922; Craib in Fl. Siam. En. 1: 182. 1925.— *Commersonia echinata* Forst. var. *platyphylla* (Andr.) Gagnep. in Fl. Gén. I.-C. 1: 521. 1911.

T h a i l a n d.— PENINSULAR: Nakhon Si Thammarat, Narathiwat, Pattani, Phatthalung, Songkhla, Surat Thani, Trang and Yala.

D i s t r i b u t i o n.— Malay Peninsula (type), Singapore, Indonesia, Burma, China, Vietnam, Philippines, Australia.

E c o l o g y.— Scattered along edges of evergreen forest; altitude 10–100 m. Flowering and fruiting during January–June.

V e r n a c u l a r.— Langkhao (ลังเค้า), chong loet (จงเลิด) (Peninsular).

15. HELICTERES

Pluk. ex Linn., Syst. Nat. ed. 1:.....1735; Linn., Sp. Pl.: 963. 1753; Benth. & Hook. f., Gen. Pl. 1: 220. 1867.— *Alicteres* Neck., Elem. 2: 304. 1790.— *Opsopaea* Neck., Elem. 2: 305. 1790.— *Methorium* Schott & Endl., Melet. Bot.: 29. t. 5. 1832.— *Orthothecium* Schott & Endl., Melet. Bot.: 31. 1832.— *Anisora* Rafin., Sylva Tellur.: 74. 1838.— *Camaion* Rafin., l.c.: 75. 1838.— *Nisoralis* Rafin., l.c.: 74. 1838.— *Ozoxeta* Rafin., l.c.: 75. 1838.— *Oudemansia* Miq., Pl. Jungh. 1: 295. 1854.

Shrub. *Leaves* simple, alternate. *Flower* bisexual, small, axillary solitary or shortly helicoid cyme, rarely terminal. *Sepals* 5, united at the base, often irregular. *Petals* 5, free, clawed, equal or unequal; claws with a pair of ear-shaped appendages. *Stamens* adnate to the gynandrophore, 5-toothed or 5-lobed apically; anthers 2-celled, in groups at the top of the column between its teeth, cells divergent. *Ovary* at the top of the column, 5-lobed; 5-locular, each locule with many ovules; styles slender; stigma with 5 teethes, or fat lobes or simple, with a narrow pointed. *Capsule* spirally twisted or straight, dehiscent. *Seeds* globose, many.

A genus of about 60 species in the tropics of Asia and America; seven species are represented in Thailand.

KEY TO THE SPECIES

1. Stigma flattened, slightly 5-lobed
 2. Leaves with serrate or double serrate margin
  3. Petals up to 1 cm long, truncate. Capsule up to 3 cm long **1. H. elongata**
  3. Petals 2–2.5 cm long, acute. Capsule more than 3 cm long **2. H. hirsuta**
 2. Leaves with entire margin. Petals up to 1 cm long, obtuse. Capsule 1–3 cm long **3. H. angustifolia**
1. Stigma simple, narrowed to a point or divided in to 5, teeth
 4. Leaves lobed toward apex, with 5(–7) basal nerves; double serrate margin. Petals more than 2 cm long
  5. Ovary glabrous; stigma divided into 5, slender pin-like teeth. Capsule woolly, not twisted after dehiscing. Leaves with auriculate base **4. H. viscida**
  5. Ovary hairy; stigma simple, narrowed to a point. Capsule glabrescent, twisted after dehiscing. Leaves with rounded or cordate base **5. H. isora**
 4. Leaves not lobed toward apex, with 3 basal nerves; entire or slightly serrate margin. Petals up to 1 cm long
  6. Leaves ovate, softly hairy on lower surface. Capsule up to 2 cm long, woolly **6. H. lanata**
  6. Leaves elliptic, oblong or lanceolate, glabrescent on lower surface. Capsule more than 2 cm long, not woolly **7. H. lanceolata**
   7. Capsule sparsely hairy then glabrescent **7.1** var. **lanceolata**
   7. Capsule velvety **7.2** var. **gagnepainiana**

1. Helicteres elongata Wall. ex Boj. in Hort. Maurit.: 35. 1837; Mast. in Fl. Br. Ind. 1: 365. 1874; Kurz, Fl. Burma 1: 144. 1877; Craib in Fl. Siam. En. 1: 171. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 158. Fig. 45. 1984.— *H. plebeja* Kurz, J. As. Soc. Bengal. 39.2: 67. 1870; Mast. in Fl. Br. Ind. 1: 366. 1874; Kurz, Fl. Burma 1: 144. 1877; Gagnep. in Fl. Gén. I.-C. 491. 1911; Craib in Fl. Siam. En. 1: 174. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 160. 1984.— *H. glabriuscula* Wall. ex Mast. in Fl. Br. Ind. 1: 366. 1874.

T h a i l a n d.— NORTH-EASTERN: Chiang Mai, Chiang Rai, Phrae, Sukhothai; NORTH-EASTERN: Phetchabun, Loei, Sakon Nakhon, Khon Kaen; CENTRAL: Saraburi; EASTERN: Chaiyaphum; SOUTH-EASTERN: Prachin Buri, Chon Buri; SOUTH-WESTERN: Uthai Thani, Kanchanaburi.

D i s t r i b u t i o n.— India, Burma, South China, Tonkin (type), Vietnam.

E c o l o g y.— Common in dry evergreen and moist upper mixed deciduous forest; altitudes 50–1300 m. Flowering and fruiting at the same time during June–December.

V e r n a c u l a r.— Khee on (ขี้อ้น) (Central); khaaochee lek (ข้าวจี้เล็ก) (North-eastern).

U s e s.— The bark yields fibres for binding material.

2. Helicteres hirsuta Lour., Fl. Cochinch. 2: 530. 1790; Kurz, Fl. Burma 1: 143. 1877; Gagnep. in Fl. Gén. I.-C. 1: 490. 1911; Ridl., Fl. Mal. Pen. 1: 281. 1922; Craib in Fl. Siam. En. 1: 171. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 161. Fig. 44. 1984.— *H. spicata* Colebr. ex Mast. in Fl. Br. Ind. 1: 366. 1874.— *H. hispida* F. Vill., Novis. App.: 28. 1880.— *H. hirsuta* Lour. var. *oblonga* King, J. As. Soc. Bengal. 60.2: 82. 1891; Craib in Fl. Siam. En. 1: 172. 1925.— *H. hirsuta* Lour. var. *vestita* King, l.c.: 82. 1891; Craib, l.c.: 172. 1925.— *H. vinosa* Craib, Kew Bull. 1924: 90; Fl.

Siam. En. 1: 175. 1925.

T h a i l a n d.— NORTHERN: Kamphaeng Phet; NORTH-EASTERN: Sakon Nakhon; EASTERN: Nakhon Ratchasima, Surin, Roi Et; CENTRAL: Lop Buri, Nakhon Nayok; SOUTH-EASTERN: Prachin Buri, Chon Buri, Chanthaburi, Trat; SOUTH-WESTERN: Kanchanaburi, Prachuap Khiri Khan; PENINSULAR: Chumphon, Ranong, Surat Thani, Phangnga, Krabi, Nakhon Si Thammarat, Trang, Songkhla.

D i s t r i b u t i o n.— India, South China, N. Vietnam (type), Malay Peninsula, Vietnam, Indonesia, Philippines.

E c o l o g y.— Common in deciduous and dry evergreen forest; altitudes 50–1000 m. Flowering and fruiting at the same time all year around.

V e r n a c u l a r.— Po tao hai (ปอเต่าไห้) (North-eastern); khee tun (ขี้ตุ่น), chaapaan (ช้าปาน) (South-eastern); khee on (ขี้อ้น), phumee (พูมี่), phangrae (พังแระ) (Peninsular).

U s e s.— The bark yields fibres for binding material.

3. Helicteres angustifolia Linn., Sp. Pl.: 963. 1753; Mast. in Fl. Br. Ind. 1: 365. 1874; Gagnep. in Fl. Gén. I.-C. 1: 495. 1911; Ridl., Fl. Mal. Pen. 1: 282. 1922; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 156. Fig. 45. 1984.— *H. obtusa* Wall. ex Kurz, J. As. Soc. Bengal. 42.2: 62. 1873; Mast. in Fl. Br. Ind. 1: 366. 1874; Kurz, Fl. Burma 1: 144. 1877; Craib in Fl. Siam. En. 1: 174. 1925.— *H. angustifolia* Linn. var. *obtusa* King, J. As. Soc. Bengal. 40.2: 83. 1891.— *H. parviflora* Ridl., J. Str. Br. Roy. As. Soc. 59: 77. 1911.

T h a i l a n d.— NORTHERN: Chiang Mai, Phrae, Sukhothai, Phitsanulok; NORTH-EASTERN: Phetchabun, Loei, Nong Khai, Sakon Nakhon; EASTERN: Chaiyaphum, Nakhon Ratchasima, Ubon Ratchathani; SOUTH-EASTERN: Prachin Buri, Chon Buri, Chanthaburi; SOUTH-WESTERN: Uthai Thani, Kanchanaburi, Ratchaburi; PENINSULAR: Chumphon, Surat Thani, Trang, Satun, Songkhla.

D i s t r i b u t i o n.— India, Burma, South China, Malay Peninsula (type), Singapore. Vietnam, Indonesia, Philippines, Australia.

E c o l o g y.— Common in deciduous and dry dipterocarp forest; altitudes 30–1000 m. Flowering and fruiting at the same time all year around.

V e r n a c u l a r.— Khee tun (ขี้ตุ่น), po khee kai (ปอขี้ไก่), mai mut (ไม้หมัด), po tao hai (ปอเต่าไห้) (North-eastern); paa hieo mong (ปาเหี้ยวหมอง), yaa haang on (หญ้าหางอ้น) (Northern); khao kee noi (เข้ากี่น้อย) (Eastern); po mat po (ปอมัดโป) (South-eastern); khee on (ขี้อ้น) (South-western); yam yae (ยำแย่) (Peninsular).

U s e s.— The bark yields fibres for binding material.

4. Helicteres viscida Bl., Bijdr. 1: 79. 1825; Kurz, Fl. Burma 1: 143. 1877; Gagnep. in Fl. Gén. I.-C. 1: 489. 1911; Ridl., Fl. Mal. Pen. 1: 281. 1922; Craib in Fl. Siam. En. 1: 175. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 161. 1984.— *H. pulchella* Wall. ex Boj. in Hort. Maurit: 35. 1837.

T h a i l a n d.— NORTHERN: Chiang Rai, Lampang; NORTH-EASTERN: Loei; SOUTH-WESTERN: Kanchanaburi; PENINSULAR: Chumphon, Trang, Songkhla, Pattani, Yala, Narathiwat.

D i s t r i b u t i o n.— South China, Vietnam (type), Malay Peninsula, Indonesia.

E c o l o g y.— Scattered along the edge of dry evergreen forest; altitudes 30–350 m. Flowering and fruiting at the same time from July to March next year.

V e r n a c u l a r.— Po khee on (ปอขี้อ้น), khee on (ขี้อ้น) (Northern); mu reh taa reh (มูเระตาเระ) (Peninsular).

U s e s.— The bark yields the fibres for binding material.

5. Helicteres isora Linn., Sp. Pl.: 963. 1753; Mast. in Fl. Br. Ind. 1: 365. 1874; Kurz, Fl. Burma 1: 142. 1877; Gagnep. in Fl. Gén. I.-C. 1: 488. 1911; Ridl., Fl. Mal. Pen. 1: 281. 1922; Craib in Fl. Siam. En. 1: 172. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 156. 1984.

T h a i l a n d.— NORTHERN: Chiang Mai, Chiang Rai, Tak, Sukhothai; NORTH-EASTERN: Loei, Sakon Nakhon; EASTERN: Nakhon Ratchasima; SOUTH-EASTERN: Chon Buri; SOUTH-WESTERN: Uthai Thani, Kanchanaburi, Ratchaburi, Phetchaburi.

D i s t r i b u t i o n.— India (type), Ceylon, South China, Vietnam, Cambodia, Malay Peninsula, Indonesia.

E c o l o g y.— Scattered in mixed deciduous forest; altitudes 100–400 m. Flowering and fruiting at the same time all year around.

V e r n a c u l a r.— Po pit (ปอปิด), so (ซ้อ), po thap (ปอทับ), ma pit (มะปิด) (Northern & Central); khee on yai (ขี้อ้นใหญ่) (North-eastern).

U s e s.— The bark yields fibres for binding material.

6. Helicteres lanata (Teijsm. et Binn.) Kurz, Fl. Burma 1: 143. 1877; Gagnep. in Fl. Gén. I.-C. 1: 492. 1911; Craib in Fl. Siam. En. 1: 173. 1925.— *Oudemansia lanata* Teijsm. et Binn. in Tijdschr. Ned. Ind. 29: 252. 1867.

