

## MALPIGHIACEAE (M. Jacobs, Leyden)

Usually *lianas*, sometimes shrubs or small trees, provided with characteristic unicellular hairs which are generally centrally attached (fig.11). *Leaves* opposite, rarely subopposite or in whorls of 3, mostly petioled, simple and mostly entire, often provided with superficial glands beneath, especially at the base. *Stipules* mostly present, variable. *Inflorescences* simple or slightly paniculate at the base, bracteate, raceme-like; pedicels articulated, bracteolate. *Flowers* often conspicuous, bisexual, but often parts of the gynoecium or androecium abortive, or rarely polygamous, actinomorphic to zygomorphic. *Sepals* 5, free or slightly connate, persistent, calyx outside sometimes provided with 1–10 distinct glands. *Petals* 5, free, imbricate, mostly cochlear, nearly always clawed, margin often ciliate, dentate or fimbriate. *Disk* inconspicuous, sometimes accrescent. *Stamens* (in Mal.) 10, sometimes unequal; filaments often connate at the base; anthers basifix or dorsifix, introrse, sometimes with enlarged connective, 2-celled, dehiscent lengthwise. *Ovary* superior, with generally 3 (in extra-Mal. *spp.* rarely 2, 4 or 5) carpels, cells, and lobes. Styles as much as carpels, persistent, free, with a terminal, sometimes little developed stigma. Ovules 1 per cell, hemi-anatropous, hanging from an almost axillary placenta. *Fruit* a schizocarp of which the mericarps may dehisce dorsally, mericarps mostly winged in various ways (*samara*), seldom fleshy and forming a drupe (in extra-Mal. *spp.* a capsule or berry may occur). *Seed* with a large and mostly straight, rarely curved, embryo; endosperm none.

**Distr.** About 57 genera and 700 *spp.*, almost entirely confined to the tropics. The bulk of the family occurs in the New World; in a general way, the distributional frontiers of the larger taxa often coincide with important geographical demarcations.

**Notes.** The exocarp may show outgrowths, wing- or crestlike which often serve as important specific characters.

The classification of the family now generally accepted was first proposed by NIEDENZU in 1890 (Ber. Deut. Bot. Ges. 8: 190) and formed the basis of his recent monographs in the Pflanzenreich (Heft 91, 92 & 94, 1928). In this classification the structure of the fruit provides the most important taxonomical characters. In principle, the wings of a mericarp may develop into 2 planes: in the median plane through each cell a dorsal wing (crest) may arise, in the tangential plane of the cell a lateral wing. The degree of development of the wings in each plane is variable with the groups.

The subfamily of the *Pyramidoterae* is characterized by a more or less pyramidal receptacle and winged fruits.

In the tribe *Hiraeae* the lateral wing is much developed and the dorsal wing less so: in *Aspidopterys* the wing is simple and surrounds the whole mericarp as a disk (fig. 1), in *Hiptage* the lateral wing is divided into a bigger, median part and 2 smaller, lateral parts, sometimes the dorsal wing is present as a small crest (fig. 7d), in *Tristellateia* the lateral wing is divided into a number of stellately expanded lobes, the dorsal wing differing slightly from the other lobes (fig. 9c).

In the tribe *Banisterieae* the dorsal wing is far surpassing the lateral one in size: in *Ryssopterys* this is very conspicuous, sometimes 2 abortive remnants of the lateral wing can be observed (fig. 9d), in *Brachylophon* only a more or less distinct dorsal crest on the mericarps is present (fig. 9a–b).

The subfamily of the *Planitorae* with a flat or slightly hollow receptacle has wingless fruits; the cultivated *Galphimia* and *Malpighia* belong here.

Except the two species here described, viz *Galphimia gracilis* and *Malpighia coccigera*, a few others are incidentally cultivated in *Malaysia*: *Byrsonima coriacea* KUNTH var. *spicata* (L. C. RICH.) NIEDENZU, *Malpighia glabra* L., *Sphedamnocarpus pruriens* (E. MEYER) SZYSZYL., and *Stigmaphyllon ciliatum* (LAMK) JUSS.

The *species of Hiptage* can be identified by the structure of the gland at the outside of the calyx, in other genera, especially in *Aspidopterys*, fruits are essential for identification.

**Ecol.** In the Bogor Botanic Gardens I saw ants visiting vividly the glands of young *Hiptage* and *Ryssopterys* leaves.

## KEY TO THE GENERA

1. Fruit bearing wing(s) or a crest.
2. Stipules connate with the base of the petiole.
  3. Leaf blade glandless. Nodes of the young twigs densely haired around just above the leaf insertions. Styles 3. Fruit with an acute dorsal crest, not winged. Shrub. . . . . 4. *Brachylophon*
  3. Leaf blade at the base with 2 glands beneath. Young twigs glabrous. Style 1, rarely 2. Samaras stellate. Climber . . . . . 3. *Tristellateia*
2. Stipules free, inserted on the twig between the petioles, sometimes reduced or wanting.
  4. Flowers zygomorphic. Style 1. Leaf base mostly acute. Samara with 1 long median wing and 2 shorter lateral wings . . . . . 2. *Hiptage*
  4. Flowers actinomorphic. Styles 3. Leaf base rounded, truncate or cordate.
    5. Leaf margin with small glands beneath. Petiole at the top with 2 distinct, dish-shaped glands. Samaras only with a dorsal wing. . . . . 5. *Rysopterys*
    5. Leaf and petiole glandless. Samara surrounded by a disk-like lateral wing. 1. *Aspidopterys*
1. Fruit smooth. Cultivated shrublets with small leaves  $\pm$  1-5 cm.
6. Leaves herbaceous, entire, with 2 glands at the base. Calyx glandless . . . . . 6. *Galphimia*
6. Leaves coriaceous, mostly thorny-dentate, glandless. Calyx with distinct glands . . . . . 7. *Malpighia*

## 1. ASPIDOPTERYS

JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 266; Arch. Mus. Hist. Nat. Paris 3 (1843) 508, repr. 254; HUTCHINSON, Kew Bull. (1917) 91-102; NIEDENZU, Pfl. R. Heft 91 (1928) 19.—*Aspidopteryx auct.*—Fig. 1-2.

Lianas. *Leaves* and petioles glandless. Stipules on the twig between the leaf insertions, very small and caducous, or wanting. *Inflorescences* axillary, rarely terminal, panicle-like, flowers crowded at the top of the opposite lateral branches, sometimes only few buds developing into flowers, the others immaturesly caducous. Bracteoles mostly inserted below the articulation of the pedicel, upper portion of the pedicel often lengthened in fruit. *Flowers* bisexual, actinomorphic, as a rule white. *Sepals* small, glandless. *Petals*  $\pm$  oblong, not clawed, recurved after anthesis, thin, entire, glabrous, somewhat cucullate at the top. Filaments thin, sometimes connate at the base, glabrous; connective little developed and only dorsally visible. *Ovary* mostly glabrous, with 3 flat, already more or less winged sides; styles 3, free, diverging, slightly shorter than the petals, terete, persistent, stigmas capitate. *Disk* inconspicuous, later growing bowl-shaped with 3 acute lobes. *Samaras* often attached to a longer or shorter carpophore, the latter persistent, sustained by the disk-lobes at its base; lateral wing of each mericarp developed into an orbicular or oblong, membranous or coriaceous disk, with radial venation towards the margin; dorsal wing little developed; seed straight and linear.

Distr. About 15-20 *spp.* centering in Bengal and Further India (north to Nepal and Sikkim, few *spp.* going west to Kumaon and Malabar, south to the Andaman Islands), Yunnan, S. China, and Hainan, in *Malaysia*: as yet unknown from the Moluccas and New Guinea, and ?Lesser Sunda Islands.

## KEY TO FLOWERING SPECIMENS

1. Axis of the inflorescence glabrous. Petiole glabrous or thinly pale- and appressed-haired.
  2. Leaves herbaceous, ovate to obovate, top acuminate . . . . . 1. *A. elliptica*
  2. Leaves coriaceous, ovate, top acute . . . . . 2. *A. celebensis*
1. Axis of the inflorescence haired. Petiole densely set with often dark-coloured hairs.
  3. Leaves tomentose on the whole lower surface. Flower buds obovate-elliptic . . . . . 4. *A. tomentosa*
  3. Leaves glabrous below, at least between the nerves. Buds subglobose or ovate-elliptic. 3. *A. concava*

KEY TO FRUITING SPECIMENS<sup>1</sup>

1. Seed in the centre of the wing. Carpophore distinct, 1-2 mm long. Fig. 1e-g. . . . . 1. *A. elliptica*
1. Seed acropically situated in the wing.
  2. Seed 3-5 mm long. Carpophore almost wanting. Fig. 1a-d. . . . . 3. *A. concava*
  2. Seed  $\frac{1}{2}$ -1 cm long. Carpophore 2-5(-7) mm long. Fig. 1h-j. . . . . 4. *A. tomentosa*

(1) Of 2. *A. celebensis* the fruits are not known.

1. *Aspidopterys elliptica* (BLUME) JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 266; Arch. Mus. Hist. Nat. Paris 3 (1843) 509, repr. 255; MIQUEL, Fl. Ind. Bat. 1, 2 (1859) 586; BACKER, Schoofl. (1911) 167; HUTCHINSON, Kew Bull. (1917) 99; MERRILL, En. Philip. 2 (1923) 380; NIEDENZU, Pfl. R. Heft 91 (1928) 25; BACKER, Bekn. Fl. Java (em. ed.) 4c (1943) fam. 110, p. 3.—*Hiraea elliptica* BLUME, Bijdr. (1825) 225.—*Rysopteris ovata* TURCZ. Bull. Soc. Nat. Moscou 36 (1863) 583.—*A. helferiana* (non KURZ) KING, J. As. Soc. Beng. 62, ii (1893) 195, pro stirp. andaman.—*A. ovata* MERR. & ROLFE, Philip. J. Sc. 3 (1908) Bot. 106; MERR. En. Born. Pl. (1921) 324.—*Combretum sexalatum* MERR. Philip. J. Sc. 1 (1906) Suppl. 73, 212, quoad fruct.—*A. sp.* VIDAL, Phan. Cum. Philip. (1885) 99.—*A. concava* var. *philippinensis* NIEDENZU, Arb. Bot. Inst. Braunsberg 6 (1915) 7; Pfl. R. Heft 91 (1928) 24.—*A. concava* var. *helferiana*

NIEDENZU, Arb. Bot. Inst. Braunsberg 6 (1915) 7, Pfl. R. l.c. 24, quoad specim. philip.—*A. andamanica* HUTCHINSON, Kew Bull. (1917) 99.—Fig. 1e-g, 2.

Climber, up to about 10 m high. Young parts sparsely and appressedly pale-haired, quickly glabrescent. Twigs terete, internodes (3-)5-15(-20) cm. Leaves ovate or ovate-elliptic to obovate-oblong, c.  $1\frac{1}{4}$ - $1\frac{3}{4}$  times as long as broad, 8-13 (-17) by 5-8 $\frac{1}{2}$ (-11) cm, herbaceous; base rounded or slightly cordate; top rounded and longer or shorter acuminate; surfaces glabrous, except sometimes the basal part of the midrib; nerves 4-7 pairs, flat above, prominent beneath; petiole 1-2(-3) cm. Inflorescences (5-)10-20 cm long, glabrous. Bracts minute. Pedicels 1-3 cm. Buds ovate-elliptic. Flowers white, sometimes yellow-green, only few setting fruit. Sepals 2-3 by 1-1 $\frac{1}{2}$  mm, thin, oblong, top rounded and sometimes a bit ciliate, further glabrous. Petals oblong with rounded top, 5-7 by 2-3 mm. Filaments 1 $\frac{1}{4}$ -1 $\frac{1}{2}$  mm, anthers c. 1 $\frac{1}{2}$ -2 by 1 mm. Carpophore pyramidal, 1-2 mm high; wing suborbicular, mostly emarginate, approximately flat, (3-) $3\frac{1}{2}$ -5 (-6) cm long, (2-) $3\frac{1}{4}$ - $5\frac{1}{2}$  cm broad, pale-translucent to shiny brown and coriaceous; dorsal wing distinct but narrow. Seed in the centre of the wing, linear,  $\frac{3}{4}$ -1 cm long.

Distr. ?China, ?Indo-China, Andaman Islands, in Malaysia: Sumatra (rare), W.-E. Java, Borneo (rare), Philippines (common). Fig. 3.

Ecol. Light, forested habitats, from the lowland up to 600 m; fl. Dec.-Jan. (Java), June-July (Philippines) but in the latter islands also in other months.

Vern. *Aroy tattaruman*, *aroy babilandak*, S, *ojot mlati rambat*, J, *yodou*, *ga angaän*, *kait*, N. Born.; Philippines: *lapiapsot*, Ilk., *lampei*, Mbo, *mayet-bong*, *tanag-amó*, Tag.

