

MALPIGHIACEAE

BY

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Lianes, shrubs or trees. Young parts covered with 1-celled, mostly brachiate, bifurcate, or compass-needle-shaped hairs. Leaves opposite, (rarely alternate) mostly entire, usually petioled, often with glands on margin and beneath, usually pinnately nerved. Petioles often with glands. Stipules usually small or wanting, rarely large, either interpetiolar, attached to the petiole or to the branch, or intrapetiolar, mostly free. Inflorescences racemose, terminal or axillary, simple or compound, consisting of racemes, corymbs or umbels, rarely reduced to a single flower. Pedicels articulate, provided with 2 bracteoles, at the base with 1 bract or rarely a leaflet. Flowers hermaphrodite, rarely diclinous (not in Surinam species), zygomorphous, heterochlamydeous, rarely apetalous (not in Surinam species). Receptacle convex, flat or depressed. Sepals 5, free or rarely united at the base, with quincuncial aestivation, rarely valvate, beset with usually 5—10 glands, or glandless (in nearly all species there are glandless and glandbearing varieties). Petals 5, alternating with the sepals, with cochlear aestivation, mostly manifestly clawed, usually unequal, often concave, rarely entire, margin often glandular. Androecium obdiplostemonous, (the 5 stamens opposite the petals often shorter than the alternating ones) either actinomorphic or zygomorphous, often some stamens sterile or abortive. Filaments usually united at the base or higher up, rarely distinct. Anthers narrow or broad, the connectives often large. Carpels 3,

rarely 2 or 4, partly or entirely united, epigynous, each with 1 pendulous, campylotropous or hemi-anatropous ovule. Styles 3, mostly free, rarely united, bearing at the top the acute, obtuse, capitate or dilated stigma. Fruit a schizocarp, the mericarps with wings or hairs (not in Surinam species), ventrally or dorsally dehiscent capsules, 1—3-pyrenous drupes, or 1-seeded nuts. Seeds without endosperm. Embryo notorrhizal, rarely straight, with mostly curved, circinnate, involute or convolute cotyledons. Plumula small.

Distribution: Nearly 800 species, 56 genera, mostly in the tropics of the New and Old World.

Principal literature:

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 A. A. Pulle, An Enumeration of the Vascular Plants known from Surinam (1906).
 J. K. Small, in N.-Amer. Flora XXV, 2 (1910).
 F. Niedenzu, Über die Fortentwicklung in der Familie der Malpighiaceae, in Engler's Bot. Jahrb. 50, Suppl. (1914), p. 162.
 W. Fawcett and A. B. Rendle, Flora of Jamaica IV (1920).
 F. Niedenzu in Engler, das Pflanzenreich IV, 141 (1928).
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The key to the genera is only based on the Surinam species.

1. a. Fruit winged (samara) attached to a high pyramidal, usually 3-sided receptacle 2

- b. Fruit a drupe, capsule, or nutlike, attached to a flat or depressed receptacle 9
2. a. Samaras with a small, dorsal ridge, keel or winglet and large distinct or united lateral wings. 3
- b. The largest wing of the samaras is the dorsal one. 6
3. a. Aestivation of the sepals quincuncial; sepals, bracts and bracteoles ovate, elliptical or lanceolate. Styles nearly straight (except: *Hiraea*). Lateral wing large, the medio-dorsal one developed, intermedial emergences wanting, or consisting only of wrinkles, crests, or small winglets. 4
- b. Aestivation of sepals valvate; sepals and large bracts and bracteoles oblanceolate or spatulate. Styles $\pm$ sigmoid. Intermedial emergences very large, therefore fruit with 5 parallel, subequal wings. Inflorescences consisting of 4-flowered pseudo-umbels, in axillar panicles or corymbs. Leaves beneath grey-velutinous, with 2 glands at the base. Calyx pink, with 8 pairwise united glands. Ovary densely hirsute with 3 styles... 3. **Diplopterys**.
4. a. Lateral wing entire (1 wing) or at top and base incised (2 wings) 5
- b. Lateral wing X-shaped, consisting of 4 parts .. 4. **Tetrapteris**.
- c. Lateral wing V-shaped, consisting of 2 parts... 5. **Dolichopterys**.
5. a. Stipules small, at the base of the petiole. Inflorescences consisting of racemes (rarely umbels) forming panicles. Pedicels with small bracteoles above or at the middle. Seeds with nearly equal cotyledons 1. **Mascagnia**.
- b. Stipules large, attached either to the base or to the top of the petiole. Inflorescences consisting of axillary or terminal umbels, either solitary or in corymbs, shorter than the leaves. Pedicels bibracteolate at the base. Seeds with unequal cotyledons, the larger one plicate around the strongly reduced interior one .. 2. **Hiraea**.
6. a. Flowers zygomorphous or actinomorphic. All 10 stamens fertile. Style-tops obtuse or uncinat.

- Wing thickened at the upper or lower margin, rarely entirely 7
- b. Flowers zygomorphous. Stamens opposite the 4 lateral sepals sterile, the others fertile or all more or less fertile. Style-tops leaf- and clawlike, with stigma at the inner angle. Wing with thick upper, thin lower margin 8
7. a. Flowers small, sub-actinomorphic. Top of the style compressed, often ending in a short claw. Stigmas clavate or truncate, at the inner angle of the top of the style. Dorsal wing of the samara with thin upper (ventral) and thick lower (dorsal) margin. (Wings of *Heteropteris reticulata* entirely thickened) 6. **Heteropteris**.
- b. Flowers zygomorphous. Top of the styles truncate and mostly with orbicular, capitellate stigmas. Dorsal wing with thick upper and thin lower margin..... 7. **Banisteria**.
8. a. Leaves pinnately nerved. All stamens more or less fertile. Dorsal wing very short, crest-like. 9. **Brachypterys**.
- b. Leaves palmately nerved. The 4 lateral stamens sterile. Dorsal wing large.. 8. **Stigmaphyllon**.
9. a. Axillary or terminal racemes, bearing 2-flowered branchlets. Bracts and bracteoles with glands. Flowers pink. Filaments glabrous, at the base united into a hirsute ring; anthers glabrous. Ovary glabrous, 2-locular with 2 styles. Fruit separating into 2 smooth cocci. 10. **Spachea**.
- b. Axillary racemes or many-to 1-flowered corymbs. Bracts and bracteoles glandless (except *Bunchosia*). Ovary 2—3-locular, with 2 or 3 styles. Fruit a 3—1-pyrenous drupe, or 3—1nuts 10
10. a. Styles obtuse. Drupe with 2 or 3 pyrenes. Cotyledons nearly straight or shortly uncinat. 11
- b. Styles subulate, nearly straight. Drupe with 1, 3-locular, 3-seeded pyrene, exocarp thin, fleshy, endocarp bony or woody. Cotyledons sub-equal, spirally involute or one enveloping the other with the margins 13. **Byrsonima**.

11. *a.* ∞- to 1-flowered, axillary and terminal corymbs. Bracteoles glandless. Calyx with 6—10 glands, the 6 posterior longer than the others. Ovary glabrous; styles free, with obtuse or slightly dilated top with the stigma at the inner angle. Drupe with 3 pyrenes, longitudinally 3—5-crested, and transversally ribbed. 11. **Malpighia**.
- b.* ∞-flowered, elongated, axillary racemes, larger than the leaves. Bracteoles with large glands. Ovary glabrous or sericeous. Styles free or united, with oblique capitellate stigmas. Drupe with 2 smooth pyrenes 12. **Bunchosia**.

1. MASCAGNIA Bert. emend. Griseb. et Ndz.

Climbing or partially erect shrubs. Leaves opposite, reticulate, petiolate, membranous or coriaceous, varying from glabrous to copiously pubescent. Stipules scanty, attached to the sides of the base of the petiole, deciduous. Axillary or terminal, simple or paniced racemes, sometimes umbels (not in Surinam species). Pedicels rather long. Bracts and bracteoles ovate, lanceolate or elliptical. Sepals broad, ovate, lanceolate or elliptical, persistent; aestivation quincuncial, outside puberulous, inside glabrous, provided with 8, rarely 10 glands. Petals unguiculate, varying in colour, membranous, mostly glabrous, ovate or obovate, with usually cordate base, often undulate; the margin crenulate, erose or toothed, rarely one of them fringed, the 5th petal rarely glandular. Stamens 10, all fertile; androecium either actinomorphic, and then the stamens opposite the petals shorter, or zygomorphic, and then the 2 stamens opposite the posterior-lateral petals, resp. opposite the posterior styles, longer than the 8 others. Filaments subulate or lanceolate, with short anthers. Ovary 3-lobed, 3-locular. Styles 3, short, mostly straight, obtuse, glabrous. The 1—3 samaras attached to a pyramidal, trigonous torus, at last becoming more or less free, with large, lateral, entire, or at the top incised wing, or divided into 2 lateral wings; dorsal

crest or winglet often, and intermedial appendages or winglets now and then present. Cotyledons mostly more or less equal, notorrhizal, leaflike.

Distribution: Species about 40, in tropical America, including the West Indies.

1. *a.* Petals in adult flowers glabrous (see also *M. leucanthele*); margin toothed or wavy. Samara-wing slightly incised 2
- b.* Petals in adult flowers sericeous outside; margin glandular-toothed or lacerate-ciliate. Samara-wing incised as far as the nut 3
2. *a.* The epipetalous stamens equal, slightly smaller than the alternating ones. Styles short, nearly straight, equal; top of the styles compressed, acute. Corymbs small, axillary. 1. **M. sepium** (Juss.) Griseb.
- b.* Of the epipetalous stamens those opposite the posterior styles larger and thicker than the others. The 2 posterior styles thickest, curved at right angles at base; the anterior style shorter, nearly straight. Tops of the styles compressed, distinctly uncinat. Panicles large, decompound, leaf-bearing, consisting of many-flowered racemes 2. **M. ovatifolia** (Kunth) Griseb.
3. *a.* Petals in adult flowers at last glabrous. Top of the styles triangular, truncate, stigma covering the whole top. Corymbs few-flowered, forming terminal or sub-terminal amplex, 3 × compound panicles 5. **M. leucanthele** Griseb.
- b.* Petals densely sericeous outside. Top of the styles compressed; stigma at the inner angle. Simple or paniced racemes 4
4. *a.* Bracteoles glandless or at the base of the lower surface with 1—4 abortive glands along the margin. Sepals with revolute, glandless tips. Petals with lacerate-ciliate, involute margins. The epipetalous stamens slightly longer than the alternating ones. Styles equal, nearly straight 3. **M. anisopetala** (Juss.) Griseb.