T h a i l a n d.— NORTHERN: Lampang, Nakhon Sawan; NORTH-EASTERN: Kalasin; EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Kanchanaburi (type–Binnedyck s.n., K), Phetchaburi, Prachup Khiri Khan.

D i s t r i b u t i o n.— Burma, South China, Cambodia, Laos, Indonesia.

E c o l o g y.— Scattered in mixed deciduous forest; altitudes 30–200 m. Flowering and fruiting at the same time during July–December.

V e r n a c u l a r.— Po khiang (ปอเขียง), khee on (ขี้อ้น) (South-western); khee tun (ขี้ตุ่น) (Eastern); khee maeo (ขี้แมว) (North-eastern); po kra chao khaao (ปอกระเจาขาว) (Northern, North-eastern).

U s e s.— The bark yields the fibres for binding material.

7. Helicteres lanceolata A. DC., Prodr. 1: 476. 1824; Kurz, Fl. Burma 1: 142. 1877; Pierre, Fl. For. Cochinch. t. 210. Fig. B. 1889; Gagnep. in Fl. Gén. I.-C. 1: 493. 1911; Craib in Fl. Siam. En. 1: 173. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 158. Fig. 45. 1984.

7.1 var. *lanceolata*

T h a i l a n d.— NORTHERN: Lamphun, Nakhon Sawan; NORTH-EASTERN: Loei, Nakhon Phanom, Khon Kaen; EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi; SOUTH-EASTERN: Prachin Buri.

D i s t r i b u t i o n.— India, Burma, South-China, Laos, Cambodia, Malay Peninsula, Philippines.

E c o l o g y.— Scattered in mixed deciduous and dry evergreen forests; altitudes 40–400 m. Flowering and fruiting at the same time during February–December.

V e r n a c u l a r.— Dee nguu (ดีงู) (Central); peek kai dam (ปีกไก่ดำ) (North-eastern).

U s e s.— The barks produce the fibres for binding material.

7.2 var. *gagnepainiana* (Craib) Phengklai. *comb. nov.*— *H. gagnepainina* Craib, Kew Bull. 1912: 146; in Fl. Siam. En. 1: 171. 1925.

T h a i l a n d.— SOUTH-EASTERN: Chon Buri (type, Kerr 2046, K), Rayong.

D i s t r i b u t i o n.— Endemic to Thailand.

E c o l o g y.— Rather common in the savanna and opened forest, altitude under 50 m. Flowering and fruiting at the same time during February–November.

V e r n a c u l a r.— Khaao chee lek (ข้าวจี่เล็ก), dee nguu (ดีงู), dee nguu ton (ดีงูต้น) (South-eastern).

U s e s.— The barks produce the fibres for binding material.

16. PENTAPETES

Linn., Diss. Dass.: 23. 1747; Amoen., Acad. 1: 407. 1749; Benth. & Hook. f., Gen. Pl. 1: 222. 1867.— *Moranda* Scop., Introd.: 289. 1777 — *Eriorhaphe* Miq., Pl. Jungh. 1: 289. 1854.

Herb or under shrub. *Leaves* simple, alternate to spirally arrangement. *Flowers* 5-merous, bisexual, solitary, axillary and terminal sepals and petals present, free. *Stamens* 15, connate at base, arranged in 5 groups each group alternate with a staminode. *Ovary* sessile, 5-locular; each locule with 2 to many ovules; style simple entire, twisted and thickened upwards; stigma 5 lobes. *Fruit* ovoid, with 5 longitudinal lobes, dehiscing along ridges. *Seed* triangular, stony, wingless.

A monotypic genus in tropical and sub-tropical Asia.

Pentapetes phoenicea Linn., Sp. Pl. 2: 698. 1753; Mast. in Fl. Br. Ind. 1: 371. 1874; Gagnep. in Fl. Gén. I.-C. 1: 511. 1911; Ridl., Fl. Mal. Pen. 1: 284. 1922; Craib in Fl. Siam. En. 1: 178. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 171. Fig. 48. 1984.— *P. angustifolia* Bl., Bijdr.: 87. 1825.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— India (type), China, Malay Peninsula.

E c o l o g y.— In wet area or rice-field. Altitudes 10–50 m. Flowering and fruiting at same time during October–December.

V e r n a c u l a r.— Po seng (ปอเส้ง), seng (เส้ง) (Central).

U s e s.— Barks produce fibre for making ropes.

17. MELOCHIA

Dill. ex Linn., Syst. Nat. ed. 1: 674. 1753; Benth. & Hook. f., Gen. Pl. 1: 223. 1867.

Undershrub to small tree. *Leaves* simple, alternate. *Flowers* 5-merous, bisexual, in clusters or loose panicle, axillary or end of twigs. *Sepals* and *petals* present, petals free. *Stamens* 5, opposite to the petals, united towards the base. *Ovary* 5-locular; each locule with 2 ovules; style subulate, free; stigma simple, narrow. *Fruit* globose or ellipsoid, with 5 longitudinal lobes, dehiscing along ridges. *Seed* triangular, stony.

A genus of about 54 species mainly in the tropic of America, 2 species have been recorded from Thailand.

KEY TO THE SPECIES

1. Leaves a cordate, dentate margin; petiole not less than 5 cm long. Flowers in an erect panicle. Sepals with acuminate apex. Small tree **1. M. umbellata**
1. Leaves ovate, triangular or linear-oblong, serrate or serrulate margin; petiole up to 2 cm long. Flowers in a dense cluster. Sepals with caudate apex. Undershrub **2. M. corchorifolia**

1. Melochia umbellata (Houtt.) Stapf., Kew Bull. 1913: 317; Craib in Fl. Siam. En. 1: 179. 1925.— *Visenia umbellata* Houtt., Handl. 8: 309. 1777.— *Melochia arborea* Blanco, Fl. Filip.: 524. 1837; Gagnep. in Fl. Gén. I.-C. 1: 508. 1911.— *M. velutina* Wall. ex Bedd., For. Man. Bot.: 35. Fig. 3. 1871; Mast. in Fl. Br. Ind. 1: 374. 1874; Kurz, Fl. Burma 1: 148. 1877; Ridl., Fl. Mal. Pen. 1: 285. 1922.

T h a i l a n d.— NORTHERN: Phrae, Tak; EASTERN: Nakhon Ratchasima; SOUTH-EASTERN: Chanthaburi, Trat; PENINSULAR: throughout the peninsular.

D i s t r i b u t i o n.— India (type), Ceylon, Burma, Malay Peninsula, Vietnam, Philippines, Australia, and Polynesia.

E c o l o g y.— Scattered along edges of evergreen forest; altitudes 10–100 m. Flowering and fruiting from November–January, and always at the same time.

V e r n a c u l a r.— Thao yaaimom luang (เท้ายายม่อมหลวง), saa dam (สาดำ) (Northern); po dam (ปอดำ), poe (เปอ) (Peninsular); faai phee yai (ฝ้ายผีใหญ่) (South-eastern).

U s e s.— Wood used for handicrafts and toys.

2. Melochia corchorifolia Linn., Sp. Pl.: 675. 1753; Mast. in Fl. Br. Ind. 1: 374. 1874; Gagnep. in Fl. Gén. I.-C. 1: 509. 1911; Ridl., Fl. Mal. Pen. 1: 284. 1922; Craib in Fl. Siam. En. 1: 178. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 167. Fig. 47. 1984.— *M. concatenata* Linn., l.c.: 675. 1753.

T h a i l a n d.— NORTHERN: Chiang Mai, Uttaradit; CENTRAL: Chainat, Ang Thong, Phra Nakhon Si Ayutthaya, Krung Thep; SOUTH-EASTERN: Chachoengsao; SOUTH-WESTERN: Kanchanaburi; PENINSULAR: Surat Thani, Satun.

D i s t r i b u t i o n.— India (type), Burma, South China, Taiwan, Japan, Malay Peninsula, Vietnam, Indonesia, Philippines, Australia, Polynesia.

E c o l o g y.— In old clearing or dry deciduous forest; altitudes 10–300 m. Flowering and fruiting during September–December, alway at the same time.

V e r n a c u l a r.— Seng lek (เส้งเล็ก), sa aeng bai mon (สะแองใบมน) (Central); khaang paak put (ขางปากปุด) (Northern).

U s e s.— Bark for making strings.

18. WALTHERIA

Linn., Gen. ed. 1: 203. 1737; et Sp. Pl.: 673. 1753; Benth. & Hook. f., Gen. Pl. 1: 224. 1867.— *Astropus* Spreng., Neue Entdeck. 3: 64. 1822.— *Lophanthus* Forst., Char. Gen. Pl.: 27. t. 14. 1776.

Herbs or undershrubs. *Leaves* simple, ovate; margin serrate to double serrate. *Flowers* bisexual, small, in dense axillary or terminal clusters. *Sepals* 5, united at the lower half into a bell-shaped tube. *Petal* 5, linear-spathulate. *Stamens* 5, connate below into a membranous tube, free above; each opposite the petals; anthers 2-lobed, extrorse. *Staminodes* none. *Ovary* sessile, 1 locular, with 2 ovules; style simple. *Capsule* dehiscent 2-valved; seed one, wingless.

Waltheria indica Linn., Sp. Pl. 2: 673. 1753; Mast. in Fl. Br. Ind. 1: 374. 1874; Gagnep. in Fl. Gén. I.-C. 1: 510. 1911; Ridl., Fl. Mal. Pen. 1: 285. 1922; Craib in Fl. Siam. En. 1: 179. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 169. Fig. 47. 1984.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— Common in the tropics, India (type).

E c o l o g y.— In the dry dipterocarp forest and savanna; altitude 40–400 m. Flowering & fruiting from September–December.

V e r n a c u l a r.— Taansaai (ตานทราย) (Northern).

19. KLEINHOVIA

Linn., Sp. Pl.: 1365. 1763; Benth. & Hook. f., Gen. Pl. 1: 219. 1867.

Small tree. *Leaves* simple, alternate, entire. *Flowers* bisexual, in a panicle at the end of twigs, 5 merous. *Sepals* and *petals* present, free. *Stamens* 10 on a slender gynandrophore, devided into 5 group, staminodes 5 adnate below; all united at base to a cup-like around the ovary. *Ovary* in serted in the staminal cup, 5 locular, locule with 1–2 ovules; style and stigma simple. *Fruit* a pyriform, membranous, inflated pyriformed dehiscent. *Seed* 1–2 each locule.

A monotypic genus occurring in tropical Asia.

Kleinhovia hospita Linn., Sp. Pl.: 1365. 1763; Mast. in Fl. Br. Ind. 1: 364. 1874; Gagnep. in Fl. Gén. I.-C. 1: 497. 1911; Ridl., Fl. Mal. Pen. 1: 280. 1922; Craib in Fl. Siam. En. 1: 171. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 144. Fig. 40. 1984.

T h a i l a n d.— CENTRAL: Saraburi, Bangkok; PENINSULAR: Nakhon Si Thammarat.

D i s t r i b u t i o n.— India (type), Ceylon, South China, Taiwan, Malay Peninsula, Indonesia, Philippines, Australia, Polynesia, West Africa.

E c o l o g y.— Cultivated as an ornamental and often spontaneous in open spaces near streams. Flowering and fruiting at the same time during February–April.

V e r n a c u l a r.— Chomphuu phuang (ชมพูพวง), chamchaa (ฉำฉา), po farang (ปอฝรั่ง) (Central).

U s e s.— For ornamental.

20. LEPTONYCHIA

Trucz., Bull. Soc. Nat. Mosc. 31.1: 222. 1858; Benth. & Hook. f., Gen. Pl. 1: 983. 1867; Veldk. & Flipp., Blumea 32.2: 447. 1987.

Shrub. *Leaves* simple, alternate, entire margin. *Flowers* bisexual, in small cymose, (1–)3(–5) flower, axillary, 5 merous. *Petals* and *sepals* present, free or nearly. *Stamens* 10, in 5 groups, united at base, surrounded the ovary. *Ovary* obovate 5(–4) locular, loculae with 2 ovules; style subulate with 2 lobes of stigma. *Fruit* globose or top-shaped, dehiscing from the top. *Seed* oblong, shining.

A genus of about 30 species mainly in tropical Asia and Africa, only one species has been recorded from Thailand.

Leptonychia caudata (Wall. ex G. Don) Burret., Notizbl. Bot. Gart. Berlin 9: 729. 1926; Valdk. & Flipp., Blumea 32.2: 451. 1987.— *Grewia caudata* Wall. ex G. Don, Gen. Pl. 1: 547. 1831.— *Leptonychia heteroclita* Kurz, J. As. Soc. Bengal. 39.2: 67. 1870; Fl. Burma 1: 150. 1877; Craib in Fl. Siam. En. 1: 180. 1925; Burret., Notizbl. Bot. Gart. Ber. 9: 729, 730, 732. 1926.— *Leptonychia glabra* Turcz., Bull.