Notes. The plants of this species with pale, thin and comparatively small fruits are all Philippine.

In the Kew Herb. there is a specimen coll. MORSE 406 from China which might belong to *A. elliptica*. If *A. macrocarpa* DOP (Fl. Gén. I.-C. 1, 1911, 603; ARÈNES, *ibid.* Suppl. 1, 1945, 540) is conspecific, the species would also occur in Indo-China.

2. *Aspidopterys celebensis* ARÈNES, Reinwardtia 3 (1954) 73.

Twigs with thickened leaf scars, glabrous. Leaves more or less opposite, ovate, coriaceous, 12-15 by 6-8 cm; base rounded to subcordate, top narrowed and acute; midrib flat above, prominent below; nerves 6-9 pairs, slightly prominent; surfaces entirely glabrous, shiny and reticulate above; margin a little revolute; petiole 1-1 $\frac{1}{2}$  cm. Inflorescences axillary, up to c. 12 cm long, lax-flowered, glabrous. Pedicels filiform, 1-1 $\frac{1}{2}$  cm. Flowers pale green. Buds elliptic. Sepals elliptic, 1 $\frac{1}{2}$  by 1 mm. Petals oblong to obovate, somewhat cucullate at the top, 5 by 2 mm. Filaments 2 mm, anthers 1-1 $\frac{1}{2}$  mm. Ovary glabrous, styles 3 mm. Fruit unknown.

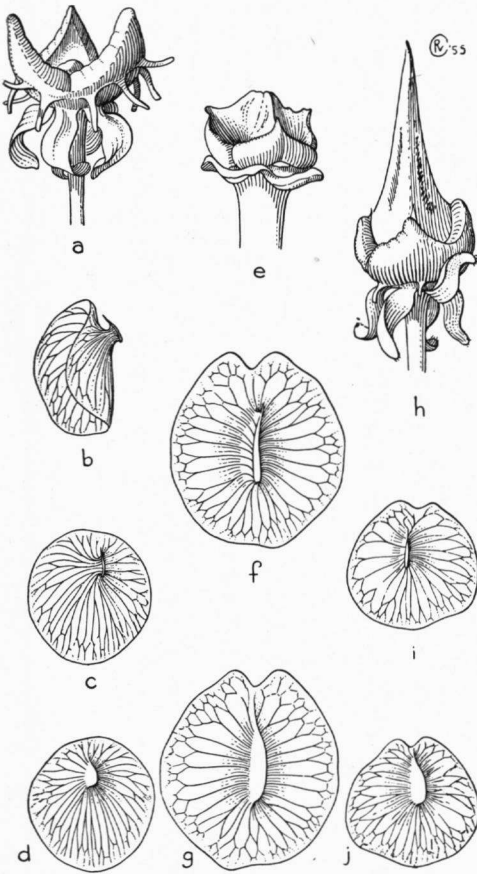


Fig. 1. Carpophores with disk lobes ( $\times 8$ ) and samaras ( $\times \frac{2}{3}$ ) of *Aspidopterys*. a-d. *A. concava* (WALL.) JUSS., e-g. *A. elliptica* (BL.) JUSS., h-j. *A. tomentosa* (BL.) JUSS.



Fig. 2. *Aspidopterys elliptica* (BL.) Juss. a. Flowering branch,  $\times \frac{2}{3}$ , b. bud,  $\times 5$ , c. flower,  $\times 5$ , d. unopened stamens, the left one from the adaxial side,  $\times 7$ , e. calyx and gynoecium, torus thickened with faint scars of petals and along inner margin scars of (5) detached stamens visible, disk hardly visible inside these scars,  $\times 7$ , f. a leaf,  $\times \frac{2}{3}$ .

Distr. *Malaysia*: NE. Celebes (once collected, KOORDERS 19642, Bo, L, 2-III-1895). Fig. 4.

Ecol. Rain-forest, 50 m.

Note. Closest resembling *A. elliptica* but distinctly differing in leaf-shape and texture.

3. *Aspidopterys concava* (WALL.) JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 266; Arch. Mus. Hist. Nat. Paris 3 (1843) 509, repr. 255; HOOK. f., Fl. Br. Ind. 1 (1874) 420; KURZ, J. As. Soc. Beng. 43, ii (1874) 137; For. Fl. Burma 1 (1877) 175; KING, J. As. Soc. Beng. 62, ii (1893) 195; HUTCHINSON, Kew Bull. (1917) 98; RIDLEY, Fl. Mal. Pen. 1 (1922) 329; BLATTER, J. Ind. Bot. Soc. 9 (1930) 145, *pro parte*; ARÈNES, Fl. Gén. I.-C. Suppl. 1 (1945) 532.—*Hiraea concava* WALLICH, Pl. As. Rar. 1 (1830) 13.—*A. concava* var. *sumatrana* NIEDENZU, Arb. Bot. Inst. Braunsberg 6 (1915) 7; Pfl. R. Heft 91 (1928) 25, *pro parte*.—Fig. 1a-d.

Liana, up to c. 20 m long. Young parts dark red-haired, twigs angular when young, more terete when older, leaf scars somewhat thickened; internodes (5-)-7-10(-15) cm, with irregular, longitudinal ridges and few lenticels, glabrous, dull brown. *Leaves* subcoriaceous, ovate-elliptic to ovate-oblong,  $1\frac{1}{4}$ - $2\frac{1}{2}$  times as long as broad, (5-)-7-10(-12) by 3-5(-8) cm; base rounded to acute, rarely subcordate, top mostly obtusely acuminate, rarely cuneate-emarginate or wholly rounded; surfaces glabrous, but basal part of the midrib below haired as is the petiole; nerves 4-7 pairs, slightly prominent; petiole  $\frac{3}{4}$ - $1\frac{1}{2}$ (-2) cm. *Inflorescences* (2-)-5-10 cm long; axes thin, terete and dark red-brown haired. Pedicels thin, glabrous except below the bracteoles, in flower 1- $1\frac{1}{2}$  cm, in fruit 3-5 cm, articulated in the lower half. Bracteoles alternate below the articulation. *Flowers* white, ovate-elliptic in bud. *Sepals* 2 by 1 mm, glabrous, top rounded. *Petals* oblong,  $3\frac{1}{2}$ -6 by  $1\frac{1}{2}$ -3 mm, glabrous, with rounded top. Ovary glabrous, styles 3- $4\frac{1}{2}$  mm. *Carpophore* almost absent, disk lobes forming a sort of cup (fig. 1a). *Samara*: main wing suborbicular, ovate or transverse-elliptic, concave outside, 2- $3\frac{1}{2}$  by  $2\frac{1}{2}$ -4 cm, scarious and pale-translucent; dorsal wing distinct but small, broadest at the base. *Seed* acroscopically situated in the wing, linear, 3-5 mm long.

Distr. Lower Burma, Martaban, Tenasserim, in *Malaysia*: Malay Peninsula (Western lowlands & Singapore), Sumatra (Lamong District, once coll.). Fig. 3. WARBURG 17248 from Bima (Sumbawa) was recorded by NIEDENZU under var. *sumatrana* which I think doubtful (*non vidi*).

Ecol. In forests, below 500 m. *Fl.* (mostly) Jan.-Feb., *fr.* March-April. It seems that during flowering and fruiting often a good deal of the leaves have fallen.

Vern. Malacca: *akar ulan*, Djambi: *talau*.

4. *Aspidopterys tomentosa* (BLUME) JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 267; Arch. Mus. Hist. Nat. Paris 3 (1843) 514, repr. 260; MIQ. Fl. Ind. Bat. 1, 2 (1859) 586; KURZ, For. Fl. Burma 1 (1877) 175; BACKER, Schoolf. (1911) 167; NIEDEN-

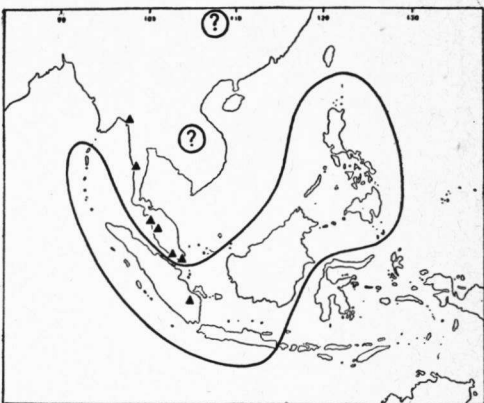


Fig. 3. Distribution of *Aspidopterys elliptica* (BL.) JUSS., the question marks indicating doubtful records from continental Asia, and localities of *A. concava* (WALL.) JUSS. (triangles).

ZU, Pfl. R. Heft 91 (1928) 21; BLATTER, J. Ind. Bot. Soc. 9 (1930) 145; BACKER, Bekn. Fl. Java (em. ed.) 4c (1943) fam. 110, p. 2.—*Hiraea tomentosa* BLUME, Bijdr. (1825) 225.—*Ryssopteris rufescens* TURCZ. Bull. Soc. Nat. Moscou 36 (1863) 583.—*A. helferiana* KURZ, J. As. Soc. Beng. 43, ii (1874) 137; For. Fl. Burma 1 (1877) 176, *descr.*; KING, J. As. Soc. Beng. 62, ii (1893) 195.—*A. concava* var. *sumatrana* NIEDENZU, Arb. Bot. Inst. Braunsberg 6 (1915) 7; Pfl. R. Heft 91 (1928) 25, *pro parte*.—For further synonyms see under the varieties.—Fig. 1h-j.

Liana, 10 m or longer. Twigs with long persistent, ferruginous to dark red-brown hairs, older twigs with irregular longitudinal ridges and few lenticels; internodes (4-)-10-15(-20) cm long. *Leaves* opposite, seldom subopposite or in whorls of 3, subcoriaceous, very variable in shape, suborbicular to ovate, elliptic or obovate, 1-2 times as long as broad, 6-13 by 4-8(-11) cm; base rounded to subcordate; top variable (see the varieties), upper surface glabrous, glaucous when dry, nerves often sulcate, lower surface dark ferruginous to fulvous-haired, nerves prominent, mostly darker haired; nerves 4-7 pairs; petiole 1- $2\frac{1}{2}$ (-3) cm, densely haired. *Inflorescences* many-flowered, 10-20 (-30) cm long, except the pedicels dark brownish red-haired. Bracts acute, to 5 mm long. Pedicels c.  $1\frac{1}{2}$ - $2\frac{1}{2}$  cm, terete, thin, glabrous above the bracteoles. Bracteoles inserted below the articulation, often not opposite, articulation below the middle of the pedicel. *Flowers* white, elliptic-obovate in bud. *Sepals*  $1\frac{1}{2}$  by 1 mm, glabrous, sometimes ciliate. *Petals* obovate, c. 5 by  $2\frac{1}{2}$  mm, glabrous, top rounded. Filaments 2- $2\frac{1}{2}$  mm, terete, sometimes connate at the base, glabrous; anthers 1- $1\frac{1}{4}$  mm, somewhat narrowed towards the top. Ovary glabrous, styles 3-4 mm. *Samaras* on a 2-5(-7) mm long acute carpophore; wing ovate, ( $2\frac{1}{2}$ -)3-4 by  $2\frac{1}{2}$ -3 cm, pale greenish and translucent, glabrescent, approximately flat;

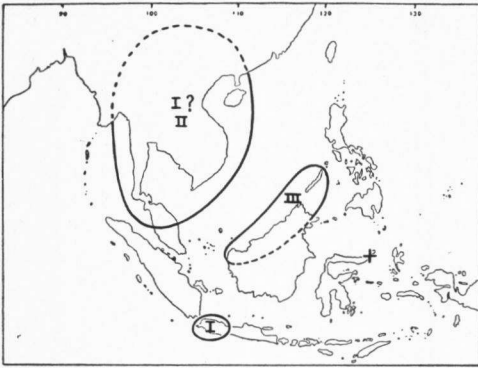


Fig. 4. Distribution of *Aspidopterys tomentosa* (BL.) JUSS.: I, var. *tomentosa*; II, var. *obcordata* (HEMSL.) NIED. (Andamans should be included); III, var. *longirostris* (ARÈNES) JACOBS; locality of *A. celebensis* ARÈNES (+).

dorsal wing small, broadest at the base. *Seed* acropically situated in the wing, c.  $\frac{3}{4}$  cm long.

Distr. Burma (Martaban, Tenasserim), Andaman Islands (according to KURZ, Rep. Veg. And. Isl. 1870, 32; variety uncertain), in *Malaysia*: Malay Peninsula, Java, Borneo, Philippines. Fig. 4.

Notes. NIEDENZU considered *A. helferiana* KURZ to represent a variety of *A. concava*. An investigation of the (fruiting) type specimen (HELPER 923) showed that the samaras agree with those of *A. tomentosa*. The only difference with typical *A. tomentosa* is the absence of an indument on the leaves, except in the basal part of the midrib below. In my opinion KURZ's species belongs to *A. tomentosa*, representing perhaps an undescribed infraspecific taxon.