- b. Margin of the bracteoles with 7—15 long-stipitate, capitate-clavate glands. Sepals erect, upper part of the margin with 5—9 stipitate glands. Petals flat with sub-glandular teeth. The 3 stamens opposite the styles with curved filaments and with much thicker anthers than the others. Styles curved, the 2 posterior ones thicker and more curved than the anterior one

..... 4. *M. multiglandulosa* Niedenzu.

1. *Mascagnia sepium* (Juss.) Griseb. in Fl. Bras. XII, 1 (1858), p. 96; id. in Vid. Medd. Kjöb. (1875), p. 147; Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 6; id. in Engl., Pfl. reich. IV, 141 (1928), p. 94; — *Hiraea sepium* Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 16, t. 165; id. in Arch. Mus. Par. III (1843), p. 552; Griseb. in Linnaea XIII (1839), p. 243.

Liane or shrub, dependent on the surrounding vegetation. Young parts covered with rufous, yellowish or whitish, sericeous or velutinous hairs; compass-needle-shaped with straight branches, or forked with erect branches; feet always very short (in Surinam specimen forked hairs with conspicuous feet). Branchlets compressed, slender, velutinous; branches cylindrical, mostly glabrous, brownish or greyish, 3—5 mm in diam, beset with many small lenticels; internodes $\frac{1}{2}$ —6(—20) cm long. Leaves opposite (sometimes pseudo-alternate) membranous, chartaceous or coriaceous, ovate or ovate-oblong, with rounded or subcordate base, revolute margin and acuminate top, very varying in size. Young leaves sericeous or velutinous; adult ones either glabrescent or with persistent hairs; above smooth, beneath often with several impressed glands; midrib strongly prominent (in subspec. *bierosa*), primary nerves (4—6 on each side) prominent, arcuate, not attaining the margin, the secondary ones laxly reticulate. Petioles mostly sericeous, 4—25 mm long, canaliculate. Stipules small, deciduous. Small, manyflowered, axillary corymbs, at the top of a velutinous peduncle. Pedicels very slender, ascending, velutinous, up to 20 mm long, bracteate

at the base, jointed below the middle and somewhat below the articulation bibracteolate. Bracts and bracteoles mostly subulate or lanceolate (rarely ovate), hirsute, 2—3, resp. $\frac{1}{2}$ —1 $\frac{1}{2}$ mm long, one of the bracteoles often with a small gland. Flowers 1—1 $\frac{1}{2}$ cm in diameter. Sepals ovate, erect, outside sericeous, inside glabrous, 3—4 mm long, beset with 8 large, ellipsoid or obovoid, 2—3 mm long, contiguous glands, with mostly free and recurved tops. Petals subequal, membranous, glabrous, patent. Limb elliptical or obovate, hollow, 3—5 mm long, base subcordate or hastate, margin toothed, top galeate, dorsally carinate; claws straight, 1—2 mm long. Stamens exserted, the episepalous ones somewhat longer; the 2 stamens opposite the posterior styles exceeding the others; filaments glabrous. Anthers elliptical, cells straight, parallel with a thick connective. Ovary 3-lobed, villose, dorsally crested; styles 3, attached to the ventral side of the carpids, glabrous, straight or slightly diverging, 2 mm long, top compressed or obtuse, stigma at the inner angle. Samaras puberulous; nut sub-globose, hardly $\frac{1}{2}$ cm high, top acuminate; lateral wing orbicular or ovate, yellow-green, at the top slightly protruding beyond the nut and slightly sinuate-emarginate, 2—3 $\frac{1}{2}$ cm in diam., very thin; margin undulate; dorsal crest semi-lanceolate, -ovate, or -cordate, 8—15 mm long, 1—2 mm high, not attaining the apical sinus. Ventral areole ovate-acute, 2—3 mm long, embryo with short radicle and fleshy cotyledons.

Distribution: From Argentina and Paraguay to Tobago and Honduras.

Sub-species *acuminata* Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908); id. in Engl., Pfl. reich. IV (1928), p. 95.

Leaves rather long-acuminate, acumen up to $\frac{1}{10}$ of the length of the leaf; mostly with long petiole (not in var. *Salzmanniana*).

var. **Salzmanniana** Ndz. l. c. [merging into var. *bierosa* (Moric.) Griseb.].

Branchlets and branches soon glabrescent. Leaves large, soon glabrous, chartaceous, ovate; base oblique-cordate, often with 2 glands; margin strongly revolute; top short-acuminate. Lower surface with strongly prominent midrib, few, arcuate primary nerves, and laxly reticulate, hardly prominent other veins; the veins at the base of the leaf slightly puberulous. Petioles puberulous, 1 cm long. Stipules subulate, hardly 2 mm long.

Distribution: Brazil.

Tapanahoni R. (Versteeg n. 681, fr. July); Locality unknown: Menge, ex reliq. Wulschlägel s. n. [B.].

var. **velutina** Griseb. in Vid. Medd. (1875), p. 147; Ndz. l. c.

Branchlets and leaves with persistent velutinous hairs. Leaves small, 3–9 cm long, membranous. Petioles long, sericeous or velutinous. Stipules very small, setaceous, caducous. Bracts and bracteoles lanceolate or setaceous. Flowers 1 cm in diam.; anthers globose.

Distribution: As in the species.

Brownsberg (B.W. n. 3180, fl. Sept.).

Subspecies **bierosa** (Moric.) Griseb. in Fl. Bras. XII, 1 (1858), p. 96; Ndz. in Engl., Pfl. reich IV (1928), p. 96; — *Hiraea bierosa* Moric. ex Juss. in Ann. sc. nat. Bot. XIII (1840), p. 260.

Leaves chartaceous or coriaceous, ovate; base cordate; top obtuse or emarginate, or shortly and broadly acute or acuminate.

var. **aequatorialis** Ndz. in Arb. Bot. Inst. l. c., p. 7; id. in Engl., l. c., p. 96.

Leaves chartaceous-coriaceous; above glabrous, beneath hispid, up to 13 cm long, and 7½ cm wide.

Distribution: Para, Guiana, Tobago, Trinidad.

Marowijne R. near Albina (Wulschlägel n. 1391, fr. Oct. [B.]).

2. **Mascagnia ovatifolia** (Kunth) Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 121; Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 13; id. in Engl., Pfl. reich IV (1928), p. 101, f. 15A; Small in N.-Amer. Fl. XXV, 2 (1910), p. 120; — *Hiraea ovatifolia* Kunth in Nov. gen. et spec. V (1821), p. 131; Juss. in Arch. Mus. Par. III (1843), p. 552; — *Hiraea divaricata* Kunth l. c., p. 131; Juss. l. c., p. 551; — *Hiraea oblongifolia* D.C., Prodr. I (1824), p. 585; Juss. l. c., p. 550; — *Hiraea elegans* Juss. l. c., p. 549; — *Hiraea Jussieuana* Miq. in Linnaea XIX (1847), p. 142; — *Mascagnia elegans* Griseb. in Fl. Bras. XII, 1 (1858), p. 15, t. 19; Pulle, Enum. Pl. Surin. (1906), p. 466.

Shrub or liane dependent on the surrounding vegetation. Young branchlets grey-velutinous, thin, cylindrical; branches glabrous, brownish, striate, up to ½ cm in diam.; internodes up to 12½ cm long. Leaves opposite, membranous-chartaceous, ovate, ovate-lanceolate or lanceolate, up to 12½ cm long, 7½ cm wide, with obtuse or acuminate base, and rather long and abruptly acuminate top, mostly glandless; margin flat. Young leaves sericeous, glabrescent, except the veins beneath; beneath midrib and primary nerves (4–5 on each side) prominent, the secondary nerves reticulate. Petioles slender, cylindrical, often curved, beneath canaliculate, sericeous, velutinous or glabrescent, up to 2 cm long, mostly glandless. Stipules minute (½–¾ mm), triangular or subulate, puberulous. Leaves of the inflorescence gradually diminishing to 1½ cm long (petioles included) bracts. Grey-pubescent, up to 40-flowered racemes, up to 10 cm long (peduncle included), in lax, ample, terminal, leafy, decompound panicles. Pedicels grey-pubescent, 1–1½ cm long, cylindrical, nearly erect, 2–3 mm above the base articulated, and bibracteolate somewhat below the joint. Bracts and bracteoles triangular-subulate or linear, small (1–1½, resp. ½–1 mm long), glandless, top acute. Flowers 1¼ cm in diam. Sepals elliptical or oblong, 2–3 mm long, outside sericeous, with 8, thick, oblong 2–2½ mm long glands,

with recurved and often free tops. Petals pink or lilac, patent, glabrous, semi-orbicular or broadly ovate; margin toothed or wavy; base cuneate or cordate; 3—5 mm long; claw straight, 3 mm long. Stamens long-exserted, glabrous, the stamens opposite the posterior styles slightly thicker and longer than the others; anthers elliptical, $\frac{1}{2}$ —1 mm long; cells pilose, recurved at the base. Ovary subglobose-ovoid, white-hirsute, each carpel with 3 dorsal crests; styles 3, glabrous, trigonous, 2 mm long, the posterior thicker, at the base curved at right angles, the anterior style nearly straight, slightly shorter; top of the styles acute or slightly uncinat, with stigma at the inner angle. Samaras pink, with few long hairs; nut reticulately veined, up to 5 mm high; ventral areole obpiriform, 3—4 mm long; wing sub-orbicular, symmetrical, entire or undulate, glabrous, membranous, with strong radial veins, $1\frac{1}{2}$ —3 cm in diam., at the top 3 mm incised; dorsal crest keel-like, 4—6 mm long, 2—4 mm wide, reaching as far as the apical wing-sinus.

Distribution: From Argentina and Paraguay to Colombia and Trinidad.

Paramaribo (Hering 32 [L.], type of *Hiraea Jussieuana* Miq.; Wulschlägel n. 920 [G.]; Went n. 225, fl. Aug.; Splitgerber n. 768 [L.]; v. Hall s. n.; Weigelt s. n. [D.]); Way to Charlesburg (B.W. n. 504, fl. and fr. Apr.); Tourtonne-laan (Kegel n. 829, fl. March [G.]); locality unknown: Focke n. 317, n. 1103, and s. n.

var. **oblongifolia** (Bertero) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 13; id. in Engl., Pfl. reich IV (1928), p. 102; — *Mascagnia oblongifolia* Bertero ex D.C., Prodr. I (1825), p. 585; Juss. in Arch. Mus. Par. III (1843), p. 550.

Leaves lanceolate-ovate, up to 12 cm long, 5 cm wide; top of the style acute or shortly uncinat; wing ovate, up to 2 cm long, 1.6 cm wide.