Soc. Nat. Mosc. 31: 223. 1875; Mast. in Fl. Br. Ind. 1: 379. 1874; Kurz, Fl. Burma 1: 150. 1877.— *Grewia acuminata* Bedd., Madras J. 3.1: 38. 1864; Mast. in Fl. Br. Ind. 1: 393. 1874.— *Leptonychia acuminata* Mast. in Fl. Br. Ind. 1: 379. 1874.— *L. acuminata* Mast. var. *mastersiana* King, J. As. Soc. Bengal. 60.2: 95. 1891; Ridl., Fl. Mal. Pen. 1: 289. 1922.

T h a i l a n d.— PENINSULAR: Throughout.

D i s t r i b u t i o n.— India, Burma, Malay Peninsula (type), Vietnam, Indonesia, Brunei.

E c o l o g y.— Common in tropical rain forest; altitudes 100–1000 m. Flowering and fruiting all year around, and always at the same time.

V e r n a c u l a r.— Phak waan (ผักหวาน) (Peninsular).

21. STERCULIA

Linn., Diss. Dass.: 29. 1747; Sp. Pl.: 1007. 1753; Amoen., Acad. 1: 412. 1749; Benth. & Hook. f., Gen. Pl. 1: 217. 1867; Tantra. in Lemba. Penel. Hutan: 35. 1976.

Deciduous trees or shrubs. *Leaves* simple, digitate or palmate-like, spirally arranged, usually crowded at the end of twigs, entire margin. *Flowers* 5-merous, unisexual; axillary, upper leaf-scars and terminal. *Sepals* free or united at base. *Male flowers* with 10(–15) stamens, on a globose head at the end of a slender staminal column. *Female flowers* with 5 free ovaries, each with 2-many ovules; styles free or connate or coherent; stigmas free, mostly curved. *Follicles* with 3–5 fruits. *Fruits* coriaceous or woody, dehiscent. *Seeds* 1–20, ellipsoid or obovoid, wingless.

A genus of about 300 species mainly in tropical and peritropical parts of the world; 13 species and 3 varriety have been recorded from Thailand.

KEY TO THE SPECIES

1. Leaves digitately compound or palmately lobed
 2. Leaves digitately compound
  3. Mature leaves glabrous. Calyx, obconical; lobes spreading. Fruit thick and woody, glabrous **1. S. foetida**
  3. Mature leaves hairy, unless on lower surface. Calyx tubular; lobes cohering at apex. Fruit thick and leathery, hairy **2. S. pexa**
 2. Leaves palmatly lobed, upto 1/3 of the lamina
  4. Lamina and petiole hairy then glabrescent
   5. Inflorescences erect. Calyx-lobes as long as calyx-tube **3. S. urena**
   5. Inflorescences pendulous. Calyx-lobes devided to base **3.1 S. urena var. thorelii**
  4. Lamina scabrous on upper surface and densely long hairy on lower surface; petiole densely long hairy then glabrescent
   6. Calyx tubular or urceolate. Ripe fruits spreading horizontally, tomentose **4. S. hypochra**
   6. Calyx obconical or broadly campanulate. Ripe fruits pendulous, softly villous **5. S. villosa**
1. Leaves elliptic, ovate, oblong or lanceolate.
 7. Leaves hairy at least on lower surface. Tree
  8. Inflorescences erect

9. Inflorescences not less than 20 cm long. Calyx-tube hairy inside. Styles sparsely hairy. Fruit globose or ellipsoid, covered by short tomentose. Petiole not less than 10 cm long, straight **6. S. macrophylla**

9. Inflorescences up to 15 cm long. Calyx-tube glabrous inside. Style glabrous. Fruits ensiformed, densely soft hairy. Petiole up to 6 cm long, make an angle to midrib **7. S. guttata**

8. Inflorescences pendulous

10. Calyx-lobes erect, 1/3 of calyx-tube; tube hairy inside. Gynandrophore glabrous. Inflorescences not less than 10 cm long. Fruits densely tomentose. Petiole smooth and straight **8. S. cordata**

10. Calyx-lobes always cohering at apex, 1/1, 2/3 or to base of calyx-tube; tube glabrous inside. Petiole swollen at both ends and make an angle to midrib

11. Leaves glaucous on lower surface. Gynandrophore hairy. Inflorescences up to 10 cm long. Fruits densely red-tomentose **9. S. gilva**

11. Leaves densely hairy on lower surface. Gynandrophore glabrous. Inflorescences not less than 10 cm long. Fruit brown-tomentose **10. S. balanghas**

7. Leaves glabrous or glabrescent; petiole swollen at both ends. Inflorescences erect or pendulous. Fruits oblong narrowed at both ends, leathery, red or dark brown hairy. Shrub

12. Leaves palm-nerved, with 3 nerves at base

13. Inflorescences pendulous. Calyx campanulate to obconical; lobes 2/3 of calyx-tube. Styles sparsely hairy. Seeds 1(–4), not less than 3 cm long **11. S. monosperma**

13. Inflorescences erect. Calyx urceolate; lobes equal to calyx-tube. Styles glabrous. Seeds 3–4, up to 2 cm long **12. S. parviflora**

12. Leaves penni-nerved

14. Calyx-lobes free, glabrous or glabrescent, spreading. Leaves oblong or elliptic **13. S. lanceolata**

14. Calyx-lobes free or united near base, hairy

15. Calyx-lobes free, glabrous inside. Leaves oblanceolate **13.1 S. lanceolata** var. **principes**

15. Calyx-lobes united near base, hairy both sides, cochering or reflexed. Leaves oblong or elliptic **13.2 S. lanceolata** var. **coccinea**

1. Sterculia foetida Linn., Sp. Pl.: 1008. 1753; Mast. in Fl. Br. Ind. 1: 354. 1874; Kurz, Fl. Burma 1: 135. 1877; Gagnep. in Fl. Gén. I.-C. 1: 461. 1911; Ridl., Fl. Mal. Pen. 1: 268. 1922; Craib in Fl. Siam. En. 1: 166. 1925; Tantra in Lemb. Penel. Hutan: 44. 1976; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 120. Fig. 32. 1984.

T h a i l a n d.— NORTHERN: Chiang Mai; EASTERN: Surin; CENTRAL: Suphan Buri, Krung Thep (cultivated); SOUTH-EASTERN: Chon Buri, Trat; PENINSULAR: Phangnga, Songkhla.

D i s t r i b u t i o n.— India (type), Ceylon, Burma, Vietnam, Cambodia, Malay Peninsula, Indonesia, Philippines, East Africa, North Australia.

E c o l o g y.— In evergreen forest, opened area, and rocky seacoast; altitudes 0–300 m. Flowering and fruiting between December–April.

V e r n a c u l a r.— Samrong (สำโรง) (Central, Eastern), chammahong (จำมะโฮง) (Northern), marong (มะโรง), homrong (โหมโรง) (Peninsular).

U s e s.— Wood greyish-brown used for indoor construction, boxes, tooth pick. Oil from seed for food and illuminating.

2. Sterculia pexa Pierre, Fl. For. Cochinch. 12: t. 182. 1888; Gagnep. in Fl. Gén. I.-C. 1: 462. 1911; Craib in Fl. Siam. En. 1: 168. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2:

118. Fig. 32. 1984.

T h a i l a n d.— NORTHERN: Chiang Mai, Tak, Nakhon Sawan; NORTH-EASTERN: Khon Kaen; EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Kanchanaburi, Prachuap Khiri Khan.

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

E c o l o g y.— In dry evergreen forest; altitude 100–900 m. Flowering between September–December. Fruiting January–March.

V e r n a c u l a r.— Po khaao (ปอขาว) (Central); po taptaek (ปอตับแตก) (Eastern); po thong (ปอทง), po baan (ปอบ้าน), po phueak (ปอเผือก) (Northern).

U s e s.— Wood whitish for plywood and boxes.

3. Sterculia urena Roxb., Pl. Corom. 1: 25. t. 24. 1795; Fl. Ind. 3: 145. 1832; Mast. in Fl. Br. Ind. 1: 335. 1874.

T h a i l a n d.— SOUTH-EASTERN: Chachoengsao. This is a new record for Thailand, found in South-Eastern Botanic Garden by H. Koyama et al. for the first time.

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

E c o l o g y.— In mixed deciduous forest; altitude 300–500 m. Flowering and fruiting between October–February.

3.1 var. *thorelii* (Pierre) Phengklai, *comb. nov.*— *S. thorelii* Pierre, Fl. For. Cochinch. 12: t. 184. 1888; Gagnep. in Fl. Gén. I.-C. 1: 463. 1911; Craib in Fl. Siam. En. 1: 169. 1925.

T h a i l a n d.— NORTHERN: Mae Hong Son, Chiang Mai, Chiang Rai.

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

E c o l o g y.— In moist upper mixed deciduous forest; altitudes 600–1000 m. Flowering and fruiting between October–February.

V e r n a c u l a r.— Po taan (ปอตาน), po khaao (ปอคาว) (North-eastern), po tok (ปอต๊อก) (Northern).

U s e s.— The bark yields fibres for binding material.

4. Sterculia hypochra Pierre, Fl. For. Cochinch. 12: t. 185. 1888; Gagnep in Fl. Gén. I.-C. 1: 460. 1910; Tantra in Lemba. Penel. Hutan: 53. 1976.

T h a i l a n d.— NORTHERN: Mae Hong Son, Chiang Mai; SOUTH-WESTERN: Kanchanaburi.

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

E c o l o g y.— In dry upper mixed deciduous forest, on limestone; altitudes 300–2000 m. Flowering January–February. Fruiting March–June.

V e r n a c u l a r.— Po faai (ปอฝ้าย) (North-eastern); po daeng (ปอแดง) (South-western and South-eastern); po khaao (ปอขาว) (Northern).

U s e s.— Wood white, used for indoor construction. Bark yields fibres for binding material.

5. Sterculia villosa Roxb., Hort. Bengal. 50: 1814; Fl. Ind. 3: 153. 1832; Master in Fl. Br. Ind. 1: 355. 1874; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 120. 1984.— *S. ornata* Wall. ex Kurz in J. As. Soc. Bengal. 42.2: 228. 1873; et. Fl. Burma 1: 136. 1877; Gagnep. in Fl. Gén. I.-C. 1: 466. 1911; Brand., Ind. Trees: 81. 1921; Craib in Fl. Siam. En. 1: 168. 1925.— *S. armata* Mast. in Fl. Br. Ind. 1: 357. 1874.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang; NORTH-EASTERN: Loei, SOUTH-EASTERN: Prachin Buri; SOUTH-WESTERN: Uthai Thani, Kanchanaburi.

D i s t r i b u t i o n.— India (type), Nepal, Burma, South China, Cambodia.

E c o l o g y.— In mixed deciduous forest; altitudes 600–1100 m. Flowering and fruiting between January–March.

V e r n a c u l a r.— Po tuup huuchaang (ปอตูบหูช้าง), po tuup mai (ปอตูบไหม) (Northern); po faai (ปอฝ้าย) (North-eastern); po daeng (ปอแดง) (South-eastern); po khaao (ปอขาว); po tuup (ปอตูบ) (South-western).

U s e s.— Wood white, used for indoor construction.

6. Sterculia macrophylla Vent., Jard. Malm. 2: t. 91. 1804; Mast. in Fl. Br. Ind. 1: 356. 1874; Ridl., Fl. Mal. Pen. 1: 268. 1922; Tantra in Lemb. Penel. Hutan: 68. 1976; Phengklai in Fl. Peat Swamp Narathiwat: 240. 1991.

T h a i l a n d.— SOUTH-WESTERN: Kanchanaburi; PENINSULAR: Narathiwat.

D i s t r i b u t i o n.— Malay Peninsula, Indonesia (type), Philippines.

E c o l o g y.— In swamp forest, altitude 0–20 m. Flowering and fruiting July–March.

V e r n a c u l a r.— Klet raet (เกล็ดแรด) (South-western); po phat bok (ปอพัดโบก) (Peninsular).

7. Sterculia guttata Roxb., Hort. Bengal.: 50. 1814; Fl. Ind. 3: 148. 1832; Mast. in Fl. Br. Ind. 1: 355. 1874; Brand., Ind. Trees: 82. Fig. 38. 1921; Craib in Fl. Siam. En. 1: 166. 1925.

T h a i l a n d.— NORTHERN: Chiang Mai, Lampang; SOUTH-WESTERN: Uthai Thani; PENINSULAR: Nakhon Si Thammarat.

