

MALPIGHIACEAE

PUANGPEN SIRIRUGSA*

Shrubs, small trees or woody climbers, usually with an indumentum of characteristic medifixed hairs. Leaves simple, entire, opposite, mostly petiolate. Stipules present. Inflorescences, racemose or paniculate or flowers solitary or paired. Pedicels articulate. Bracts and bracteoles present. Flowers bisexual. Calyx 5-merous, persistent, sometimes with 1–10 glands. Petals 5-merous, sometimes unequal; mostly with a claw. Disk inconspicuous. Stamens 10, unequal; filaments often broadened and connate at the base. Ovary superior, 3-locular, 3-lobed; styles 3, if 1 the other 2 abortive; ovule 1 in each loculus. Fruit a schizocarp, splitting into samaras, more or less winged or drupaceous mericarps.

About 60 genera and 700 species, mostly in the tropics. Six genera and 22 species in Thailand.

KEY TO THE GENERA

- 1. Leaves with 2 basal glands or lower surface of lamina with gland dots. Inflorescences racemose
- 2. Style 1 well developed (one species of *Hiptage* has additional, rudimentary styles); ovary hairy. Fruits winged. Woody climber
 - 3. Calyx lobes hairy. Mericarps with 3 wings, the middle wing often the longest **1. Hiptage**
 - 3. Calyx lobes glabrous. Mericarps with more than 3 wings, usually 8 and together star-shaped **2. Tristellateia**
- 2. Styles well developed, ovary glabrous. Mericarp not winged. Shrub (cultivated) **Galphimia gracilis** Bartling
- 1. Leaves without glands. Inflorescences racemose, paniculate, or flowers solitary or paired
- 4. Woody climber. Inflorescences paniculate, usually many-flowered. Mericarps winged **3. Aspidopterys**
- 4. Shrubs, inflorescences racemose, or flowers solitary or paired. Mericarps slightly winged or drupaceous
 - 5. Calyx glands absent. Flowers actinomorphic. Nodes brownish hairy. Mericarps slightly winged **4. Brachylophon**
 - 5. Calyx glands present. Flowers zygomorphic. Nodes glabrous. Mericarps drupaceous (cultivated) **5. Malpighia**

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1. HIPTAGE

Gaertn., Fruct. 2: 169. t. 116. 1790; Juss., Ann. Sci. Nat. Bot. Sér. 2. 13: 268. 1840; Benth. & Hook.f., Gen. Pl. 1: 258. 1862; Niedenzu in Pflanzenfam. ed. 1.3. 4: 54. 1897; Niedenzu in Pflanzenr. 91: 67. 1928.

Woody climbers or shrubs. Leaves mostly coriaceous, often with 2 basal glands, sometimes on the lower surface with marginal and laminal gland dots; lateral veins anastomosing; petioles sometimes with 2, mostly sulcate glands. Stipules minute, triangular, caducous. Inflorescences racemose, axillary or terminal, mostly hairy. Bracts lanceolate or triangular, hairy, caducous. Bracteoles mostly acute, hairy, adnate to the pedicel, below the articulation, caducous. Flowers bisexual, zygomorphic, white, pale yellow or pink. Calyx with one large external gland, basally adnate to the lobe, sometimes decurrent on the pedicel, or with 2 small glands, basally adnate to the margin of each lobe, sometimes inconspicuous or absent. Sepals oblong, ovate, elliptic or lanceolate, rarely orbicular, outside hairy, inside glabrous, often ciliate. Petals clawed, unequal, outside hairy, inside glabrous. Stamens glabrous, unequal (slightly unequal), mostly 1 distinctly the longest; tip curved, almost as long as the style. Ovary 3-lobed, hairy; style 1 with acute tip (in *H. gracilis* furthermore 2 rudimentary ones) tip; curved or curled; the other two hardly developed. Fruit a schizocarp with 3 globular mericarps; mericarp coriaceous; each with 3 wings; middle one often the longest; 2 lateral wings, more or less similar to each other, sometimes hardly developed (in *H. monopteryx*); dorsal crest sometimes present.

About twenty-five species in Tropical Asia. Ten species are recorded from Thailand.

KEY TO THE SPECIES

- 1. Calyx glands conspicuous, dark-coloured or large
- 2. Lower surface of leaves without marginal gland dots. Calyx glands one or more, mostly orbicular or ovate, rarely up to 2 mm long. Mericarps with the middle wing longer than the lateral ones, rarely longer than 2 cm
- 3. Style hairy. Mature leaves glabrous on lower surface. Calyx mostly with one gland **1. H. detergens**
- 3. Style glabrous. Mature leaves tomentose on lower surface. Calyx mostly with more than 1 gland **2. H. bullata**
- 2. Lower surface of leaves, mostly with marginal gland dots. Calyx glands mostly solitary, elliptic, oblong, triangular, lanceolate, linear or obovate, usually more than 2 mm long. Mericarps with three similar wings or middle wing longer than the lateral ones, usually more than 2 cm long, and up to 6 cm
- 4. Peduncle 5–10 mm long, rarely longer. Pedicel 3–5 mm long, articulate below the middle. Mericarps with 3 similar wings, linear, spine-like, 1–1.5 cm long **3. H. triacantha**
- 4. Peduncle more than 10 mm long. Pedicel 8–20 mm long, articulate at the middle. Mericarp with the middle wing oblong or obovate, 3–5 cm long, longer than the lateral ones **4. H. benghalensis**
- 1. Calyx glands inconspicuous or absent

5. Pedicels usually glabrous, at least above the articulation
 6. Rachis glabrous, rarely sparsely white hairy. Lower leaf surface with marginal gland dots
 5. *H. lucida*
 6. Rachis yellow hairy. Lower leaf surface without marginal gland dots
 6. *H. glabrifolia*
 5. Pedicels hairy
 7. Lower surface of leaves with laminal gland dots, at least 1 pair, usually below the middle of the leaf
 7. *H. calcicola*
 8. Leaves at margin darkened, not recurved; base usually rounded; when young brownish pubescent. Glands dark-coloured. Sepals elliptic. Petals suborbicular, slightly crenate
 8. *H. gracilis*
 8. Leaves at margin not darkened, recurved; base usually cuneate; when young whitish pubescent. Glands not dark. Sepals lanceolate or ovate-oblong. Petals oblong
 8. *H. gracilis*
 7. Lower surface of leaves without laminal gland dots
 9. Sepals orbicular, recurved. Pedicels when older or in fruit geniculate at the thickened articulation. Mericarp with well-developed lateral wings, up to 2 cm long
 9. *H. condita*
 9. Sepals oblong, not recurved. Pedicel when older or in fruit straight, articulation not thickened. Mericarp with hardly developed lateral wings, rarely up to 5 mm long
 10. *H. monopteryx*

1. *Hiptage detergens* Craib, Kew Bull. 1926: 157; in Fl. Siam. En. 1: 202. 1926; Niedenzu in Pflanzenr. 91: 43. 1928. Figure 58: A-D.

Woody climber; branches appressed yellow hairy, glabrescent. *Leaves* elliptic-oblong or ovate-oblong, 3–5 by 1–2 cm; apex acute to acuminate; base obtuse or cuneate; young leaves with a dense caducous pubescence, often with 2 basal glands; upper surface shiny; lateral veins 6–9 pairs; petioles hairy, 3–7 mm long. *Inflorescences* ca 2–3 cm long, pale yellowish hairy; peduncle mostly less than 1 cm; pedicels yellow pubescent, articulate at the middle, 6–10 mm; bracts lanceolate, ca 1–5 mm long; bracteoles lanceolate, 1.2–1.5 mm long. *Flowers*: calyx gland (rarely more than one), conspicuous, ovate or suborbicular often concave, 1.5–2 mm in diam., adnate to the base of the calyx, sometimes decurrent on the pedicel. *Sepals* oblong, apex rounded; base truncate, ca 2 by 1 mm. *Petals* orbicular or ovate; apex rounded; base auriculate; margin serrate-crenate, ciliate, claw 1–1.5 mm; limb 6 by 5–6 mm. *Stamens*: the longest filament ca 7–9 mm; the short ones, 3–5 mm long; anthers 0.5–0.7 mm. *Ovary* 2–3 mm in diam., style 6–8 mm long, hairy. *Mericarps* yellowish or whitish hairy, coriaceous; the middle wing obovate-oblong, apex rounded, irregularly crenate or lobed, 1–1.4 cm long; lateral ones oblong, 0.5–1 cm long with a short dorsal crest.

Thailand.—PENINSULAR: Phangnga, Pulau Panyi (type: HANIFF & NUR 4007, ABD, K).

Distribution.—Endemic to Thailand.

Ecology.—On limestones hill in evergreen forests; ca 200 m alt.

2. *Hiptage bullata* Craib, Kew Bull. 1926: 155; in Fl. Siam. En. 1: 201. 1926; Niedenzu in Pflanzenr. 91: 72. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1: 520. 1945. Figure 58: E-H.

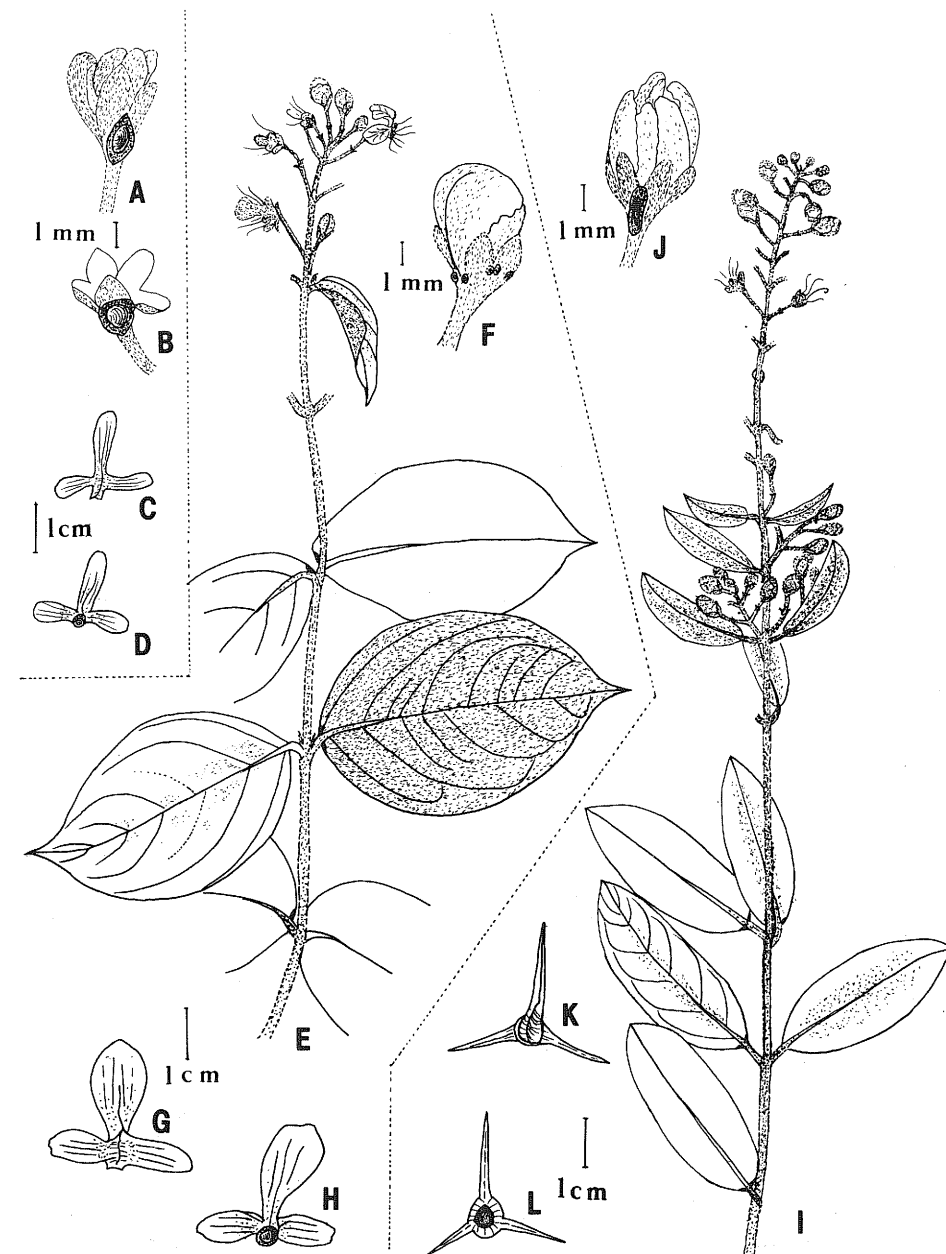


Figure 58. *Hiptage detergens* Craib: A-B. flowers, showing calyx-lobes and calyx glands; C. mericarp, dorsal side; D. mericarp, ventral side.— *H. bullata* Craib: E. flowering branch; F. bud; G. mericarp, dorsal side; H. mericarp, ventral side.— *H. triacantha* Pierre: I. flowering branch; J. flower; K. mericarp, dorsal side; L. mericarp, ventral side.