Distribution: Colombia, Guiana.

Locality and collect. unknown: Herb. Reichenbach s. n., named *Hiraea floribunda* [D.].

3. **Mascagnia anisopetala** (Juss.) Griseb. in Fl. Bras. XII, 1 (1858), p. 95; Pulle, Enum. Pl. Surin. (1906), p. 466; Ndz. in Engl., Pfl. reich IV, 141 (1928), p. 106; t. 15N, O; Kostermans l. c. p. 4; — *Hiraea anisopetala* Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 13; id. in Arch. Mus. Par. III (1843), p. 554; Miq. in Linnaea XVIII (1844), p. 57; — *Mascagnia macrodisca* (Tr. et Planch.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. (1908), p. 16; id. in Engl., Pfl. reich IV (1928), p. 105; — *Hiraea macrodisca* Tr. et Planch. in Ann. sc. nat. 4e sér. Bot. XVIII (1862), p. 326.

Shrubby liane, grey-tomentose; arms of the hairs curved, 1 mm long, feet 0.2 mm long. Branches cylindrical, 4—5 mm in diam.; branchlets compressed; internodes $1\frac{1}{2}$ —5(—17) cm long. Leaves opposite, membranous-chartaceous, ovate, obovate, elliptical or oblong, 5—10(—17) cm long, 2—5(—9) cm wide; base acute or obtuse; top acuminate, mucronate or obtuse; margin flattish. Adult leaves above glabrous, smooth, shining, beneath densely sericeous-tomentose (rarely nearly glabrous) with prominent midrib and primary nerves (5—6 on each side); the secondary ones reticulate, slightly prominent; base along the margin often with 2—5 glands. Petioles thick, canaliculate, $\frac{1}{2}$ —2 cm long, usually with disappearing glands. Stipules very small or wanting. Densely sericeous, simple, 5—20-flowered racemes, or axillary and terminal, up to 10 cm long, raceme-bearing panicles. Pedicels 3—7 mm long, densely sericeous, bracteolate slightly above the middle, bracteate at the base. Bracts and bracteoles ovate or lanceolate, outside sericeous, top often slightly revolute; bracteoles along the basal margin with 0—4 glands. Flowers 1—1.2 cm in diam. Sepals lanceolate with revolute top, outside densely sericeous, inside glabrous, shining, 4—7 mm long, with 8 oblong-elliptical, 2—3 mm long glands, halfway free and recurved. Petals membranous, pale-reddish, strongly unequal, patent, except the petal opposite the glandless sepal (Chodat, in Bull. Soc. Bot. Genève 9 (1917), p. 58), outside densely sericeous,

obovate-oblong, 2—3 mm long, the 5th one 5—6 mm long, with involute lacerate-ciliate margin, and thin (5th one dilated), 1½—3 mm long claws. Stamens included, glabrous, those opposite the sepals slightly longer than the others; filaments subulate, short; anthers linear-oblong, with cordate or hastate base. Ovary densely hirsute, 3-crested; styles equal, nearly straight, glabrous, top compressed, stigmas at the inner angle. Samaras sericeous-tomentose; nut subglobose, 5—6 mm in diam.; ventral areole broadly ovate or orbicular, 4 mm in diam.; wing sub-orbicular, 3—5(—8) cm in diam., with deep-sinuate margin, at the top incised as far as the nut; dorsal crest oblique-elliptical or ovate, sinuate, ½—2 cm high, 6—10 mm wide.

Distribution: Tropical South America.

var. *macrodisca* (Tr. et Pl.) Kosterm. l. c., p. 5; — *Mascagnia macrodisca* (Tr. et Pl.) Ndzu. in Engl., Pfl. reich l. c., p. 105.

Leaves slightly sericeous beneath.

Distribution: Colombia, Bolivia.

Paramaribo (Splitg. n. 768 [L.], named *Hiraea rosea* Splitg.); upper Saramacca R. near Jacob-Kondre (Pulle n. 111, fl. Dec.); upper Suriname R. near Goddo (Stahel n. 35, fl., fr., Jan.).

4. *Mascagnia multiglandulosa* Ndz. in Bull. Herb. Boiss. 2 sér. VII (1907), p. 284; id. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 17; id. in Engl., Pfl. reich IV (1928), p. 107, f. 15P.

Olive-green, velutinous liane. Branches cylindrical, glabrescent, brownish, slightly striate, up to 4 mm in diam.; branchlets compressed, velutinous; internodes 2—12 cm long. Leaves opposite, chartaceous, ovate; base cordate; margin flattish; top caudate-acuminate; up to 10 cm long, and 5 cm wide. Young leaves densely velutinous; adult on both sides velutinous, beneath midrib and primary nerves (6—9 on each side)

prominent, the few secondary ones reticulate and slightly prominent. Petioles thick, cylindrical, velutinous, 3—11 mm long. Stipules very small. Leaves of the inflorescences gradually diminishing to small bracts. Racemes 6—12-flowered, 2—3 cm long, axillary and terminal, usually in panicles. Pedicels straight, thickish, velutinous, 6—11 mm long, bibracteolate slightly above the middle, bracteate at the base. Bracts ovate or lanceolate, acute, outside velutinous, inside glabrous, 4—7 mm long. Bracteoles ovate-lanceolate, acute, outside velutinous, inside glabrous; margin with 7—15 long-stipitate (up to 1 mm) capitellate-clavate glands. Flowers 1½ cm in diam. Sepals erect, ovate-lanceolate, acute, outside velutinous, inside glabrous, 4—6 mm long, margin with 5—9, long-stipitate (up to 1 mm), capitellate-clavate glands, at the base with 8 ellipsoid or obovoid, 1½—2 mm long glands. Petals yellow, membranous, outside sericeous; limb flat, ovate-orbicular or obovate; base cordate; margin sub-glandular-toothed; 2—4 mm long; claw thick, straight, 2 mm long. Stamens glabrous, the 2 stamens opposite the posterior styles incurved, much longer and thicker than the others, 4 mm long; the stamen opposite the anterior style as long, but thinner; the stamen opposite the 5th petal 2 mm long, sigmoid between the posterior styles. Anthers glabrous, cells slightly protruding beyond the base of the flat, thick, glandular connective; filaments glabrous, united at the base. Ovary long-hirsute, 3-lobed, 3-locular; styles 3, glabrous, compressed; the posterior ones curved, the anterior one nearly straight, 3—4 mm long, top compressed, with acute or slightly uncinat dorsal side; stigmas at the inner angle. Samaras unknown.

Distribution: Paraguay.

var. *surinamensis* Kosterm. l. c., p. 5.

Branchlets cylindrical, covered with dense lanuginose hairs. Leaves oblong or elliptical, with rounded or subcordate

base and slightly revolute margin; top shortly acuminate or apiculate; above at last glabrous, except the larger veins, beneath with persistent dense lanuginose hairs. Inflorescences and flowers with rusty lanuginose hairs.

Brownsberg (v. Emden s. n., fl. Sept.).

5. *Mascagnia leucanthele* Griseb. in Fl. Bras. XII, 1 (1858), p. 96; Ndz. in Engl.-Prantl., Nat. Pfl. fam. III, 4 (1890), p. 55; id. in Engl., Pfl. reich IV (1928), p. 108; Pulle, in Rec. Tr. Bot. Néerl. IX (1912), p. 143; — *Tetrapteris leucanthele* Griseb. in Schomb., Fauna u. Fl. Guia. (1847), p. 1003; — *Tetrapteris calophylla* Griseb. in Linnaea XXII (1849), p. 23; — *Mascagnia bracteosa* Griseb. p. p. in Fl. Bras. l. c., p. 97.

Liane with silvery or somewhat yellow, velutinous tomentum. Branches cylindrical, glabrescent, brown or dark-violet, beset with lenticels, up to 5 mm in diam.; branchlets compressed; internodes $\frac{1}{2}$ –12 cm long. Leaves opposite, chartaceous, obovate; base rounded; margin strongly revolute; top shortly acuminate or apiculate. Young leaves densely velutinous, the adult ones subglabrescent, smooth, shining above; beneath densely velutinous, with prominent midrib and primary nerves (4–5 on each side), secondary nerves hardly prominent. Petioles velutinous, above canaliculate, up to $1\frac{1}{2}$ cm long. Stipules setaceous, nearly invisible. Leaves of the inflorescences gradually diminishing to hardly (included the 2–3 mm long petiole) 6 mm long bracts. Corymbs 4–6-flowered, forming terminal or subterminal, ample, compound, lax panicles. Pedicels ascendent, slender, 6 mm long, jointed below the middle. Bracts obovate, obtuse, concave, outside densely sericeous, 3 mm long, petioles 1–3 mm long; bracteoles same shape, $1-1\frac{1}{2}$ mm long, petioles 1 mm long. Flowers 1 cm in diam. Sepals lanceolate, outside sericeous, with strongly revolute top, 4–5 mm long, with 10 obovoid, striate, $1\frac{1}{2}$ –2 mm long glands, with free and recurved tops. Petals reddish, erect,

with revolute top, obovate, in bud puberulous at base, glabrescent; 3–4 mm long, the 5th one larger; margin slightly toothed; claw broad, erect, 1–2 mm long. Stamens nearly equal, included; anthers resupinate, cordate-ovoid, 1–1.3 mm long; filaments short, glabrous, united at the base. Ovary sericeous; styles 3, straight, trigonous, glabrous; stigmas truncate, covering the whole top of the style. Samaras reddish, the young ones sericeous, at last puberulous, attached to the pyramidal torus, at last becoming free; nut subglobose, 6 mm in diam.; ventral areole suborbicular, 4 mm in diam.; wing suborbicular, entire, except for the angle of 45° – 120° at the top, up to $3\frac{1}{2}$ cm wide, nearly 3 cm high; margin sinuate, incised as far as the nut; dorsal crest semi-cordate, with sinuate margin, up to $1\frac{1}{4}$ cm high, and $\frac{1}{2}$ cm wide.

Distribution: Guiana, Amazone-district.

Daalbergweg (B.W. n. 5453, fr. Nov.); Para district near Republiek (Kuyper n. 46, fl. Oct.); forest of Zanderij I (Samuels n. 254 [L.]); Patrick-savanna (Gonggryp s. n., fr.); Brownsberg (B.W. n. 6692, fl. Nov.); locality unknown: Weigelt s. n., named *Banisteria nitida* Weigelt [D.].