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

E c o l o g y.— In mixded deciduous and evergreen forests; altitudes 350–1800 m. Flowering February–April. Fruiting January–May.

V e r n a c u l a r.— Po daeng (ปอแดง), po khanun (ปอขนุน) (Central & Peninsular); po faan (ปอฟาน) (Northern); mok chaek (หมกแฉก) (Peninsular).

U s e s.— Wood white used for indoor construction and plywood. Seeds edible after roasted.

8. Sterculia cordata Bl., Bijdr.: 83. 1825; G. Don, Gen. Hist. 1: 516. 1831; Tantra in Lemb. Penel. Hutan: 63. 1976.— *S. javanica* R. Br. in Benn., Pl. Jav. Rar.: 230. 1844; Ridl., Fl. Mal. Pen. 1: 274. 1922; Craib in Fl. Siam. En. 1: 167. 1925.

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

D i s t r i b u t i o n.— Indonesia (type), Malay Peninsula.

E c o l o g y.— In primary and secondary forest; altitude 10–200 m.

9. Sterculia gilva Miq., Sum.: 401. 1860; Tantra in Lemb. Penel. Hutan: 106. 1976.— *S. bicolor* Mast. in Fl. Br. Ind. 1: 359. 1874; Ridl. Fl. Mal. Pen. 1: 274. 1922; Phengklai in Fl. Peat Swamp Narathiwat.: 239. 1991.

T h a i l a n d.— PENINSULAR: Narathiwat.

D i s t r i b u t i o n.— Malay Peninsula, Brunei, Indonesia (type).

E c o l o g y.— In peat swamp forest, altitude 0–20 m. Flowering & fruiting July–March.

V e r n a c u l a r.— Ka luu pae (กะลูแป) (Malay–Peninsular).

10. Sterculia balanghas Linn., Sp. Pl.: 1007. 1753; Mast. in Fl. Br. Ind. 1: 358. 1867; Tantra in Lemb. Penel. Hutan: 140. 1976.— *S. rubiginosa* Vent., Jard. Malm. 2: t. 91. 1804; Mast. in Fl. Br. Ind. 1: 358. 1874; Kurz, Fl. Burma 1: 138. 1877; Ridl., Fl. Mal. Pen. 1: 271. 1922; Craib in Fl. Siam. En. 1: 169. 1925; Tantra in Lemb. Penel. Hutan: 79. 1976.— *S. angustifolia* Roxb., Fl. Ind. 3: 148. 1832; Kurz, Fl. Burma 1: 138. 1877; Gagnep. in Fl. Gén. I.-C. 1: 473. 1911; Ridl., Fl. Mal. Pen. 1: 274. 1922; Craib in Fl. Siam. En. 1: 165. 1925.— *S. ensifolia* Mast. in Fl. Br. Ind. 1: 359. 1874.— *S. balanghas* Linn. var. *mollis* (Wall. ex R. Br.) Mast., l.c.: 358. 1874.— *S. balanghas* Linn. var. *angustifolia* (Roxb.) Mast., l.c.: 358. 1874.— *S. rubiginosa* Vent. var. *ensifolia* (Mast.) Ridl., Fl. Mal. Pen. 1: 273. 1922; Craib in Fl. Siam. En. 1: 169. 1925.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— India, Nepal, Ceylon (type), Burma, Malay Peninsula, Indonesia.

E c o l o g y.— In evergreen forest; altitude 10–1600 m. Flowering January–March. Fruiting February–June.

V e r n a c u l a r.— Po khanun (ปอขนุน) (South-western); mak lin ang (มักลิ้นอาง) (Northern); po faan (ปอฟาน), po kham (ปอคำ), chaa saam kaeo (ช้าสามแก้ว) (Peninsular).

11. Sterculia monosperma Vent., Jard. Malm.: t. 91. 1804; Tantra in Lemb. Penel. Hutan: 154. 1976.— *S. nobilis* (Salisb.) Smith in Rees, Cycl. 34: No. 4. 1819; Gagnep. in Fl. Gén. I.-C. 1: 472. 1911; Craib in Fl. Siam. En. 1: 168. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 121. 1984.— *Southwellia nobilis* Roxb., Fl. Ind. 3: 114. 1832 (non L.).

T h a i l a n d.— NORTHERN: Chiang Mai, Chiang Rai, Lampang; CENTRAL: Nakhon Pathom; PENINSULAR: Trang.

D i s t r i b u t i o n.— India, Malay Peninsula, China (said to be the origin), France (cultivated, type).

E c o l o g y.— Cultivated as a fruit tree. Flowering and fruiting from October–April.

V e r n a c u l a r.— Kao lat (เกาลัด) (Central); ngonkài bai yai (หงอนไก่ใบใหญ่) (Peninsular).

U s e s.— Seeds edible after rosted.

12. Sterculia parviflora Roxb. ex G. Don, Gen. Hist. 1: 516. 1831; Roxb. Fl. Ind. 3: 147. 1832; Mast. in Fl. Br. Ind. 1: 359. 1874; Gagnep. in Fl. Gén. I.-C. 1: 476. 1910; Ridl. Fl. Mal. Pen. 1: 271. 1922; Smitinand, Nat. Hist. Bull. Siam. Soc.: 168. 1967; Tantra in Lemb. Penel. Hutan: 50. 1976.— *S. maingayi* Mast. in Fl. Br. Ind. 1: 359. 1874.— *S. holttumii* Ridl., Kew. Bull. 1926: 471.

T h a i l a n d.— SOUTH-WESTERN: Prachuap Khiri Khan; PENINSULAR: Surat Thani, Phangnga, Nakhon Si Thammarat, Satun, Songkhla.

D i s t r i b u t i o n.— India (type), Burma, Vietnam, Malay Peninsula, Indonesia.

E c o l o g y.— In lowland mixed deciduous and primary forest; altitude 10–350 m. Flowering January–March. Fruiting March–July.

V e r n a c u l a r.— Po khanun (ปอขนุน) (South-western).

U s e s.— Wood white used for indoor construction and plywood; bark yielding good fibres for binding materials.

13. Sterculia lanceolata Cav., Diss 5: 287. t. 145. Fig. 1. 1788; Gagnep. in Fl. Gén. I.-C. 1: 470. 1911; Craib in Fl. Siam. En. 1: 167. 1925; Kou-mei, Fl. Reipub. Pop. Sin. 49.2: 132. Fig. 36. 1984.— *S. tonkinensis* A. DC., Bull. Herb. Boiss. 2.3: 368. 1903; Gagnep., l.c.: 469. 1911; Kou-mei, l.c.: 125. 1984.

T h a i l a n d.— Throughout the country.

D i s t r i b u t i o n.— Ceylon, China (type) Vietnam, Laos, Malay Peninsula.

E c o l o g y.— In lowland evergreen forest by streams, and in hill evergreen forest; altitude 30–1600 m. Flowering and fruiting all year around, but frequent between March–May.

V e r n a c u l a r.— Po phaa saam (ปอผ่าสาม), kin nguang (กินง่วง), taang kai (ต่างไก่), lin bo uean (ลิ้นบ่อเอื่อน) (North-eastern); cha ton top (จะต้อนตบ) (Northern); ngonkai lang khaao (หงอนไก่หลังขาว) (Peninsular).

13.1 var. *principis* (Gagnep.) Phengklai *comb. nov.*— *Sterculia principis* Gagnep., Lec., Not. Syst. 1: 82. 1909; in Fl. Gén. I.-C. 1: 468. t. 21b. 1911; Craib in Fl. Siam. En. 1: 169. 1925.

T h a i l a n d.— NORTHERN: Chiang Mai, Chiang Rai, Lampang, Phrae, Tak; NORTH-EASTERN: Loei.

D i s t r i b u t i o n.— Burma, Laos (type).

E c o l o g y.— In evergreen to hill evergreen forests; altitude 500–1100 m. Flowering in September–January. Fruiting April–June. Flowers sometimes with the horn-shaped galls.

V e r n a c u l a r.— Lin nguang (ลิ้นง่วง) (Northern).

13.2 var. *coccinea* (Jack) Phengklai *comb. nov.*— *Sterculia coccinea* Jack, Mal. Misc. 1.1: 22. 1820; Tantra in Lemb. Penel. Hutan: 129. 1976.— *Sterculia hypostica* Miq., Fl. Ind.: 399. 1860.— *S. coccinea* Roxb., Fl. Ind. 3: 151. 1832; Mast. in Fl. Br. Ind. 1: 357. 1874; Kurz, Fl. Burma 1: 137. 1877; Brand. Ind. Trees: 83. Fig. 39. 1921.— *S. laevis* Wall. in Hook. Bot. Misc. 1: 287. 1830; Mast. in Fl. Br. Ind. 1: 357. 1874; Ridl., Fl. Mal. Pen. 1: 269. 1922; Craib in Fl. Siam. En. 1: 167. 1925; Phengklai in Fl. Peat Swamp Narathiwat: 239. 1991.— *S. balanghas* Linn. var. *glabrescens* Mast. in Fl. Br. Ind. 1: 358. 1874.— *S. coccinea* Jack. var. *hamiltonii* (Kuntze) Tantra in Lemb. Penel. Hutan: 133. 1976.— *Clompanus hamiltonii* Kuntze, Rev. Gen. Pl. 1: 77. 1871.

T h a i l a n d.— PENINSULAR: Surat Thani, Narathiwat.

D i s t r i b u t i o n.— India, Ceylon, Burma, Malay Peninsula (type), Indonesia.

E c o l o g y.— In evergreen forest; altitude 0–200 m. Flowering January–March.

CODE GENERA & SPECIES NUMBERS

1. MANSONIA
- 1.1 M. gagei Drumm.

2. HERITIERA
- 2.1 H. sumatrana (Miq.) Kosterm.
- 2.2 H. javanica (Bl.) Kosterm.
- 2.3 H. formes Buch.- Ham.
- 2.4 H. littoralis Ait.
- 2.5 H. parvifolia Merr.
- 2.6 H. macrophylla Wall. ex Kurz
- 2.7 H. simplicifolia (Mast.) Kosterm.

3. THEOBROMA
- 3.1 T. cacao Linn.

4. PTEROCYMBIUM
- 4.1 P. tinctorium (Blanco) Merr.
- 4.2 P. macranthum Kosterm.

5. SCAPHIUM
- 5.1 S. linearicarpum (Mast.) Pierre
- 5.2 S. scaphigerum (G. Don) Guib. & Planch.

6. FIRMIANA
- 6.1 F. kerrii (Craib) Kosterm.
- 6.2 F. pallens (Wall. ex King) Stern
- 6.3 F. colorata (Roxb.) R. Br.

7. DOMBEYA
- 7.1 D. acutangula Cav.
- 7.2 D. wallichii (Lind.) Benth. & Hook. f.

8. PTERYGOTA
- 8.1 P. alata (Roxb.) R. Br.

9. ERIOLAENA
- 9.1 E. candollei Wall.

10. REEVESIA
- 10.1 R. pubescens Mast.
- 10.1(1) R. pubescens Mast. var. siamensis (Craib) Anth.

11. PTEROSPERMUM
- 11.1 P. semisagittatum Buch.- Ham ex Roxb.
- 11.2 P. lanceaefolium Roxb.
- 11.3 P. cinnamomeum Kurz
- 11.4 P. grande Craib
- 11.5 P. littorale Craib
- 11.5(1) var. littorale Craib
- 11.5(2) var. venustrum (Craib) Phengklai
- 11.6 P. pecteniforme Kosterm.
- 11.7 P. diversifolium Bl.
- 11.8 P. grandiflorum Craib
- 11.9 P. acerifolium Willd.

12. ABROMA
- 12.1 A. angusta Linn. f

13. BYTTNERIA
- 13.1 B. andamanensis Kurz
- 13.2 B. pilosa Roxb.
- 13.3 B. echinata Wall. ex Kurz
- 13.4 B. aspera Colebr.