KING (1893) erroneously regarded as the type a specimen of WALLICH (Cat. 1057) from Phanoë, which I cannot identify with certainty because fruits are lacking. KING also referred to *A. helferiana* his Andaman specimens which have been described later by HUTCHINSON as *A. andamanica*, here considered conspecific with *A. elliptica*.

Provisionally the species can be segregated into the following three varieties:

*var. tomentosa.*

Leaves elliptic-obovate, top shortly narrowed to rounded, abruptly acuminate-cuspidate.

Distr. Probably in Further India, in *Malaysia*: W. Java. Fig. 4.

Ecol. In rain-forests, up to 1000 m; fl. Aug.–Nov. Sometimes on calcareous soil.

Vern. *Ojot sella kuda*, *aroy kipeusing*, S.

*var. obcordata* (HEMSLEY) NIEDENZU, Pfl. R. Heft 91 (1928) 22.—*A. obcordata* HEMSLEY in HOOK. Ic. Pl. 27 (1900) t. 2673; CRAIB, Fl. Siam. En. 1 (1926) 204; ARÈNES, Fl. Gén. I.-C. Suppl. 1 (1945) 540.

Leaves elliptic to obovate, short-acuminate-cuspidate; top truncate to emarginate, in the latter case the tip protruding from a wide, apical sinus, so that the leaf appears three-topped.

Distr. Yunnan, Siam, Burma, in *Malaysia*: Malay Peninsula (Kedah, once collected, RIDLEY s.n., SING). Fig. 4.

*var. longirostris* (ARÈNES) *comb. nov.*—*A. concava* (non JUSSIEU) MERR. En. Born. (1921) 324, *pro specim. born.*—*A. longirostris* ARÈNES, Not. Syst. 11 (1943) 75.

Leaves ovate-elliptic, 6–9 by 3–5 cm, acute to acuminate with narrowed top. Samaras on carpophore 5–7 mm long, wing suborbicular,  $2\frac{1}{2}$  cm in diam.

Distr. *Malaysia*: Philippines (probably Palawan, type loc.), ?Borneo (Sarawak). Fig. 4.

Note. Although I am not certain about the two specimens collected in Sarawak by HAVILAND (3732 & 2857), I tentatively assume them to belong to this variety; MERRILL's record of *A. concava* in Borneo is solely based on these 2 numbers. Their flowers agree very well with those of *A. tomentosa*, but fruits are wanting.

Doubtful

*A. glabriuscula* (WALL.) JUSS. *var. subrotunda* NIEDENZU was mentioned by NIEDENZU, Pfl. R. Heft 91 (1928) 30, on account of a specimen WARBURG 13393, from Arrayal, Luzon. As no material was available to me I am not able to state anything about the occurrence of this SE. Asiatic species in the Philippines.

2. HIPTAGE

GAERTNER, Fruct. 2 (1791) 169; JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 268; NIEDENZU, Pfl. R. Heft 91 (1928) 67; ARÈNES, Reinwardtia 3 (1954) 72.—Fig. 5–7.

Stout shrubs, scandent or arborescent. *Stipules* minute, glandlike, or wanting, if present inserted on the twig between the petioles. *Leaves* elliptic to oblong, subcoriaceous, short-stalked, in most cases glabrescent, base generally with 2 glands beneath, margin often with smaller, scattered glands beneath. *Inflorescences* terminal or axillary, raceme-like, short-haired, scattered along the rachis. Calyx outside posteriorly provided with one dark-coloured gland often adnate to the pedicel (rarely the gland is wanting, or in extra-Mal. spp. more glands may be present). *Flowers* bisexual, zygomorphic, light-coloured. *Calyx* deeply incised.

*Petals* more or less unguiculate, somewhat different in shape, outer one more elliptic, inner (posterior) one more orbicular and often provided with 2 basal outgrowths. Stamens unequal, anterior one being 2-3 times as long as the other 9, of which the posterior is the shortest. Ovary 3-lobed, with the initial wings visible, haired; one style slightly longer than the long stamen, coiled inwards in bud, stigma acute, 2 styles abortive. *Samaras* consisting of a globular mericarp with 3 laterally developed coriaceous wings, middle one the longest and at right angles to the 2 lateral ones; dorsal wing incidentally developed into a bigger or smaller crest between the lateral 3 wings.

Distr. About 20-30  *spp.*, centering in Further India, from Ceylon to NW. India, the Himalaya, S. China, Formosa, in *Malaysia*: east to the Philippines, Celebes and Timor, one  *sp.* in Fiji. *H. benghalensis* occupies most of the generic area.

Notes. The structure of the calycinal gland(s) has been accepted as being of primary importance for the distinction of sections and of species. The genus has been divided into:

*Sect. Archihiptage* (NIED.) ARÈNES: 5 small glands on the calyx (4-7  *spp.* in Further India).

*Sect. Metahiptage* (NIED.) ARÈNES: calycinal gland absent (one  *sp.* in Malaya and 1-5 in China and Further India).

*Sect. Hiptage*: one large calycinal gland (4  *spp.* in Malaysia, c. 9  *spp.* in Further India, 1 in Formosa, and in Fiji *H. myrtifolia* A. GRAY (cf. A. C. SMITH, J. Arn. Arb. 31, 1950, 288).

#### KEY TO THE SPECIES

1. Calyx glandless (fig. 5a). Petals only outside at the base haired. *Sect. Metahiptage* 1. *H. burkilliana*
1. Calyx with a distinct gland (fig. 5b-e). Petals outside entirely haired. *Sect. Hiptage*.
  2. Calycinal gland sunken in the tissue of the apex of the pedicel (fig. 5b). Youngest parts densely tomentose . . . . . 2. *H. sericea*
  2. Gland distinctly inserted on the surface of the calyx (and eventually on the pedicel) (fig. 5c-e). Youngest parts appressedly haired.
    3. Calycinal gland convex, elliptic to linear, decurrent on the pedicel (fig. 5c). Sepals roundish, haired outside all over . . . . . 3. *H. benghalensis*
    3. Calycinal gland concave, orbicular-elliptic, not or scarcely decurrent on the pedicel (fig. 5d-e).
      4. Adult leaves quite glabrous. Sepals haired chiefly in the centre . . . . . 4. *H. luzonica*
      4. Adult leaves densely haired below. Sepals haired all over . . . . . 5. *H. pubescens*

1. *Hiptage burkilliana* ARÈNES, Reinwardtia 3 (1954) 68.—Fig. 5a.

Climber, up to 10 m; twigs terete, internodes 4-7 cm, light brown, glabrous, with numerous lenticels. *Leaves* oblong, twice as long as broad, 7-12 by 3½-5(-6) cm; base acute to rounded, without or with 2 small glands; top distinctly acuminate; nerves 4-5 pairs; surfaces both glabrous; petiole ¾ cm. *Inflorescences* at the ends of the twigs, terminal and axillary, sparsely fulvous-sericeous haired, sometimes secondarily branched, (6-)10-15 cm long; rhachis stout, terete, 1½-2 mm in diam. at the base. Bracts small and acute, mostly caducous, or wanting. Pedicels 1½-2½ cm, articulated somewhat above the middle, the articulation marked by a whorl of appressed hairs, upper portion thickened towards the flower. Bracteoles sometimes caducous, inserted halfway the lower portion of the pedicel. *Flowers* pink. *Sepals* triangular-elliptic, 2-3 by 1-2 mm, top obtuse-rounded, outside densely fulvous-sericeous, inside glabrous. *Petals* 5-10 mm long including the distinct claw, 4-6 mm broad, entire to subcrenulate, except the claw and lower portion of the midrib outside petals quite glabrous, inner one nearly without basal outgrowths. Filaments terete, longer one 7-8, other ones about

3 mm. Style glabrous, acute. *Samaras*: middle wing 2½ by 1 cm, lateral wings 1½ cm long.

Distr. *Malaysia*: Malay Peninsula (Pahang), twice collected.

Note. The material is too scarce to form a final opinion on the taxonomic affinity with *H. minor* DUNN from Yunnan; there is doubtless a great similarity. In *H. minor* the leaves are quite glandless, the pedicels are only 1-1½ cm and thinner, the flowers are smaller in all parts and white or pale yellow.

Except the type specimen (BURKILL & HANIFF 16940, Pahang, 12-XI-1924, Bo, SING), a second specimen, with mature fruit, has also been collected in Pahang (BURN-MURDOCH 219, Kuantan, 22-VI-1913, SING).

2. *Hiptage sericea* HOOK. f., Fl. Br. Ind. 1 (1874) 419; KING, J. As. Soc. Beng. 62, ii (1893) 194; RIDLEY, Fl. Mal. Pen. 1 (1922) 328; NIEDENZU, Pfl. R. Heft 91 (1928) 81; BLATTER, J. Ind. Bot. Soc. 9 (1930) 149.—*Clerodendron sericeum* WALL. Cat. (1829) no 1814, *pro parte, nom. nud.*—Fig. 5b.

Climber, twigs terete, densely brown short-tomentose, glabrescent, internodes (1½-)-2-4(-6) cm. *Leaves* oblong, 2-2½ times as long as broad, 4-5½(-8) by 1½-2½(-3½) cm; base acute to

rounded, glands at the base and margin sometimes wanting; top acuminate; nerves c. 4 pairs; surfaces densely haired in the youth, glabrescent except the basal part of the midrib, shiny above; petiole 5(–9) mm, densely fulvous-pubescent, glabrescent. *Inflorescences* mostly axillary, 4–7 cm

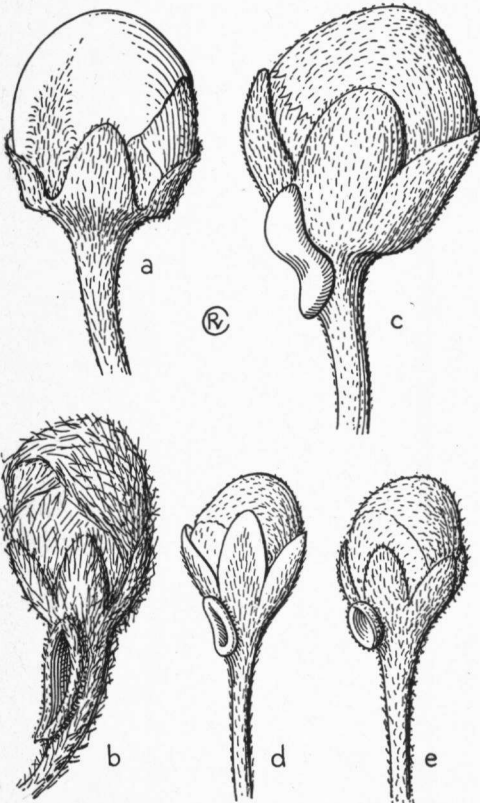


Fig. 5. Buds in *Hiptage*, all  $\times 5$ , a. *H. burkilliana* ARÈNES, b. *H. sericea* HOOK. f., c. *H. benghalensis* (L.) KURZ, d. *H. luzonica* MERR., e. *H. pubescens* MERR.

long, dense-flowered, strongly haired. Bracts are thickly haired pimples. Pedicels 1½–2 cm, halfway articulated, lower part with the minute or abortive bracteoles, upper part thickened towards the flower, with the oblong, 1–3 mm long gland sunken in it, often a bit curved around the gland (fig. 5b). *Flowers* white. *Sepals* elliptic-ovate, c. 2 by 1½ mm, with rounded top, outside densely haired, inside glabrous. Outer *petal* elliptic, inner one orbicular, 6–8 by 4–5 mm, margin irregularly fimbriate, outside densely haired, inside glabrous. Long filament 10–12, other ones 5–7 mm long. Style glabrous, acute. Central wing of the *samara* (2–)3–4 by ¾–1¼ cm, lateral wings 1½–2 cm long, all variable in shape.

Distr. China (Cape Syngmoon, cf. NIEDENZU), ?India (WIGHT 358), Lower Siam, in *Malaysia*: Malay Peninsula, probably rare.

Ecol. according to HENDERSON in open places and on river-banks.

Vern. Malaya: *Akar dèdalù bukit*, a. *kiral*, a. *kulupus*, a. *papina*, *sarunchi*.

Notes. Much resembling *H. detergens* CRAIB from Siam, but that *sp.* has a superficial (not immersed), suborbicular gland.

The origin of WIGHT's specimen (mentioned in his *Prodromus* as *H. parvifolia*, but certainly belonging to *H. sericea*) is not exactly known. WIGHT himself says it came from Ceylon, but HOOKER f. calls this an error; on the label is written: 'Pen. Ind. Or'; this would be the only record from India.