2. HIRAEA Jacq.

Trees or lianes. Leaves opposite, entire, petiolate, mostly coriaceous, usually somewhat pubescent, often copiously so, glandless; not only the primary nerves, but also the secondary ones parallel to each other. Petiole biglandular, rather short. Stipules mostly large, mostly subulate, persistent, attached to the base or to the top of the petiole, sometimes wanting. Usually 4-flowered umbels, axillary or at the top of short branchlets, or often 3- ∞ forming an axillary corymb. Pedicels bibracteolate at the base; bracts and bracteoles ovate, lanceolate or elliptical. Flower buds globose. Sepals 5, with quincuncial aestivation, persistent, ovate, lanceolate or elliptical, mostly with 8, rarely with 9–10 glands; in the same species often glandless. Petals 5, unguiculate; limb membranous or

fleshy, ovate to sub-orbicular, yellow or white; margin nearly entire, toothed or shortly fimbriate, of the 5th one long and glandular-fimbriate. Stamens 10, all fertile; filaments subulate or filiform, united at the base; anthers sub-globose, oblong or ovoid. Androecium and gynaecium either actinomorphic (not in Surinam species), or zygomorphic, with curved stamens and styles. Ovary 3-lobed, 3-locular, dorsally crested; styles distinctly sigmoid, uncinata. The 3—1 samaras with large, entire, or variously divided wing, dorsal winglet and inter-medial crests, or the latter wanting; torus pyramidal; samaras becoming free. Cotyledons strongly unequal, the exterior enveloping the reduced interior one.

Distribution: Species about 26, in tropical America, including the W. Indies.

1. a. Leaves beneath golden-yellow haired. Filaments opposite the posterior styles much longer and thicker than the others, strongly curved with decurrent anthers; the filament opposite the 5th petal much smaller than the others. Styles sericeous at the base, the 2 posterior ones semi-circular, sigmoid, longer and thinner than the slightly incurved anterior one. Wings thickish-coriaceous, divided into 3 lobes; dorsal crest $\pm$ entire 4. *H. chrysophylla* Juss.
- b. Leaves beneath glabrous or nearly so. Stamens diminishing from the for-part to the back-part of the flower. Styles sericeous or glabrous at the base, nearly equal in length, the posterior ones sigmoid. Wings membranous; dorsal crest toothed, or only the midrib prominent 2
2. a. Leaves acuminate, with obtuse acumen, glandless. Petals membranous, yellow. Anthers sub-globose with short, thick, glanduliform, sub-globose connectives. Dorsal crest of samara small, only the midrib 0.3 mm prominent 1. *H. affinis* Miq.
- b. Leaves acuminate, glandless or glandular-toothed. Petals fleshy, yellow or white. Anthers large

- (1½—2 mm), ellipsoid or obovoid. Samara with a distinct dorsal crest 3
3. a. Leaves coriaceous or coriaceous-chartaceous, glabrous, acuminate, base slightly cordate or cuneate, margin revolute, glandular-toothed. Stipules attached at ⅓ from the base of the petiole. Pedicels thick, 1 mm in diam. Stamens hardly diminishing from the for-part to the back-part of the flower. Dorsal crest of the samara ½ cm high, or only the midrib prominent... 2. *H. Gaudichaudiana* Juss.
 - b. Leaves chartaceous, glabrous, except the midrib beneath; obtusely acuminate, base usually obtuse or rounded; margin flattish, glandless; midrib and primary nerves beneath strongly prominent, reddish. Stipules at, or nearly at the top of the petiole. Petioles more slender, ½—1 mm in diam. Androecium strongly zygomorphic. Dorsal crest of the samara oblique-quadrangular, 2 mm long, 1—1½ mm high 3. *H. fagifolia* (D.C.) Juss.
1. *Hiraea affinis* Miq. in *Linnaea* XIX (1847), p. 133; Ndz. in *Verz. Vorl. Lyc. Hos.* (1906), p. 8; id. in *Engl., Pfl. reich* IV (1928), p. 135, t. 18J; *Pulle, Enum. Pl. Surin.* (1906), p. 467.
- Liane. Branchlets compressed, striate, at first sericeous, soon glabrescent; branches cylindrical, grey or brownish, with many, very small lenticels, up to 7 mm in diam.; internodes 2—10 cm long. Leaves coriaceous-chartaceous, obovate or oblong-obovate or oblong, up to 23 cm long, and 11 cm wide; base cordate; top obtusely acuminate, margin flat, glandless. Young leaves sericeous; adult ones soon glabrescent, above nearly smooth, shining, with impressed midrib and primary nerves, beneath strongly prominent, the secondary ones nearly parallel, ½—3 mm from each other, slightly prominent; veins reticulate. Petioles thick, sericeous, 5—11 mm long, with subulate, hardly 1 mm long stipules at ⅓ from the base, top with 2 inconspicuous, gland-like, disappearing dots. Umbels mostly 4-flowered, forming axillary, $\pm$ contracted and corym-

biform panicles. Umbel-bearing peduncles 4—8 mm long, sericeous, thick, bibracteate 0—2 mm above their base. Lower bracts subtriangular, acute, 2—2½ mm long, upper ones ovate, 1½ mm long. Bracteoles semi-orbicular, ½ mm long, sericeous outside. Pedicels sericeous, 1—2 mm long, bibracteolate at the base. Flowers 1.7 cm in diam.; buds globose. Sepals lanceolate or lanceolate-ovate, 3½—5 mm long, top reflexed, outside sericeous, with 8—9 oblong, longitudinally canaliculate, 2—3 mm long glands. Petals membranous, yellow, concave, suborbicular, 5—6 mm long, base sub-hastate, decurrent into the claw; margin, especially of the 5th one, toothed or fringed; claw rather slender, slightly reflexed, 3 mm long. The 3 anterior stamens slightly curved, separated from the others, the 7 others inclined to the for-part of the flower; filaments of the epipetalous stamens shorter than the others, the filament opposite the 5th petal smallest. Filaments glabrous, united at the base. Anthers sub-globose, with thick glanduliform sub-globose connectives. Ovary ovoid, 1 mm long, densely hirsute, each carpel with 2 dorsal appendages; styles 3, rather slender, long-exserted, 3 mm long, the posterior ones sigmoid, as long as the slightly curved anterior one; tops long-uncinate, stigmas at the inner angle. Nut of samara sericeous, globose, 6 mm in diam., fanlike nerved, ventral areole orbicular, 2 mm in diam. The 2 wings membranous, glabrous, reniform, greenish-white, up to 5 cm high and 3 cm wide, margin sinuate. Only the midrib of the dorsal crest 0.3 mm prominent.

Distribution: Fr. Guiana.

Gland bearing form: Karouany R. (Kappler n. 1709, type specimen.)

Glandless form: Marowijne R., Djoeka-creek (B.W. n. 3685, fl. March.); Coppename R., bank below Raleigh-falls (Lanjouw n. 989, fr. Sept.).

Vernacular name: Kautété.

2. *Hiraea Gaudichaudiana* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 258; id. in Arch. Mus. Par. III

(1843), p. 571; Griseb. in Fl. Bras. XII, 1 (1858), p. 98; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 137; — *Tetrapteris Gaudichaudiana* Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 9.

Climbing shrub. Young parts rusty-sericeous. Branchlets compressed, sericeous; branches glabrous, smooth or striate, ½ cm in diam., with few lenticels; internodes 2—10 cm long. Leaves large, coriaceous or coriaceous-chartaceous, obovate or oblanceolate, up to 28 cm long, 11 cm wide, with often glandular-toothed, revolute margin; base slightly cordate or cuneate, top shortly acuminate. Young leaves sericeous, soon glabrescent, rarely midrib remaining sericeous beneath; adult ones with rather smooth, shining upper surface with impressed nerves, beneath midrib and primary nerves strongly prominent, the secondary less, nearly parallel, 1½—4 mm from each other. Petioles thick, often sericeous, ½—1½ cm long with 4—7 mm long, intrapetiolar, setaceous, hirsute stipules at or above the middle. Umbels 3—6-flowered, forming axillary, much contracted yellow-or grey-sericeous panicles. Peduncles sericeous, thickish, 0—1 cm long, consisting of 2 internodes. Pedicels thick (1 mm in diam.), velutinous or tomentose, 1—2½ cm long, bracteolate at the base. Bracts and bracteoles ovate, 2½—3, resp. 1½—2 mm long. Flowers 15—23 mm in diam.; buds globose. Sepals broadly ovate, outside sericeous, 3 mm long, with 8—10 ellipsoid or obovoid glands; petals fleshy, yellow or white, glabrous; limb concave, orbicular, with cuneate, more or less rounded base; 6—7 mm long, margin subentire or slightly fringed, the 5th petal glandular-fimbriate, 5 mm long, fringes ½—1 mm long. Claw thin, reflexed at the base, 2—3 mm long. Stamens hardly diminishing from the for-part of the flower to the back-part; the 3 anterior stamens curved and separated from the others; anthers obovoid, 1½—2½ mm long, with thick, red, flat-convex connectives, cells parallel. Filaments glabrous, 2½ mm long, united at the

base. Ovary densely hirsute, dorsally with 2 appendages; styles 3, exserted, the anterior one less sigmoid than the other two; tops uncinatate, stigmas at the inner angle. Samaras sparingly pubescent; nut globose, $\frac{1}{2}$ cm in diam.; ventral areole sub-orbicular, 2 mm in diam. Wings membranous, semi-orbicular or elliptical-reniform, $3\frac{1}{2}$ —4 cm high, 2 cm wide; margin undulate or repand; dorsal crest deeply lacerate, hardly $\frac{1}{2}$ cm high and wide, or only midrib prominent.

Distribution: Tropical Brazil.

Gland bearing form: Marowijne R. (Kappler s. n. [L.]); Gonini R. (Versteeg n. 68, fr. Aug.); Brownsberg (B.W. n. 6696, fr. Nov.); without locality: Kappler n. 64 [L.].

3. *Hiraea fagifolia* (D.C.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 258; id. in Arch. Mus. Par. III (1843), p. 567, t. XIX; Griseb. in Fl. Bras. XII, 1 (1858), p. 99; Ndz. in Verz. Vorles. Lyc. Hos. (1906), p. 14; id. in Engl., Pfl. reich IV (1928), p. 140, t. 18N; Pulle, Enum. Pl. Surin. (1906), p. 467; Small in N.-Amer. Fl. XXV, 2 (1910), p. 123; — *Hiraea fagifolia* (D.C.) Juss., var. *Candolleana* Ndz. in Verz. Vorl. l. c., p. 114; id. in Engl., Pfl. reich l. c., p. 141; — *Banisteria fagifolia* D.C., Prodr. I (1824), p. 590; — *Hiraea Riedleyana* Juss. in Ann. sc. l. c., p. 258; id. in Arch. Mus. l. c., p. 569; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 121; Pulle, Enum. l. c., p. 467.