Straggling shrub; young branches yellowish hairy, glabrescent, reddish-brown. *Leaves* ovate, ovate-elliptic to ovate-oblong, (4.5–)6–12(–14.5) by 3–8.5 cm; apex mucronate or acuminate, rarely obtuse; base rounded to subcordate, often with 2 basal glands; upper surface tomentose when young, glabrescent; lower surface tomentose, nerves more prominent; lateral veins 5–7 pairs; petiole tomentose when young, 5–10 mm long. *Inflorescences* pale yellowish hairy, 4–13 cm long; peduncle ca 1.5 cm long; pedicels hirsute, ca 8–12 mm long, articulate about the middle; bracts triangular, ca 3 by 1.5–2 mm; bracteoles acute, 1–2 mm long. *Flowers*: calyx glands orbicular, often less than 1 mm in diam., usually 2 on each lobe. *Sepals* ovate or oblong; apex rounded; base truncate, 2.5–3 by 2 mm. *Petals* white, with patches of yellow at the base, suborbicular; base truncate or cuneate; margin crenate-dentate, claw 1–1.5 mm; limb ca 8 by 6 mm. *Stamens*: often one filament broader, ca 3 mm long; the slender filaments, 4–5 mm long; anthers 1.5–2 mm long. *Ovary* ca 2 mm in diam., style ca 3 mm long, glabrous. *Mericarps* white, long hairy; the middle wing obovate, apex rounded or slightly lobed, 1.7–2 by 0.8–1 cm; lateral wings oblong, 1–1.3 by 0.5–0.6 cm, mostly without a dorsal crest.

Thailand.—NORTHERN: Chiang Mai, Uttaradit (Kaeng Ap Nang, Mae Ping Rapids, type: KERR 2945; ABD, K).

Distribution.—Endemic to Thailand.

Ecology.—On limestone rocks in scrub forest; 200–500 m alt.

3. *Hiptage triacantha* Pierre, Fl. For. Cochinch. 18 : t. 274. 1893; Dop in Fl. Gén. I.-C. 1 : 596. 1911; Niedenzu in Pflanzenr. 91 : 72. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1 : 515. 1945. Figure 58 : I-L.

Shrub; branches glabrous, yellow-brown hairy when young. *Leaves*: elliptic to elliptic-oblong, rarely obovate, 3–7 by 1–3 cm; apex obtuse, rarely mucronate; base obtuse to cuneate; young leaves white hairy, older glabrous, often with 2 basal glands; lower surface mostly with marginal gland dots; lateral veins 5–8 pairs; petiole glabrescent, 4–5 mm. *Inflorescences* 4–10 cm, yellowish hairy; peduncle 5–10(–12) mm long; pedicels yellowish tomentose, in flowers 3–5 mm long, in fruits ca 8 mm long, articulate below the middle; bracts lanceolate, 2–4 mm long; bracteoles linear-lanceolate, 1–2 mm long. *Flowers*: calyx gland prominent, (rarely 2), oblong, linear or obovate, sometimes convex, at base of calyx lobe, sometimes decurrent on pedicel, 1.5–3 by 0.7–1 mm. *Sepals* oblong, apex rounded; base truncate, ca 4 by 1 mm. *Petals* white or pale yellow; ovate-oblong to oblong, apex rounded; base auriculate; margin crenate-dentate, ciliate; claw ca 1 mm long; limb 6–9 by 3–5 mm. *Stamens*: the longest filament, ca 8 mm long; the short ones, ca 3 mm long; anthers ca 1 mm long. *Ovary* 1–2 mm in diam.; style ca 5 mm long, glabrous. *Mericarps* pale yellow or white hairy; all three wings similar, linear, spine-like, apex acute, or middle wing often apically lobed, 1–1.5 cm long.

Thailand.—NORTH-EASTERN: Nakhon Phanom, Khon Kaen; EASTERN: Nakhon Ratchasima, Ubon Ratchathani; SOUTH-EASTERN: Prachin Buri.

Distribution.—Indochina (type).

Ecology.—In deciduous forests; 50–200 m alt.

Vernacular.—Khrua kluai noi (เครื่องถ้วยน้อย), sam hun khrua สามหุนเครื่อง (North-eastern).

4. *Hiptage benghalensis* (Linn.) Kurz, J. Asiat. Soc. Bengal 43 (2): 136. 1874; Pierre, Fl. For. Cochinch. 18 : t. 273. 1893; Craib in Fl. Siam. En. 1 : 201. 1926; Niedenzu in Pflanzenr. 91 : 77. 1928; Jacobs in Fl. Males. I. 5 : 132. 1955; Back. & Bakh. f., Fl. Java 1 : 439. 1963.—*Banisteria benghalensis* Linn., Sp. Pl.: 427. 1753.—*H. madablota* Gaertn., Fruct. 2 : 169, t. 116. 1791; Juss., Ann. Sci. Nat. Bot. Sér. 2.13 : 268. 1840; Arch. Mus. Hist. Nat. 3 : 502. 1843; Kurz, Fl. Burma 1 : 173. 1877; Dop in Fl. Gen. I.-C. 1 : 598. 1911; Ridl. in Fl. Mal. Pen. 1 : 328. 1922; Arènes in Fl. Gén. I.-C. Suppl. 1 : 515. 1945; Hook. f. in Fl. Br. Ind. 1 : 418. 1874.—*H. harmandiana* Pierre, l.c. 17 : t. 270.—*H. candicans* Hook. f. var. *harmandiana* (Pierre) Dop, Bull. Soc. Bot. Fr. 55 : 429. 1908.—*H. candicans* Hook. f. var. *angustifolia* Craib, l.c.: 202.—*H. teysmannii* Arènes, Reinwardtia 3 : 69. 1928. Figure 59; Plate XX: 21.

a. ssp. *benghalensis*

Woody climber; young branches appressed pale brownish hairy, glabrescent. *Leaves* elliptic, oblong, obovate, ovate to lanceolate, 5(–8)–15(–18) by 3–7(–11) cm; apex acuminate, rarely acute or mucronate; base cuneate or rounded; young leaves pale brownish pubescent; mature leaves with upper surface glabrous, often shiny; lower surface mostly with 2 basal glands and marginal gland dots; lateral veins (4–) 5–6(–7) pairs; petioles pubescent when young, usually glabrescent, thick, mostly dark coloured, (3–) 6–10(–13) mm. *Inflorescences* (4–) 9–22(–30) cm long, pubescent; peduncle (0.5–) 1.5–4 cm; pedicels pubescent, articulate at the middle, in flowers 8–20 mm, in fruits 10–25 mm; bracts lanceolate, 2–4 mm long; bracteoles acute, ca 1 mm long. *Flowers*: calyx gland (usually only 1) prominent, elliptic, oblong, triangular, lanceolate to oblanceolate, often convex at the base of calyx lobe, sometimes more or less decurrent on the pedicel, 2–4 by 1 mm. *Sepals* ovate to elliptic; apex rounded; base truncate, ca 2.5 by 2 mm. *Petals* white, with yellowish blotches, ovate-oblong to orbicular; apex rounded; base truncate or auriculate; margin fringed; claw 1–2 mm long; limb rounded, 6–8 mm in diam. *Stamens*: the longest filament ca 12 mm long; the short ones ca (3–) 4–5(–6) mm; anthers 1–2 mm long. *Ovary* ca 2 mm in diam.; style ca 1 cm long, glabrous. *Mericarps* hairy, the middle wing oblong or obovate, apex acute or rounded, sometimes lobed, (2.5–) 3–5(–6) by 1–1.5(–2) cm; lateral wings 1.5–3 cm, sometimes with dorsal crest; dorsal wing present or not, ca 5–8 by 1–2 mm.

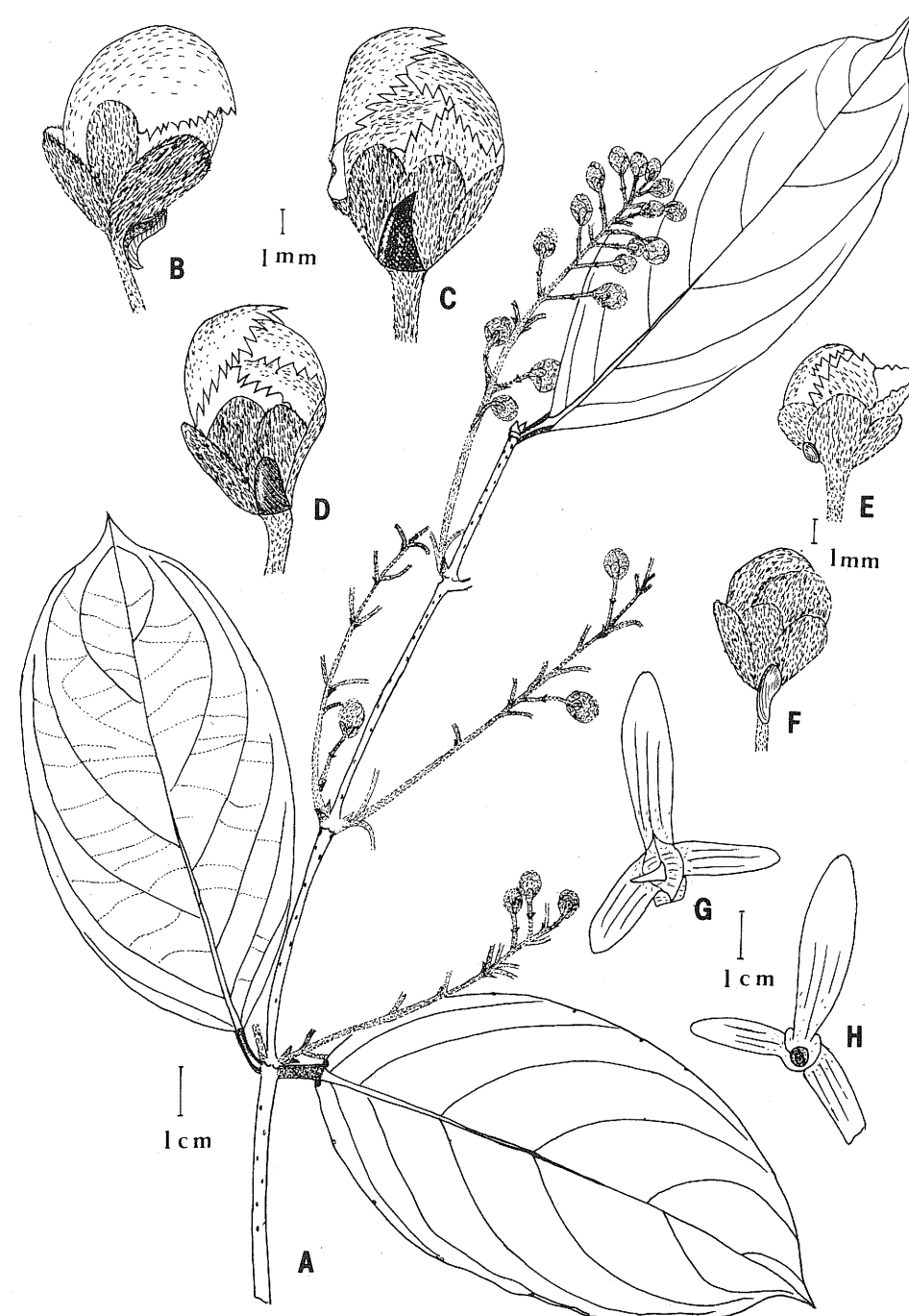


Figure 59. *Hiptage benghalensis* (Linn.) Kurz: A. flowering branch; B-F. buds, showing the variations of calyx glands; G. mericarp, dorsal side; H. mericarp, ventral side.

Thailand.— Widespread throughout the country.

Distribution.— Burma (type), India, China, Indo-China and Malesia.

Ecology.— Limestone cliffs, lower mixed deciduous forest, scrub jungle, edge of evergreen forest, and near the beach; sea level to 2000 m alt.

Vernacular.— Salao (สะเลา), phaya chang phueak (พญาช้างเผือก), kamlang chang phueak (กำลั้งช้างเผือก) (Northern); kalang chang (กะลั้งจาง) (Karen/Northern); nora (โนรา) (Central); haen pik (แพนปึก) (North-eastern).

b. ssp. *candicans* (Hook.f.) Sirirugsa, stat. nov.— *H. candicans* Hook.f., Fl. Br. Ind. 1 : 419. 1874.— incl. var. *parvifolia* Pierre, Fl. For. Cochinch. 17 : t. 271. 1892.— var. *latifolia* Pierre, l.c.— var. *cuneiformis* Arènes, Notul. Syst. (Paris) 11 : 68. 1943.— var. *lanata* Arènes, l.c.: 69.