3. *Hiptage benghalensis* (L.) KURZ, J. As. Soc. Beng. 43, ii (1874) 136; CRAIB, Fl. Siam. En. 1 (1926) 201; NIEDENZU, Pfl. R. Heft 91 (1928) 77, incl. f. *longifolia* NIED., f. *typica* NIED., *pro parte*, f. *cochinchinensis* PIERRE (non vidi), f. *macroptera* (vide infra); BLATTER, J. Ind. Bot. Soc. 9 (1930) 149; BACKER, Bekn. Fl. Java (em. ed.) 4c (1943) fam. 110, p. 4.—*Banisteria benghalensis* LINNÉ, Sp. Pl. 1 (1753) 437.—*Molina racemosa* CAV. Diss. 9 (1790) 435, t. 362.—*H. madablota* GAERTN. Fruct. 2 (1791) 169, t. 116; JUSSIEU, Arch. Mus. Hist. Nat. Paris 3 (1843) 502, t. 16, repr. 248; MIQ. Fl. Ind. Bat. 1, 2 (1859) 585; HOOK. f., Fl. Br. Ind. 1 (1874) 418; KURZ, For. Fl. Burma 1 (1877) 173; KING, J. As. Soc. Beng. 62, ii (1893) 194; BACKER, Schoolfl. (1911) 167; DOP, Fl. Gén. I.-C. 1 (1911) 598; KOORD. Exk. Fl. Java 2 (1912) 449; RIDLEY, Fl. Mal. Pen. 1 (1922) 328; ARÈNES, Fl. Gén. I.-C. Suppl. 1 (1945) 515.—*Gaertnera racemosa* (CAV.) ROXB. Pl. Corom. 1 (1795) 19, t. 18.—*Gaertnera obtusifolia* ROXB. Hort. Beng. (1814) 32, nom. nud.—*H. obtusifolia* (ROXB.) DC. Prod. 1 (1824) 583; NIEDENZU, Pfl. R. Heft 91 (1928) 79.—*Ban(n)isteria javanica* THUNB. Fl. Jav. (1825) 16, nom. nud.—*H. javanica* BLUME, Bijdr. (1825) 224; JUSSIEU, Arch. Mus. Hist. Nat. Paris 3 (1843) 502, repr. 248; MIQ. Fl. Ind. Bat. 1, 2 (1859) 586; HOCHR. Bull. Inst. Bot. Btzg 19 (1904) 44, incl. f. *rubella*, l.c.; BACKER, Schoolfl. (1911) 167; KOORD. Exk. Fl. Java 2 (1912) 449; NIEDENZU, Pfl. R. Heft 91 (1928) 76, *pro parte*.—*H. parvifolia* WIGHT & ARNOTT, Prod. 1 (1834) 107, *pro parte*; HOOK. f., Fl. Br. Ind. 1 (1874) 419; NIEDENZU, Pfl. R. Heft 91 (1928) 79, *quoad ssp. typica* NIED.—*H. sumatrana* MIQ. Fl. Ind. Bat. Suppl. 1 (1860) 512.—? *H. tetraptera* MERR. Philip. J. Sc. 5 (1910) 188; En. Philip. 2 (1923) 382.—*H. macroptera* MERR. Philip. J. Sc. 5 (1910) Bot. 189; En. Philip. 2 (1923) 382; NIEDENZU, Pfl. R. Heft 91 (1928) 79, *pro forma*.—*H. pinnata* ELMER, Leaf. Philip. Bot. 5 (1913) 1810; MERR. EN. Philip. 2 (1923) 382.—*H. malaiensis* NIEDENZU, Arb. Bot. Inst. Braunsberg 6 (1915) 39; Pfl. R. Heft 91 (1928) 76.—*H. teysmannii* ARÈNES, Reinwardtia 3 (1954) 69.—Fig. 5c, 6, 7d.

Climber, up to 30 m, rarely shrub-like; internodes c. 5–7 cm; epiderm at first densely short fulvous-haired to glabrous, later crazed and scaling off, bark dull brown to shiny brownish black, often lenticellate. *Leaves* variable, pink or



reddish and short-haired when young, getting green and subcoriaceous when older, c. 2-3 times as long as broad, (8-)10-15(-20) by (3-)4-6(-10) cm; base acute to rounded, mostly with 2 glands; margin often with glandular dots below; top acuminate, rarely acute or rounded; midrib slightly prominent above, more prominent beneath, nerves (4-)6-7 pairs, irregularly curved towards the top, smaller nerves sometimes sunken; upper surface often shiny and nearly always glabrous, lower surface glabrous, rarely very densely set with minute, appressed hairs or glabrescent; petioles 7-10 mm, dark-coloured. *In-florescences* (4-)10-20 (-35) cm long, fulvo-sericeous haired, rhachis stout, terete and 2-3 mm thick below, angular above. Bracts acute, 2-5 mm long. Pedicels terete, mostly thickened towards the flower, articulation about the middle, 2-bracteolate, 1-2 cm, in fruit up to 3 cm. *Gland* convex, elliptic to lanceolate, 2-5(-6) mm long, about half on the calyx and half decurrent on the pedicel. *Flowers* 1-2½ cm in diam., very fragrant, varying in colour between pink and sordidly white, the inner one or more petals partly yellow. *Sepals* ovate to elliptic, slightly subcoriaceous, top about truncate-rounded, 2-5(-8) by 1½-3(-4½) mm, outside always fulvous sericeous, inside often so, or glabrous. *Petals* orbicular to elliptic, (3-)6-12 by (2-)5-10 mm, more or less clawed, inside glabrous, outside haired, margin mostly fimbriate and glabrous, the inner petal with 2 outgrowths at the base. Short filaments 2-4(-10) mm, the long one 8-12(-18) mm long, mostly glabrous, anthers 1-2 mm. Style terete, with acute top. *Samaras* variable in size and shape, dark reddish when fresh, shiny brown when dry, glabrescent, middle wing elliptic or obovate, top obtuse, acute, or rounded, sometimes divided into 2 lobes, (3-)5-6(-7) by 1(-2) cm, lateral wings 2-3 by ½-1(-1½) cm; dorsal crest sometimes present.

*Distr.* Ceylon, throughout India, NW to the Punjab, in the Himalayas up to 1000(-1500) m, Further India, Nicobar and Andaman Isl., S. China, Formosa, in *Malaysia*: Sumatra, Malay Peninsula (all the provinces, according to HENDERSON perhaps not wild S of Perlis), Java, Madura, Kangean Arch., Lesser Sunda Islands (Bali, Alor, Timor), Borneo, Philippines (Palawan, ?Mindanao), Celebes (incl. Saleijer Isl.). Cultivated in Malaysia and in some other tropical countries because of its pretty, fragrant flowers.

*Ecol.* On several kinds of soil in secondary forest, clearings, forest edges, teak-forest, both under everwet and periodically dry conditions, from sea-level up to 1000(-1500) m; *fl.* throughout the year.

*Uses.* According to GORTER (*vide infra*) a decoction of the root is sometimes given to bulls in Java; it would have aphrodisiac properties. From the bark of the root a remarkable glucosid, hiptagin, has been isolated by this author (Bull. Jard. Bot. Btzg III, 2, 1920, 187-202).

In Alor Isl. the bark is pounded and put on fresh wounds; the wood is said to be used as ridge-pole of pyramidal house roofs.

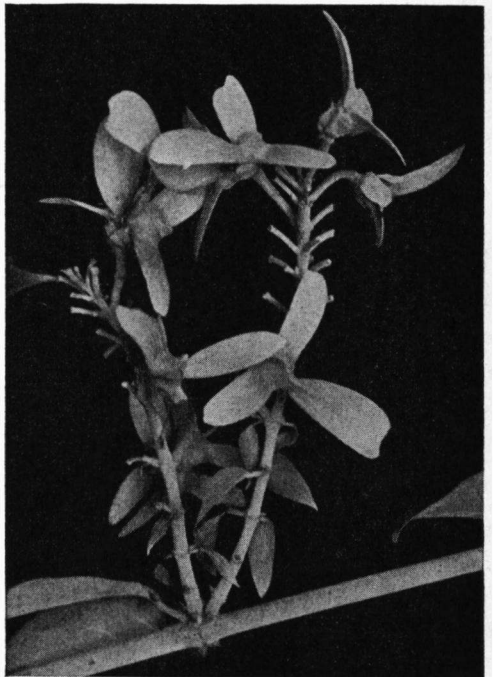
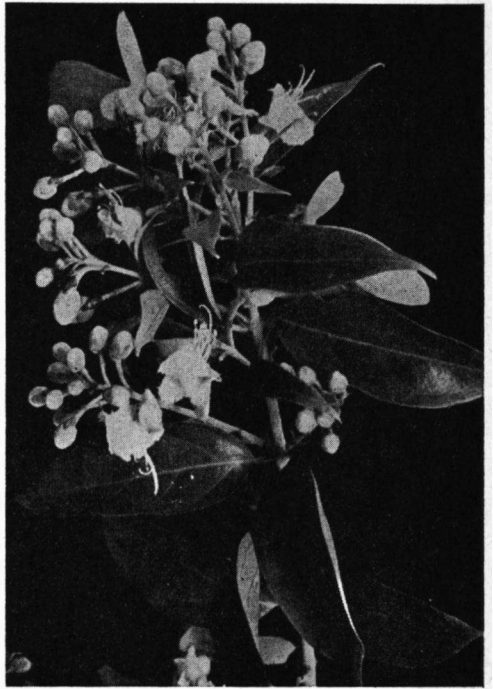


Fig. 6. *Hiptage benghalensis* (L.) KURZ. Flowering and fruiting branches, Singapore Botanic Gardens, July 1955 (photogr. G. H. ADDISON).



Fig. 7. *Hiptage luzonica* MERR. a. Flowering branch,  $\times \frac{2}{3}$ , b. flower,  $\times 4\frac{1}{2}$ , c. samara, ventral side, nat. size, d. *H. benghalensis* (L.) KURZ, samara, dorsal side with small crest, nat. size.

According to BRANDIS (For. Fl. 1874), the bark is bitter.

In India the leaves are used externally in cutaneous diseases.

Morph. According to SUBRA RAO (Curr. Sc. 6, 1937, 281): 'almost all the embryo-sacs show more than one embryo and the number of embryos in one embryo-sac may go up to eight'.

DOCTERS VAN LEEUWEN described several kinds of galls (Zooecidia 1926, 270).

Vern. Java: *Aroy burrie*, *a. beurit*, *kibodas*, *ojot ki kupu kupu*, *S, kakas*, *djaranan*, *ojot-prawan*, *kròsòk*, *lo alas*, J; Palawan: *tagabu*, Tagb.

Notes. This species has been described under various names, all representing slight variations on a common specific pattern of a widely diffused population. These forms are, however, connected by a number of transitional specimens. It has appeared impossible to delimit them in a satisfactory way and the only reasonable solution appears to me to merge them into one whole, without distinguishing subspecies or varieties.

The structure of the gland and the sepals provide the best characters to separate the species from *H. luzonica* and others.

Of *H. tetraptera* MERR., from Palawan, no material was available; from its description I conclude it is a *benghalensis* specimen with a very big dorsal crest on its samaras. Of *H. macroptera* MERR. from Mindanao, no material was available; it is tentatively referred here. *H. teysmannii* ARÈNES represents a narrow-leaved form.

4. *Hiptage luzonica* MERR. Govt Lab. Publ. Philip. no 35 (1905) 33; En. Philip. 2 (1923) 381; NIEDENZU, Pfl. R. Heft 91 (1928) 75.—*Triopteris jamaicensis* (non L.) BLANCO, Fl. Filip. (1837) 350.—*H. madablota* (non GAERTN.) F.-VILL. Nov. App. (1880) 32; VIDAL, Sinopsis Atlas (1883) 17, t. 22; Rev. Pl. Vasc. Filip. (1886) 73.—*H. cebuensis* ELMER, Leaf. Philip. Bot. 2 (1910) 683.—*H. cumingii* MERR. Philip. J. Sc. 5 (1910) 190.—*H. javanica* (non BL.) MERR. Philip. J. Sc. 5 (1910) Bot. 190; En. Philip. 2 (1923) 381; NIEDENZU, Pfl. R. Heft 91 (1928) 76, *pro stirp. philip.*—*H. reticulata* MERR. Philip. J. Sc. 5 (1910) Bot. 186.—*H. loheri* MERR. Sp. Blanc. (1918) 213.—*H. parvifolia* ssp. *cumingii* NIEDENZU, Verz. Vorl. K. Ak. Braunsberg (1924) 14, *incl. var. megaphylla, glandulosa et eglandulosa*; Pfl. R. Heft 91 (1928) 80.—*H. benghalensis* (non KURZ) NIEDENZU, Pfl. R. Heft 91 (1928) 75, *pro parte.*—?*H. beccariana* ARÈNES, Reinwardtia 3 (1954) 70.—*H. brachybotrys* ARÈNES, Reinwardtia 3 (1954) 67.—*H. vidalii* ARÈNES, Reinwardtia 3 (1954) 70.—Fig. 5d, 7a-c.