Climbing shrub; young parts sericeous. Branchlets compressed, striate, grey-sericeous (hairs very short), with few, very small lenticels; branches glabrous, reddish, up to $\frac{1}{2}$ cm in diam.; internodes 1—7 cm long. Leaves chartaceous, mostly obovate, up to 20 cm long and 10 cm wide, usually acuminate (with blunt tip) or rarely apiculate; base mostly rounded or more or less cordate; margin flattish, glandless. Young leaves sericeous, soon glabrescent, the midrib on the lower surface excepted; adult leaves above glabrous, rather smooth, the midrib and primary nerves (9—14 on each side) impressed, the secondary ones nearly parallel, 1—2 mm separated from each

other; beneath midrib and primary nerves strongly prominent, reddish, the secondary ones slightly prominent. Petioles stout, grey-sericeous, $\frac{1}{2}$ —1 cm long, with 2 setaceous, 3—5 mm long, stipules at or little below the top, and dorsally 2 glandular dots. Umbels mostly 4-flowered, forming axillary, contracted, corymbiform panicles. Umbel-bearing peduncles 5—7 mm long, puberulous, on their turn attached to 0—2 mm long peduncles. Pedicels slender, $\frac{1}{2}$ —1 mm in diam., grey-puberulous, 1— $1\frac{1}{2}$ cm long. Bracts and bracteoles concave, ovate, outside puberulous, $1\frac{1}{2}$ —2, resp. 1— $1\frac{1}{2}$ mm long. Flowers 1— $1\frac{1}{2}$ cm in diam.; buds globose. Sepals sub-orbicular, shortly acuminate, 2—4 cm in diam., outside puberulous, glandless or with 8 ellipsoid, 1—2 mm long glands, with free tops. Petals fleshy, yellow or white; limb hollow, orbicular, glabrous, 4—7 mm long, with cuneate, emarginate base, and toothed or fringed margin, the 5th one distinctly glandular-fringed; claws thin, 2—3 mm long. Stamens exserted, the epipetalous ones smaller than the others: the stamen opposite the 5th petal smallest; the 3 anterior ones curved and separated from the others; those opposite the posterior styles with much thicker and longer filaments than the others, and with curved cells, long-protruding beyond the connectives; filaments $\pm$ highly united, anthers large, elliptical or obovate, $1\frac{1}{2}$ —2 mm long, connectives thick, glanduliform, ellipsoid. Ovary hirsute, 1 mm high, carpids 3-crested; styles 3, exserted, sericeous at the base, $4\frac{1}{2}$ mm long, the posterior ones distinctly sigmoid, curved at right angles, with uncinatate tops; the anterior one nearly straight, with long-uncinatus top. Stigmas at the inner angle. Samaras glabrous; nut globose, puberulous, 4 mm high, ventral areole elliptical, 2 mm high; the lateral wings sub-orbicular or reniform, membranous, with semi-circular, sinuate exterior, and rather straight interior margin, 2—5 cm high, $1\frac{1}{2}$ — $2\frac{1}{2}$ cm wide; dorsal crest oblique-quadrangular, short, puberulous.

Distribution: Northern South America to Guatemala.

Gland bearing form: Paramaribo near Pl. Beekhuizen (Wulschlägel n. 57 [B.] and s. n. [B.]); near Pl. Kwatta (Kegel n. 804 [G.]); Para district (Wulschlägel n. 917 p. p. [G.]); locality unknown: Hostmann n. 291, 363a, 412 [L.], 494 p. p., s. n. [L.], Kappler n. 412 [L.].

Glandless form: Paramaribo (Splitgerber n. 242 [L.], type of *H. guyanensis* Splitg. msc., fl. Nov.); Para district (Splitgerber n. 468 [L.], *H. guyanensis* Splitg. msc., fl. May); locality unknown: Hostmann n. 494 p. p.; Weigelt s. n. [D.], named *Hiraea Weigeltiana* Rehb.

var. **Blanchetiana** (Moric.) Ndz. in Verz. Vorl. Lyc. Hos. (1906), p. 14; id. in Engl., Pfl. reich IV (1928), p. 141; — *Hiraea Blanchetiana* Moric., Pl. Amer. (1830), p. 140, t. 65; Juss. in Arch. Mus. Par. III (1843), p. 567; Miq. in Linnaea 18 (1844), p. 57; Pulle, Enum. Pl. Surin. (1906), p. 466; — *Hiraea multiflora* Miq. in Nat. Verh. Maatsch. Wetensch. Haarlem II, 7 (1850), p. 83.

Leaves mostly elliptical or oblong; base rounded. Stipules attached below the top of the petiole. Calyx with 8 glands. Dorsal crest of the samara sub-triangular, hardly 2 mm high.

f. **latifolia** Ndz. in Verz. Vorl. l. c., p. 14; id. in Engl., Pfl. reich l. c., p. 141.

Leaves elliptical or obovate.

Gonini R. (Versteeg n. 170, fl. Aug.); Paramaribo (Focke n. 325, fl. and fr. May, 493 [L.], 993 [L.]; Kegel n. 293 [G.] fl. Aug. and 352 [G.]; Essed n. 306, fr. March; Coll. indig. n. 32a, fl. Febr.); Paramaribo, near Kwattaweg (Focke n. 784; 1104, type of *H. multiflora* Miq.; Pulle n. 16, fl. July; Kegel n. 804 p. p. [G.]); Slootwijk (Soeprata n. 23], fl. July); Hemas Boite (Soeprata n. 48A, fl. June); Wagenwegstraat (Soeprata n. 23A, fl. June); Poelepantje (Kegel n. 737 [G.], fl. Febr.); Para district (Splitgerber n. 468a [L.], fl. May), near Pl. La Rencontre (Focke n. 784, fl. Apr.); Saramacca R. (Focke n. 317 p. p.); locality unknown: Splitgerber n. 33 [L.] and s. n. [L.], n. 468 [L.], fl. Jan., 468a [L.]; Focke n. 468 [L.], 1372, and s. n. [L.]; Hostmann n. 363, 493 [L.], and s. n. [L.].

4. **Hiraea chrysophylla** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 258; id. in Arch. Mus. Paris III

(1843), p. 572; Griseb. in Fl. Bras. XII, 1 (1858), p. 100, t. XX; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 122; Ndz. in Verz. Vorl. Lyc. Hos. (1906), p. 16; id. in Engl., Pfl. reich IV (1928), p. 143, t. 1D, 19; Pulle, Enum. Pl. Surin. (1906), p. 467.

Liane or shrub. Young parts covered with golden-yellow hairs. Branchlets sericeous, glabrescent; branches glabrous, brown-violet, striate, with many very small lenticels, 3 mm in diam.; internodes 1—10 cm long. Leaves chartaceous, obovate or oblong, 5—10 cm long, 2½—5 cm wide, with acuminate or apiculate top, and narrowed, obtuse base. Young leaves sericeous; adult ones glabrous above, smooth, with impressed midrib and primary nerves, beneath golden-yellow or rarely silvery sericeous, with strongly prominent midrib and primary nerves, the secondary ones nearly parallel, ½—2 mm from each other, nearly invisible. Margin flat, often with very small glandular dots. Petioles sericeous, 5—7½ mm long, mostly curved, with 2 glands and 2 stipules below the top. Stipules linear, hirsute, 1—4 mm long. Usually 4-flowered umbels, forming a contracted, axillary, shortly puberulous corymbiform panicle, much shorter than the leaves. Umbel-bearing peduncles thin, 7 mm long. Pedicels slender, puberulous, 1—1½ cm long, bibracteolate at the base. Bracts and bracteoles ovate, obtuse, outside sericeous, 1—2½ mm long. Flowers 1.7 cm in diam.; buds globose. Sepals ovate, acute, 2 mm long, outside sericeous, with 8 or 10 ellipsoid, 1 mm long glands with free tops. Petals fleshy, glabrous, yellow; limb concave, orbicular, 6 mm in diam., with cuneate base, toothed or shortly fimbriate margin (fringes hardly ½ mm long); the 5th one distinctly glandular-fimbriate; claw thin, curved. Stamens exserted; filaments glabrous, rather highly united; epipetalous stamens smaller than the others, the stamen opposite the 5th petal smallest; those opposite the 2 posterior sepals longer and thicker, strongly curved, with decurrent anthers; the 3 anterior stamens slightly curved, separated from the other 7, which are curved

to the for-part of the flower. Anthers orbicular, $\frac{1}{2}$ mm long, with thick, globose connectives. Ovary ovoid, 1 mm high, hirsute, carpids dorsally 3-crested; styles 3, sericeous at their bases; the posterior ones semi-circular-sigmoid, longer and thinner than the small, thick, simply curved anterior one. Tops hammer-shaped, long-uncinate, with stigmas at the inner angles. Samaras pubescent; the 2 lateral wings 1 cm long, divided into 3 ovate, oblong or linear lobes; the lobes thick-coriaceous, entire. Dorsal crest nearly entire, semi-oblong, 1—2 mm high, 5 mm long.

Distribution: Northern Brazil, Guiana.

Glandless form: Tapanahoni R. (Versteeg n. 803, fl. Aug.); Cottica R. near Moengo (Lanjouw n. 423, fl. Aug.); upper Commewijne R. (Hostmann n. 225, and n. 318 [L.]; Focke n. 1225); upper Suriname R. (B.W. n. 5448, fl. June); upper Coppename R. (Boon n. 1075, fl. Aug.); Wajombo (B.W. n. 3146, fl. Nov.); Corantijne R., near Goud-creek (B.W. n. 3577, fl. Oct.).

Gland bearing form: Marowijne R., Siparawyne-creek (Kappler n. 2127 [L.]); Commewijne R. near Pl. Waiampibo (Splitgerber n. 511 [L.], named: *H. discolor* Splitg. msc., fl. Jan.); Suriname R., Kabelstation (Lanjouw n. 1153, fl. Nov.); Suriname R., Sara-creek, Abontjeman (Coll. ind. n. 302, fl. May); upper Gran Rio (Stahel n. 222, fl. and fr. March); upper Gran Rio, Maupé-dam (Stahel n. 205, fl. Febr.); Saramacca R. (Wullschlägel n. 55 [B.]); upper Saramacca R. near Janbasigado (Pulle n. 193, fl. Jan., n. 406, 436, 478, fl. March); locality unknown: Hostmann n. 1107 p. p.; Tulleken n. 1075 [L.].

Vernacular names: Talekirang; Talikji (Car.).