14. COMMERSONIA
- 14.1 C. bartramia (Linn.) Merr.

15. HELICTERES
- 15.1 H. elongata Wall. ex Boj.
- 15.2 H. hirsuta Lour.
- 15.3 H. angustifolia Linn.
- 15.4 H. viscida Bl.
- 15.5 H. isora Linn.
- 15.6 H. lanata (Teijsm. et Binn.) Kurz
- 15.7 H. lanceolata A.DC.
- 15.7(1) H. lanceolata A.DC. var. lanceolata A.DC.
- 15.7(2) H. lanceolata A.DC. var. gagnepainiana (Craib) Phengklai

16. PENTAPETES
- 16.1 P. phoenicea Linn.

17. MELOCHIA
- 17.1 M. umbellata (Houtt.) Stapf.
- 17.2 M. corchorifolia Linn.

18. WALTHERIA
- 18.1 W. indica Linn.

19. KLEINHOVIA
- 19.1 K. hospita Linn.

20. LEPTONYCHIA
- 20.1 L. caudata (Wall. ex G. Don) Burret.

21. STERCULIA
- 21.1 S. foetida Linn.
- 21.2 S. pexa Pierre
- 21.3 S. urena Roxb.
- 21.3(1) S. urena Roxb. var. thorelii (Pierre) Phengklai
- 21.4 S. hypochra Pierre
- 21.5 S. villosa Roxb.
- 21.6 S. macrophylla Vent.
- 21.7 S. guttata Roxb.
- 21.8 S. cordata Bl.
- 21.9 S. gilva Miq.
- 21.10 S. balanghas Linn.
- 21.11 S. monosperma Vent.
- 21.12 S. parviflora Roxb.
- 21.13 S. lanceolata Cav.
- 21.13(1) S. lanceolata Cav. var. principis (Gagnep.) Phengklai
- 21.13(2) S. lanceolata Cav. var. coccinea (Jack) Phengklai

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Collins J. 212: 15.6 (K); **215**: 11.7 (K, SING); **280**: 21.1 (K); **298**: 15.7(2) (K); **305**: 15.5 (AAU, K); **385**: 15.2 (K); **414**: 2.4 (K); **498**: 15.7(2) (K); **515**: 11.7 (K); **926**: 15.5 (K); **977**: 2.4 (K); **1013 A, B, C**: 11.5 (L); **1311**: 15.5 (K); **1362**: 15.2 (AAU, K); **1470**: 15.7(2) (K, L); **1471**: 15.6 (K); **1608**: 15.5 (K); **1880**: 17.2 (AAU, K); **1881**: 18.1 (K); **1993**: 21.1 (K); **2022**: 15.7(2) (K).

Condon G. 15: 15.2 (AAU); **86**: 15.3 (AAU); **212**: 17.1 (AAU, BKF); **295**: 21.10 (AAU); **344**: 17.1 (AAU); **421**: 11.9 (AAU); **852**: 21.6 (AAU); **897**: 2.2 (AAU); **907**: 15.2 (AAU); **1162**: 21.13(2) (AAU); **1188**: 21.10 (AAU).

Dechagosai T. 6: 11.2 (BKF).

Dhammabut V. 13: 9.1 (BKF).

Floto F. 7767: 15.2 (BKF, C); **7797**: 13.1 (BKF,C, K); **7833**: 18.1 (BKF, C, L).

Franck C.W. 10: 15.5 (C); **59**: 15.1 (C).

Fukuoka N. T-11184: 15.1 (BKF, L); **T-11185**: 15.1 (BKF); **T-34644**: 21.13 (BKF, K, L).

Garrett H.B.G. 177: 15.5 (BKF, C, K, L); **310**: 21.13(1) (K); **466**: 21.13(1) (K); **512**: 15.3 (BKF); **743**: 15.3 (K, L); **778**: 21.13(1) (BKF, L); **895**: 15.3 (AAU, K,L); **896**: 18.1 (AAU, BKF, K, L); **1023**: 21.13(1) (BKF, K, L); **3344**: 13.1 (K).

Geesink R. et al. **4918**: 21.13 (L); **4957**: 20.1 (BKF, L); **5212**: 2.4 (AAU, BKF, C, K, L); **5301**: 21.12 (AAU, BKF, C, K, L); 5346: 21.13 (BKF, L); **5563**: 21.13 (L); **5656**: 21.13(1) (AAU, C, K, L); **5656a**: 21.13(1) (BKF); **5811**: 15.2 (BKF, C); **5852**: 15.3 (AAU, C); **5858**: 15.5 (AAU, BKF, K, KYO); **5991**: 11.1 (AAU, BKF, C, K); **6003**: 21.4 (BKF, C, K); **6067**: 9.1 (AAU); **6087**: 15.1 (BKF); **6164**: 15.1 (AAU, BKF, C, KYO); **6185**: 21.1 (K); **6377**: 14.1 (BKF); **6451**: 5.2 (BKF, L); **6602**: 2.4 (L); **6639**: 15.2 (AAU, BKF, C, K, KYO); **6671**: 21.10 (AAU, BKF, C, K, L); **6730**: 13.4 (BKF, L); **6747**: 11.1 (AAU, BKF, C, K); **6796**: 15.2 (BKF, K); **6799**: 11.1 (BKF, K, L); **6881**: 21.13 (AAU, BKF, K, L); **6969**: 15.1 (AAU, BKF, C, K, KYO); **7036**: 15.3 (BKF, C, K); **7332**: 15.2 (AAU, BKF, C, K, KYO); **7502**: 2.4 (BKF, L); **7530**: 20.1 (L); **7604**: 13.1 (L); **7804**: 2.4 (BKF, C, K, L); **8080**: 15.3 (BKF, C, K); **8133**: 6.1 (L); **8176**: 21.4 (BKF, C, K, L); **8223**: 15.1 (BKF, L); **8378**: 11.1 (BKF, L).

Gillett R. 4: 15.6 (K).

Gram K. et al. **105**: 21.5 (C); **125**: 15.3 (C).

Hamid..... **3595**: 15.2 (K); **3846**: 15.2 (K); **3867**: 11.2 (sing); **7572**: 11.2 (Sing).

Hamilton et al. **15**: 15.2 (BKF); **110**: 15.2 (BKF).

Haniff et al. **2095**: 20.1 (K); **2716**: 20.1 (K); **3940**: 6.3 (sing); **4018**: 21.10 (K); **4395**: 18.1 (K, Sing); **7512**: 11.2 (K).

Hansen B. et al. **11092**: 11.2 (BKF); **11708**: 21.5 (C, L); **12125**: 20.1 (BKF, C, K, L); **12141**: 20.1 (BKF, C); **12148**: 6.3 (BKF, C, K, L); **12171**: 21.10 (BKF, C, K, L, Sing); **12236**: 21.10 (BKF, C); **12257**: 21.10 (BKF, C, L, Sing); **12272**: 21.13(2) (C); **12294**: 11.6 (BKF, K, L); **12344**: 21.1 (C); **12492**: 11.2 (C); **12782**: 21.10 (AAU, BKF, C, K, L); **12883**: 21.10 (AAU, BKF, C, K, L); **12960**: 5.2 (C).

Hardial 577: 15.2 (BKF, K, L, Sing).

Hennipman E. 3715: 20.1 (BKF, L, P); **3731**: 20.1 (BKF, C, K, L).

Hosseus C.C. 60: 15.1 (K, L); **70**: 15.3 (C, K, L); **411**: 21.5 (K, L).

Hambhanon C. et al. **295**: 21.13 (BKF).

Indrapong S. 29: 2.4 (BKF, C. L); **68**: 21.3(1) (BKF, C, K, L); **89**: 15.3 (BKF, C, K).

Iwatsuki K. et al. **T-248**: 17.2 (L); **T-3975**: 15.1 (BKF, KYO); **T-7274**: 5.2 (BKF, K, KYO); **T-7301**: 21.1 (AAU, C, K, L); **T-9456**: 15.1 (BKF); **T-8470**: 20.1 (BKF, L); **T-9559**: 15.1 (AAU, BKF); **T-10313**: 15.1 (BKF); **T-10953**: 13.2 (BKF, KYO); **T-10960**: 21.13 (BKF); **T-27779**: 2.4 (BKF).

Jackson J.K. 6177: 15.1 (BKF).

Kaewparadai S. 3: 11.1 (BKF).

Kaewsingh A. Sn: 21.12 (BKF).

Kamropming P. 26: 15.5 (BKF).

Kanhavases C. 218: 21.4 (BKF).

Kanokwichit M. Sn: 2.2 (BKF).

Kerr A.F.G. 462: 15.2 (L); **630**: 15.1 (K); **899**: 9.1 (K); **902**: 15.1 (AAU, K, L); **1043**: 4.2 (K); **1088**: 21.13 (K); **1184**: 11.1 (K); **1410**: 15.5 (AAU, K); **1805**: 11.8 (K, L); **1923**: 15.3 (AAU); **1948**: 15.5 (AAU, K, L); **1953**: 18.1 (AAU, K); **2046**: 15.7(2) (K); **2081**: 2.2 (K); **2097**: 11.5 (K); **2100**: 2.4 (K); **2104**: 15.6 (AAU, K); **2142**: 15.2 (AAU, K); **2376**: 12.1 (K); **2407**: 17.1 (K); **2418**: 15.4 (K); **2422**: 21.13 (K); **2466**: 13.2 (K); **2471**: 9.1 (K); **2538A**: 21.7 (K); **2733**: 19.1 (K); **2751**: 21.3 (K); **2853**: 21.5 (K);

2866: 6.1 (K); **3004**: 4.1 (K); **3010**: 16.1 (K); **3015**: 21.2 (K); **3035**: 15.3 (K); **3036**: 15.1 (AAU, K); **3113**: 15.3 (AAU); **3129**: 21.5 (K); **3170**: 4.1 (K); **3252**: 13.4 (K); **3480**: (K); **3544**: 21.5 (K); **3578**: 11.3 (K); **3608**: 15.7 (K); **3734**: 17.2 (K); **3781**: 17.2 (K); **3863**: 16.1.(K); **3935**: 13.3 (K); **4028**: 2.4 (K); **4164**: 15.2 (C, K); **4202**: 11.7 (K); **4267**: 21.1 (K); **4341**: 12.1 (K); **4596**: 21.2 (K); **4596A**: 21.2 (K); **4602**: 15.1 (BKF); **4653**: 15.3 (K); **4667**: 18.1 (K); **4733**: 21.10 (K); **4786**: 17.1 (K); **4969**: 21.5 (K); **5399**: 11.1 (AAU, K); **5420**: 21.3 (K); **5497**: 11.4 (K); **5797**: 10.1(1) (C, K); **5846**: 15.2 (K); **5873**: 11.5(2) (K); **5895**: 18.8 (K); **6114**: 13.1 (BK, C, K, L); **6493**: 13.4 (BK, K); **6496**: 15.2 (K); **6663**: 13.2 (BK, K) **6796**: 15.2 (AAU, C); **7017**: 13.3 (BK, K); **7024**: 15.7 (K); **7167**: 21.4 (K); **7259**: 15.4 (K); **7286**: 14.1 (BK, K); **7287**: 13.4 (BK, K); **7466**: 5.2 (K, L); **7613**: 20.1 (C, K, L); **7617**: 21.10 (K); **7827**: 11.2 (K); **7859**: 11.5 (K, L); **8446**: 21.13 (C, K, L); **8505**: 6.3 (BK, C); **8548**: 4.1 (BK, K); **8548A**: 4.1 (BK, K); **8568**: 21.13 (C, K, L); **8568A**: 21.13 (C, K, L); **8811**: 15.7 (K); **8870**: 21.10 (NY); **9002**: 15.3 (K); **9011**: 15.6 (K); **9073**: 13.1 (BK, K); **9197**: 11.2 (K); **9445**: 5.2 (K); **9447**: 17.1 (AAU, K); **9554**: 21.10 (C, K, Sing); **9685**: 21.10 (K); **9775**: 21.3 (C, K, L, Sing); **9819**: 17.1 (K); **9826**: 15.2 (AAU, K); **9877**: 21.10 (Sing); **9887**: 13.2 (BK, K, L); **9997**: 21.4 (K, L); **9998**: 1.1 (K); **10026**: 2.2 (K); **10065**: 20.1 (K); **10131**: 21.10 (K, L); **10238**: 21.5 (K, L); **10288**: 21.4 (C, K, L); **10351**: 4.2 (BK, K); **10376**: 15.3 (K); **10463**: 15.2 (K); **10498**: 6.3 (BK, C); **10503**: 21.5 (C, K, L); **10512** : 13.2 (BK, K); **10646**: 6.3 (BK, K); **10697**: 21.11 (K); **10758**: 18.1 (K); **10770**: (13.1); **10878**: 1.1 (C, K); **10883**: 15.2 (C, K); **10889**: 11.2 (K); **10986**: 21.13(2) (K); **11113**: 11.6 (C, K); **11148**: 11.5 (C, K, L); **11281**: 15.2 (K); **11457**: 5.2 (K); **11473**: 21.3 (C, K, L); **11653**: 11.2 (K); **11655**: 17.2 (K); **11736**: 15.2 (AAU, K); **11842**: 6.3 (BK, K); **11910**: 15.3 (K); **12096**: 20.1 (K); **12123**: 21.13(2) (K); **12130**: 11.2 (K); **12170**: 20.1 (K, L); **12178**: 21.13 (C, K, L); **12243**: 5.2 (K); **12265**: 21.10 (K); **12281**: 15.2 (AAU); **12323**: 17.1 (AAU, K); **12340**: 8.1 (K); **12526**: 21.10 (AAU, K); **12706**: 11.6 (K); **12720**: 21.10 (AAU, K); **12728**: 4.1 (BK, K); **12779**: 2.4 (K); **12859**: 21.2 (K); **12931**: 1.1 (K); **12934**: 21.13(2) (K); **12986**: 2.3 (K); **13076**: 15.3 (C, L); **13335**: 13.1 (BK, K, L); **13544**: 15.2 (C, K); **13554**: 15.3 (K); **13936**: 17.1 (K); **14051**: 15.3 (AAU, K); **14060**: 21.10 (K); **14344**: 14.1 (BK, K); **14569**: 21.4 (K); **14610**: 11.7 (K); **14673**: 15.4 (K, L); **14744**: 11.2 (K); **14872**: 20.1 (AAU, K); **15377**: 19.1 (K); **15411**: 21.9 (K); **15595**: 21.13(2) (K); **15746**: 20.1 (K); **16426**: 11.2 (K); **16433**: 21.3 (C, K); **16434**: 21.5 (L); **16496**: 21.13 (C, K, L); **16650**: 21.1 (K); **16697**: 2.2 (K); **16701**: 5.2 (K); **16814**: 5.2 (K); **16876**: 21.13(2) (K); **16982**: 21.10 (C, K, L); **17026**: 5.2 (K); **17319** 6.3 (BK, K); **17365**: 21.10 (K); **17420**: 4.1 (BK, K); **17444**: 20.1 (K); **17549**: 21.13(2) (K); **17555**: 5.2 (K); **17720**: 21.13(2) (K); **17853**: 11.5(2) (K); **18177**: 2.2 (K); **18251**: 11.7 (K); **18258**: 6.3 (BK, K); **18570**: 4.1 (AAU, BK, K); **18628**: 11.6 (K); **18913**: 21.10 (C, K, L); **18918**: 6.3 (BK, K); **18936**: 21.10 (K, L); **19240**: 14.1 (BK, C, K, L); **19340**: 21.13(2); **19353**: 21.13(2) (K); **19497**: 21.6 (K, L); **19645**: 15.3 (AAU, K); **19997**: 21.1 (K); **20043**: 21.13 (C, K, L); **20201**: 6.3 (BK, C); **20406**: 6.3 (BK); **21367**: 13.3 (BK, K).