Scandent or shrub-like, only youngest parts fulvous-sericeous, quickly glabrescent; twigs greyish brown with many lenticels; internodes 3-4(-7) cm long. Leaves ovate-elliptic, c. 2(-4) times as long as broad, (4)-6-12(-15) by 2<sup>1</sup>/<sub>2</sub>-4<sup>1</sup>/<sub>2</sub>(-6) cm; base acute to rounded, basal glands mostly present, marginal glands mostly wanting; top distinctly acuminate; nerves 4-6 pairs; surfaces quickly glabrescent, latest on the basal part of the midrib, adult leaves often shiny above, firmly herbaceous

to subcoriaceous; petioles 1/2-1(-1 1/2) cm, dark-coloured. Inflorescences mostly axillary, 3-10(-14) cm long, fulvous-sericeous, rachis at the base 1-1 1/2 mm in diam. Pedicels 1-2 1/2 cm, slightly thickened towards the flower, articulation often below the middle. Bracteoles on or below the articulation. Gland orbicular to elliptic, concave, dish-shaped, 1 1/2-2 1/2(-3) mm long, not or scarcely decurrent on the pedicel. Flowers pinkish or greenish, 1-2 cm in diam. Sepals ovate to elliptic-oblong, 2-3 by 1-2 mm, top obtuse, rarely acute; inside as a rule glabrous, outside haired, mainly in the centre, less so at the margin. Petals 4-9(-10) by 3-5(-6) mm, oblong to suborbicular, base cordate, sometimes rounded, claw often distinct; inside glabrous, outside haired, margin irregularly subcrenulate. Stamens 2-4 mm, the odd one 6-10 mm long, filaments glabrous. Style glabrous. Middle wing of samaras obovate, incidentally elliptic, 2-2 1/2(-3) by 3/4-1-1 3/4 cm, top mostly rounded; lateral wings 3/4-1 1/2 cm long; no dorsal crest.

Distr. Malaysia: throughout the Philippines (incl. also Palawan), Celebes (N. peninsula).

Ecol. Fl. Feb.-March (mostly), fr. March-April.

Vern. *Baka-baka*, Bis.

Notes. The description of *H. parvifolia* var. *eglandulosa* NIED. contains an error; in the type specimen I found distinct calycinal glands.

*H. beccariana* ARÈNES, from N. Celebes, is here referred to *H. luzonica*. Besides the type there are 3 sheets collected by J. J. SMITH (633, 635, 636, Bo) from Gorontalo, all with equally insufficiently developed flowers as in the type. There are slight differences with *H. luzonica*; the leaves are not so acuminate and very finely reticulate and the sepals are hairy inside. Otherwise the specimens agree very well with *H. luzonica* and the mentioned characters do not seem important enough to distinguish *H. beccariana* as a separate species. Additional complete material from Celebes is desirable to verify this point.

In the diagnosis of *H. brachybotrys* ARÈNES the leaves are described as loosely pubescent; an examination of the type specimen showed that crystals of corrosive sublimate are responsible for the haired appearance.

*H. detergens* CRAIB, from Lower Siam, reminds of *H. luzonica*, but can easily be distinguished by its haired twigs, the light-coloured, haired petioles, and less glabrescent, smaller leaves.

*H. reticulata* MERR. is in its leaves somewhat different from typical *H. luzonica*. No material has been collected again since 1886; the type specimen is unfortunately not in a very good state.

The closest ally is the endemic Fijian *H. myrtifolia* A. GRAY (U.S. Expl. Exp., Bot. 1, 1854, 267, Atl. 1, 1857, t. 21). Though it is hardly different in floral characters, I cannot regard it as conspecific with *H. luzonica*. It can be distinguished by the leaves: petiole (2)-3-5(-6) mm, blade light-coloured, ovate, smaller and less shiny, with less developed basal glands, apex blunt and mucronate to acute; fruit mostly with a distinctly produced dorsal crest. The Fijian sheets are not homogeneous.

5. *Hiptage pubescens* MERR. Philip. J. Sc. 5 (1910) Bot. 187, incl. var. *lanceolata* MERR. l.c.; En. Philip. 2 (1923) 382; NIEDENZU, Pfl. R. Heft 91 (1928) 74.—? *H. curranii* MERR. Philip. J. Sc. 5 (1910) Bot. 188; En. Philip. 2 (1923) 381; NIEDENZU, Pfl. R. Heft 91 (1928) 74.—Fig. 5e.

Small tree (or scandent?, see note), 4–5(–9?) m high. Young twigs densely fulvous or greyish haired, often tardily glabrescent; internodes 1–3½ cm long. *Leaves* oblong to lanceolate, 2½–7 times as long as broad, 4–7 by ¾–2 cm; base rounded, glandless; top acute to slightly acuminate; nerves 7–10 pairs, inconspicuous; upper surface densely fulvous or greyish sericeous when young, shiny and sooner or later glabrescent, lower surface dull, persistently thick-tomentose; petiole ¼–½ cm. *Inflorescences* axillary, about as long as the leaves, densely haired in all parts. Bracts linear, c. ½ cm. Pedicels 1–1¼ cm. *Flowers* yellow or red; calycinal gland orbicular, cup-shaped with a thickened rim, c. 1 mm in diam. *Sepals* obtuse, triangular, haired on both surfaces, 1½–2 mm long. *Petals* as far as

known not distinctly clawed, suborbicular to elliptic, entire, haired outside, 4–6 mm long. Long stamen c. 3½ mm, the others c. 2 mm. Ovary haired; style 3–4 mm. *Samaras* with an oblong central wing ¾–1¼ cm long, the two lateral wings from tip to tip ¾–1 cm long.

Distr. *Malaysia*: Philippines (a few numbers known only from Luzon), 0–1200 m (MERRILL).

Vern. *Dalúnit*, *pangardisen*, *panuniandyen*, Ilk.

Notes. Although no material of *H. curranii* MERR. was available to me, I assume that it belongs to *H. pubescens*. MERRILL himself mentions that the scandent habit of *H. curranii* is the only character really distinguishing it from the arborescent *H. pubescens*. I conclude provisionally that they are conspecific.

#### Excluded

*H. lawsonii* ELMER, Leaf. Philip. Bot. 8 (1915) 2751 = *Hippocratea lawsonii* ELMER (*Hippocrateaceae*).

### 3. TRISTELLATEIA

DU PETIT-THOUARS, Gen. Nov. Madagasc. (1806) 14; repr. in Mém. Bot. & Voy. (1811); JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 269; Arch. Mus. Hist. Nat. Paris 3 (1843) 494, repr. 240; NIEDENZU, Pfl. R. Heft 91 (1928) 57; ARÈNES, Mém. Mus. Nat. Hist. Nat. n.s. 21 (1947) 275.—Fig. 8, 9c.

Lianas, mostly glabrous. *Petiole* with 2 small stipules on its base. *Leaf* margin mostly with 2 basal glands. *Inflorescence* raceme-like. Pedicels rather long, 2-bracteolate upon the articulation. *Flowers* actinomorphic, bisexual. *Petals* long-clawed, carinate below, oblong, entire. Filaments unequal, those of the outer whorl the longest and also the broadest at the base. Ovary globose, style 1, exceptionally 2 (the other 2–1 abortive), terete. *Samaras* coriaceous-ligneous, lateral wing (somewhat irregularly) divided into 4–10 rather narrow lobes which stellately expand in one plane, median wing among the lobes and resembling them. (In extra-Mal. spp. the median wing may be wanting or the samara may possess irregularly inserted additional appendages.)

Distr. About 22 spp. described, all in Madagascar, except *T. africana* in E. Africa and *T. australasiae* in the palaeotropical region E of the Mergui Islands.

Notes. After the characters of the fruit NIEDENZU (Verz. Vorl. K. Ak. Braunsberg, 1924, 7) divided the genus into sect. *Homoiactinia* with regularly lobed samaras, containing i.a. *T. australasiae*, and sect. *Heteractinia* with irregularly lobed samaras.

The pedicels in *T. australasiae* are about decussate, therefore the inflorescence does not represent a purely racemose structure.

1. *Tristellateia australasiae* A. RICHARD, Sert. Astrol. (1833) t. 15; Voy. de l'Astrolabe, texte (1834) 38, descr. (*T. australis*); JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 269; Arch. Mus. Hist. Nat. Paris 3 (1843) 495, repr. 241 (*T. australasica*); MIQ. Fl. Ind. Bat. 1, 2 (1859) 585; BENTH. Fl. Austr. 1 (1863) 286; HOOK. f. Fl. Br. Ind. 1 (1874) 418; KING, J. As. Soc. Beng. 62, ii (1893) 193; BAILEY, Queensl. Fl. 1 (1899) 170; SPRAGUE in CURT. Bot. Mag. (1910) t. 8334; DOP, Fl. Gén. I.-C. 1 (1911) 593; MERR. Philip. J. Sc. 7 (1912) Bot. 236; Fl. Manila (1912) 278; Sp. Blanc. (1918) 213;

RIDLEY, Fl. Mal. Pen. 1 (1922) 327; MERR. En. Philip. 2 (1923) 380; NIEDENZU, Pfl. R. Heft 91 (1928) 60, incl. f. *typica* NIED. et f. *obtusiuscula* NIED.; BLATTER, J. Ind. Bot. Soc. 9 (1930) 148; BACKER, Bekn. Fl. Java (em. ed.) 4c (1943) fam. 110, p. 3; ARÈNES, Fl. Gén. I.-C. Suppl. 1 (1945) 507; Mém. Mus. Hist. Nat. Paris n.s. 21 (1947) 282.—*Hiraea reclinata* BLANCO, Fl. Filip. (1837) 378, non JACQ.—*T. malintana* BLANCO, Fl. Filip. ed. 2 (1845) 267, ed. 3, 2 (1878) 132, t. 435.—Fig. 8, 9c.

Liana, up to c. 10 m, only youngest parts appressedly short white-haired, quickly glabres-

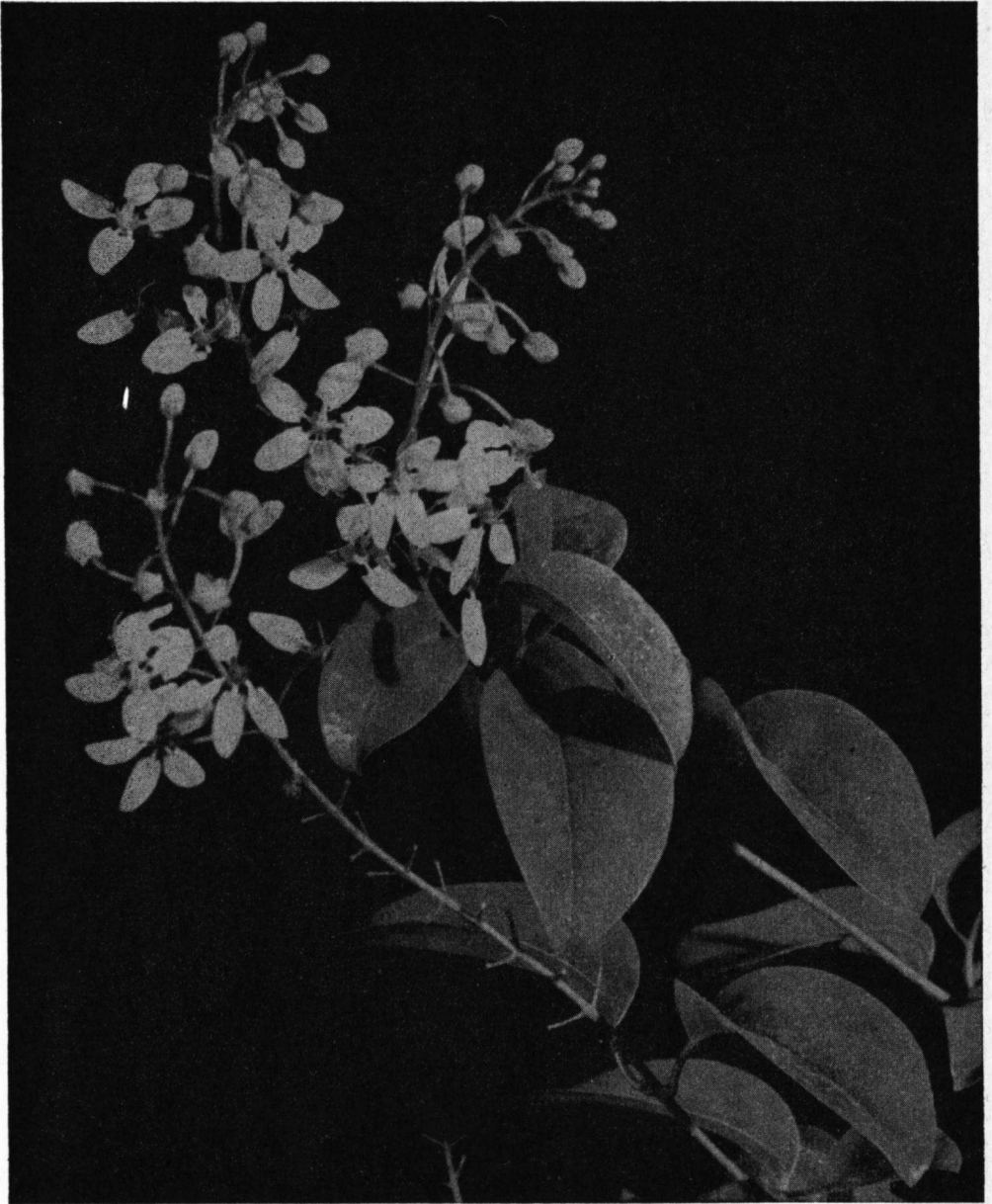


Fig. 8. Flowering branch of *Tristellateia australasiae* A. RICH.,  $\times 2/3$   
(Kebun Raya Indonesia, June 1953).