Shrub or small tree, up to 10 m tall. Lower surface of leaves often more densely pubescent than in ssp. *benghalensis*.

Thailand.— NORTHERN: Chiang Mai (Mae Taeng, Mae Sa, Doi Suthep), Lampang, Lamphun, Kamphaeng Phet; NORTH-EASTERN: Phetchabun, Khon Kaen, Loei; SOUTH-EASTERN: Chon Buri (Si Racha); SOUTH-WESTERN: Kanchanaburi, Phetchaburi (Khao Yoi).

Distribution.— India, Burma (type), Yunnan.

Ecology.— Common on hill in deciduous forest and in open evergreen forest; ca 300–1600 m alt.

Vernacular.— Kamlang chang phueak (กำลั้งช้างเผือก) (Northern); phaya chang phueak (พญาช้างเผือก) (South-western); kasong wasoe (กาซองวาซอ) (Karen/South-western).

5. *Hiptage lucida* Pierre, Fl. For. Cochinch. 18 : t. 273. 1893; Dop in Fl. Gén. I.-C. 1 : 595. 1911; Craib in Fl. Siam. En. 1 : 202. 1926; Niedenzu in Pflanzenr. 91 : 71. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1 : 524. 1945. Figure 60 : A-C.

Woody climber; branches glabrous, shiny; nodes sparsely white hairy; buds pubescent. *Leaves* elliptic or elliptic-oblong, 5.5–11.5 by 1.5 cm; apex acuminate or mucronate; base rounded, glabrous, mostly with 2 basal glands; lower surface often with marginal gland dots; lateral veins 4–7(–8) pairs; petiole glabrous, ca 5 mm long. *Inflorescences* up to 14 cm long; peduncle and rachis glabrous, or rarely sparsely white hairy; peduncle ca 2 cm long; pedicels glabrous, or rarely sparsely white hairy, 1–2.2 cm, articulate mostly below the middle; bracts triangular, ca 2 by 1 mm; bracteoles acute, ca 1 mm long. *Flowers*: calyx glands very small, inconspicuous. *Sepals* ovate to oblong; apex acute to rounded; base truncate, ca 2.5 by 1.2 mm. *Petals* pink, obovate or suborbicular; apex rounded; base truncate or cuneate; margin fimbriate; claw 1.5–2.5 mm; limb 8–10 by 7–8 mm. *Stamens*: the longest filament ca 8–9

mm, the short ones 3–5 mm long; anther ca 1 mm long. *Ovary* ca 2 mm in diam; style ca 1 cm long, glabrous. *Mericarps* mostly glabrous; sometimes sparsely white hairy; middle wing oblong, apex rounded or lobed, 3–4.5 by 0.7–1.2 cm; lateral wings 1.5–2.2 by 0.6–1 cm.

Thailand.—CENTRAL: Krung Thep (Bangkok); SOUTH-EASTERN: Prachin Buri, Chon Buri (Si Racha).

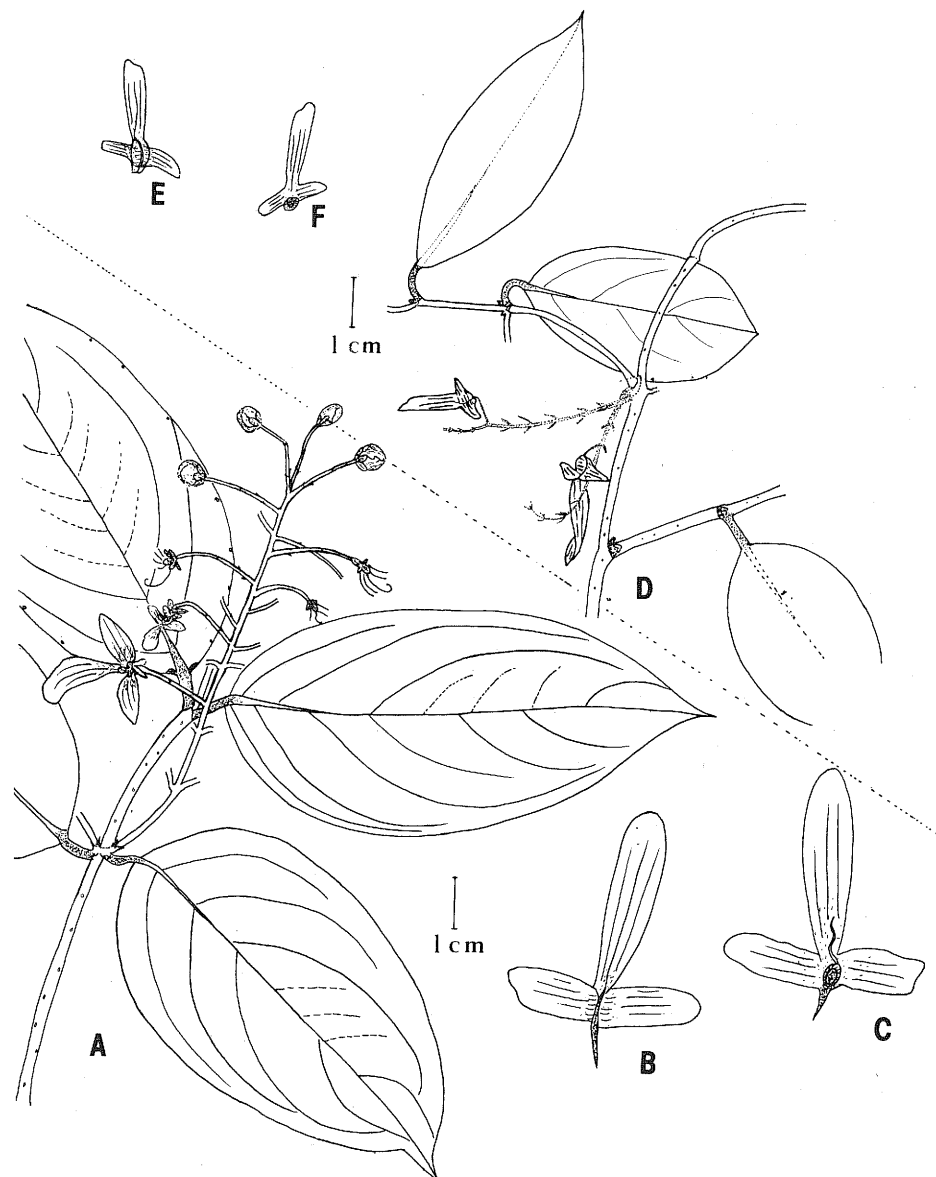


Figure 60. *Hiptage lucida* Pierre: A. flowering branch; B. mericarp, dorsal side; C. mericarp, ventral side.— *H. glabrifolia* Craib: D. fruiting branch; E. mericarp, dorsal side; F. mericarp, ventral side.

Distribution.— Chochin-China (type).

Ecology.— Near the beach, dry evergreen forest; sea-level to 100 m alt.

Vernacular.— Nori (โนรี) (Central).

6. *Hiptage glabrifolia* Craib, Kew Bull. 1915 : 425; in Fl. Siam. En. 1 : 202. 1926; Niedenzu in Pflanzenr. 91 : 83. 1928; Arenes in Fl. Gén. I.-C. Suppl. 1 : 522. 1945. Figure 60: D-F.

Woody climber; branches glabrous. *Leaves* elliptic or elliptic-oblong, 5.5–13.5 by 2–4.5 cm; apex acuminate, or obtuse; base rounded or cuneate; both surfaces glabrous; upper shiny, often with 2 basal glands; margin light coloured, without marginal gland dots; lateral veins, 5–8 pairs; petiole glabrous, ca 1 cm long. *Inflorescences* up to 6 cm long, yellowish hairy; peduncle short, 1–3 mm long; pedicels glabrous, except below the articulation, articulate at the middle, in flower ca 2.5 mm long, in fruit ca 5 mm long; bracts triangular, keeled, 1.5–2 mm long; bracteoles triangular, keeled, ca 1 mm long. *Flowers*: calyx glands inconspicuous. *Sepals* oblong; apex rounded; base truncate, 1–1.5 by 0.5–1 mm. *Petals* caducous, delicate, oblong; apex rounded; base cuneate and decurrent; margin slightly crenate; claw ca 1 mm long; limb ca 3 by 1 mm. *Stamens*: the longest filament ca 3 mm; the short ones, 1–1.5 mm; anthers ca 0.5 mm long. *Ovary* 0.5–1 mm in diam.; style 3–4 mm long, glabrous. *Mericarps* sparsely hairy at the centre; middle wing oblong; apex mostly 2-lobed, 15–19 by 3–5 mm; lateral wings, 5–7 by 2–3 mm.

Thailand.—NORTHERN: Chiang Mai (Mae Ping Rapids, Kaeng Soi—type: KERR 2941, ABD, BM, E, K).

Distribution.— Endemic to Thailand.

Ecology.— In evergreen forest by river; ca 180 m alt.

7. *Hiptage calcicola* Sirirugsa, Nord. J. Bot. 7 : 277. 1987. Figure 61: A-G.

Scrambling shrub; young branches yellowish hairy, glabrescent. *Leaves* elliptic or ovate, 3–10.5 by 1–4.5 cm; apex mucronate or acuminate, rarely rounded; base rounded rarely subcordate; young leaves yellowish pubescent; mature leaves glabrous; margin dark-coloured; upper surface shiny; lower surface without basal glands and marginal gland dots, often with 1 or 2 pairs of dark-coloured laminal glands near base; lateral veins 5–7 pairs; petiole not thickened, yellowish hairy when young, glabrescent, 6–10 mm long. *Inflorescences* yellowish hairy, up to 12 cm; peduncle 1–2.5 cm; pedicels pubescent, in flower 0.4–1.5 cm long, in fruit 1.5–2 cm long, articulate below the middle; bracts lanceolate, ca 2 mm long; bracteoles acute, ca 1 mm long. *Flowers*: calyx glands small, inconspicuous, sometimes absent. *Sepals* elliptic, apex rounded; base truncate, ca 1.5 by 0.8 mm. *Petals* white, suborbicular; apex rounded; base

truncate or auriculate; margin slightly crenate, ciliate; claw 1–2 mm long; limb 3.5–4 by 3.5–4 mm. *Stamens*: filaments 1–2.5 mm; anthers 0.5–1 mm. *Ovary* ca 1 mm in diam.; style ca 4 mm long, glabrous. *Mericarps* yellowish hairy, more sparsely towards the apex, chartaceous; middle wing oblong, apex 2-lobed or rounded, 2–2.5 by 0.5–0.8 cm; lateral wings oblong, 1–1.2 by 0.3–0.5 cm.