3. DIPLOPTERYS Juss., emend. Niedenzu.

Lianes or climbing shrubs. Leaves opposite, entire, the secondary nerves nearly parallel, veins areolate. Stipules large, interpetiolar. Umbels 4-flowered in terminal or axillary panicles or corymbs. Bracts and bracteoles oblanceolate or linear-spathulate. Aestivation of the sepals valvate; sepals oblanceolate or spatulate, velutinous on both sides, with 8, pairwise united

glands. Petals orbicular, generally cochleate, toothed or fringed, outside sericeous. Stamens 10, all fertile; the 3 posterior ones much smaller than the others; the 2 opposite the posterior-lateral petals with longer and thicker filaments and anthers than the anterior ones. Ovary pilose, 3-lobed. Styles 3, sigmoid, short, obtuse or uncinat. Samaras attached to a pyramidal torus, at last becoming more or less free; each with at least 5 longitudinal wings. Cotyledons flat, straight.

Distribution: Species 7 in Peru, Brazil, Guiana, Trinidad.

1. *Diplopterys rosea* (Miq.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. IV (1912), p. 20; id. in Engl., Pfl. reich IV (1928), p. 228; — *Hiraea rosea* Miq., Stirp. Surin. (1850), p. 84; — *Jubelina rosea* (Miq.) Ndz. in Pulle, Enum. Pl. Surin. (1906), p. 472.

Liane. Branchlets compressed, densely velutinous-tomentose (hairs bifid); branches cylindrical, glabrescent; internodes 1—12 cm long. Leaves opposite, entire, membranous-chartaceous, obovate, up to 18 cm long and 10 cm wide; base oblique, obtuse or rounded; top obtuse or very short-acuminate; margin flat, with few, glandular dots. Young leaves densely velutinous-tomentose, glandless; adult ones minutely punctulate above, with few scabrous hairs and impressed midrib and primary nerves; beneath with persistent hairs, midrib strongly prominent, primary nerves (7 on each side) slightly prominent, the secondary ones parallel, 3—5 mm from each other, veins areolate. Petioles velutinous, glandless, above canaliculate, 10—18 mm long. Stipules thick, triangular, hirsute, 1 mm long. Umbels 4-flowered, forming terminal or axillary, ample, densely rusty-velutinous, up to 4 × compound panicles. All peduncles compressed, canaliculate; 2—4 umbels on short, $\frac{1}{2}$ cm long peduncles. Pedicels with incurved top, abruptly thickened, sericeous, up to 1 cm long, bibracteolate at the base. Bracts and bracteoles petiolate, pink, velutinous, linear-oblanceolate, concave, with thick top, acuminate or obtuse, 7—13, resp.

5—7 mm long. Flowers $1\frac{1}{2}$ cm in diam.; anterior part enlarged. Sepals pink, sericeous, spathulate-linear, thickened towards the top, 5—6 mm long, already in bud inclined towards the anterior part of the flower, with 8, pairwise connate, white-greenish, broadly ovoid (broader than the sepals), 2—3 mm long glands. Petals pink, outside sericeous, orbicular; the 2 anterior ones cochleate, nearly entire, 8 mm long, the others flat, 4—5 mm long and glandular-fimbriate. Claws sericeous, 3—4 mm long. Stamens diminishing from the front to the back-part of the flower. The episepalous ones smaller and thinner; the 3 posterior ones reduced; the 2 stamens opposite the posterior-lateral petals with sigmoid, thick filaments and thick anthers. Filaments glabrous, flat, united up to the middle. Ovary ovoid, hirsute, $1\frac{1}{2}$ mm high. Styles 3, the posterior ones sigmoid, thicker and slightly longer than the straight anterior one. Young samaras densely sericeous, with thick and long hairs (arms of the hairs 2 mm long), glabrescent. Nut with a rather broad rostrum (1 mm) at the base; ventral areole linear, 6—7 mm long; the 2 lateral cells empty, the other one ovoid. Wings membranous-chartaceous, with deep-wavy margin, the 2 lateral ones oblong-elliptical, 3—3½ cm wide, 4—4½ cm high, bases confluent. Dorsal wing semi-orbicular, 3½ cm long, hardly 2 cm wide; the 2 intermediate appendages one half shorter than the dorsal wing, forming transverse, wavy winglets.

Distribution: Guiana.

Upper Marowijne R. (Kappler ed. Hohenack. n. 1807, fl. Aug., type of *Hiraea rosea* Miq.); Tapanahoni R. (Versteeg n. 720, fl. Aug.).

4. TETRAPTERIS Cav.

Low, climbing or erect shrubs, mostly lianes. Leaves opposite, entire, petioled, chartaceous or coriaceous, glabrous or sparingly pubescent, reticulate, glandless. Stipules interpetiolar, attached to the petiole or to the branch, inconspicuous, deciduous. Corymbs or umbels in terminal panicles, rarely axillary, or

terminal, simple racemes, corymbs or umbels. Bracts and bracteoles ovate, lanceolate or elliptical, now and then leaf-like. Sepals 5, broad, persistent, with quincuncial aestivation, with 8, rarely 10 glands, or glandless. Petals 5, unguiculate, usually glabrous, yellow or reddish; limb concave, ovate, orbicular or obovate, with acute, rounded or cordate base and revolute, nearly entire or toothed margin (rarely the 5th one fimbriate). Stamens 10, all fertile, actinomorphic, the episepalous ones usually slightly longer. Filaments triangular or subulate, up to $\frac{1}{3}$ — $\frac{1}{2}$ connate; anthers broad, glabrous or rarely hirsute. Ovary consisting of more or less united carpids; each carpoid with crest. Styles 3, usually nearly equal and straight, short, obtuse, stigmas mostly truncate. The 1—3 samaras attached to a pyramidal torus, at last more or less free. Wing X-shaped, divided into 4, rarely 2 segments; the parts equal, or the lower ones (rarely the upper ones) smaller. Various dorsal and intermediate emergences. Seeds pear-shaped or sub-globose. Cotyledons thick, nearly equal, replicate.

Distribution: Species about 60, from Argentina and Rio Grande do Sul to Cuba and Mexico.

1. a. Umbels, mostly 4-flowered, forming compound panicles, with normal and reduced leaves..... 2
- b. Umbels or racemes, but without leaves..... 4
2. a. Leaves thin-chartaceous, glabrous, or with few hairs beneath 3
- b. Leaves thick-chartaceous, densely-sericeous beneath 7. **T. calophylla** Juss.
3. a. The 2 posterior styles 2 × thicker and as long as, or $\frac{1}{2}$ mm longer than the anterior one. No appendages between dorsal crest and wing of the samaras 8. **T. crispa** Juss.
- b. Styles nearly equal. Many intermediate appendages. 6. **T. discolor** (G. F. W. Meyer) D.C.
4. a. Stipules interpetiolar, attached to the branch, leaving annular scars. Umbels mostly 4-flowered, forming a panicle. Lower segments of the wing

- much shorter than the upper ones 5. **T. mucronata** Cav.
- b. Stipules petiolar, attached to the base of the petiole. Racemes or corymbiform racemes. Segments of the wing nearly equal. 5
5. a. Sepals nearly glabrous. Petals glabrous with long-fimbriate margin. Filaments filiform, up to 4 mm long. Carpids glabrous. Wing of the samara glabrous, membranous. Intermediate appendages wanting. 3. **T. fimbripetala** Juss.
- b. Sepals outside sericeous. Petals sericeous or glabrous with entire or toothed margin. Filaments broad, $1\frac{1}{2}$ —3 mm long. Carpids sericeous. Wing coriaceous, nearly glabrous or sericeous. Intermediate appendages many 6
6. a. Axillary many-flowered racemes. Bracts and bracteoles 6—4, resp. 4—3 mm long. Flowers $1\frac{1}{2}$ —2 cm in diam. Sepals erect. Dorsal crest deeply lacerated into many lobes 1. **T. maranhamensis** Juss.
- b. Corymbiform racemes or panicles. Bracts and bracteoles 3—1, resp. $1-\frac{1}{2}$ mm long. Flowers $1-1\frac{1}{2}$ cm in diam. Sepals strongly recurved. Dorsal crest nearly entire. 4. **T. acutifolia** Cav.
- c. Axillary and terminal racemes. Bracts and bracteoles 2—3, resp. 3—5 mm long, one of the latter with a gland. Flowers $1\frac{1}{4}$ cm in diam. Sepals incurved. Dorsal crest nearly entire 2. **T. squarrosa** Griseb.

1. **Tetrapteris maranhamensis** Juss. in Arch. Mus. Paris III (1843), p. 537; Griseb. in Fl. Bras. XII, 1 (1858), p. 87, t. 15; Pulle in Rec. Tr. Bot. Néerl. IX (1912), p. 144; Ndz. in Engl., Pfl. reich IV (1928), p. 179; — *Hiraea gracilis* Benth. in Hook. Lond. Journ. Bot. VII (1848), p. 135; Griseb. in Linnaea 22 (1849), p. 24.

Liane. Young parts white-sericeous, with long hairs, soon glabrous. Branchlets compressed, very slender, nearly glabrous; branches cylindrical, dark-violet, glabrous, ribbed, up to 3 mm in diam., with many, small grey lenticels; internodes $\frac{1}{2}$ —3 cm

long. Leaves chartaceous, lanceolate-oblong, or ovate-oblong, up to 9 cm long, 3 cm wide; base rounded or subcordate; margin flat; top very acute and long-acuminate. Young leaves white-sericeous; adult ones above glabrous, shining, with slightly prominent nerves, beneath dull, glabrous or with few hairs, the rusty midrib and primary nerves (5—8 on each side), prominent, secondary ones densely reticulate; lower surface with few glandular dots. Petioles glabrous, slender, canaliculate above, $1\frac{1}{2}$ —2 mm long. Stipules inconspicuous. Racemes axillary, somewhat sericeous, many-flowered, up to 10 cm long; peduncle often with small, $1\frac{1}{2}$ — $\frac{1}{2}$ cm long, leaves. Pedicels slender, glabrescent, erect-patent, thickened towards the top, 8—11 mm long, bibracteolate in the middle, bracteate at the base. Bracts and bracteoles lanceolate or linear-lanceolate, outside sericeous, 4—6, resp. 3—4 mm long, base often petioled. Flowers $1\frac{1}{2}$ —2 cm in diam. Sepals triangular-ovate, erect, outside densely sericeous, inside glabrous, except at the base, 3— $3\frac{1}{2}$ mm long, with 8 oblong, 2 mm long glands. Petals yellow, membranous, unequal; limb nearly flat, obovate or sub-orbicular, 5—9 mm long, outside sericeous, base slightly sagittate-cordate, margin toothed or nearly entire, claws straight, $1\frac{1}{2}$ —2 mm long; 5th petal smaller. Stamens glabrous, slightly exserted. The stamen opposite the glandless sepal very short; those opposite the styles largest, with flat, $2\frac{1}{2}$ —3 mm long, filaments, united at the base. Anthers erect, curved, elliptical, $\frac{1}{2}$ —1 mm long; cells nearly as long as the connectives. Carpids slightly connate, densely sericeous, with 4 appendages. Styles nearly straight, glabrous, slender, more or less equal, 3— $3\frac{1}{2}$ mm long, attached at the base of the ventral side of the carpids; tops compressed, uncinat. Samaras glabrescent. Nut sericeous, cylindrical, obconical, radially ribbed, 2 mm long. Sub-basal areole orbicular, 1 mm in diam. Segments of the wing coriaceous, nearly equal, linear-oblong or linear-oblongate, nearly entire, up to 8 mm long, $2\frac{1}{2}$ mm wide.