cent. Twigs terete, lenticellate, internodes up to 25 cm, nodes somewhat thickened. Leaves rarely subopposite or exceptionally in whorls of 3, ovate to ovate-oblong,  $1\frac{1}{2}$ – $2\frac{1}{2}$  times as long as broad, 6–12 by 4–7 cm, glabrous; base rounded to slightly cordate, seldom acute, 2 glands mostly present; apex narrowed, acute or acuminate; midrib not

or slightly prominent above, prominent below, nerves 4–5 pairs; margin somewhat recurved, glandless; petiole about 1– $1\frac{1}{2}$  cm, distinctly sulcate, often scarcely haired. Stipules linear-lanceolate, 1 mm, acute. Inflorescences terminal or on mostly 2-leaved branchlets; rachis (5–) 10–25 cm long, very scarcely haired. Pedicels

about decussate,  $1\frac{1}{2}$ –2(–3) cm long, distinctly articulated below the middle, lower portion persistent. Bracts thin, acute, 1–2 mm. Bracteoles minute. *Flowers* 2–2½ cm in diam., bright yellow. *Sepals* triangular, blunt, glabrous, glandless, about 3 by  $1\frac{1}{2}$  mm. *Petals* 2–3 mm unguiculate, limb elliptic, 8–13 by 5–6 mm, base truncate to slightly hastate, top rounded. Filaments 3–4 and  $1\frac{1}{2}$ –2½ mm, narrowed upwards, glabrous, at first yellowish, getting red, and when the anthers have fallen brightly red; anthers lanceolate, 2–3 mm long, connective narrow and only dorsally visible. Ovary c. 1 mm in diam., short-haired, at 3 sides provided with a whorl of papillae; style terete, 6–7 mm, glabrous. *Mericarps* proper about globular and 2–4 mm in diam., whole *samaras* including the  $\pm$  8 appendages 1–2 cm in diam.

Distr. Formosa, Cochinchina, Siam, westwards to the Mergui Islands, eastwards to the Carolines, New Caledonia, New Ireland, and on the Queensland coast, throughout *Malaysia* more or less common along coasts.

Ecol. Plant from brushwood and rain-forest on and beyond sea-shores, in the *Barringtonia* fringe, in the transitional zone between rain-forest and mangrove, in tidal swamps, along littoral creeks and estuaries, more landwards sometimes cultivated. *Fl.* throughout the year.

Vern. Sandakan: *akar pulut pulut*, Brunei: *bagu, bajau*; Banka: *akar kerak*; Celebes, Tjempaga: *duku duku*; Philippines: *bahau*, Sul., *aŋasin*, Bik., *bagnit*, Tagb., *bagit*, Bik., Tag., *binusisi, bauing*, Tag., *ibud-ibud*, Bis., *magbuaya*, C. Bis., *sigid*, S. L. Bis., *kaulog-pau*, Bag., *mapinit*, Neg.

#### 4. BRACHYLOPHON

OLIVER in Hook. Ic. Pl. 16 (1887) t. 1566; NIEDENZU, Pfl. R. Heft 93 (1928) 249. —Fig. 9a–b, 11c.

Shrubs, glabrous except the base of the internodes. *Leaves* glandless, the base of the short petiole 2-stipulate. *Inflorescence* a raceme (or in an extra-Mal. *sp.* a panicle). Pedicels sustained at the extreme base by a bract and bracteoles. *Flowers* actinomorphic, bisexual. *Sepals* glandless. *Petals* unguiculate, oblong, glabrous. Outer whorl of stamens longer than the inner one, anthers glabrous, each theca opening by a short apical slit. *Styles* 3, free, thin, somewhat shorter than the petals, often curved at the top. Often only 2 or 1 of the 3 *mericarps* developing; exocarp loosening from the endocarp, subcoriaceous, wings not developed except a relatively small, acute, dorsal crest.

Distr. Three *sp.*, one in E. Africa representing *sect. Catosepalis* NIED., 2 others in Indo-Malaya representing *sect. Brachylophon* of which one in Siam, the other in *W. Malaysia*: Sumatra, Malay Peninsula.

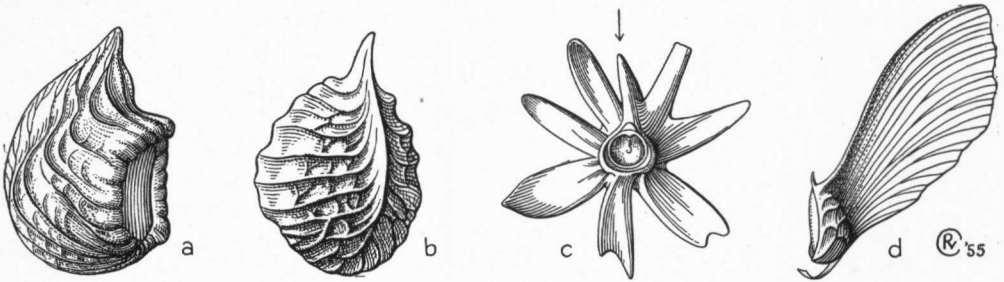


Fig. 9. Mericarps: a–b. of *Brachylophon curtisii* OLIV.,  $\times 2\frac{1}{2}$ , c. of *Tristellateia australasiae* A. RICH.,  $\times 2\frac{1}{2}$ , the arrow indicating the dorsal wing, d. of *Ryssopterys timoriensis* (DC.) JUSS., nat. size.

1. *Brachylophon curtisii* OLIVER in Hook. Ic. Pl. 16 (1887) t. 1566; KING, J. As. Soc. Beng. 62, ii (1893) 197; RIDLEY, Fl. Mal. Pen. 1 (1922) 329; HENDERSON, Gard. Bull. Str. Settl. 4 (1928) 233; NIEDENZU, Pfl. R. Heft 93 (1928) 250; BLATTER, J. Ind. Bot. Soc. 9 (1930) 150.—*B. hullettii* KING, J. As. Soc. Beng. 62, ii (1893) 196; RIDLEY, Fl. Mal. Pen. 1 (1922) 329, *pro var.*; NIED. Pfl. R. Heft 93 (1928) 252; BLATTER, J. Ind. Bot. Soc. 9

(1930) 150, *pro var.*—*B. scortechinii* KING, J. As. Soc. Beng. 62, ii (1893) 197; NIED. Pfl. R. Heft 93 (1928) 252; BLATTER, J. Ind. Bot. Soc. 9 (1930) 150, *pro var.*—Fig. 9a–b, 11c.

Shrub 1–2 m high. Twigs stout, angular when young, terete when older, internodes up to about 10 cm, glabrous except the base which is surrounded by a dense mass of shiny brown hairs, glabrescent when the leaves have fallen. *Leaves*

dark green (*ex coll.*), lanceolate, 3-4 times as long as broad, (10-)15-30(-40) by 4-7(-10) cm; base acute, top narrowed and acuminate; midrib more prominent below than above; nerves numerous, parallel; surfaces entirely glabrous except in the very youth; petioles very short, sulcate, base broad and provided with 2 *c.* 2-3 mm long *stipules*. *Racemes* terminal and in the higher axils; rhachis relatively thick, up to 10 cm, angular. Bracts convex, triangular-ovate, acute, *c.* 3 mm long, finely ciliate, mostly persistent. Pedicels with the articulation and 2 bracteoles at the extreme base, 1½-2½ cm, thin, terete, glabrous. Buds oblong. *Flowers* yellow. *Sepals* 2-3 by 1½-2½ mm, with broad base, finely ciliate, otherwise glabrous. *Petals* more or less narrowed into the claw, top rounded, 9-10 by 3-4(-6) mm, very fine ciliate. Filaments 3-5 mm, those of the outer whorl slightly longer and broader than of the inner one; anthers long and narrow, broadest at the cordate base, 3-5 mm long, connective little developed. Ovary ovate, *c.* 1½ mm high, glabrous; styles threadlike, glabrous, stigma not thickened. *Mericarps* with a distinct, dorsal crest elongated in an acute apex, 1-1½ cm long, glabrous, distinctly nerved.

Distr. *Malaysia*: Sumatra (Indragiri, CURTIS

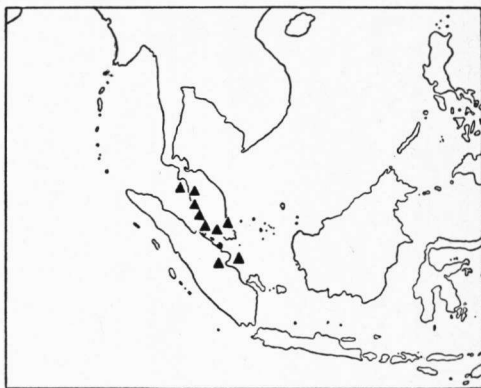


Fig. 10. Localities of *Brachylophon curtisii* OLV.

3549, SING), Lingga Archip. (Singkep Isl., BÜNNE-MEIER 7226, BO, L), Malay Peninsula (rare). Fig. 10.

Ecol. Only little is known, most records from plains, highest one from 600 m alt. In bushes, in moist places. *Fl.* March-August.

## 5. RYSSOPTERYXS

BLUME *ex* JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 286; Arch. Mus. Hist. Nat. Paris 3 (1843) 383, repr. 129; NIEDENZU, Pfl. R. Heft 93 (1928) 281.—*Rhyssopteris*, *Ryssopteris*, *Ryssopteryx auctt.*—Fig. 9d, 11-12.

Lianas, rarely shrublike, variable in the vegetative parts, more or less haired. Twigs terete. *Stipules* between the petiolar bases upon the twig, abortive to well-developed, sometimes more collateral accessory stipules. *Leaves* mostly provided with 2 orbicular glands near the insertion of the petiole, often tomentose below, margin below often with small glands. *Inflorescences* axillary, rarely terminal on small branchlets; rhachis simple or only at the top with 2 opposite branches in the axils of 2 small, haired and base-glanded leaves. Pedicels crowded at the top of the axes, 2-bracteolate, thickened above the articulation; only few pedicels bearing fruit and persistent. *Flowers* androdioecious, actinomorphic, 1-2½ cm diam. *Sepals* roundish. *Petals* sometimes unguiculate, orbicular-elliptic, glabrous. Filaments connate at the base, thin, terete, 2-5 mm long; anthers basifix, connective well-developed and forming the whole dorsal side of the anther. Ovary strigose. Styles 3(-4), free, sometimes coiled, terete, mostly somewhat longer than the anthers, stigmas terminal and a little thickened. Each *samara* outside attached to a basal, tape-shaped, carpophore; only the dorsal wing developed, making the fruit 2-6 cm long, showing resemblance to that of an *Acer*, but with the keel of the wings adaxial; mericarp proper globular; rarely 2 lateral abortive wings visible (fig. 9d).

Distr. Six  *spp.* recognized, a few taxa undescribed, mainly developed in New Caledonia, distributed through N. Queensland to *East Malaysia* west as far as Sunda Straits, north as far as Luzon and Formosa. *R. timoriensis* occupies the widest area coinciding roughly with the generic one. Fig. 13.

