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 cohercle, 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 basifixed or dorsifixed, 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 (samaras), 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 Pyramidotorae 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., Sphedanocarpus pruiens (E. MEYER) SZYSZL., 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.
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
      5. Tristellateia
3. Stipules free, inserted on the twig between the petiolar parts, 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
5. Leaf margin with small glands beneath. Petiole at the top with 2 distinct, dish-shaped glands.
   Samaras only with a dorsal wing.
   5. Ryssopterys
5. Leaf and petiole glandless. Samara surrounded by a disk-like lateral wing.
   1. Aspidopterys

1. Fruit smooth. Cultivated shrublets with small leaves ± 1–5 cm.
6. Leaves herbaceous, entire, with 2 glands at the base. Calyx glandless.
   6. Galphimia
   7. Malpighia

1. ASPIDOPTERYS


Lianas. Leaves and petiolar parts 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 immaturely 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 ± oblong, not clawed, recurved after anthesis, thin, entire, glabrous, somewhat cucullate at the top. Filaments thin, sometimes connate at the base, glabrous; connecive little developed and only dorsally visible. Ovary mostly glabrous, with 3 flat, already more or less winged sides; styles 3 or 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 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.
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5. Leaf margin with small glands beneath. Petiole at the top with 2 distinct, dish-shaped glands.
   Samaras only with a dorsal wing.
   5. Ryssopterys
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**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 hairy. 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 subglobular or olate-elliptic.
   3. A. concava

**KEY TO FRUITING SPECIMENS**

1. Seed in the centre of the wing. Carpophore distinct, 1–2 mm long. Fig. 1 e–g.
   1. A. elliptica
1. Seed acroscopically situated in the wing.
   2. Seed 3–5 mm long. Carpophore almost wanting. Fig. 1 a–d.
   3. A. concava
   2. Seed 1½–1 cm long. Carpophore 2–5(–7) mm long. Fig. 1 h–j.
   4. A. tomentosa

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

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 obovately-oblong, c. 11/4—11/4 times as long as broad, 8—13 (—17) by 5—8(—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—11/2 mm, thin, oblong, top rounded and sometimes a bit ciliolate, further glabrous. **Petals** oblong with rounded top, 5—7 by 2—3 mm. Filaments 11/4—11/2 mm, anthers c. 11/2 by 1 mm. **Carpophore** pyramidal, 1—2 mm high; wing suborbicular, mostly emarginate, approximately flat, (3—)31/2—5 (6) cm long, (2—)3—4(—)5(—51/2) cm broad, pale-translucent to shiny brown and coriaceous; dorsal wing distinct but narrow. **Seed** in the centre of the wing, linear, 31/4—1 cm long.

**Distr.** China, ?India-?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.


**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. 1.—C. 1, 1911, 603; ARÉNES, *ibid*. Suppl. 1, 1945, 540) is conspecific, the species would also occur in Indo-China.


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—11/2 cm. **Inflorescences** axillary, up to c. 12 cm long, lax-flow ered, glabrous. Pedicels filiform, 1—11/2 cm. **Flowers** pale green. Buds elliptic. **Sepals** elliptic, 11/4 by 1 mm. **Petals** oblong to obovate, somewhat cumulate at the top, 5 by 2 mm. Filaments 2 mm, anthers 1—11/2 mm. Ovary glabrous, styles 3 mm. **Fruit** unknown.

**Fig. 1.** Carpophores with disk lobes (× 8) and samaras (×12½) 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, × 2/3,  
b. bud, × 5,  
c. flower, × 5,  
d. unopened stamens, the left one from the adaxial side, × 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, × 7,  
f. a leaf, × 2/3.