Dorsal crest nearly semi-orbicular, lacerate; the many lobes lanceolate, 2—3½ mm wide. Many intermediate, aculeate-lingulate 2—3½ mm long appendages.

Distribution: Northern Brazil, Guiana.

Upper Suriname R. (Wulfschlägel n. 827 p.p. ex Niedenzu).

2. **Tetrapteris squarrosa** Griseb. in Fl. Bras. XII, 1 (1858), p. 87, t. 16; Ndz. in Engl., Pfl. reich IV (1928), p. 181; Pulle in Rec. Tr. Bot. Néerl. IX (1912), p. 144; — *Bunchosia squarrosa* Griseb. in Linnaea 22 (1849), p. 11; — *Tetrapteris fimbripetala* Griseb. in Linnaea l. c., p. 23; — *Tetrapteris complicata* Miq., Stirp. Surin. (1850), p. 82; Pulle, Enum. Pl. Surin. (1906), p. 468; — *Tetrapteris rhodopteron* Oliv. in Trans. Linn. Soc. Lond. 2e ser. Bot. (1887), p. 272.

Climbing shrub or liane. Young parts with very short, sericeous hairs, very soon glabrous. Branchlets slightly puberulous, compressed, dark-brown; branches cylindrical, grey, slender, 2½ mm in diam.; internodes 2—6 cm long. Leaves coriaceous or chartaceous, ovate or lanceolate, 11—15 cm long, 5½ cm wide; base mostly obtuse or rounded; margin flat or slightly revolute; top acuminate, with generally obtuse acumen. Young leaves sparingly pubescent; adult ones above glabrous, shining, smooth, beneath with long-persistent sericeous hairs, only midrib prominent, primary nerves (5—7 on each side) hardly prominent, veins obsolete. Stipules minute, ½—1 mm long, or wanting. Petioles glabrescent, slightly canaliculate above, 4—6 mm long. Racemes straight, axillary, peduncled, 10—25-flowered, with long-persistent sericeous hairs, up to 10 cm long. Pedicels 12 mm long, bracteolate at or below the middle, bracteate at the base; the upper ones shorter. Bracts lanceolate-ovate, fleshy, outside nearly glabrous, with prominent midrib, 2—3 mm long, top often revolute or circinnate. Bracteoles larger, elliptical, fleshy, nearly glabrous, concave, 3—5 mm long, one of them with a large gland at the outside. Flowers 1¾ cm in diam. Sepals ovate-lanceolate, outside slightly

sericeous, 4—5 mm long, top acutish, slightly incurved, with 10 very thick, oblong, longitudinally furrowed, decurrent glands, 3—4 mm long, with recurved, free tops. Petals yellow, glabrous, ovate or obovate, 4—6 mm long, base somewhat sagittate, margin toothed; claw thick, 1—2 mm long. Stamens hardly exerted, the episepalous ones hardly longer; filaments flat, glabrous, rather highly connate, 2½ mm long. Anthers linear-lanceolate or elliptical, with cordate base, slightly puberulous, 1—1½ mm long. Carpids slightly united, densely hirsute, 1 mm long, with many appendages. Styles nearly equal, glabrous, thickish, slightly recurved towards the top, attached to the basal, ventral side of the carpids; tops acutish or hardly compressed. Samaras nearly glabrous; nut obconical, radially ribbed, sericeous, 3 mm in diam.; sub-basal areole orbicular, 1 mm in diam. Lateral wing distinctly 4-parted, rigid-coriaceous, segments nearly equal, oblong or spathulate-oblong, nearly entire, or top slightly retuse, glabrous, up to 12 mm long, and 3½ mm wide. Dorsal crest nearly entire, semi-orbicular, 2—3 mm high, up to 5 mm long, at the top protruding 2 mm between the upper segments. The many transversal, intermediate crests lingulate, parallel, 1—3 mm long.

Distribution: Northern South America as far as Peru.

Gonini R. (Versteeg n. 224, fl. and fr. Aug.); savannah near Bergendaal (Focke n. 1153, fl. Oct., type of *T. complicata* Miq.); savannah near Brownsberg (Lanjouw n. 1247, fl. Nov.); Brownsberg (B.W. n. 6643, fl. Sept.); Para district (Wulfschlägel n. 917 p. p. [B.]; n. 827 p. p. [B.]; Kegel n. 317 [D.]); upper Suriname R. (Wulfschlägel n. 919 p. p. [B.]); Gros Placer (coll. indig. n. 153, fl. and fr. Apr.); Coppename R. near Raleigh falls (Lanjouw n. 736, fl. Sept.; n. 959, fl. Sept.); upper Coppename R. (Boon n. 1223 and n. 1222, fr. Oct.; n. 1144, fr. Sept.); upper Nickerie R., Blanche Marie falls (Tulleken n. 342, fl. Sept.; n. 357 [L.], fl. Sept.).

3. **Tetrapteris fimbripetala** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 263; id. in Arch. Mus. Paris III (1843), p. 544; Pulle, Enum. Pl. Surin. (1906), p. 468; Ndz. in Engl., Pfl. reich IV (1928), p. 182.

Liane. Young parts sparingly appressed white-pruinose-puberulous, soon glabrescent. Branchlets compressed, glabrous; branches cylindrical, dark-purple, smooth, up to $2\frac{1}{2}$ mm in diam. Internodes 2—5 cm long. Leaves coriaceous or chartaceous, oblanceolate, obovate or oblong, up to 12 cm long, 5 cm wide; base acute, rarely obtuse; margin revolute; top acuminate. Young leaves slightly pubescent; adult ones soon glabrous, above smooth and shining, with impressed midrib, and slightly prominent primary nerves, below with several, often more or less obsolete, glands, midrib strongly prominent, primary nerves (8—10 on each side) and the few, laxly reticulate secondary ones slightly prominent. Petioles usually glabrous, canaliculate above, 6—15 mm long. Stipules minute or wanting. Racemes axillary, nearly glabrous, lax, 4—8-flowered, $7\frac{1}{2}$ cm long; peduncles compressed, $2\frac{1}{2}$ cm long. Pedicels compressed, puberulous, $1\frac{1}{2}$ —2 cm long, jointed 5—8 mm above the base, bibracteolate 2—3 mm below the joint. Bracts ovate or triangular, acute, sericeous, $1\frac{1}{2}$ —2 mm long. Bracteoles large, leaf-like, sub-orbicular or ovate, with acute base and very short petioles, 3—5 mm long, often biglandular at the base. Flowers 2— $2\frac{1}{4}$ cm in diam. Sepals erect, ovate, $3\frac{1}{2}$ mm long, more or less glabrous, with 10 ellipsoid or oblong, $1\frac{1}{2}$ —2 mm long glands. Petals yellow, glabrous, membranous, with many veins, concave, orbicular, 7—9 mm long, base cuneate, margin long-fimbriate (fringes 1 mm long), claws recurved, slender, 2—3 mm long. Stamens exserted, those opposite the posterior styles longer and thicker than the others; the episepalous ones hardly longer than the others. Filaments long, filiform, glabrous, slightly connate at the base, the 2 largest 4 mm long. Anthers oblong, glabrous, 1 — $1\frac{1}{2}$ mm long. Carpids slightly connate, glabrous, 1 mm high, with many appendages. Styles nearly equal (5 mm), attached to the base of the carpids, exserted, glabrous, the posterior ones recurved at the base, the anterior one nearly straight; tops obtuse. Samaras glabrous. Nut

glabrous, cylindrical, radially veined, 2—3 mm in diam.; the sub-basal areole orbicular, somewhat concave, 1 mm in diam. Segments of the wing nearly equal, membranous, glabrous, red, oblique, linear-oblanceolate, with acute top and hardly confluent bases, up to 2 cm long, 5—8 mm wide. Dorsal crest trapezoid, deep-sinuate, 5 mm high, 6 mm long, the dorsal top acute, protruding 5 mm between the upper segments of the wing. Intermediate crests wanting.

Distribution: Guiana.

Patrick savannah (Coll. indig. n. 174, fl. and fr. May); Sectie O (Pulle n. 178, fl. Jan.); Zanderij I (Pulle n. 64, fr. July); along railway, km 118 (Stahel s. n., fr. Aug.); Brownsberg (B.W. n. 6817, fr. March); Maratakka R. (B.W. n. 3507, fr. Sept.; n. 3456, fl. Nov.); without locality: Hostmann n. 1252; n. 1227 [K.].

4. *Tetrapteris acutifolia* Cav., Diss. IX (1790), p. 433, t. 261; D.C., Prodr. I (1824), p. 587; Juss. in Arch. Mus. Paris III (1843), p. 534; Miq. in Linnaea 18 (1844), p. 56; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 189; — *Tetrapteris lancifolia* Juss. in Arch. Mus. l. c., p. 536; Griseb. in Fl. Bras. XII, 1 (1858), p. 82.

Liane. Young parts yellow- or grey-sericeous. Branchlets compressed, very slender, glabrous or sericeous; branches cylindrical, smooth, dark-violet, nearly glabrous, up to 3 mm in diam.; internodes 1—6(—10) cm long. Leaves chartaceous, ovate-lanceolate or ovate, up to 13 cm long, $5\frac{1}{2}$ cm wide; base obtuse or rounded; margin recurved, often with few, small glands; top acute or long-acuminate. Young leaves sericeous, (hairs thin, 700 μ long, curled, feet short); adult ones above smooth, metallic shining, beneath the rusty midrib prominent, primary nerves (5—8 on each side) slightly prominent, slightly curved, not attaining the margin; secondary ones laxly reticulate. Petioles mostly slender, canaliculate above, with long-persistent, sericeous hairs, often with 2 minute glands at or above the middle, 4—6 mm long. Stipules minute.