## KEY TO THE SPECIES

1. Connective of the anthers apiculate, exceeding the thecae. Samaras 4–6 cm long. Stipules minute. **1. *R. tiliaefolia***  
 1. Connective not apiculate, not exceeding the thecae. Samaras 2–4 cm long. Stipules often well developed.  
 2. Leaves glabrous to greyish haired below . . . . . **2. *R. timoriensis***  
 2. Leaves with a thick, white tomentum below, concealing the small veins ***R. timoriensis* var. *discolor***

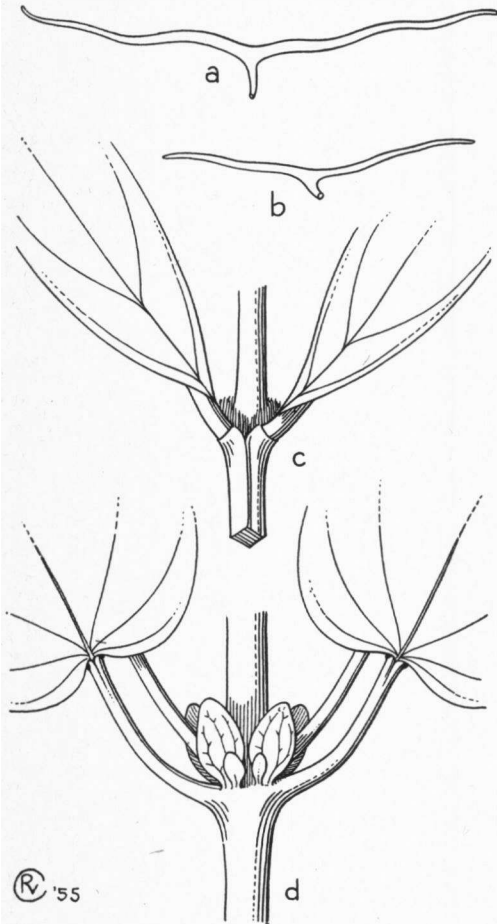


Fig. 11. *a.* Hair of *Ryssopterys timoriensis* var. *discolor* (GAND.) JACOBS, *b.* ditto of *R. timoriensis* (DC.) JUSS., both enlarged, *c.* *Brachylophon curtisii* OLIV., showing the hairy node, *d.* *Ryssopterys timoriensis* (DC.) JUSS., showing insertion of stipules on a flowering node.

**1. *Ryssopterys tiliaefolia*** (VENT.) JUSSIEU, *Ann. Sc. Nat.* II, 13 (1840) 286; *Arch. Mus. Hist. Nat. Paris* 3 (1843) 384, repr. 130; *Miq. Fl. Ind. Bat.* 1, 2 (1859) 583; BACKER, *Schoolfl.* (1911) 166; NIEDENZU, *Pfl. R.* Heft 93 (1928) 285 (*tiliifolia*); VON MALM, in FEDDE, *Rep.* 34 (1934) 277; BACKER, *Bekn. Fl. Java* (em. ed.) 4c (1943) fam. 110, p. 5.—*Banisteria tiliaefolia* VENT. Choix (1803) 50, t. 50, non KUNTH (1821).—*Heteropterys albida* BLUME,

*Bijdr.* (1825) 226.—*R. microstema* JUSSIEU, *Arch. Mus. Hist. Nat. Paris* 3 (1843) 384, repr. 130, *pro parte*; MIQ. *Fl. Ind. Bat.* 1, 2 (1859) 583, *pro parte*; non F.-VILL. *Nov. App.* (1880) 32.—*R. chrysantha* HASSK. *Hort. Bog.* 1 (1858) 133; *Miq. Fl. Ind. Bat.* 1, 2 (1859) 584.—*R. albida* MERR. *En. Philip.* 2 (1923) 382, *quoad nomen*; NIEDENZU, *Pfl. R.* Heft 91 (1928) 286, *pro stirp. jav.*—Fig. 12.

Thin-stemmed liana, up to 25 m. Young parts pale greyish appressedly haired; twigs with few lenticels, at last glabrescent, internodes (5–)7–12 (–25) cm. Stipules deltoid, 1–3 mm long or smaller. *Leaves* ovate (1–)1<sup>1</sup>/<sub>4</sub>–1<sup>1</sup>/<sub>2</sub>–(2) times as long as broad, (6–)8–12(–18) by (4–)6–11(–12) cm; base sometimes acute, mostly rounded to deeply cordate; top narrowed and distinctly acuminate, sometimes more rounded and cuspidate; nerves 4–8 pairs; upper surface glabrous except sometimes the leaf-base, lower surface densely pale tomentose; petiole 3–7(–10) cm, more or less angular, fulvo-tomentose, with distinct glands at the top. Rhachis of the *inflorescence* about 6–10 cm, appressedly pale tomentose. Pedicels 1<sup>1</sup>/<sub>2</sub>–2, in fruit to 3 cm long, terete, much haired, articulation below the middle. Bracteoles small. *Flowers* yellow (rarely white?), fragrant. *Sepals* roundish, c. 2 mm, densely haired outside, glabrous inside. *Petals* roundish to elliptic, more or less unguiculate, 6–8(–10) mm long, margin entire to subcrenulate. Filaments thin, terete, 2–3 mm long, glabrous; anthers 1<sup>1</sup>/<sub>2</sub> by 1/2–1 mm, glabrous, connective the best developed in ♂ flowers, dark red or purplish when fresh, blackish when dry, more or less cordate at the base, narrowed into the distinctly acuminate top exceeding the thecae. Style 2–3 mm. *Samaras* 4–5(–6) cm long, 1<sup>1</sup>/<sub>2</sub>–2 cm broad, wing often narrowed at the base, nerves in the wing curved about 60–90°.

*Distr. Malaysia:* W.-E. Java, ?Lesser Sunda Islands (Sumbawa: Bima; Lombok). Fig. 13.

*Ecol.* In rain-forest, edges of forests, all sorts of brushwood, numerous or not, sometimes in rather dry places, from sea-level up to 1000 m. *Fl.* throughout the year.

DOCTERS VAN LEEUWEN described several kinds of galls (*Zoocecidia* 1926, 272).

*Vern. Java:* *aroy kitapas*, *a. kibaks*, *a. kikapu kupu*, *a. kibaka*, *a. kikeuñus*, *a. laitepar*, *kingkilaban lakalina*, *S. tēmas*, *ojod tēmas*, *kētapangan*, *J. kunjik*, *konjik*, *Md.*

*Note.* The Bima specimen (ZOLLINGER *s.n.*) is inadequate and probably belongs to this species; RENSCH 398 (v. MALM, *L.c.*) from Lombok I have not seen.

**2. *Ryssopterys timoriensis*** (DC.) JUSSIEU in DELESSERT, *l.c. Sel. Pl.* 3 (1837) 21, t. 35 (*timorensis*);





Fig. 12. *Ryssopterys tiliaefolia* (VENT.) JUSS. a. Flowering branch, left beneath with very young fruits,  $\times \frac{2}{3}$ , b. ♂ flower,  $\times 3$ , c. the same, showing calyx and styles,  $\times 6$ , d. stamens, the left one from the adaxial side,  $\times 6$ , e. 2 fully developed samaras, attached to their carpophores, and 1 abortive one,  $\times \frac{2}{3}$ , f. a cordate leaf,  $\times \frac{2}{3}$ .

Ann. Sc. Nat. II, 13 (1840) 287; Arch. Mus. Hist. Nat. Paris 3 (1843) 387, repr. 133, t. 11; MIQ. Fl. Ind. Bat. 1, 2 (1859) 584; BENTH. Fl. Austr. 1 (1863) 285; BAILEY, Queensl. Fl. 1 (1899) 169; NIEDENZU, Pfl. R. Heft 93 (1928) 283, *incl. f. amboinensis* NIED.; GUILLAUMIN, J. Arn. Arb. 12 (1931) 233.—*Banisteria timoriensis* A.P. DC. Prod. 1 (1824) 588; SPANOGHE, Linnæa 15 (1841) 180.—*Hiraea obscura* BLUME, Bijdr. (1825) 226.—*Hiraea ovata* BLUME, Bijdr. (1825) 226.—*R. abutilifolia* JUSSIEU, Ann. Sc. Nat. II, 13 (1840) 286; Arch. Mus. Hist. Nat. Paris 3 (1843) 385, repr. 131; K. SCH. & LAUT. Fl. Schutzgeb. (1901) 387 (*arbutifolia*, *sphalma*); NIEDENZU, Pfl. R. Heft 93 (1928) 284, *incl. var. intermedia* (HOCHR.) NIED.—*Banisteria dichotoma* (non L.) SPANOGHE, Linnæa 15 (1841) 179.—*R. abutilifolia* auctt.—*R. cumingiana* JUSSIEU, Arch. Mus. Hist. Nat. Paris 3 (1843) 386, repr. 132; MIQ. Fl. Ind. Bat. 1, 2 (1859) 584 (*cumingiana*); F.-VILL. Nov. App. (1880) 32; VIDAL, Phan. Cum. Philip. (1885) 99; MERR. En. Philip. 2 (1923) 382.—*R. dealbata* JUSSIEU, Arch. Mus. Hist. Nat. Paris 3 (1843) 386, repr. 132; MIQ. Fl. Ind. Bat. 1, 2 (1859) 584; F.-VILL. Nov. App. (1880) 32; VIDAL, Phan. Cum. Philip. (1885) 99; MERR. En. Philip. 2 (1923) 382; NIEDENZU, Pfl. R. Heft 93 (1928) 282, *incl. var. α, β et γ*.—*R. microstema* JUSSIEU, Arch. Mus. Hist. Nat. Paris 3 (1843) 384, repr. 130, *pro parte*; F.-VILL. Nov. App. (1880) 32.—*R. chrysantha* (non HASSK.) HOCHR. Bull. Inst. Bot. Btzg no 19 (1904) 43.—*R. timorensis* var. *tillifolia* (non VENT.) K. SCH. & LAUT. Nachtr. (1905) 283, *pro stirp.*—*R. intermedia* HOCHR. Bull. Inst. Bot. Btzg no 19 (1904) 45; Ann. Jard. Bot. Btzg Suppl. 3, 2 (1910) 838.—*R. albida* MERR. En. Philip. 2 (1923) 382, *pro stirp.*, non *Heteropterys albida* BL.; NIEDENZU, Pfl. R. Heft 93 (1928) 286, *pro stirp. philip.* For further synonyms see the variety.

—Fig. 9d, 11b, d.

Twiner, rarely creeping, up to c. 10 m. Young parts densely greyish fulvous-haired; twigs terete, with few lenticels, rather quickly glabrescent, internodes (7–)10–15(–25) cm. *Stipules* variable in shape and size, roundish-obovate to lanceolate, with narrowed base and rounded top, 2–12(–20) by 1–8 mm, often with smaller accessory stipules at the extra-petiolar side (fig. 11d). *Leaves* variable in shape, size and hairiness, ovate (1–)1<sup>1</sup>/<sub>2</sub>–1<sup>3</sup>/<sub>4</sub> (–2<sup>1</sup>/<sub>2</sub>) times as long as broad, (5–)8–12(–15) by 4–7(–12) cm; base shallowly cordate, rounded, or truncate, top acute, sometimes acuminate or rounded and cuspidate; nerves 4–7(–8) pairs; surface above glabrous, below glabrous, glabrescent or more or less densely greyish tomentose (fig. 10b); petiole (1–)2–7 cm, indistinctly sulcate, sparsely haired to glabrous, with 2 distinct glands at the top. *Flowers* yellow (rarely white?), fragrant. Pedicels 1–1<sup>1</sup>/<sub>2</sub> cm, densely appressed-haired. *Sepals* roundish, about 2 mm, more or less haired outside, glabrous inside. *Petals* orbicular-elliptic, more or less unguiculate, 6–8(–11) cm long, entire to subcrenulate. Filaments thin, terete, 2–4 mm, rarely the outer whorl 1 mm longer than the inner one, glabrous; anthers 1–1<sup>1</sup>/<sub>2</sub> by 1/2–1 mm,

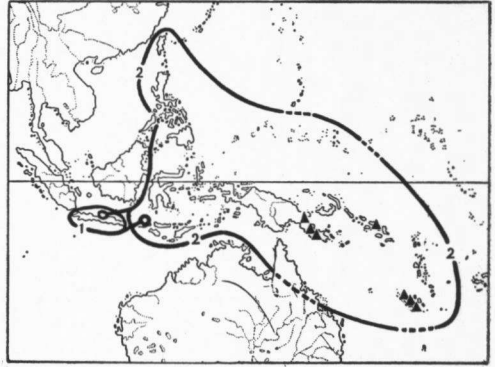


Fig. 13. Distribution of 1. *Ryssopterys tillaefolia* (VENT.) JUSS. and 2. *R. timoriensis* (DC.) JUSS.; the areas overlap each other with one locality. The triangles indicate the localities of *R. timoriensis* var. *discolor* (GAND.) JACOBS.

connective ovate-elliptic, after flowering often dorsally curved, sometimes haired, top obtuse, not exceeding the thecae. Styles (rarely 4), about 3–4 mm long, pink, stigmas pale yellow. *Samaras* (2–)3–3<sup>1</sup>/<sub>2</sub>(–4) cm long, 1–1<sup>1</sup>/<sub>2</sub> cm broad, wing mostly not narrowed at the base, nerves in the wing curved about 30–60°.

Distr. From Formosa and Micronesia (Carolines) to E. Malaysia, N. Queensland and Melanesia (not in Fiji), in *Malaysia*: Central Java (Tenga Isl. near Djapara), Kangean Archip., Lesser Sunda Isl. (not seen from Bali), Celebes, Philippines (not seen from Palawan), Moluccas, and New Guinea. Fig. 13.