Kevie 32: 2.4 (C).

Kiah 24309: 20.1 (K); **24362**: 15.2 (K); **24416**: 15.5 (K).

King R.M. et al. **5489**: 15.5 (C, K).

Kingon W. F.37417 ; 17.2 (Sing); **F.37568**: 17.2 (Sing).

Kitiyakara M.C. 21: 11.7 (K).

Kloss C.B. 6649: 21.10 (K); **6692**: 21.10 (K); **6890**: 15.2 (K); **6948**: 15.2 (K).

Kosterman A. 261: 21.2 (K); **262**: 11.1 (K, L); **273**: 13.2 (K, L); **299**: 11.1 (K, L); **506**: 12.1 (BK); **508**: 12.1 (BK, K, Sing); **636**: 15.1 (K, L); **1192**: 11.1 (L).

Koyama H. et al. **T-30197**: 15.2 (BKF, KYO, K); **T-30485**: 21.13 (BKF); **T-30536**: 21.13 (BKF); **T-30955**: 15.2 (BKF, KYO); **T-31945**: 15.2 (BKF, KYO); **T-33023**: 21.3 (BKF); **T-33032**: 21.2 (BKF); **T-34007**: 21.13 (BKF); **T-34043**: 21.13 (BKF).

Koyama T. et al. **15431**: 21.13 (AAU, BKF, NY); **15608**: 21.13 (AAU, BKF, NY); **15658**: 11.5 (AAU, BKF).

Kuengcaim T. 22: 11.7 (BKF).

Lakshanakara M.C. 246: 16.1 (K); **263**: 15.1 (C, K, L); **277**: 17.2 (K); **281**: 15.2 (K); **389**: 20.1 (AAU, K); **409**: 12.1 (BK); **477**: 15.7(2) (K, L); **541**: 11.2 (K); **823**: 11.7 (K); **906**: 15.3 (K); **949**: 13.3 (BK, K); **1031**: 15.7 (K); **1036**: 11.1 (K); **1365**: 4.1 (BK, K).

Larsen K. et al. **91**: 15.2 (AAU); **281**: 13.1 (AAU, BKF, C, L); **488**: 15.2 (AAU); **644**: 15.1 (AAU, BKF, L, Sing); **810**: 15.2 (AAU); **820**: 15.3 (AAU); **997**: 10.1 (C, K); **1327**: 18.1 (AAU, C); **1436**: 15.2 (AAU,

Sing); **1446**: 15.3 (AAU, L, Sing); **2625**: 21.13(1) (AAU, C); **3081**: 21.13(1) (AAU); **3335**: 15.5 (AAU, BKF); **8058**: 15.6 (C, K); **8059** 15.6 (BKF, C); **8110**: 15.3 (BKF, C, K); **8346**: 21.2 (C, L); **8408**: 18.1 (C, L); **9225**: 15.2 (BKF, C); **9331**: 21.5 (C); **9351**: 6.2 (BKF, C, L); **9888**: 8.1 (BKF, C); **9981**: 5.2 (C); **10521**: 15.1 (AAU, BKF, C); **30642**: 15.2 (AAU, BKF, K, KYO); **30980**: 2.4 (AAU); **31160**: 13.1 (AAU, BKF, K, KYO, NY); **31426**: 15.7 (AAU); **31431**: 15.3 (AAU, BKF, K, KYO); **31433**: 15.1 (AAU, BKF, K, KYO); **31728**: 15.5 (AAU, BKF, L); **32093**: 15.7 (AAU, L); **32095**: 15.2 (AAU); **32106**: 11.1 (AAU, BKF, L); **32193**: 15.5 (AAU, BKF, L); **32244**: 13.1 (AAU); **32700**: 20.1 (AAU, BKF); **32976**: 20.1 (AAU); **33343**: 20.1 (AAU); **33345**: 21.13 (AAU, BKF, L); **33901**: 9.1 (AAU, K); **33990**: 15.5 (AAU, BKF, K); **34025**: 15.3 (AAU, BKF, K, KYO); **34271**: 9.1 (AAU); **34358**: 13.4 (AAU, BKF, K, L).

Lei 132: 21.13 (Sing); **598**: 21.13 (Sing).

Lekagul S. 35: 16.5 (BKF); **55**: 15.3 (BKF); **76**:21.13 (BKF); **80**: 21.13 (BKF); **83**: 21.13 (BKF).

Lindhard E. Sn: 15.7(2) (C, K).

Marcan A. 195: 15.2 (K); **229**: 11.7 (K); **282**: 3.1 (C, K); **301**: 12.1 (C, K); **349**: 15.6 (K); **360**: 18.1 (K); **364**: 15.5 (K); **415**: 19.1 (K); **474**: 16.1 (K); **569**: 21.1 (K); **659**: 15.6 (K); **821**: 21.4 (C); **900**: 15.7 (K); **929**: 15.3 (K); **1613**: 17.2 (K); **Sn**: 17.1 (C).

Maxwell J.F. 71-253: 15.2 (AAU); **71-411**: 11.7 (AAU); **71-439**: 15.7 (AAU); **72-43**: 21.1 (AAU); **72-135**: 21.10 (AAU, L); **72-275**: 13.4 (AAU, BK); **72-472**: 13.4 (BK); **73-1**: 19.1 (AAU); **73-54**: 13.4 (AAU, BK); **73-66**: 9.1 (AAU, BK); **73-179**: 15.2 (AAU); **73-185**: 13.1 (AAU, BK); **73-262**: 15.1 (AAU); **73-442**: 15.2 (AAU); **73-612**: 11.7 (AAU); **73-787**: 11.1 (AAU); **74-69**: 21.10 (AAU); **74-177**: 4.1 (AAU, BK, BKF); **74-101**: 2.5 (BKF); **74-192**: 4.1 (AAU); **74-200**: 4.1 (AAU, BK, BKF); **74-233**: 11.7 (AAU, BKF); **74-240**: 6.3 (AAU, BK, BKF); **74-251**: 21.10 (AAU, BKF); **74-314**: 9.1 (BK); **74-421**: 15.2 (AAU); **74-472**: 13.4 (AAU, BK); **74-495**: 11.1 (AAU); **74-504**: 4.1 (AAU, BK); **74-765**: 15.1 (AAU, L); **74-789**: 10.1(1) (BK); **74-1008**: 11.5 (AAU, L); **74-1010**: 16.1 (AAU, L); **74-1085**: 17.1 (AAU, L); **75-12**: 6.3 (BK); **75-13**: 21.4 (AAU, L); **75-18**: 4.1 (BK); **75-53**: 4.1 (AAU, BK); **75-129**: 21.4 (AAU, L); **75-124**: 6.3 (BK, BKF); **75-160**: 21.4 (AAU, L); **75-193**: 4.1 (BK); **75-222**: 21.10 (AAU, L); **75-252**: 21.2 (L); **75-442**: 15.7 (AAU, L); **75-543**: 13.4 (AAU, BK, L); **75-576**: 21.1 (AAU, L); **75-590**: 21.12 (AAU, L); **75-671**: 11.7 (AAU, L); **75-925**: 15.7 (AAU); **75-931**: 15.5 (AAU); **75-944**: 15.1 (AAU, L); **75-994**: 15.5 (AAU); **76-28A**: 5.2 (L); **76-80**: 21.4 (AAU, L); **76-374**: 13.4 (AAU, BK, L); **76-438**: 5.2 (AAU, L); **76-707**: 11.2 (AAU, L); **84-325**: 21.10 (BKF); **84-402**: 17.1 (BKF); **84-475**: 20.1 (BKF); **85-150**: 2.6 (BKF); **85-165**: 11.2 (BKF); **85-182**: 21.12 (BKF); **85-206**: 21.1 (BKF); **85-406**: 11.2 (AAU, BKF); **85-409**: 19.1 (AAU, BKF, L); **85-559**: 21.10 (AAU, BKF); **85-682**: 21.12 (AAU, BKF, L); **85-742**: 21.10 (AAU, BKF); **85-743**: 21.10 (BKF); **85-1035**: 17.1 (AAU, BKF, L); **85-1185**: 17.1 (AAU, BKF); **86-7**: 21.10 (L); **86-8**: 20.1 (AAU, BKF, L); **86-43**: 20.1 (AAU, L); **86-171**: 21.13 (L); **86-173**: 11.2 (L); **86-205**: 4.1 (BKF, L); **86-214**: 20.1 (AAU, BKF); **86-335**: 11.2 (L); **86-376**: 21.10 (AAU, BKF, L); **86-885**: 18.1 (BKF, L); **86-939**: 17.7 (BKF, L); **87-6**: 21.10 (BKF, L); **87-79**: 21.5 (AAU, BKF, L); **87-125**: 11.6 (BKF, L); **87-237**: 11.9 (AAU); **87-239**: 13.4 (BKF); **87-327**: 21.13(2) (L); **87-382**: 21.12 (AAU, BKF); **87-402**: 11.2 (AAU); **87-1467**: 21.2 (BKF); **87-1512**: 13.2 (BKF); **88-164**: 21.5 (BKF); **88-186**: 21.2 (BKF); **88-227**: 21.13 (BKF); **88-434**: 21.7 (BKF); **88-516**: 15.7 (BKF); **88-868**: 21.2 (BKF); **88-1164**: 21.3(1) (BKF); **88-1249**: 6.3 (BKF); **89-56**: 21.13(1) (BKF); **89-101**: 15.5 (BKF); **89-169**: 4.2 (BKF); **89-270**: 21.13 (BKF); **89-324**: 4.2 (BKF); **89-510**: 9.1 (BKF).

Munikanon C. 18: 2.4 (BKF).