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, 1¼–2½ 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 3¼–1½(–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 1–1½ cm, in fruit 3–5 cm, articulated in the lower half. Bracteoles alternate below the articulate flowers white, ovate, elliptic in bud. Sepals 2 by 1 mm, glabrous, top rounded. Petals oblong, 3½–6 by 1½—3 mm, glabrous, with rounded top. Ovary glabrous, styles 3–4½ mm. Carpophore almost absent, disk lobes forming a sort of cup (fig. 1a). Samara: main wing suborbiculate, ovate or transverse-elliptic, concave outside, 2–3½ by 2½–4 cm, scarious and pale-translucent; dorsal wing distinct but small, broadest at the base. Seed acropically situated in the wing, linear, 3–5 mm long.

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

Ecot. 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.


Liana, 10 m or longer. Twigs with long persistent, ferrugineous 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 ferrugineous to fulvous-haired, nerves prominent, mostly darker haired; nerves 4–7 pairs; petiole 1–2½(–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. 1½–2½ 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 1½ by 1 mm, glabrous, sometimes ciliate. Petals obovate, c. 5 by 2½ mm, glabrous, top rounded. Filaments 2–2½ mm, terete, sometimes connate at the base, glabrous; anthers 1–1½ mm, somewhat narrowed towards the top. Ovary glabrous, styles 3–4 mm. Samaras on a 2–5(–7) mm long acute carpophore; wing obovate, (2½–3)–4 by 2½–3 cm, pale greenish and translucent, glabrescent, approximately flat;

Fig. 3. Distribution of *Aspidopterys elliptica* (Bl.) Jusseij, the question marks indicating doubtful records from continental Asia, and localities of *A. concava* (WALL.) Jusseij. (triangles).
dorsal wing small, broadest at the base. Seed acroscopically situated in the wing, c. 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. helleriana KURZ to represent a variety of A. concava. An investigation of the (fruiting) type specimen (HELFER 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 Phanôé, which I cannot identify with certainty because fruits are lacking. KING also referred to A. helleriana 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-cuspitate.
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.

Leaves elliptic to obovate, short-acuminate-cuspitate; top truncate to emarginate, in the latter case the tip protruding from a large 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.

Leaves ovate-elliptic, 6–9 by 3–5 cm, acute to acuminate with narrowed top. Samaras on carpophore 5–7 mm long, wing suborbicular, 2/3 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 (1732 & 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; AREÑES, 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, hairless; one style slightly longer than the long stamen, coiled in bud, stigma acute, 2 styles abortive. Samaras consisting of a globular mercarp 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. Archiptage (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 hairied. Sect. Metahiptage 1. H. burkiliiana
2. Calycinal gland sunken in the tissue of the apex of the pedicel (fig. 5b). Youngest parts densely tomentose... 2. H. sericea
2. Calycinal gland distinctly inserted on the surface of the calyx (and eventually on the pedicel) (fig. 5c–e).
Youngest parts appressedly hairied.
3. Calycinal gland convex, elliptic to linear, decurrent on the pedicel (fig. 5c). Sepals roundish, hairied 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 hairied chiefly in the centre
4. H. luzonica
4. Adult leaves densely hairied below. Sepals hairied all over
5. H. pubescens

1. Hiptage burkiliiana 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 3 1/2–5(–6) cm; base acute to rounded, without or with 2 small glands; top distinctly acuminate; nerves 4–5 pairs; surfaces both glabrous; petiole 3/4 cm. Inflorescences at the ends of the twigs, terminal and axillary, sparsely fulvous-sericeous hairied, sometimes secondarily branched, 6–10–15 cm long; rhachis stout, terete, 1 1/2–2 mm in diam. at the base. Bracts small and acute, mostly caducous, or wanting. Pedicels 1 1/2–2 1/2 cm, articulated somewhat above the middle, the articulation marked by a whorl of appressed hairs, upper portion thinned 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 1–10 mm long including the different 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 2 1/2 by 1 cm, lateral wings 1 1/2 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 1–1 1/2 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, Ph. 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 (1 1/2–2)–4(–6) cm. Leaves oblong, 2–2 1/2 times as long as broad, 4–5 1/2(–8) by 1 1/2–2 1/2(–3 1/2) 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 long, dense-flowered, strongly hairy. Bracts are thickly haired pimplies. 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 3/4–1 1/4 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.