Ecol. Brushwood or forest edges, often in coastal regions, in the inner mangrove zone, often in calcareous soil, not seldom in rather dry habitats, up to 1500 (2000?) m. *Fl.* throughout the year.

Vern. Sumba: *raoaimarinu*, *kwakatehi*; Timor, Tobaki: *olas med*; Philippines: *bingkit*, Mindoro, *bugtung-âhas*, Tag., *lagun*, *laumus*, Bag.

Notes. A very variable species of which a number of extreme or otherwise deviating specimens have been formerly designated specific rank. They are, however, linked by transitional specimens and do not show geographically significant areas. There is one exception, *viz* var. *discolor*, which shows a typically different indument and a well-defined area (fig. 13).

As to the distribution the 2 Malaysian species of *Ryssopterys* slightly overlap, *i.e.* there is one locality of *timoriensis* in the area of *tillaefolia* and, reversely, there are 1 or 2 localities of the latter in the area of *R. timoriensis*.

It is true that the species *Hiraea ovata* BL. and *H. obscura* BL. have been described from Java, but the labels of their type specimens read them to have come from Timor! BLUME's data on the origin of these sheets seem to rest on an error.

NIEDENZU mentions a specimen from South Sumatra (Palembang) (WARBURG 1998); I have



Fig. 14. *Galphimia gracilis* BARTL. in flower (Bogor, May 1939).

not seen it and I have some doubt about this record.

*var. discolor* (GAND.) *comb. nov.*—*R. discolor* GANDOGER, Bull. Soc. Bot. Fr. 60 (1913) 458; NIEDENZU, Pfl. R. Heft 93 (1928) 285, *forma 1 et 3, pro parte*; GUILLAUMIN, Bull. Soc. Bot. Fr. 79 (1932) 515; Fl. Nouv. Caled. (1948) 174.—*R.*

*australcaledonica* NIED. Arb. Bot. Inst. Braunschweig 6 (1915) 63; Pfl. R. Heft 93 (1928) 287, *incl. var. primaeva, pro parte.*—Fig. 11a.

Liana or shrublike. Young parts very densely white-tomentose, twigs later glabrescent, internodes 3–8(–20) cm. *Stipules* variable, not more than 10 mm long, deltoid to lanceolate and cuspidate, densely haired; sometimes more acces-

sory stipules. *Leaves* ovate-elliptic, *c.* 1.4–1.6(–2<sup>1</sup>/<sub>2</sub>) times as long as broad, (3–)4–10 by (2–)3–7 cm; base rounded, sometimes slightly cordate, top often rounded, seldom narrowed, cuspidate; nerves 4–5 pairs; surface glabrescent above, very densely white-haired below (fig. 10a); petiole 1–4 cm, narrowly sulcate above, densely haired, glands at the underside of the leaf base often more or less abortive. *Inflorescence* in all parts white-haired; rhachis often stout, 3–8 cm long. Pedicels 1–3 cm. *Flowers* yellow, fragrant. *Sepals* roundish, *c.* 2–3 by 2 mm. *Petals* orbicular-elliptic, distinctly unguiculate, 7–10 mm long. Filaments 2–4 mm, anthers *c.* 1 mm long. *Samaras* 2–3<sup>1</sup>/<sub>2</sub>(–4) by

1–1<sup>1</sup>/<sub>2</sub> cm, often slightly smaller than in the species.

*Distr.* Solomon Islands (Ysabel Isl.), New Caledonia, in *Malaysia*: SE. New Guinea. Fig. 13.

*Ecol.* About the same as in the *sp.* proper, up to 500 m.

*Notes.* Some sheets from Queensland are resembling this variety and might appear to belong to it.

The only character really distinguishing it from *R. timoriensis* is the thick, white indument, consisting of hairs which are longer, thicker, and more coiled than in the species. In the leaf-shape many transitional forms exist.

## 6. GALPHIMIA

CAVANILLES,  *Ic. Descr. Pl.* 5 (1799) 61; JUSSIEU,  *Arch. Mus. Hist. Nat. Paris* 3 (1843) 321, repr. 67.—**Fig. 14.**

Low shrubs. *Leaves* entire, with 2 small glands at the base of the limb. Stipules inserted on the base of the petiole. *Racemes* terminal, bracteate. Pedicels with 2 bracteoles below the articulation. *Flowers* bisexual, almost actinomorphic. *Sepals* 5, mostly glandless, shorter than the petals. *Petals* distinctly clawed, entire. Filaments 10, not or scarcely connate at the base, the episepalous ones the longest. Ovary globular, 3-lobed, often 1 or 2 cells not developing further; styles 3, free, coiled in bud, divergent, acute. *Fruit* dry, smooth, mericarps not winged, dehiscent.

*Distr.* About 10  *spp.*, from California and Texas to the Argentine, centering in Mexico.

1. *Galphimia gracilis* BARTLING,  *Linnaea* 13 (1839) 552; BACKER,  *Schoolfl.* (1911) 165; KOORD.  *Exk. Fl. Java* 2 (1912) 450; NIEDENZU,  *Pfl. R. Heft* 94 (1928) 595; BACKER,  *Bekn. Fl. Java (em. ed.)* 4c (1943) fam. 110, p. 5; STEEN.  *Fl. Sch. Indon.* (1951) 236.—*G. glauca (non CAVAN.)* MERR.  *Fl. Manila* (1912) 277.—*Thryallis glauca* (KUNTZE  *partim*) MERR.  *En. Philip.* 2 (1923) 383.—**Fig. 14.**

Shrub, 1/2–2 m high. Youngest parts appressedly reddish-haired, older twigs brown, glabrous; internodes 2–4 cm. *Leaves* herbaceous, elliptic-oblong, sometimes ovate, 3–5 by 1–2<sup>1</sup>/<sub>2</sub> cm; base acute, with 2 glandular pimples, top obtuse to rounded, tip a minute, acute point; nerves 4–5 pairs; petiole *c.* 1 cm, green when young, turning red. *Stipules* *c.* 3 mm long, linear, acute, red. *Racemes* later overtopped by 2 lateral branches, 6–12 cm, appressedly dark-red short-haired. Bracts 3–4 mm, linear,

acute, persistent. Pedicels 3/4–1<sup>1</sup>/<sub>4</sub> cm, articulated about the middle. Bracteoles at the top of the lower portion. *Flowers* yellow, 1<sup>1</sup>/<sub>2</sub>–2 cm in diam., glabrous in all parts. *Sepals* ovate, slightly carinate and decurrent in the pedicel, 2–2<sup>1</sup>/<sub>2</sub> by 1–1<sup>1</sup>/<sub>2</sub> mm, top blunt, sometimes recurved. *Petals* slightly carinate below, two slightly shorter than the others, 2–3<sup>1</sup>/<sub>2</sub> mm clawed, limb triangular, blunt, *c.* 5 by 3<sup>1</sup>/<sub>2</sub> mm. Filaments with somewhat broadened base, glabrous, yellow, turning red, persistent, 2<sup>1</sup>/<sub>2</sub>–3 and 4 mm long; anthers 2–2<sup>1</sup>/<sub>2</sub> mm long, lanceolate, caducous. Ovary 2–3 mm in diam.; styles terete, 5–6 mm long, caducous. *Fruits* brown, globular, *c.* 5 mm.

*DISTR.* Central America, cultivated widely in the tropics, in *Malaysia*: rather commonly cultivated in gardens below 1000 m. *Fl.* Jan.–Dec.

*Uses.* Cultivated for ornamental purpose; propagated by seeds or cuttings.

## 7. MALPIGHIA

PLUMIER  *ex LINNÉ*,  *Gen. Pl. ed. 5* (1754) 194; JUSSIEU,  *Arch. Mus. Hist. Nat. Paris* 3 (1843) 258, repr. 4; SMALL,  *N.-Amer. Fl.* 25 (1910) 152; NIEDENZU,  *Pfl. R. Heft* 94 (1928) 611.—**Fig. 15–16.**

Small trees or dwarf shrubs. *Leaves* shortly petioled, with small, narrow stipules, glandless, sometimes thorny-dentate. *Flowers* solitary or in inflorescences, bisexual, zygomorphic. Calycinal glands distinct, up to 2 at the base of each sepal, 6 being always present in the posterior part, 1–4 incidentally present in the anterior part of the calyx. *Petals* inequal, fimbriate (the larger ones) to entire (the smaller ones), distinctly clawed, glabrous. *Stamens* glabrous, shorter than the petals, 2 opposite

ones in the transversal plane different from the other 8. *Ovary* glabrous; styles free, diverging, as a rule 2 well developed, the posterior one abortive. *Fruit* fleshy, separating into drupe-like nuts.

*Distr.* About 26–36 *spp.* centering in Central America, a few *spp.* north to California and Texas, south to Columbia and Peru.

1. *Malpighia coccigera* LINNÉ, Sp. Pl. 1 (1753) 426; ed. 2, 1, 2 (1762) 611 (*coccigrya*); JUSSIEU, Arch. Mus. Hist. Nat. Paris 3 (1843) 263, repr. 9; SMALL, N.-Amer. Fl. 25 (1910) 160; BACKER, Schoolfl. (1911) 165; KOORD. Exk. Fl. Java 2 (1912) 450; BACKER, Bekn. Fl. Java (em. ed.) 4c (1943) fam. 110, p. 6; BRUGGEMAN, Ind. Tuinb. (1939) 250; STEEN, Fl. Sch. Indon. (1951) 236.—*M. coccigera* auctt.—Fig. 15–16.

Shrublet,  $\frac{1}{2}$ – $2\frac{1}{2}$  m high. Twigs terete, when young sparsely set with pale, appressed hairs; internodes 1– $1\frac{1}{2}$ –2 cm. *Leaves* either along the twig and then with a few, mucronate, marginal teeth, margin between the teeth revolute, or on dwarf shoots, and then entire, coriaceous, suborbicular to elliptic, 1– $1\frac{1}{2}$ –2 by  $\frac{3}{4}$ – $1\frac{1}{4}$ –( $1\frac{1}{2}$ ) cm; base rounded to truncate; top rounded to slightly notched; petiole and margin sometimes sparsely haired; surfaces glabrous, shiny and with prominent venation above; petiole 1–2 mm. *Stipules* small, linear, near the base of the petioles. *Flowers* on the dwarf shoots, axillary, single or paired,

white to pale pink or light red, glabrous, faintly scented. Pedicels *c.*  $1\frac{1}{2}$  cm, articulation in the lower half, marked by 2 small bracteoles. *Calyx* with 6–10, flat, elliptic glands *c.*  $1\frac{1}{2}$  mm in diam., sepals 2–3 mm long, blunt. *Petals* slightly differing in size, claw 2–4 mm, limb 5–7 by 3–7 mm. *Filaments* sometimes slightly unequal in length, *c.* 3 mm, 2 opposite filaments thicker and bearing anthers about twice the size of the others. Two styles ascending in a bow, 5 mm, the third one abortive, 2 mm; stigma *c.* 1 mm wide. *Fruit* (not seen) red, 8–10 mm long, only 1–2 mericarps developing.

*Distr.* Central America (Caribbean area), in *Malaysia*: cultivated chiefly in Java, below 800 m, especially in hedges. *Fl.* throughout the year. Propagation by seeds and cuttings.

Vern. *Japanese Mint*, D.

#### Excluded

*Triopteris poliandra* BLANCO, Fl. Filip. ed. 3, 2 (1878) 133 = *Berrya ammonilla* ROXB. (*Tiliaceae*).



Fig. 15. *Malpighia coccigera* L. Flowering twig with small subentire leaves of dwarf shoots,  $\times \frac{3}{5}$  (Cult. Kebun Raya Indonesia, April 1955).

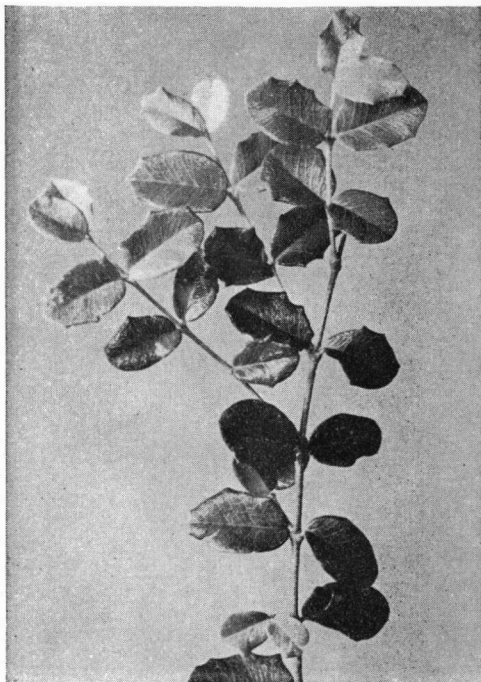


Fig. 16. *Malpighia coccigera* L. Young twig with larger dentate leaves of the same plant as fig. 15, nat. size.