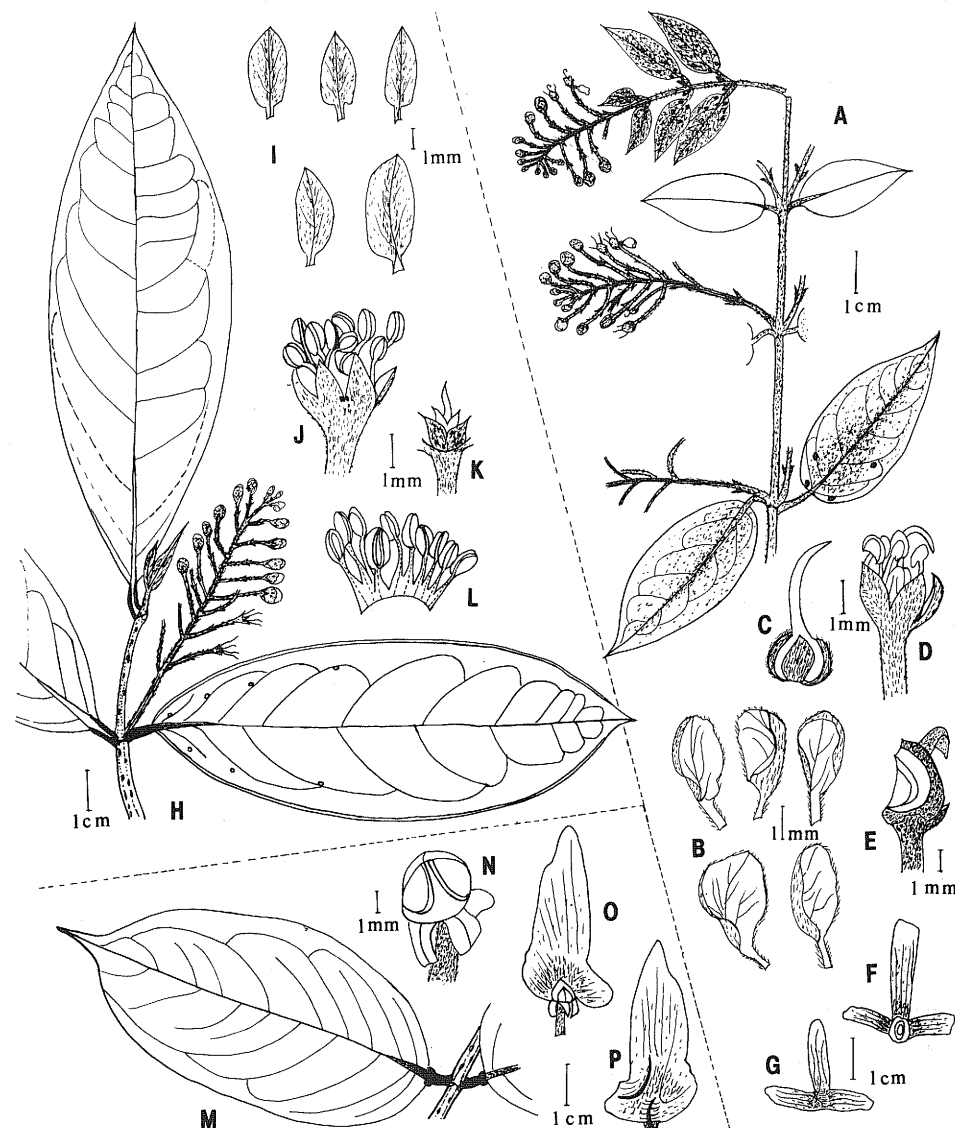


Figure 61. *Hiptage calcicola* Sirirugsa: A. flowering branch; B. petals; C. ovary and style; D. flower with petals removed; E. carpophore; F. mericarp, ventral side; G. mericarp, dorsal side.— *H. gracilis* Sirirugsa: H. flowering branch; I. petals; J. flower with petals removed; K. ovary and styles; L. stamens.— *H. monopteryx* Sirirugsa: M. node and one leaf; N. carpophore; O. mericarp, ventral side; P. mericarp, dorsal side.

Thailand.— SOUTH-WESTERN: Prachuap Khiri Khan (Pran Buri-type: SMITINAND 8512, BKF); PENINSULAR: Phangnga, Phatthalung.

Distribution.— Endemic to Thailand.

Ecology.— On rocky limestone hill, in dry evergreen forest; 10–50 m alt.

Note.— This species is related to *H. stellulifera* Arènes from Indo-China, but is distinguished by its nonstellate indumentum on the leaves.

8. *Hiptage gracilis* Sirirugsa, Nord. J. Bot. 7 : 279. 1987. Figure 61: H-L.

Straggling shrub; branches glabrous. *Leaves* elliptic-oblong, 7–12 by (2.5–) 3–4.5 cm, brownish hairy when young, glabrescent; upper surface shiny; margin recurved; lower surface sometimes with marginal gland dots; basal glands absent, mostly with 1–4 pairs of laminal gland dots, particularly on lower part; apex acuminate, rarely acute or mucronate; base cuneate to obtuse; veins 4–10 pairs; petiole glabrous, ca 5–8 mm long. *Inflorescences* 4–5 cm long, brownish pubescent; peduncle 1.5–2 cm long; pedicels pubescent, articulate at the middle, in flower ca 0.7–1 cm long; bracts triangular, 1–2 mm long; bracteoles acute, ca 1 mm long. *Flowers*: calyx glands very small, inconspicuous, or sometimes absent. *Sepals* lanceolate or ovate-oblong; apex acute; base truncate, ca 2 by 1 mm. *Petals* oblong, ciliate; apex obtuse or rounded; base truncate or auriculate; claw 0.5–0.8 mm; limb 4–5 by 1.5–2 mm. *Stamens*: filaments, 1.5–4 mm long; anthers 0.7–1 mm long, often one distinctly largest. *Ovary* ca 0.5 mm in diam.; style ca 1 mm long, the other two styles slightly developed, ca one third or half as long as the longest one. Schizocarps (not seen).

Thailand.— EASTERN: Chaiphaphum (Nam Phrom Dam-type: SMITINAND & SANTISUK S.n., BKF).

Distribution.— Endemic to Thailand.

Ecology.— In evergreen forest; ca 650 m alt.

Note.— This species is known only from the type collection. The laminal gland dots are rather faint.

9. *Hiptage condita* Craib, Kew Bull. 1926: 156; in Fl. Siam. En. 1 : 202. 1926; Niedenzu in Pflanzenr. 91 : 69. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1 : 581. 1945. Figure 62.

Straggling shrub; branches glabrous; axillary buds covered with long brown hairs. *Leaves* elliptic or elliptic-oblong, rarely lanceolate, 5–9.5 by 2.5–3.5 cm, glabrous; lower surface mostly with 2 basal glands; margin light-coloured and without marginal gland dots; lateral veins 4–6 pairs; petiole glabrous, 5–8 mm long. *Inflorescences* 5–14 cm long, brown hairy; peduncle 1–2 cm long; pedicels brown hairy, articulate at middle or above, when older geniculate at the thickened articulation, in flower 12–15 mm, in fruit 14–20 mm; bracts

lanceolate, 1–2 by 1 mm; bracteoles acute, 1–1.5 mm long. *Flowers*: calyx glands minute, inconspicuous. *Sepals* orbicular, recurved, ca 2 mm in diam. *Petals* white, oblong; apex rounded; base truncate or auriculate; margin fimbriate; claw ca 2 mm long; limb ca 9 by 7–9 mm. *Stamens*: the longest filament ca 1 cm long, the short ones 4–5 mm long; anthers ca 1.5 mm long. *Ovary* 1.5–2 mm in diam.; style ca 1 cm long, glabrous. *Mericarps* glabrous, except at the centre, sparsely red-brown hairy; middle wing elliptic-oblong or oblanceolate-oblong; apex rounded or lobed, ca 1.5 by 0.8 cm; lateral wings, ca 2 by 0.8 cm; dorsal crest, winged, ca 5–8 by 1–2 mm.

Thailand.—NORTHERN: Chiang Rai (Mae Kok, Doi Tham Tu Pu—type: GARRETT 154; ABD, BK, C, K).

Distribution.—Endemic to Thailand.

Ecology.—On precipitous limestone peak; ca 530 m alt.

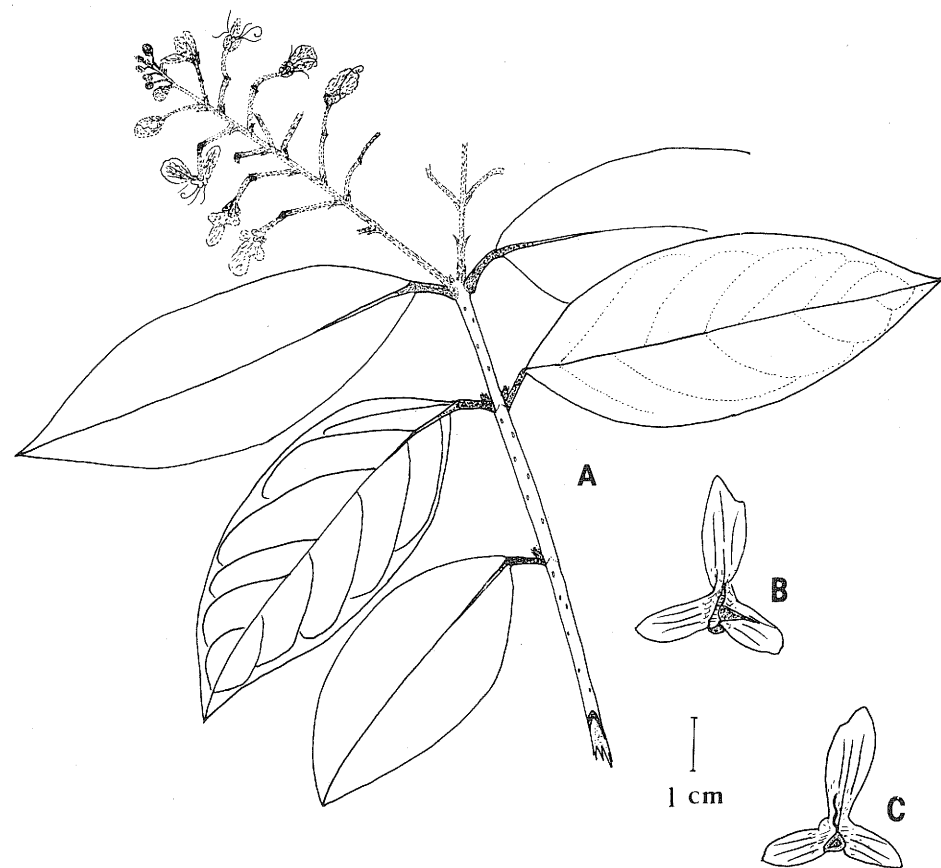


Figure 62. *Hiptage condita* Craib: A. flowering branch; B. mericarp, dorsal side; C. mericarp, ventral side.

10. Hiptage monopteryx Sirirugsa, Nord. J. Bot. 7 : 279. 1987. Figure 61: M-P.

Woody climber; branches glabrous. *Leaves* elliptic to elliptic-oblong, rarely oblanceolate, 6.5–13 by 3–6.5 cm; apex acuminate; base rounded; upper surface glabrous, shiny; lower surface glabrescent, or sparsely brownish hairy, often with 2 basal glands, rarely with marginal gland dots; lateral veins 6–7 pairs; petiole glabrescent. *Inflorescences* (not seen), infructescence ca 4–6 cm long, brownish hairy; peduncle ca 1 cm long; pedicels brownish hairy, articulate at the middle, 1.2–1.5 cm long; bracts triangular, 1.5–2 mm long; bracteoles acute, 0.4–1 mm long. *Flowers*: calyx glands absent. *Sepals* oblong; apex rounded; base truncate, ca 2.5 by 1 mm. *Petals* (not seen). *Ovary*: style glabrous, ca 4 mm long. *Mericarps* brownish hairy, particularly at the centres; middle wing oblong, apex mostly irregularly, 2-lobed, or sometimes acute; lateral wings hardly developed, sometimes only one slightly developed, up to 5 mm long.

Thailand.—SOUTH-EASTERN: Trat (Ko Chang—type: BEUSEKOM & SANTISUK 3179, AAU, BKF, C, E, KYO, L, and P).

Distribution.—Endemic to Thailand.

Ecology.—In evergreen forests; at low alt.

Note.—This species is known only from the type collection. The two basal glands of leaves are the largest to be observed in all species.

2. TRISTELLATEIA

Thouars, Gen. Nova Madag.: 14 no. 47. 1806 (n.v.); *ibid.*: 206. no. 47. 1809; Benth. & Hook.f., Gen. Pl. 1 : 258. 1862; Niedenzu in Pflanzenr. 91 : 57. 1928.—*Zymum* Noronha ex Thouars, Hist. Vég. Isles Austral. Afriq.: 69. t. 23. 1806.

Woody climber; leaf margins with 2 basal glands; petiole with 2 small stipules. *Inflorescences* raceme-like, terminal. *Pedicels* subtended by a bract and with 2 bracteoles at the point of articulation. *Flowers* actinomorphic. *Sepals* glandless, glabrous. *Petals* clawed, entire. *Stamens* unequal, filaments of the outer whorl longest, and also broadest at the base. *Ovary* 3-lobed, hairy; style 1 (rarely 2), well-developed. *Fruits* a winged samara, each carpel with 4–10 irregular appendages, the whole thus star-shaped.

More than twenty species in E. Africa and Madagascar. One species in SE. Asia, including Thailand.

Tristellateia australasiae A. Rich., Sert. Astrol.: t. 15. 1833; Juss., Arch. Mus. Hist. Nat. 3: 495. 1843; Hook.f. in Fl. Br. Ind. 1: 418. 1874; Dop in Fl. Gén. I.-C. 1: 593. 1911; Ridl., Fl. Mal. Pen. 1: 327. 1922; Craib in Fl. Siam. En. 1: 200. 1926; Niedenzu in Pflanzenr. 91: 60. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1:507. 1945; Jacobs in Fl. Males. I. 5:136. 1955. Figure 63; Plate XX: 22.