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

The origin of WIGHT's specimen (mentioned in his Prodrumus as H. parviflora, 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.


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. Inflorescences (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 ovate, top obtuse, acute, or rounded, sometimes divided into 2 lobes, (3–)5–6(–7) by 1(–2) cm, lateral wings 2–3 by 1½(–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 aphrodisiacal properties. From the bark of the root a remarkable glucosid, hiptagin, has been isolated by this author (Bull. Jard. Bot. Btsg 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 ridgepole of pyramidal house roofs.
Fig. 7. Hiptage luzonica MERR. a. Flowering branch, × 2½, b. flower, × 4½, 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 (Zoocecidia 1926, 270).

Vern. Java: Aroy burrie, a. beurit, kibodas, ojot ki kupu,kupu, S, kokas, dijaranan, ojot-prawan, krboek, 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 Areñas represents a narrow-leaved form.


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-oblong, c. 2(—4) times as long as broad, (4—)6—12(—15) 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 cm 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 subrenunculate. 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 (1 1/4—)1—1 1/4 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).


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 Areñas, 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 Areñas the leaves are described as loosely pubescent; an examination of the type specimen showed that crystals of corrosive sublimate are responsible for the hairy appearance.

H. detersgens Craib, from Lower Siam, reminds of H. luzonica, but can easily be distinguished by its hairy twigs, the light-coloured, hairy 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.

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 3½–2 cm; base rounded, glandless; tip 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 1–1½ cm. *Flowers* yellow or red; calyceal 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 ¾–1½ 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.** Dalùnît, pangardisen, panunyandiyan, 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 arborecent *H. pubescens*. I conclude provisionally that they are conspecific.

**Excluded**


### 3. TRISTELLATEIA


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 whichstellately 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.


The pedicels in *T. australasiae* are described on account, therefore the inflorescence does not represent a purely racemose structure.


Liana, up to c. 10 m, only youngest parts appressedly short white-haired, quickly glabres-
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 1/2-2 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 1/2 cm, distinctly sulcate, often scarcely haired. Stipules linear-lanceolate, 1 mm, acute. Inflorescences terminal or on mostly 2-leaved branchlets; rhachis (5-) 10-25 cm long, very scarcely haired. Pedicels
about decussate, 1½–2(–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 1½ 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 1½–2½ 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 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., ahusin, Bik., bagnit, Tagb., bagit, Bik., Tag., binusisi, baising, 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 panicule). 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 spp., one in E. Africa representing sect. Catocephalis 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 curtisi Oliv., × 2½, c. of Tristellateia australasiae A. Rich., × 2½, the arrow indicating the dorsal wing, d. of Ryssopterys timoriensis (DC.) Juss., nat. size.


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

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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 axes; rachis 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, 1 1/2-2 1/2 cm, thin, terete, glabrous. Buds oblong. Flowers yellow. Sepals 2-3 by 1 1/2-2 1/2 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 corolla base, 3-5 mm long, connective little developed. Ovary ovate, c. 1 1/2 mm high, glabrous; styles threadlike, glabrous, stigma not thickened. Mericarps with a distinct, dorsal crest elongated in an acute apex, 1-1 1/2 cm long, glabrous, distinctly nerve

Distr. Malaysia: Sumatra (Indragiri, CURTIS

5. RYSSOPTERYS

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.—Rhysopteris, Rysoopteris, Rysopteryx 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; rachis 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 androecious, actinomorphic, 1-2 1/2 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.
1. Connective of the anthers apiculate, exceeding the thecae. Samaras 4–6 cm long. Stipules minute. 1. *R. tiliaefolia*

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 curtilis* OLIV., showing the hairy node, d. *Ryssopterys timoriensis* (DC.) Juss., showing insertion of stipules on a flowering node.**


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 1/4–1 1/2(–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. Rachis of the inflorescence about 6–10 cm, appressedly pale tomentose. Pedicels 1 1/2–2, 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) cm long, margin entire to subcrenulate. Filaments thin, terete, 2–3 mm long, glabrous; anthers 1 1/2 by 1/2–1 mm, glabrous, connective the best developed in d 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 1/2–2 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 (Zooc Cecidia 1926, 272).