Murata G. T-14753: 17.2 (BKF, L); **T-14917**: 15.1 (KYO); **T-15395**: 15.3 (AAU, BKF, K, KYO, L); **T-15418**: 15.3 (BKF, KYO); **T-15426**: 15.1 (BKF, KYO); **T-16188**: 18.1 (BKF, K, L); **T-16189**: 15.6 (BKF, KYO); **T-16199**: 18.1 (BKF); **T-16201**: 18.1 (BKF, L); **T-16572**: 15.3 (BKF); **T-16682**: 15.5 (BKF, KYO); **T-16690**: 15.3 (KYO); **T-16712**: 15.5 (BKF, KYO); **T-16969**: 18.1 (L); **T-16995**: 15.5 (BKF); **T-16988**: 15.3 (BKF, KYO); **T-17107**: 15.1 (BKF); **T-17115**: 15.1 (BKF, KYO); **T-17190**: 15.3 (BKF, KYO); **T-17300**: 17.2 (L); **T-17742**: 15.2 (BKF); **T-17752**: 15.7 (BKF); **T-37003**: 17.2 (BKF); **T-37013**: 17.2 (BKF); **T-37256**: 15.6 (AAU); **T-37348**: 15.6 (L); **T-37458**: 15.3 (L); **T-37491**: 15.2 (AAU); **T-37532**: 15.3 (AAU); **T-37574**: 15.5 (L); **T-37584**: 15.6 (AAU); **T-37606**: 18.1 (L); **T-41667**: 15.2 (L); **T-41691**: 15.2 (L); **T-41839**: 21.2 (BKF); **T-49799**: 15.3 (BKF, L); **T-49802**: 15.3 (BKF, L); **T-49807**: 15.1 (AAU, BKF); **T-49812**: 15.2 (AAU); **T-50445**: 21.10 (BKF); **T-51178**: 15.7(2) (AAU); **T-51252**: 15.4 (AAU).

Nakkan D. 15: 21.5 (BKF); **17**: 19.1 (BKF); **21**: 21.10 (BKF); **24**: 6.3 (BKF); **40**: 15.5 (BKF); **49**: 15.3 (BKF); **56**: 21.13 (BKF); **74**: 21.13 (BKF); **102**: 21.13 (BKF); **116**: 21.13 (BKF); **203**: 15.7(1) (BKF); **235**: 15.2 (BKF); **246**: 11.7 (BKF); **365**: 5.2 (BKF).

Na Nakorn W. 731: 11.2 (BKF); **735**: 13.1 (BKF).

Na Songkla P. 14: 15.1 (BKF).

Nielsen E. Sn: 15.1 (C).

Nim-a-nong B. 74: 21.10 (BKF, C, L); **218**: 15.1 (BKF, C, K); **1612**: 21.10 (AAU, C, L).

Nitrasirirak P. 213: 21.13 (BKF, L); **233**: 20.1 (BKF).

Niyomdham C. et al. **19**: 17.1 (BKF, C, L); **25**: 21.10 (AAU, BKF, C, K, L); **44**: 21.13 (BKF); **59**: 21.13 (AAU, BKF, C, L); **346**: 2.4 (AAU, BKF, C, K); **646**: 2.4 (BKF, C); **649**: 20.1 (BKF); **652**: 21.9 (BKF, C); **704**: 21.6 (BKF, C); **730**: 20.1 (BKF); **785**: 21.13 (BKF); **931**: 14.1 (AAU, C, K, L); **1082**: 20.1 (AAU, BKF, C, K, L); **1196**: 21.13 (BKF); **1278**: 11.6 (AAU, BKF); **1357**: 21.13 (BKF, K); **1365**: 6.1 (AAU, BKF, C, K, L); **1357**: 21.13 (AAU, BKF, C); **1812**: 20.1 (AAU, BKF, K, L, NY); **1818**: 21.13 (BKF); **1826**: 21.9 (AAU, BKF, K, L); **1941**: 17.2 (BKF); **1953**: 21.6 (AAU, BKF).

Noe 35: 5.2 (K); **81**: 5.2 (K, L); **156**: 15.2 (C, K, L); **160**: 15.3 (AAU, K); **190**: 15.5 (AAU, C, K); **221**: 15.6 (AAU, K); **274**: 18.1 (AAU, K).

Nooteboom H.P. et al. **819**: 21.7 (BKF, L); **845**: 21.13 (K, L); **845A**: 21.13(1)(L).

Nuphakdi C. 31: 15.2 (BKF); **95**: 15.2 (BKF); **265**: 5.2 (BKF).

Paisooksantivatana Y. 531-81: 13.2 (BK).

Patanaponpaiboon P. 351: 2.3 (BKF); **352**: 2.4 (BKF), **371**: 2.4 (BKF).

Phengklai C. et al. **33**: 21:13 (BKF, K); **58**: 21.13 (BKF); **90**: 4.2 (BKF, C, K, L); **140**: 11.1 (BKF, K); **151**: 15.1 (BKF, C, K, L); **313**: 15.7(1) (BKF); **380**: 13.2 (BKF, K, L); **401**: 17.1 (BKF, K, L); **555**: 21.4 (BKF, C, L); **970**: 21.10 (BKF, C, L); **1165**: 15.4 (C, K, L); **1248**: 2.4 (BKF); **2001**: 2.4 (BKF); **2901**: 15.1 (BKF, C, K, KYO); **2963**: 9.1 (AAU, BKF, C, K, L); **3293**: 15.2 (BKF); **3361**: 15.7 (BKF); **3580**: 21.1 (BKF); **3620**: 15.2 (BKF); **3744**: 15.2 (BKF); **3841**: 15.2 (BKF); **3907**: 15.1 (BKF); **3989**: 15.5 (BKF); **4100**: 15.1 (BKF, C, NY); **4258**: 15.1 (BKF, NY); **4263**: 15.2 (BKF, C, K, KYO); **6006**: 15.5 (AAU, BKF, K); **6127**: 15.2 (AAU); **6135**: 15.3 (AAU, K, L); **6236**: 15.1 (BKF); **6245**: 15.1 (BKF); **6516**: 11.7 (BKF); **6517**: 5.2 (BKF); **6520**: 11.5 (BKF); **6565**: 15.3 (BKF); **6570**: 15.3 (BKF); **6622**: 15.1 (BKF); **6653**: 11.1 (BKF); **6663**: 15.1 (BKF); **6677**: 11.3 (BKF); **6731**: 15.1 (BKF); **6990**: 6.1 (BKF); **7055**: 11.5 (BKF); **7109**: 11.3 (BKF); **7361**: 21.2 (BKF); **7388**: 21.2 (BKF); **7525**: 21.7 (BKF); **7529**: 15.5 (BKF); **7539**: 15.3 (BKF).

Phengnaren S. 189: 11.5 (BKF); **299**: 21.13(1) (BKF, L); **300**: 21.13(1) (BKF); **396**: 15.7 (BKF); **441**: 20.1 (BKF, L); **536**: 21.13 (BKF); **636**: 15.2 (BKF, L); **Sn**: 11.1 (BKF, L); **Sn**: 13.1 (BKF).

Phrombupha A. 17: 15.1 (BKF); **28**: 15.5 (BKF); **Sn**: 13.1 (BKF).

Phromdej C. et al. **245**: 14.1 (BKF); **262**: 11.6 (BKF, C, L); **296**: 15.4 (K, L).

Phusomsaeng S. et al. **6**: 21.10 (BKF); **10**: 21.13(1) (BKF, K, L); **17**: 21.11 (BKF); **19**: 15.5 (BKF); **28**: 20.1 (BKF); **33**: 12.1 (BKF, C, K, L); **42**: 17.1 (BKF, C, K, L); **51**: 15.2 (AAU, BKF, C); **76**: 21.10 (BKF, C, L); **105**: 2.2 (AAU, BKF, C, K, L); **162**: 21.10 (AAU, BKF, C, L); **226**: 2.2 (BKF, C); **316**: 21.10 (BKF, L); **328**: 11.2 (AAU, BKF, C, K); **376**: 14.1 (BKF, C, K, L); **458**: 20.1 (BKF, L); **532**: 11.7 (BKF).

Pierre 3747: 15.6 (K, NY).

Pinnin S. 14: 15.2 (BKF).

Pramool Sn: 2.3 (BKF); **Sn**: 2.4 (BKF).

Premrasami A. 29: 21.9 (AAU, C, K).

Premrasami T. Sn: 4.1 (BKF); **Sn**: 2.4 (BKF).

Prov. Chaiyaphum Sn: 11.3 (BKF).

Put 30: 15.1 (K, L); **37**: 21.5 (BKF); **69**: 11.1 (K); **73**: 21.2 (BKF); **190**: 15.2 (K); **215**: 15.2 (K); **299**: 2.3 (BKF); **374**: 2.2 (BKF); **407**: 5.2 (BKF); **462**: 15.2 (K); **646**: 14.1 (K); **674**: 11.6 (K); **715**: 21.10 (K); **731**: 13.4 (BK, K); **747**: 14.1 (BK, C, K, L); **916**: 13.4 (BK, K); **956**: 13.2 (BK, K, L); **1104**: 15.5 (AAU, C, K); **1131**: 15.1 (AAU, C, K); **1243**: 11.7 (K); **1438**: 11.6 (K); **1479**: 21.10 (AAU, K); **1551**: 21.6 (K, L); **1610**: 15.4 (K); **1728**: 2.4 (K); **1772**: 15.5 (K); **1826**:

15.1 (C, K); **1923**: 15.3 (K); **1946**: 15.6 (AAU, K); **2007**: 15.2 (K): **2053**: 15.7(2) (K); **2070**: 15.3 (K); **2090**: 11.1 (K); **2121**: 21.2 (K); **2163**: 16 (K); **2231**: 18.1 (AAU, K); **2237**: 15.2 (K); **2376**: 6.3 (BK); **2470**: 18.1 (AAU, K, L); **2492**: 21.2 (K); **2516**: 21.10 (K, L); **2558**: 16.1 (K); **2561**: 17.2 (AAU, K); **2648**: 4.1 (AAU); **2678**: 4.1 (K); **2761**: 11.2 (K); **2768**: 15.7 (2) (K); **3080**: 1.1 (K); **3113**: 15.3 (K); **3123**: 15.2 (C, K, KYO); **3556**: 10.1 (K); **3600**: 20.1 (K); **3671**: 15.4 (C, K); **3793**: 21.10 (C, K, L); **4030**: 21.10 (K); **4071**: 15.6 (AAU, K); **4221**: 15.2 (C, K); **16036**: 21.12 (L); **Sn**: 4.1(BK).

Rabil 10: 5.2 (K); **12**: 2.1 (K); **86**: 13.1 (BK, C, K, KYO, L); **91**: 15.2 (AAU, C, K); **264**: 15.2 (C, K, KYO); **265**: 15.4 (C, K, L); **272**: 11.2 (K).

Rock J.F. 1566: 9.1 (K); **1663**: 9.1 (K).

Ruang-em T. 22: 11.7 (K).

Sangkachand B. 21: 15.3 (BKF); **24**: 15.1 (BKF); **27**: 15.2 (BKF); **36**: 15.2 (BKF); **59**: 20.1 (BKF); **103**: 12.1 (BKF, C, K, L, P); **109**: 4.1 (BKF, C, K, L); **122**: 21.13 (BKF, L); **133**: 11.8 (BKF, C, K); **143**: 15.2 (BKF); **219**: 18.1 (BKF, C, K, L); **323**: 5.2 (BKF); **339**: 11.3 (BKF, C, K); **428**: 13.4 (BKF, K); **467**: 2.4 (BKF); **473**: 15.2 (BKF); **479**: 15.4 (L); **515**: 15.7 (BKF); **579**: 21.10 (BKF); **645**: 11.7 (BKF, K, L); **718**: 20.1 (BKF); **720**: 15.2 (BKF); **800**: 6.2 (BKF); **893**: 14.1 (BKF); **1033**: 14.1 (AAU, BKF, C, KYO, L); **1041**: 11.2 (BKF, C); **1078**: 20.1 (BKF, L); **1116**: 15.4 (AAU, C, K, KYO); **1129**: 11.2 (BKF, C, L); **1190**: 21.4 (BKF); **1227**: 14.1 (BKF, C, KYO, L); **1254**: 20.1 (BKF, K, L); **1310**: 15.4 (AAU, K, L); **1311**: 15.4 (AAU, C, K); **1416**: 11.9 (BKF, K); **1478**: 15.2 (AAU, BKF, C, L); **1503***: 20.1 (AAU, BKF, C, K, L); **1503***: 21.10 (BKF); **1511**: 6.3 (BKF, C, K, L); **1516**: 17.1 (BKF, L); **1519**: 21.10 (AAU, C, L); **1521** 20.1 (BKF, C, K, L); **1526**: 21.13(2) (BKF, L); **1459**: 14.1 (BKF, C, L); **1569**: 15.2 (BKF, C, L); **1591**: 15.6 (BKF, C, L); **1592**: 18.1 (BKF, C, K, L); **3160**: 21.5 (BKF); **3098**: 11.8 (C, K, L).

Sangkachand P. 452: 14.1 (BK); **1218**: 14.1 (BK); **1679**: 12.1 (BK).