Youngest parts white hairy. *Leaves* coriaceous, glabrous, sparsely hairy in young leaves, ovate or ovate-oblong, 7–12 by 3–5 cm; apex acute or acuminate; base rounded, sometimes oblique, with 2 basal glands; margin recurved; lateral nerves 4–7 pairs; petiole 1–2 cm long, sulcate, hairy above. *Raceme* terminal,

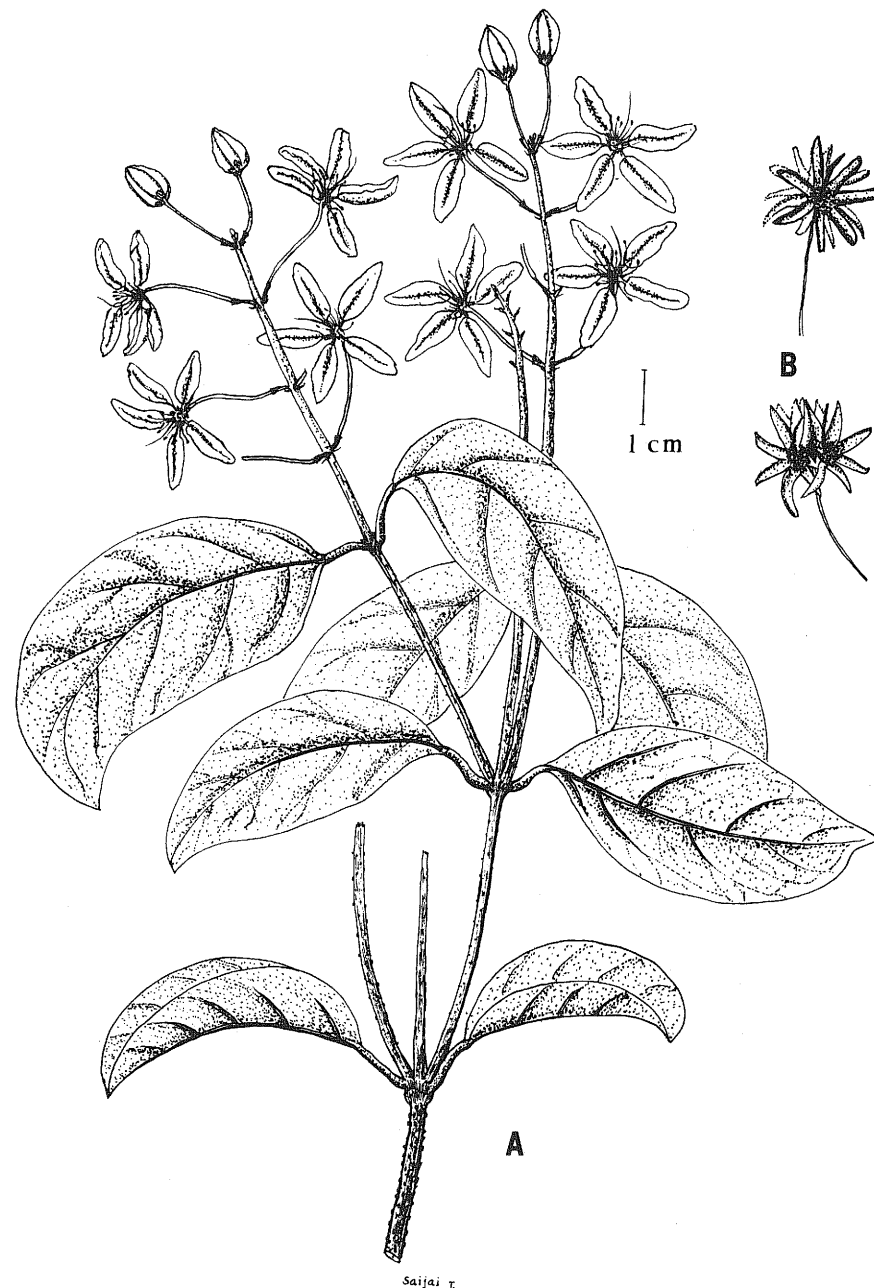


Figure 63. *Tristellateia australasiae* A. Rich.: A. flowering branch; B. mericarp.

10–20 cm long; pedicels decussate, 1.5–3 cm long, articulate below the middle, lower portion persistent; bracts acute, 2–3 mm long, hairy on the back; bracteoles minute, ca 1 mm long, glabrous. *Sepals* triangular, apex obtuse, 3–4 by 2 mm. *Petals* yellow, slightly unequal, 1.5–2 cm long; limb 10–15 by 5–7 mm, oblong; apex obtuse; base truncate. *Stamens*: filaments broad at base, yellow, reddening, bright red after anthesis, 4–5 and 2–3 mm long; anthers 2–3 mm long, connective narrow, but distinct on dorsal side. *Ovary* 2–3 mm in diam. with a whorl of young wings on each carpel; style 6–8 mm long, glabrous. *Mericarps* sparsely white hairy, each carpel irregularly 8-winged, one often larger than the others, 1–2 cm in diam.

Thailand.— SOUTH-EASTERN: Chon Buri (Si Racha); PENINSULAR: Surat Thani (Ko Pha-ngan), Ranong (Kapoe), Phangnga (Takua Pa), Phuket, Krabi (Ko Chong Lat), Trang (Kantang); often cultivated as an ornamental.

Distribution.— Formosa, S. Vietnam (Cochin-China), Malesia, Mergui Islands, Caroline Islands, New Caledonia, New Ireland, Australia (Queensland coast).

Ecology.— In the transitional zone between rain forest and mangrove; widely cultivated.

Vernacular.— Rakhon thong (ระคนทอง) (Northern); phuang thong khrua (พวงทองเครือ) (Central).

3. ASPIDOPTERYS

Juss., Ann. Sci. Nat. Bot. Sér. 2. 13: 266. 1840; Benth. & Hook.f., Gen. Pl. 1: 259. 1862; Niedenzu in Pflanzenr. 91: 19. 1928.

Woody climbers; young parts hairy. *Leaves* and petioles glandless. *Stipules* minute on the branch between the opposite leaves, caducous. *Inflorescences* paniculate, axillary or terminal; bracts hairy; bracteoles on the pedicels below the articulation, hairy; upper portion of pedicel often lengthening in fruit. *Flowers* bisexual, actinomorphic. *Sepals* glandless, margin mostly ciliate. *Petals* white or pale yellow, not clawed, sometimes keeled, thin, glabrous, usually entire, rarely ciliate. *Stamens* glabrous, filaments slightly unequal, slender; bases broadened, sometimes connate; connective inconspicuous. *Ovary* 3-lobed, usually with 3 flat already more or less winged sides; styles 3, free; stigma capitate. *Disk* inconspicuous, later developing into cup-shaped, trimerous, acute lobes. *Fruit* a schizocarp with 3 mericarps, often attached to a carpophore; mericarps 3-winged; dorsal wing hardly developed; 2 laterals developed into one orbicular, ovate or oblong, translucent membranous or coriaceous wings with radial venation. *Seeds* linear or triangular.

About fifteen to twenty species in tropical Asia; six species occur in Thailand.

KEY TO THE SPECIES

1. Petiole usually longer than 1 cm; pedicels glabrous at least above the bracteoles. Lateral mericarp-wings translucent or membranous, suborbicular, orbicular, ovate, or elliptic, 1.5–3.5 cm long
2. Lower surface of leaves glabrous, at least between the veins; margin hyaline, usually sparsely red hairy. Inflorescences rusty brownish pubescent. Lateral mericarp-wings suborbicular or orbicular; carpophore almost absent **1. *A. concava***
2. Lower surface of leaves tomentose or pubescent; margin not hyaline. Inflorescences yellowish or brownish tomentose or pubescent. Lateral mericarp-wings ovate; carpophore present and persistent
3. Ovary glabrous; pedicel hairy at least below the bracteoles, articulate below the middle; lower surface of leaves yellowish or brownish tomentose, at least on the midrib. Lateral mericarp-wings glabrous, translucent; carpophore acute, 4–6 mm long **2. *A. tomentosa***
3. Ovary hirsute; pedicels glabrous, articulate at middle or above; lower surface of leaves whitish pubescent. Lateral mericarp-wings long, white hairy, membranous; carpophore pyramidal, 1–2 mm long **3. *A. nutans***
1. Petiole up to 1 cm long; pedicels hairy. Lateral mericarp-wings coriaceous, oblong or elliptic-oblong, 2.5–6 cm long
4. Calyx-lobes glabrous. Lateral mericarp-wings oblong, glabrous
5. Both leaf surfaces hirsute **4. *A. hirsuta***
5. Upper surface of leaves glabrous; lower brownish pubescent **5. *A. thorellii***
4. Calyx-lobes hairy. Lateral mericarp-wings elliptic-oblong, hairy **6. *A. sp.***

1. *Aspidopterys concava* (Wall.) Juss., Ann. Sci. Nat. Bot. Sér. 2. 13: 266. 1840; Arch. Mus. Hist. Nat. 3: 509. 1843; Hook. f. in Fl. Br. Ind. 1: 420. 1874; Kurz, J. Asiat. Soc. Bengal 43 (2): 137. 1874; Fl. Burma 1: 175. 1877; King, J. Asiat. Soc. Bengal 62(2): 195. 1893; Hutch., Kew Bull. 1917: 98; Ridl., Fl. Mal. Pen. 1: 329. 1922; Nienzen in Pflanzenr. 91: 22. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1: 532. 1945; Jacobs in Fl. Males. I. 5: 129. 1955.— *Hiraea concava* Wall., Pl. As. Rar. 1: 13. 1830. Figure 64.

Young parts red-brown hairy. *Leaves* subcoriaceous, ovate-elliptic to ovate-oblong, 5–9 by 2.5–6 cm; apex retuse; base obtuse or rounded; mature leaves glabrous, except the proximal part of the midrib beneath; margin hyaline and often red hairy; lateral veins 4–5 pairs; petiole 1–1.5 cm long, sparsely hairy. *Inflorescences* rusty brownish pubescent, with short rachis, up to 12 cm long; peduncle 0.5–5 cm long; pedicels articulate at the middle, basal part densely hairy, more sparsely hairy towards the tip, older glabrous, except below the bracteoles, in flower 1–1.5 cm long, in fruit 2.5–3.5 cm long; bracts ca 1 mm long; bracteoles minute. *Sepals* ovate-oblong; apex rounded, ca 2 by 1 mm, glabrous. *Petals* whitish, oblong; apex rounded, 4–5 by 2–3 mm. *Stamens*: filaments 1.5–2 mm long, as long as the anthers. *Ovary* glabrous; styles 3–4 mm long; disk-lobes persistent, ca 2 mm long. *Mericarps*: lateral wings orbicular, pale, translucent; dorsal wing small, broadened towards base. *Seeds* triangular, 5–6 by 3–4 mm.

T h a i l a n d .—PENINSULAR: Phangnga, Krabi, Satun, Narathiwat.

D i s t r i b u t i o n .—Burma (type), Malay Peninsula, Indo-China, Borneo, and Java.

E c o l o g y .—In evergreen forests; 100–400 m alt.

2. *Aspidopterys tomentosa* (Bl.) Juss., Ann. Sci. Nat. Bot. Sér. 2. 13: 267. 1840; Arch. Mus. Hist. Nat. 3: 514. 1843; Kurz, Fl. Burma 1: 175. 1877; Hutch., Kew Bull. 1917: 94; Nienzen in Pflanzenr. 91: 21. 1928; Jacobs in Fl. Males. I. 5: 129. 1955; Back. & Bakh. f., Fl. Java 1: 438. 1963.— *Hiraea tomentosa* Bl., Bijdr.: 225. 1825.— *A. helferiana* Kurz, J. Asiat. Soc. Bengal 43 (2): 137. 1874.—