Ver. Java: aroy kita pas, a. kibaks, a. kikupu kupa, a. kibaka, a. kikeuus, a. latiepar, kingkila ban lakalina, S, têmas, ojod têmas, kêtapangan, 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 DELSSERT, Ic. Sel. Pl. 3 (1837) 21, t. 35 (timoriensis);
Fig. 12. *Ryssopterys tillaefolia* (Vent.) Juss. a. Flowering branch, left beneath with very young fruits, × 2/3, b. ♂ flower, × 3, c. the same, showing calyx and styles, × 6, d. stamens, the left one from the adaxial side, × 6, e. 2 fully developed samaras, attached to their carpophores, and 1 abortive one, × 2/3, f. a cordate leaf, × 2/3.


Twiner, rarely creeping, up to c. 10 m. Young parts densely greyish fulvous-haired; twigs terete, with some lenticels, rather quickly glabrescent, internodes (7—10—15—25) cm. Stipules variable in shape and size, roundish-obevate to lanceolate, with narrow 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—)1/2—1/3—1/4 (2/3) times as long as broad, (5—)8—12—15 by 4—7—12 cm; base shallowly cordate, rounded, or truncate, top acute, sometimes acuminated 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. Pedicles 1—1/2 cm, densely appressed-haired. Sepals roundish, about 2 mm, more or less hairless outside, glabrous inside. Petals orbicular-elliptic, more or less unguiculate, 6—8—11 cm long, entire to subcuneulate. Filaments thin, terete, 2—4 mm, rarely the outer whorl 1 mm longer than the inner one, glabrous; anthers 1—1/2 by 1/2—1 mm, 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 1/2—4 cm long, 1—1 1/2 cm broad, wing mostly not narrowed at the base, nerves in the wing curved about 30—60°.

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

Ecol. Bushwood 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 (2007) m. Fl. throughout the year.


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


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-

Fig. 14. Galphimia gracilis BARTL. in flower (Bogor, May 1939).
sory stipules. *Leaves* ovate-elliptic, c. 1.4–1.6(-2 1/2) times as long as broad, (3–)4–10 by (2–)3–7 cm; base rounded, sometimes slightly cordate, top often rounded, seldom narrowed, cuspitate; 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 1/2(–4) by 1–1 1/2 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 epipetalous 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 *sp.*, 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,** PI. 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 (1922) 383.—Fig. 14.

Shrub, 1/2–2 m high. Young parts appressedly reddish-haired, older twigs brown, glabrous; nodes 2–4 cm. *Leaves* herbaceous, elliptic-oblong, sometimes ovate, 3–5 by 1–2 1/2 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 overlapped by 2 lateral branches, 6–12 cm, appressedly dark-red short-haired. Bracts 3–4 mm, linear, acute, persistent. Pedicels 3/4–1 1/4 cm, articulated about the middle. Bracteoles at the top of the lower portion. *Flowers* yellow, 1 1/2–2 cm in diam., glabrous in all parts. *Sepals* ovate, slightly carinate and decurrent in the pedicel, 2–2 1/2 by 1–1 1/2 mm, top blunt, sometimes recurved. *Petals* slightly carinate below, two slightly shorter than the others, 2–3 1/2 mm clawed, limb triangular, blunt, c. 5 by 3 1/2 mm. Filaments with somewhat broadened base, glabrous, yellow, turning red, persistent, 2 1/2–3 and 4 mm long; anthers 2–2 1/2 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. MALPIGIA**

**Plumer 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,** PI. 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* unequal, 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.


Shrublet, 1½–2½ m high. Twigs terete, when young sparsely set with pale, appressed hairs; internodes 1–1½(-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, 1–1½(-2) by ¾–1¼(-1½) 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. 1½ cm, articulation in the lower half, marked by 2 small bracteoles. Calyx with 6–10, flat, elliptic glands c. 1½ 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 Mirt, 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, × 3½ (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.