Santisuk T. et al. **271**: 17.1 (BKF, C, K, L); **472**: 15.2 (BKF, C, K); **477**: 11.6 (BKF); **626**: 20.1 (BKF); **645**: 21.13 (C, K); **676**: 11.7 (C, K); **691**: 2.4 (BKF); **720**: 21.13 (BKF); **851**: 11.2 (BKF); **720**: 21.13 (BKF); **851**: 11.2 (BKF); **883**: 21.10 (BKF); **886**: 20.1 (BKF); **888**: 21.13 (BKF); **895**: 17.1 (BKF); **899**: 21.13 (BKF); **975**: 9.1; **1243**: 11.2 (BKF); **6676**: 13.1 (BKF); **6908**: 4.1 (BKF); **6953**: 21.7 (BKF).

Schmidt Johs 91: 5.2 (C); **437**: 2.2 (C); **739**b: 16.1 (C); **877**: 5.2 (C).

Schomburk 239: 15.6 (C); **271**: 15.7 (K).

Seidenfaden G. et al. **2404**: 17.2 (C); **2434**: 15.2 (C); **2747**: 17.2 (C); **2760**: 15.2 (C); **2916**: 17.2 (C); **10943**: 11.7 (C).

Shimizu T. et al. **T-7741**: 15.1 (BKF); **T-8158**: 15.2 (L); **T-11351**: 13.4 (BKF, KYO); **T-18004**: 15.1 (BKF, KYO); **T-18330**: 15.1 (BKF, KYO, L); **T-19161**: 15.1 (BKF, KYO); **T-19341**: 15.1 (BKF, KYO); **T-19431**: 11.7 (BKF); **T-20015**: 17.2 (L); **T-21012**: 15.1 (BKF, KYO, L); **T-21231**: 15.5 (BKF, KYO); **T-21268**: 15.5 (BKF, KYO); **T-21404**: 15.1 (BKF, KYO); **T-21444**: 15.1 (KYO); **T-21463**: 15.1 (BKF, KYO, L); **T-21815**: 15.1 (BKF, KTO); **T-21825**: 15.1 (KYO); **T-22174**: 16.1 (AAU, BKF); **T-22185**: 17.2 (BKF, L); **T-22244**: 15.1 (BKF, KYO); **T-22266**: 15.2 (KYO); **T-22443**: 15.1 (KYO); **T-22466**: 15.3 (BKF, KYO); **T-22629**: 15.1 (BKF, KYO, L); **T-23232**: 15.1 (BKF, KYO, L); **T-23257**: 15.2 (BKF, KYO, L); **T-23565**: 21.10 (BKF, L); **T-26040**: 15.2; **T-26129**: 21.10 (BKF, C, L); **T-26362**: 11.2 (BKF, C, L); **T-26555**: 15.3 (BKF, KYO, L); **T-27213**: 20.1 (AAU); **T-27254**: 20.1 (AAU); **T-27490**: 15.2 (BKF, KYO); **T-27541**: 15.2 (BKF, KYO); **T-27618**: 15.2 (BKF, KYO, L); **T-27673**: 15.2 (BKF, KYO); **T-27684**: 15.2 (BKF, KYO); **T-27693**: 15.2 (BKF, KYO, L).

Shiwiwat N. et al. **2**: 15.2 (K).

Singhasatit S. 141: 15.1.

Sirirugsa P. 840a (BKF); **960a**: 20.1 (BKF, L); **982**: 21.10 (BKF).

Sithipong T. 119: 15.6 (BKF).

Smith E. 660: 12.1 (K).

Smitinand T. et al. **106**: 21.13 (BKF); **310**: 21.13 (BKF); **462**: 15.1 (BKF); **557**: 21.13 (BKF); **660**: 11.5 (BKF); **957**: 11.5 (BKF); **1052**: 21.13 (BKF); **1110**: 15.1 (BKF, K, L); **1176**: 11.8 (BKF); **1195**: 21.10 (BKF); **1325**: 13.4 (BKF); **1354**: 2.1 (BKF); **1588**: 21.5 (BKF); **1590**: 21.7 (BKF); **1641**: 12.1 (BKF, BOR, K); **2293**: 11.2 (BKF); **2306**: 21.1 (BKF); **2329**: 21.1 (BKF, K); **2600**: 15.3 (BKF); **2813**: 11.1 (BKF); **2814**: 11.5 (BKF); **3011**: 11.7 (BKF); **3401**: 13.1 (BKF, K); **3419**: 13.1 (AAU, BKF); **3470**: 13.4 (BKF); **3503**: 12.1 (AAU); **3517**:

13.1 (BKF); **3597**: 17.1 (BKF); **3814**: 13.4 (L); **4095**: 20.1 (BKF); **4104**: 5.2 (BKF); **4108**: 21.13(2) (BKF); **4203**: 6.1 (BKF); **4245**: 21.4 (BKF); **4385**: 4.2 (BKF, K); **4463**: 18.1 (BKF); **4696**: 21.10 (BKF); **4822**: 18.1 (BKF); **5455**: 5.2 (BKF); **6097** 13.1 (BKF, K, L); **6297**: 15.3 (K); **7001**: 11.7 (BKF); **7002**: 2.5 (BKF, C, K, L); **7100**: 5.2 (BKF, K); **7116**: 2.2 (BKF); **7171**: 5.2 (BKF); **7171A**: 5.2 (BKF); **7386**: 11.5 (BKF); **7946**: 21.13(2) (BKF, L); **8331**: 10.1 (BKF, C, K); **8426**: 15.7(2) (BKF); **8467**: 21.13 (BKF); **8479**. 15.2 (BKF); **8483**: 11.1 (BKF); **8538**: 11.5 (BKF); **8688**: 4.1 (BK); **8868**: 15.7 (BKF); **10270**: 21.10 (BKF, C, L); **10523**: 11.5 (BKF); **10558**: (AAU, BKF); **10595**: 8.1 (BKF); **10634**: 6.3 (BKF); **10711**: 15.3 (BKF); **10829**: 2.7 (BKF, C, K, L); **10858**: 10.1(1) (BKF, C); **10944**: 14.1 (AAU, BKF, C, K, L); **11036**: 10.1(1) (BKF); **11349**: 2.4 (BKF); **11513**: 11.5 (BKF, K); **11542**: 11.5 (BKF); **11603**: 11.2 (BKF); **11627**: 11.2 (BKF); **11805**: 21.10 (BKF); **12056**: 2.4 (BKF); **12180**: 21.12 (BKF); **12256**: 11.5 (BKF); **90-127**: 21.13(2) (BKF); **Sn**: 13.2 (BKF).

Songsee 49: 4.1 (L).

Sørensen Th. et al. **675**: 20.1 (BKF, C, K, L); **1238**: 6.1 (BKF, C, K, L); **1259**: 11.8 (BKF, C); **1281**: 21.5 (C); **1348**: 15.3 (BKF, C, K); **1424**: 17.2 (C); **1863**: 13.2 (BKF, K); **2466**: 17.2 (C); **2471**: (BKF, C, K); **2810**: 21.13 (C); **2978**: 21.13(1) (C); **3600**: 11.1 (BKF, C); **3620**: 21.13(1) (C); **3684**: 15.1 (BKF, C); **3810**: 15.7 (BKF, C, K); **4714**: 15.3 (BKF, C); **5028**: 15.3 (BKF, C); **5071**: 17.2 (C); **5098**: 21.13 (C); **5192**: 15.3 (C); **5195**: 18.1 (BKF, C); **5327**: 21.13(1); **5337**: 21.13(1) (C, K); **5516**: 15.1 (BKF, C); **5617**: 15.3 (BKF, C); **5645**: 21.13(1) (C); **5859**: 15.3 (BKF, C); **6112**: 15.4 (C); **7066**: 21.13 (C); **7327**: 15.3 (BKF, C); **7772**: 15.3 (BKF, C).

Steenis C.G.G.J. 19593: 21.2 (L).

Sukarin S. 4: 9.1 (BKF).

Sukkri B. 29: 21.13 (BKF); **456**: 15.1 (BKF); **Sn**: 21.11 (BKF).

Suthison S. 465: 6.3 (BK); **1274**: 13.1 (BK); **1523**: 4.2 (BK); **2477**: 9.1 (BK).

Suvanakoses P. 38: 15.5 (BKF); **145**: 20.1 (BKF); **186**: 15.2 (BKF); **288**: 20.1 (BKF); **428**: 11.2 (BKF); **683**: 4.1 (BKF); **802**: 20.1 (BKF); **845**: 17.2 (BKF); **911**: 15.1 (BKF); **1113**: 11.3 (BKF); **1142**: 21.13 (BKF); **1143**: 21.13(1) (BKF); **1210**: 9.1 (BKF); **1520**: 15.3 (BKF); **1779**: 20.1 (BKF, L); **1791**: 21.7 (BKF); **1797**: 15.2 (BKF); **1800**: 21.10 (BKF); **1824**: 20.1 (BKF); **1978**: 21.3(1) (BKF).

Suvanasara R. 26: 15.5 (BKF).

Suvanasudhi 302: 21.13 (BKF); **Sn**: 2.1 (BKF).

Suvathabhandhu K. 177: 15.1 (K, L, Sing); **182**: 15.2 (K, L).

Tagawa M. et al. **T-295**: 15.4 (AAU, C, K, KYO, L); **T-2249**: 15.3 (BKF, KYO, L); **T-4651**: 20.1 (BKF); **T-6718**: 20.1 (L); **T-8669**: 15.1 (BKF, KYO); **T-9150**: 15.1 (BKF, L); **T-9151**: 15.1 (BKF, L); **T-9818**: 21.13(1) (BKF, L).

Thavon S. 40: 21.7 (BK, BKF); **51**: 21.13 (BKF); **190**: 21.13 (BKF); **317**: 2.1 (BKF); **318**: 15.2 (BKF); **359**: 15.2 (BKF); **370**: 21.13(2) (BKF); **533**: 17.1 (BKF); **648**: 20.1 (BKF); **681**: 5.2 (BKF); **682**: 5.1 (BKF); **978**: 17.1 (BKF).

Thaworamas D. 6: 2.2 (BKF).

Thonanon N. 9: 8.1 (BKF); **32**: 8.1 (BKF).

Tresukon U. Sn: 11.5 (BKF).

Tuyama T. 58152: 6.1 (KYO).

Ubolcholaket A. 94: 2.4 (AAU); **336**: 2.4 (AAU).

Vacharapong 87: 15.2 (KYO).

Vanakit S. 98: 2.4 (BKF).

Van der Kevie 32: 2.4 (K).

Vanpruk T.S. 51: 11.1 (BKF); **82**: 12.1 (BKF); **182**: 9.1 (BKF, K); **217**: 17.1 (BKF, K); **224**: 11.9 (K); **333**: 15.1 (BKF); **334**: 21.3 (K); **335**: 15.3 (BKF, K); **353**: 21.13(1) (K); **409**: 21.13 (BKF, K); **503**: 21.5 (K); **603**: 11.9 (K); **637**: 15.2 (BKF, K); **650**: 21.10 (BKF, K); **699**: 14.1 (BKF, K); **768**: 11.5 (K); **769**: 11.5 (BKF, K); **830**: 21.10 (BKF, K); **1026**: 15.5 (BKF, K).

Vesterdal A. 11: 15.7 (C); **482**: 15.2 (C).

Vidal J.E. 5817: 17.1 (BKF); **6370**: 10.1(1) (BKF, K).

Yonebayashi C. 93013: 15.3 (BKF).

Walker E.H. 7912: 13.2 (KYO).

Whitmore T.C. 3121: 21.12 (K).

Williams L. 17159 (BKF, K); **17167**: 15.2 (BKF).

Winit 106: 6.3 (BKF); **107**: 12.1 (BK, K); **108**: 17.1 (K); **167**: 21.13 (BKF); **337**: 15.3 (K); **338**: 15.7 (BKF, K); **339**: 15.5 (K); **464**: 16.1 (K); **629**: 18.1 (BKF, K); **651**: 13.2 (K); **722**: 9.1 (BKF); **772**: 9.1 (K); **783**: 15.2 (BKF); **805**: 21.10 (BKF) (note this number have two number the other one is 21.13(1) (BKF, K); **823**: 13.2 (BKF, BK, K); **838**: 21.13 (BKF, K); **842**: 21.11 (BKF); **1249**: 21.13 (BKF, K); **1274**: 11.3 (BKF, K); **1444**: 15.4 (K); **1472**: 13.1 (BKF, K); **1507**: 15.6 (BKF, K); **1627**: 21.13 (BKF, K); **1631**: 13.4 (BK, BKF, K); **1770**: 13.1 (BK, BKF, K); **1783**: 15.2 (K); **1805**: 21.10 (K); **1863**: 4.2 (K).

Witt D.O. 33: 11.5(2) (K).

Wongprasert T. 23: 11.1 (C, K).

Yoda K. 899: 15.3 (KYO); **957**: 15.3 (KYO); **961**: 15.3 (KYO); **1046**: 15.3 (KYO).

Zimmermann R. 48: 21.2 (K, L); **128**: 21.1 (K)