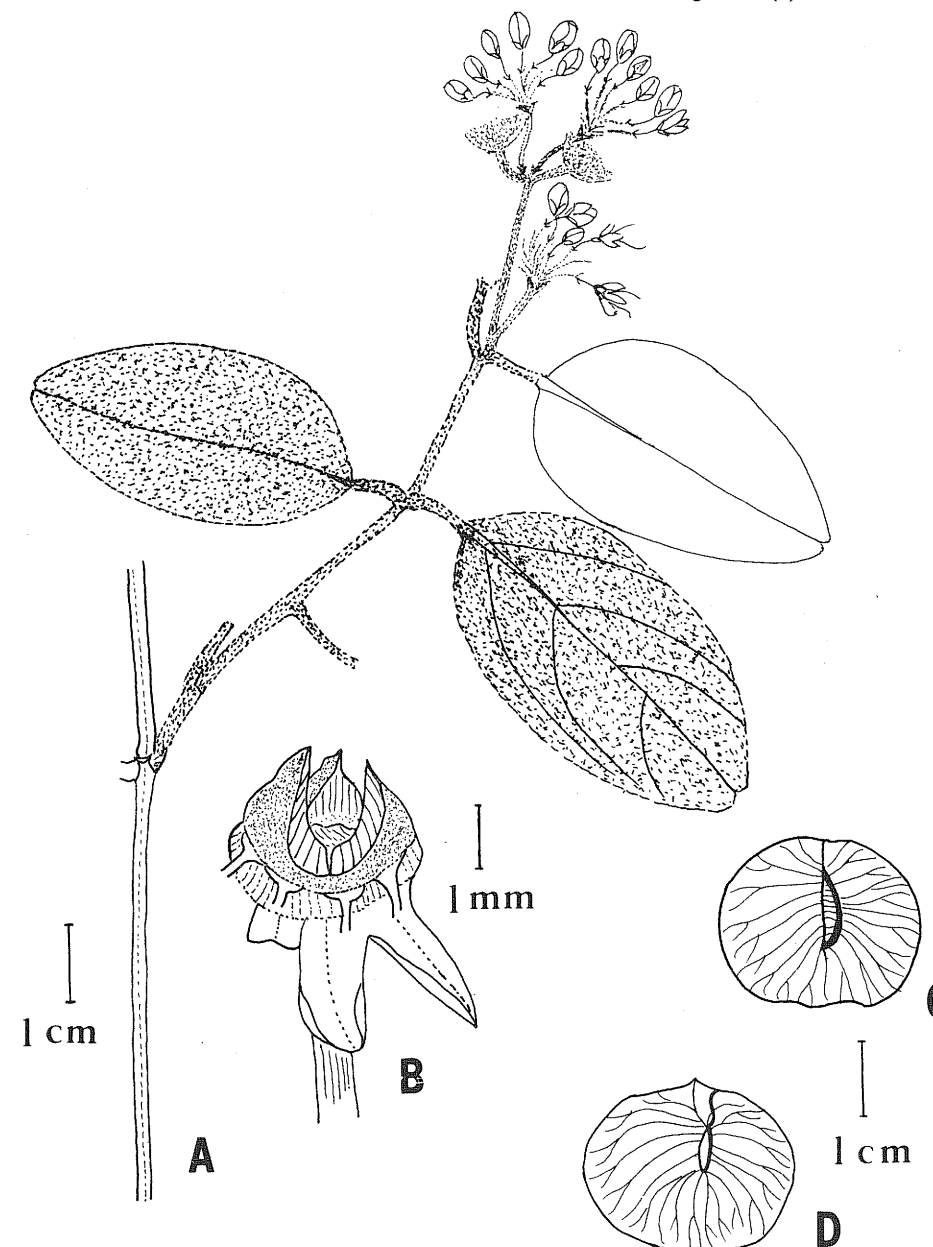


Figure 64. *Aspidopterys concava* (Wall.) Juss.: A. flowering branch; B. carpophore with disk lobes; C. mericarp, dorsal side; D. mericarp, ventral side.

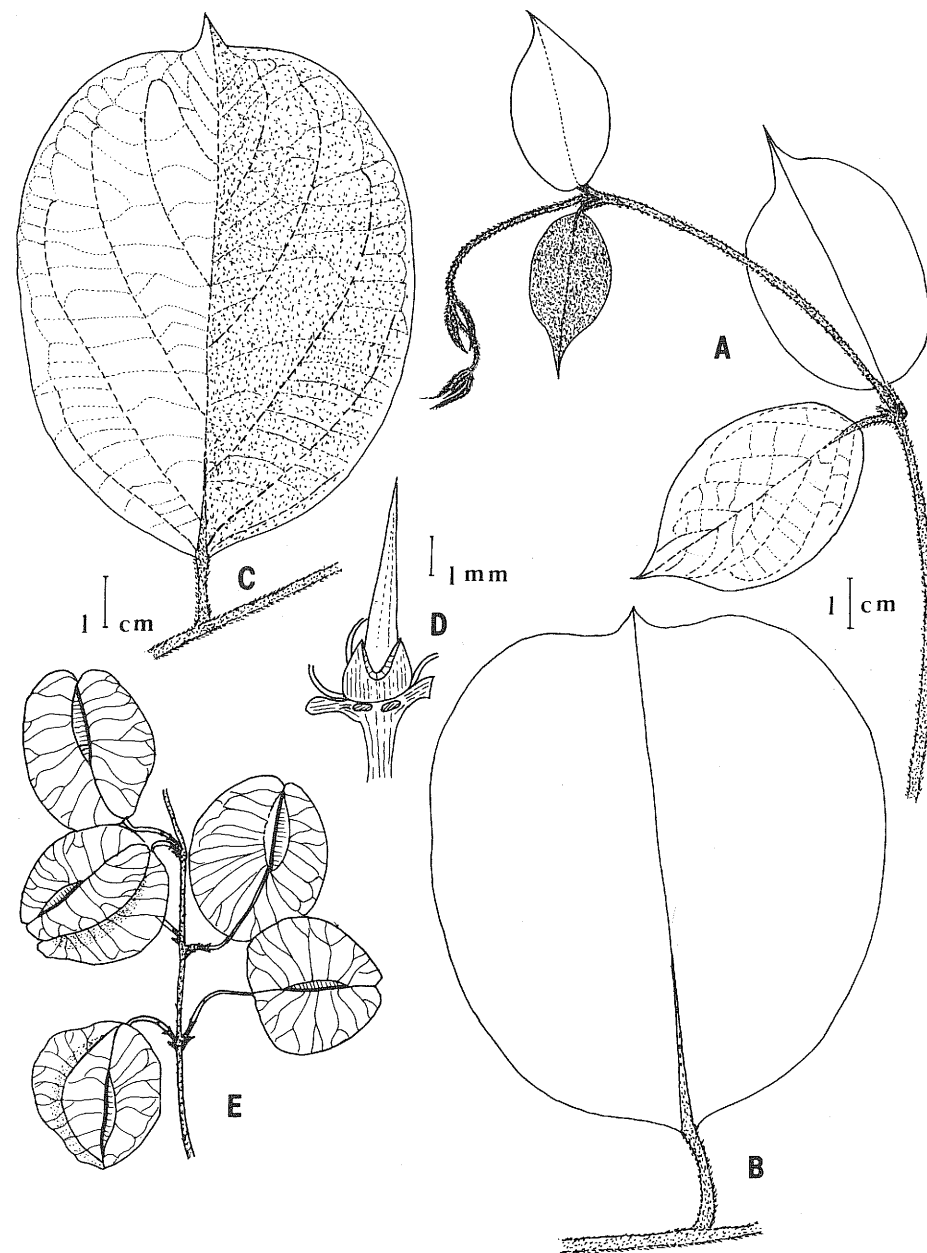


Figure 65. *Aspidopterys tomentosa* (Bl.) Juss.: A. young branch; B-C. leaves; D. carpophore with disk lobes; E. part of infructescence.

A. obcordata Hemsl. in Hook., Ic. Pl. Sér. 4.7: t. 2673. 1900; Hutch., l.c.: 97; Craib in Fl. Siam. En. 1: 204. 1926; Arènes in Fl. Gén. I.-C. Suppl. 1: 540. 1945.— *A. concava* var. *sumatrana* Nienzenz l.c.: 25. 1928.— *A. tomentosa* var. *obcordata* (Hemsl.) Nienzenz l.c.: 22; Jacobs l.c.: 130. Figure 65.

Branches pale brownish to dark reddish-brown hairy; older branches glabrescent. *Leaves* coriaceous, suborbicular, ovate, obovate, lanceolate or elliptic, 6–13 by 5–14 cm; apex obcordate-cuspidate, rounded-cuspidate or acuminate; base rounded to subcordate, cuneate; upper surface glabrous except when young, often glaucous when dry, nerves sulcate; lower surface densely yellowish or brownish hairy, or sometimes glabrous except on midrib, veins prominent; lateral veins, 4–6 pairs; petiole 1–4 cm, hairy. *Inflorescences* up to 27 cm long; peduncle 1.5–7 cm long, yellowish or brownish hairy, as well as the rachis; pedicels slender, articulate below middle, glabrous except below the bracteoles, 0.5–2 cm long; bracts acute, 2–3 mm long; bracteoles acute, ca 1 mm long. *Sepals* ovate-oblong, apex rounded, base truncate, ca 3 by 1 mm, glabrous. *Petals* white to light yellowish, oblong, apex rounded, base truncate, 5–6 by 1–1.5 mm. *Stamens*: filaments, 2–2.5 mm long; anthers ca 1 mm long. *Ovary* glabrous, ovoid, ca 1 mm in diam.; styles ca 3 mm long. *Mericarps*: lateral wings ovate, apex emarginate, pale translucent, 2.5–3.5 by 1.5–3 cm, glabrous; dorsal wing 3–4 mm high; carpophore acute, 4–6 mm long, persistent. *Seeds* linear, ca 10 by 2 mm.

Thailand.—NORTHERN: Chiang Rai (Chiang Saen), Chiang Mai, Lampang (Mae Tha), Phitsanulok (Nakhon Thai); EASTERN: Chaiyaphum; CENTRAL: Saraburi; SOUTH-EASTERN: Chon Buri; SOUTH-WESTERN: Kanchanaburi.

Distribution.—Java (type), Malay Peninsula, Philippines, probably E. Burma, W. Cambodia and Borneo.

Ecology.—In evergreen forests; 275–2000 m alt.

Vernacular.—Kai kom khrua (ท้ายคอมเครือ) (Northern).

Note.—In a number of collections (KERR 15031, GARRETT 1306, PHENGKLAI et al. 3103, and MAXWELL 76-112), two types of leaf apices occur, i.e. obcordate-acuminate and acuminate-cuspidate and integrated. Consequently *A. tomentosa* var. *obcordata* (Hemsl.) Nienzenz separated by an obcordate-acuminate apex does not merit recognition and should be included in *A. tomentosa* (Bl.) Juss.

3. *Aspidopterys nutans* (Roxb. ex DC.) Juss., Ann. Sci. Nat. Bot. Sér. 2.13: 267. 1840; Arch. Mus. Hist. Nat. 3: 513. 1843; Hook.f. in Fl. Br. Ind. 1: 421. 1874; Kurz, Fl. Burma 1: 175. 1877; Dop in Fl. Gén. I.-C. 1: 601. 1911; Hutch., Kew Bull. 1971: 98; Craib in Fl. Siam. En. 1: 203. 1926; Nienzenz in Pflanzenr. 91: 27. 1928; Arènes in Fl. Gén. I.-C. Suppl. 1: 543. 1945.—*Hiraea nutans* Roxb. (Hort. Beng.: 34. 1814, nom. nud.) ex DC., Prod. 1: 585. 1824; Roxb., Fl. Ind. ed. 2.2: 447. 1832; Wall., Pl. As. Rar. 1: 13. 1830.—*A. lanuginosa* (Wall.) Juss., l.c.: 512. 1843; Nienzenz, l.c.: 26.—*Hiraea lanuginosa* Wall., l.c. Figure 66.

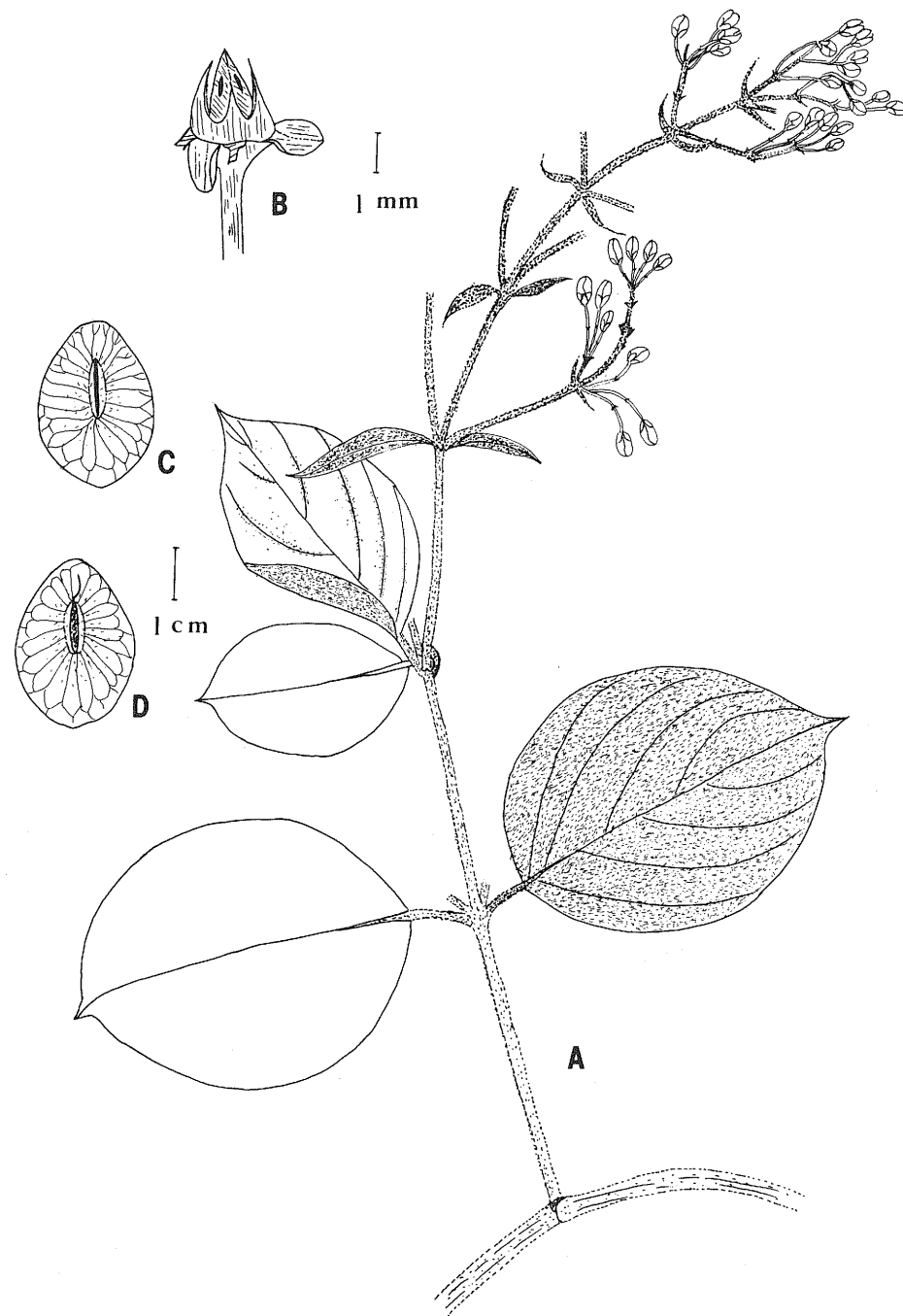


Figure 66. *Aspidopterys nutans* (Roxb. ex DC.) Juss.: A. flowering branch; B. carpophore with disk lobes; C. mericarp, dorsal side; D. mericarp, ventral side.

Young parts mostly white-pubescent; old branches glabrous. *Leaves* coriaceous, elliptic, ovate, obovate or suborbicular, 6.5–13 by 5–12 cm; apex acuminate to cuspidate or mucronate; base obtuse, rounded or subcordate; upper surface glabrous; lower surface white-pubescent; nerves prominent; lateral veins 4–7 (–8) pairs; petiole 1–4 cm long, pubescent, becoming glabrous with longitudinal ridges. *Inflorescences* up to 28 cm long; peduncle up to 7.5 cm long, pubescent; pedicels glabrous, articulate at middle or above, in flower 2–18 mm long, in fruit 12–22 mm long; bracts lanceolate, 1–7 mm long; bracteoles acute, ca 1 mm long. *Sepals* obovate-oblong, apex rounded, base truncate, 1–2 by 1 mm, glabrous. *Petals* oblong to elliptic-oblong, apex rounded, base truncate, 4–5 by 2–2.5 mm. *Stamens*: filaments 1.5–2.5 mm long, filiform, broadened and slightly connate at base; anthers 1–1.2 mm long. *Ovary* hirsute, globose, ca 1 mm in diam.; style 2–2.5 mm long. *Mericarps*: lateral wings ovate, apex emarginate or rounded, long whitish hairy, membranous, 1.8–3.5 by 1.3–2.5 cm; dorsal wing undeveloped; carpophore pyramidal, 1–2 mm high; disk-lobes acute, ca 1 mm high. *Seeds* linear, ca 10 by 2 mm.

Thailand.—NORTHERN: Chiang Rai, Lampang (Mae Saloi), Phrae (Mae Kham Mi), Sukhothai, Kamphaeng Phet, Nakhon Sawan; EASTERN: Ubon Ratchathani (Khemarat); CENTRAL: Saraburi (Kaeng Khoi, Muak Lek), Krung Thep (Bangkok); PENINSULAR: Pattani.

Distribution.—India (type), Burma, Indo-China.

Ecology.—On limestone hills, in mixed deciduous and scrub forests; 50–600 m alt.

Vernacular.—Khruea khao khon (เครือเขาน), khruea khao pun (เครือเขาปูน) (Northern); khruea to (เครือต้อ) (North-eastern).

4. *Aspidopterys hirsuta* (Wall.) Juss., Ann. Sci. Nat. Bot. Sér. 2.13: 267. 1840; Arch. Mus. Hist. Nat. 3: 512. 1843; Hook.f. in Fl.Br. Ind. 1: 421. 1874; Kurz, Fl. Burma 1: 176. 1877; Niedenzu in Pflanzenr. 91: 31. 1928; Craib in Fl. Siam. En. 1: 203. 1926; Arènes in Fl. Gén. I.-C. Suppl. 1: 535. 1945.—*Hiraea hirsuta* Wall., Pl. As. Rar. 1: t. 13. 1830. Figure 67.

All parts except flowers yellowish-brown, hirsute. *Leaves* subcoriaceous, elliptic, ovate to obovate, 7–17 by 4–10 cm; apex acuminate to cuspidate; base subcordate; lower surface glaucous; margin ciliate; lateral veins, 6–9 pairs; petiole 4–10 mm long. *Inflorescences* with branches regularly opposite, umbel-like; pedicels articulate below middle, 3–7 mm long; bracts lanceolate, acute, 4–8 mm long; bracteoles acute, 1–2 mm long. *Sepals* oblong, apex rounded, base truncate, ca 2 by 1 mm, glabrous. *Petals* obovate, apex rounded, base truncate, keeled, 3–4 by 2–2.5 mm. *Stamens*: filaments 1–1.5 mm long; anthers 1.5–2 mm long. *Ovary* glabrous, globose, 0.5–1 mm in diam.; styles ca 3 mm long. *Mericarps*: lateral wings oblong, slightly narrowed towards the apex, both ends rounded or truncate, sometimes slightly repand, coriaceous, glabrous,

3.2–6 by 1–2 cm; dorsal wing undeveloped. *Seeds* linear, ca 7–10 by 2–3 mm.

Thailand.—NORTHERN: Chiang Mai (Doi Suthep, Mae Ho), Mae Hong Son, Lampang.

Distribution.—Burma (type).

Ecology.—In mixed deciduous forests; 300–500 m alt.

Vernacular.—On khao (ออนขาว) (Northern); thi-khu (ทึ่ขุ) (Karen/Northern).

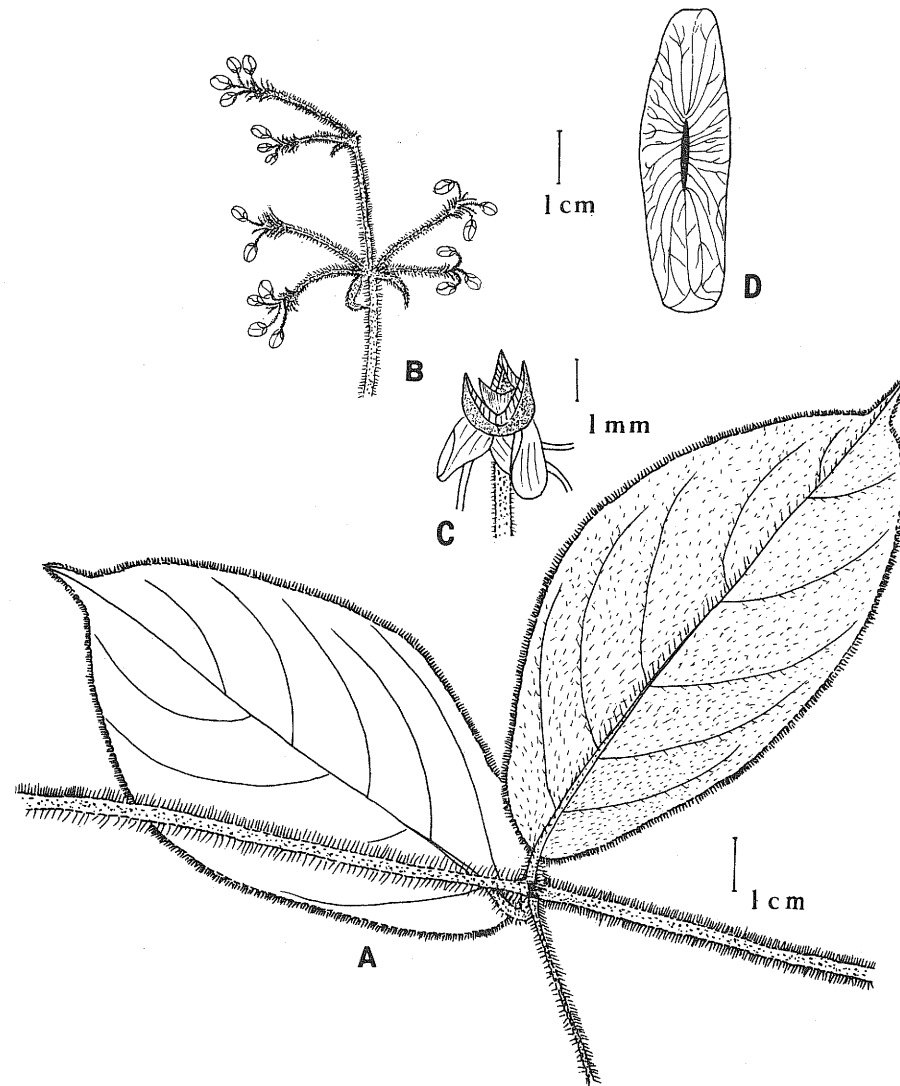


Figure 67. *Aspidopterys hirsuta* (Wall.) Juss.: A. branch; B. part of inflorescence; C. carpopore with disk lobes; D. mericarp, dorsal side.

5. *Aspidopterys thorelii* Dop, Bull. Soc. Bot. France 55: 428. 1908; in Fl. Gén. I.-C. 1: 602. 1911; Hutch., Kew Bull. 1917: 95; Craib in Fl. Siam. En. 1: 204. 1926; Arènes in Fl. Gén. I.-C. Suppl. 1: 534. 1945.— *A. thorelii* Dop var. *dolichocarpa* Arènes, Notul. Syst. (Paris) 11: 77. 1943.— *A. sessilifolia* Arènes, l.c.: 78; in Fl. Gén. I.-C. Suppl. 1: 536. 1945. Figure 68: A-F.

Young parts rusty brownish hairy, becoming glabrous. *Leaves* coriaceous, elliptic, elliptic-ovate or obovate, 7–18 by 4–10 cm; apex acuminate to cuspidate; base subcordate; upper surface glabrous; lower surface brownish pubescent; lateral veins 5–8 (–9) pairs; petiole 0–5 mm. *Inflorescences* pubescent; pedicels slender, articulate below middle, 3–15 mm long, pubescent; bracts lanceolate, 3–10 mm long; bracteoles acute, 1–2 mm long. *Sepals* ovate to ovate-oblong, apex rounded, base truncate, 2–3 by 1 mm, glabrous. *Petals* light yellowish, obovate-oblong, apex rounded, base truncate, keeled, 4.5–6 by 3 mm, sometimes ciliate. *Stamens*: filaments ca 1.8–2.5 mm long; anthers ca 1.5–2 mm long. *Ovary* glabrous, globose, ca 0.5 mm in diam.; style 2–2.5 mm long. *Mericarps*: lateral wings oblong, both ends rounded, truncate, or emarginate, coriaceous, glabrous, 2.5–5.2 by 1–1.8 cm; dorsal wing not developed. *Seeds* linear, 10 by 1.5 mm.

Thailand.—NORTHERN: Mae Hong Son, Lampang, Phrae; NORTH-EASTERN: Nakhon Phanom (THOREL 3037, type); CENTRAL: Saraburi; SOUTH-EASTERN: Prachin Buri, Chon Buri.

Distribution.—Kampuchea.

Ecology.—In mixed deciduous and scrub forests; 10–600 m alt.

Vernacular.—Khruca prasong tua phu (เครือประสงต์ตัวผู้), sut thao (สุตเถา) (South-western).

6. *Aspidopterys* sp. in obs. Figure 68: G-H.

NORTHERN: Chiang Mai (Doi Chiang Dao); SMITINAND & ANDERSON 7247 (BKF).

This specimen is closely related to *A. thorelii* Dop. It can be distinguished by the hairy calyx-lobes and mericarps, but the specimen is rather inadequate and complete material is needed.

4. BRACHYLOPHON

Oliv. in Hook., Ic. Pl. 16: t. 1566. 1887; Nienzen in Pflanzenfam. ed. 1.3. 4: 59. 1897; Nienzen in Pflanzenr. 93: 249. 1928.

Shrub or small tree, glabrous except the nodes; young branches angular. *Leaves* glandless; petiole short, 2-stipulate. *Inflorescences* racemose, terminal or axillary; pedicels articulate near base, subtended by a bract and provided

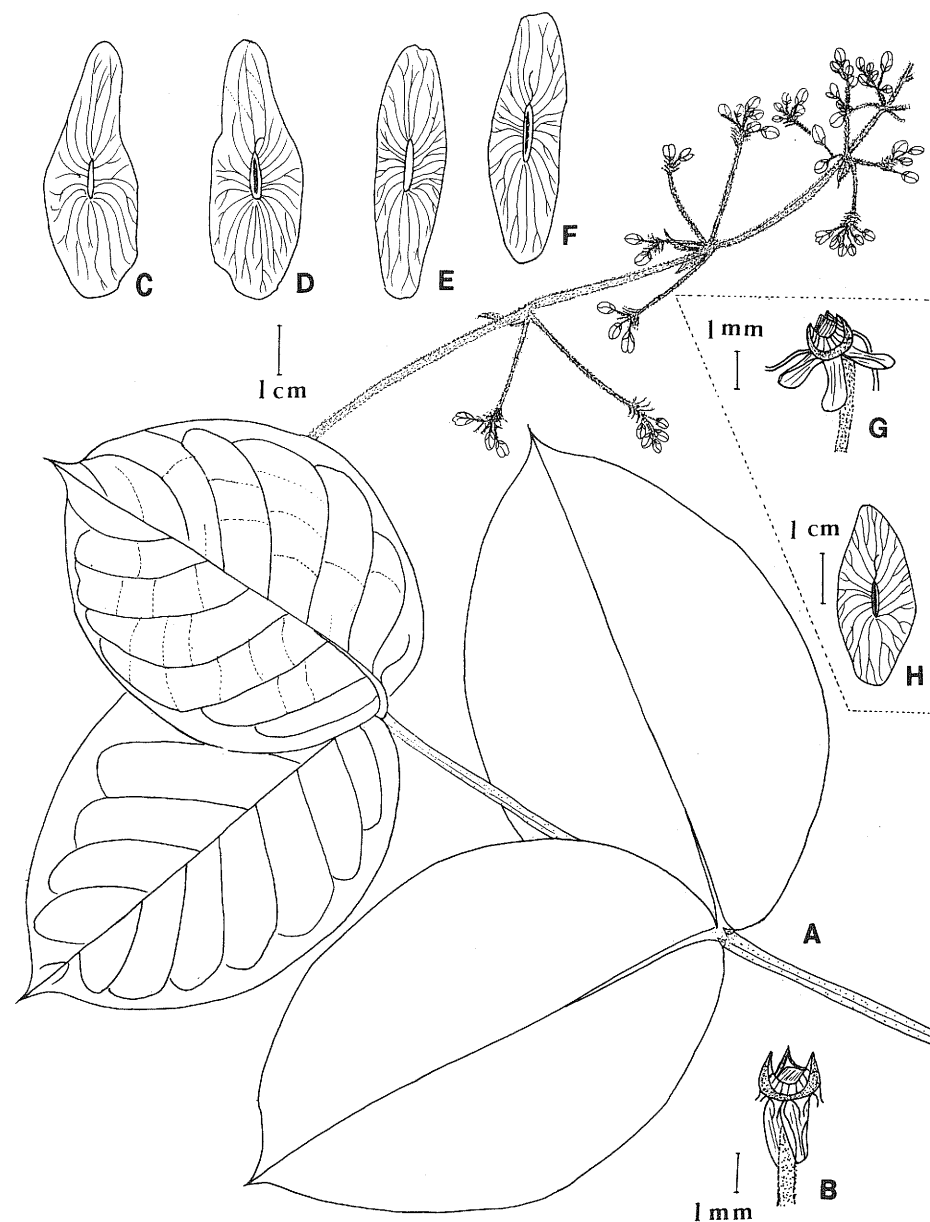


Figure 68. *Aspidopterys thorelii* Dop: A. flowering branch; B. carpophore with disk lobes; C-E. mericarps, dorsal sides; D-F. mericarps, ventral sides.— *Aspidopterys* sp. (SMITINAND 7247): G. carpophore with disk lobes; H. mericarp, ventral side.

with 2 bracteoles. *Flowers* actinomorphic. *Sepals* glandless, glabrous, finely ciliate. *Petals* clawed, oblong, glabrous. *Stamens* with outer whorl longer than the inner one; anthers glabrous, opening by apical slits. *Ovary* 3-lobed, glabrous; styles 3, free, filiform, often curved at the top. *Mericarps* 3, sometimes only 1 or 2 developing, keeled along back and with a small wing-like process developed at the apex.

One species in Africa; two in Asia, both occurring in peninsular Thailand.

KEY TO THE SPECIES

1. Pedicels 3–5 mm long; peduncle and rachis slender, less than 1 mm across. Leaves with lateral nerves anastomosing 5–12 mm from the margin 1. *B. anastomosans*
1. Pedicels 20–30 mm long; peduncles and rachis stout, 1–1.5 mm across. Leaves with lateral nerves anastomosing 2–3 mm from the margin 2. *B. curtisii*

1. *Brachylophon anastomosans* Craib, Kew Bull. 1926: 157; in Fl. Siam. En. 1: 204. 1926; Niedenzu in Pflanzenr. 93: 250. 1928. Figure 69.

Shrub ca 1 m tall; nodes bearded with brownish hairs. *Leaves* membranous, unequal-sided, elliptic-oblong to oblanceolate, 10–15 by 4–5 cm; apex caudate-acuminate; base cuneate; lateral nerves, 7–9 pairs, anastomosing 5–12 mm from the margin, prominent on lower surface; petiole 2–5 mm long, sulcate. *Stipules* acicular, ca 3 mm long. *Raceme* up to 12 cm long; pedicels 3–5 mm long; bracts and bracteoles persistent, ciliate. *Sepals* imbricate, ovate, obtuse, 1.5–2.5 by 1–1.5 mm. *Petals* oblong-obtuse, 8–12 by 4–5 mm. *Stamens* with filaments of inner whorl straight, 2 mm long; those of outer whorl curved, about twice as long; anthers 4 mm long. *Ovary* ovate, ca 2 mm long; styles 0.8–1 cm long. *Mericarps* with dorsal crest, reticulate, hairy, 4–5 mm long.

Thailand.—PENINSULAR: Yala (Bannang Sata—type: KERR 7306; ABD, BK, K).

Distribution.—Endemic to Thailand.

Ecology.—Scattered in evergreen forest on limestones; ca 50 m alt.

2. *Brachylophon curtisii* Oliv. in Hook., Ic. Pl. 16: t. 1566. 1877; King, J. Asiat. Soc. Bengal 62(2): 197. 1893; Ridl., Fl. Mal. Pen. 1:329. 1922; Henderson, Gard. Bull. Str. Settlement. 4:233. 1928; Niedenzu in Pflanzenr. 93:250. 1928; Jacobs in Fl. Males. I. 5:138. 1955.—*B. hullettii* King, l.c.: 196.—*B. scortechinii* King, l.c.: 197; Niedenzu, l.c.: 252. Plate XX: 20.

Small tree, ca 5 m tall; nodes bearded with copious, shiny brown hairs. *Leaves* coriaceous, elliptic to elliptic-oblong, 10–20 by 4–7 cm; apex acuminate; base acute; lateral veins, 7–12 pairs, anastomosing 2–3 mm from the margin; petiole 2–3 mm long, sulcate, broader at base. *Stipules* triangular, ca 2 mm long.

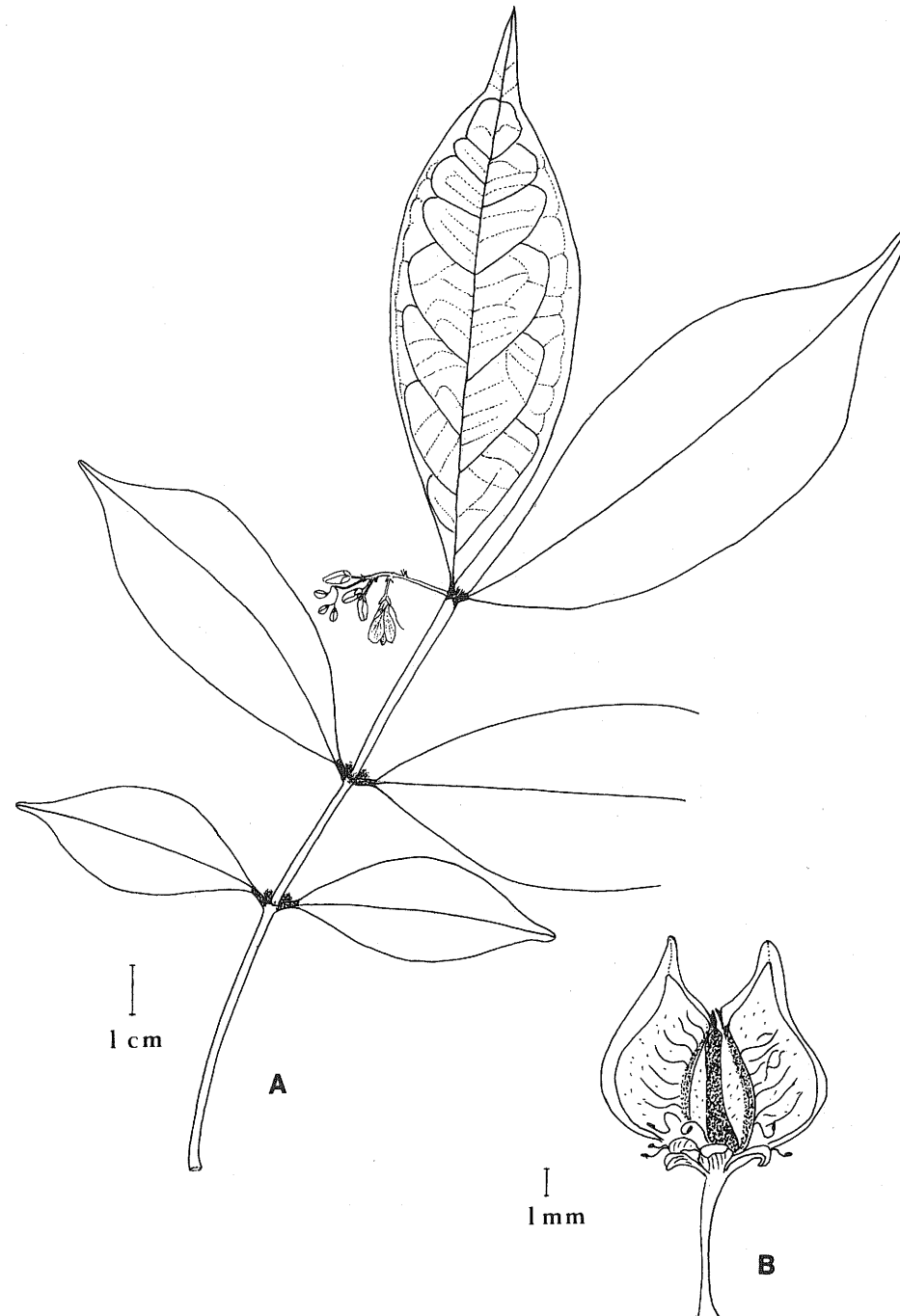


Figure 69. *Brachylophon anastomosans* Craib: A. flowering branch; B. mericarp.

Raceme ca 1–2 cm long; pedicels 2–3 cm long; bracts and bracteoles caducous, minute, ciliate. *Sepals* obtuse with broad base, 2–3 by 1.2 mm. *Petals* obtuse, more or less narrowed towards the base, 9–10 by 3–6 mm, finely ciliate. *Stamens* with filaments of outer whorl, 5–7 mm long, slightly longer and broader than the inner ones; anthers 3–5 mm long. *Ovary* ovate, ca 2–3 mm long; styles ca 1 cm long. *Mericarps* with dorsal crest, reticulate, glabrous, 1–1.5 cm long.

Thailand.—PENINSULAR: Songkhla, Phatthalung.

Distribution.—Malay Peninsula (type), Sumatra, Borneo (Sarawak) and Lingga Archip.

Ecology.—Scattered along streams in evergreen forests; ca 50–200 m alt.

5. MALPIGHIA

Linn., Sp. Pl.: 425. 1753.

About thirty-six species, distributed in central America. Two species cultivated as ornamentals in Thailand.

KEY TO THE SPECIES

1. Leaves relatively small (0.5–1 by 0.3–0.6 cm); base truncate or rounded; margin spiny-dentate, at least on the largest leaves. Pedicels glabrous, at least on lower part. Calyx glabrous, ciliate. Central America (Caribbean area) **1. *M. coccigera* Linn.**
1. Leaves larger (2.5–7.5 by 1.5–3.5 cm); base cuneate; margin entire. Pedicels hairy. Calyx hairy (Tropical America) **2. *M. glabra* Linn.**