Racemes few-flowered, 4–6 cm long, often corymbiform, forming lax, densely sericeous, terminal (or in the axils of the upper leaves) panicles. Pedicels densely sericeous, slender, oblique-erect, 6–12 mm long, bracteate at base, at $\frac{1}{3}$ from the base bibracteolate. The lower bracts often lanceolate, more or less amplexicaulous, densely sericeous, up to 3 mm long, the upper ones ovate, 1–1½ mm long, with rounded or acutish top. Bracteoles ovate or sub-orbicular, concave, thickish, outside sericeous, ½–1 mm long, base somewhat amplexicaul. Flowers 1 cm in diam. Sepals outside sericeous, inside glabrous, oblong or linear, 3–5 mm long, tops strongly recurved, with 8, oblong, narrow, 1–3 mm long glands, with free and recurved tops. Petals membranous, outside more or less sericeous, yellow, elliptical or ovate, 3 mm long, base cuneate or sub-sagittate, margin nearly entire or serrate; claws patent, sericeous, slender, 1–2 mm long. Only the anthers of the nearly equal stamens exerted. Filaments broadish, 1½–2 mm long, outside sericeous, up to $\frac{1}{3}$ connate. Anthers glabrous, broadly elliptical, with cordate base, recurved, 1 mm long; cells parallel, slightly protruding beyond the base of the ellipsoid, dark, connectives. Carpels united at the ventral side, densely sericeous. Styles sericeous at the base, nearly straight, tops obtuse. Samaras sericeous. Nut ovoid, densely sericeous, 4 mm long; ventral areole ovate, acute, small, 2 mm high. Segments of the wing coriaceous, sericeous at the base, nearly equal, ovate, oblong-obovate or linear-oblong, 1–1¼ cm long, 4–7 mm wide; tops rounded or slightly emarginate. Dorsal crest ring-shaped, beginning at the insertion of the style, ending between the lower segments, 2–4 mm high. Between dorsal crest and wing a row of verrucous or wing-like, 1–5 mm high appendages.

Distribution: Brazil to Guiana.

Gonini R. (Versteeg n. 106, fl. and fr. Aug.); upper Suriname R. (Wulfschlägel n. 919 [B.] p. p.); upper Cottica R. (Focke n. 682, fl. Oct.); upper Suriname R. (B.W. n. 5110, fr. May).

5. *Tetrapteris mucronata* Cav., Diss. IX (1790), p. 434, t. 262, f. 2, emend. Kosterm.; D.C., Prodr. I (1824), p. 587; Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 9; id. in Arch. Mus. Paris III (1843), p. 521; Griseb. in Fl. Bras. XII, 1 (1858), p. 80; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 198, f. 22D; Kosterm. l. c., p. 5; — *Tetrapteris crebriflora* Juss. in St. Hil., Fl. Bras. mer. l. c., p. 8; id. in Arch. Mus. Par. l. c., p. 521; Griseb. in Fl. Bras. l. c., p. 80; Ndz. in Engl., l. c., p. 197; — *Banisteria eglandulosa* Vellozo, Fl. flum. IV (1827), p. 290, t. 155.

Climbing shrub. Young parts with golden-yellow, sericeous hairs, very soon glabrescent. Branchlets nearly cylindrical, thin, smooth; branches cylindrical, rufous, striate, ½ cm in diam.; internodes 1–5 cm long. Leaves ovate, elliptical or oblong, up to 7, resp. 12 cm long, 7, resp. 5½ cm wide, coriaceous, base acute, obtuse or slightly rounded; margin revolute, top obtuse, acuminate or mucronate. Adult leaves glabrous, shining, above midrib and primary nerves slightly prominent, beneath midrib strongly, primary nerves prominent, secondary ones densely reticulate. Lower leaf surface with glandular dots. Petioles thickish, slightly marginate, canaliculate above, glabrous, ½–1 cm long. Stipules membranous, distinct, triangular, 0.3 mm long, attached to the branch, very soon deciduous, leaving an annular scar. Umbels 4–6-flowered, forming a simple, axillary panicle, ½–⅓ length of leaf, rarely equal in length (subspec. *eumucronata*), or longer than the subtending leaves (subspec. *crebriflora*). Pedicels slender, sericeous, 6–10 mm long, bracteolate somewhat below the middle, bracteate at the base, on a compressed, 1 cm long peduncle. Bracts of the umbels lanceolate, acute, with two, 3–6 mm long glands at the base, or glandless. Bracts and bracteoles of the flowers lanceolate-subulate, 1–2, resp. 0.3 mm long. Flowers 1–1½ cm in diam. Sepals erect, sparingly haired, elliptical or sub-orbicular, 2 mm long, with 8 ellipsoid, 1½ mm long glands or glandless. Petals white or yellow, glabrous,

orbicular or elliptical or oblong-obovate, concave, 4—5 mm long, with cuneate or cordate base, crenulate margin, and 1—1½ mm long claws; 5th petal flat, 3 mm long, with broader, 2 mm long claw. Androecium slightly or distinctly zygomorphous, and then anterior stamens much larger and thicker than the posterior ones. Anthers erect, those of the posterior stamens elliptical, 1 mm long, of the anterior ones oblong, 2 mm long, with cells protruding beyond the thick, glanduliform, connectives. Filaments glabrous, rather highly connate. Ovary ovoid, hirsute, 1 mm high, carpids with 2 glabrous appendages. Styles thin, straight, glabrous, 2 mm long, the anterior one 1 mm longer than the posterior ones; tops obtuse or slightly capitellate, more or less compressed. Samaras glabrous. Nut sub-globose, 4 mm in diam.; ventral areole ovate, acute, 3 mm long. Segments of the wing entire, obovate, oblong or linear-oblong, coriaceous; the lower ones (up to 3 ×) smaller than the upper ones. Dorsal crest semi-ovate, 1 cm long, up to 2½ mm high, with wavy margin, thorn-shaped at the base. Intermediate winglets thorn-shaped on each side.

Distribution: Northern South America, from Panama to Bolivia; West Indies.

Subspec. **eumucronata** Kosterm. (*T. mucronata* sensu Ndz.).

Panicles ½—⅓ of the length of the subtending leaves. Petals orbicular or elliptical. Androecium distinctly zygomorphous.

f. **ovata** Ndz. in Verz. Vorl. Lyc. Hos. (1909), p. 30; id. in Engl., Pfl. reich IV (1928), p. 199.

Leaves usually ovate or obovate, up to 10 cm long, 7 cm wide. Segments of samara obovate, upper ones 13 mm long, 8 mm wide, lower ones 10 mm long, 5 mm wide. Dorsal crest up to 4 mm long, with 2 large teeth, the basal one up to 7 mm long.

Paramaribo (Wulfschlägel n. 56 [B.], fl. Aug.); near Poelepantje (Kegel n. 982 [G.]); Para district near Berlijn (Wulfschlägel n. 1389 [B.] and n. 1390 [B.]), without locality: Wulfschlägel n. 917 p. p. [B.] and s. n. [B.].

f. **ovalis** Ndz. in Verz. Vorl. l. c., p. 36, id. in Engl. l. c., p. 199.

Leaves usually elliptical. Segments of the samara oblong, upper ones 15 mm long, 5 mm wide, lower ones 10 mm long, 4 mm wide.

Tapanahoni R. (Versteeg n. 716, fl. July); Wajombo R. (Pulle n. 551, fl. Sept.); without locality: Hostmann n. 1142 (gland bearing form, named *T. spec.* Benth. Lond. Journ. Bot. VII, 1848, p. 134); Hostmann s. n. [L.]; Kappler n. 626 [L.]; Kegel n. 954, n. 982 and s. n. [G.].

f. **oblonga** Ndz. in Verz. Vorl. l. c., p. 37; id. in Engl. l. c., p. 199.

Leaves usually oblong, up to 12½ cm long, 5 cm wide. Segments of samara linear-oblong, upper ones up to 16 mm long, 4 mm wide, lower ones 12 mm long, 3 mm wide. Dorsal crest nearly rectangular, 5 mm wide.

Upper Lawa R. (Kappler n. 2125, fl. Nov. and n. 2126 [L.], fr. Nov.); Paramaribo (Kegel n. 953 [G.] and s. n. [G.]); Brownsberg (B.W. n. 726, fl. Sept.); without locality: Kappler n. 150 [K.].

Subspec. **crebriflora** (Juss.) Kosterm. l. c., p. 5.

Panicles as long as or longer than the subtending leaves. Petals oblong-obovate. Androecium slightly or distinctly zygomorphous.

var. **dubia** Griseb. in Vidd. Medd. Kjöb. (1875), p. 142; Ndz. in Engl. l. c., p. 198.

Pedicels bracteolate 3—4 mm from the base. Bracts and bracteoles lanceolate, 2 mm long. Posterior stamens larger. Anterior style longer. Samaras with elliptical segments.

Distribution: Brazil, Peru, Guiana.

Paramaribo (Went n. 536, fr. Oct.); Gran Rio (Hulk n. 226, fr. Sept.); without locality: Kappler a. 1862 [L.] and s. n.

6. **Tetrapteris discolor** (G. F. W. Meyer) D.C., Prodr. I (1824), p. 587; Juss. in Arch. Mus. Paris III (1843), p. 525; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 121; Ndz. in Engl., Pfl. reich IV (1928), p. 205, t. 22, f. F; — *Triopteris discolor* G. F. W. Meyer Prim. Fl. Esseq. (1818), p. 182.

Climbing shrub. Young parts grey-sericeous. Branchlets compressed, white-sericeous or sub-glabrous; branches cylindrical, grey, glabrous, striate, 3 mm in diam., usually with many tuberculate, reddish lenticels; internodes 1–5½ cm long. Leaves thin-chartaceous, oblong or elliptical, up to 13 cm long, and 5 cm wide; base obtuse, margin flat; top acuminate. Young leaves sericeous; adult ones glabrous, except along the nerves beneath; above smooth, shining, lower surface with many glands, midrib and primary nerves (6–8 on each side) prominent, secondary ones slightly prominent, reticulate. Petioles nearly glabrous, canaliculate above; up to 1 cm long. Stipules ovate or lanceolate-ovate, 1–2 mm long, deciduous, leaving an annular scar. Umbels axillary, usually 4-flowered, forming a short, corymbiform, leaf-bearing, terminal panicle, up to 5 cm long. Peduncles of the umbels thick, compressed, of 2 internodes, the lower internode (1 cm) longer than the upper one (up to 5 mm) with 2 elliptical, 2–5 mm long bracts at the joint. Pedicels pubescent, 3 mm long, bracteate at the base, bibracteolate in the middle. Bracts ovate, acute, outside puberulous, 1½ mm long; bracteoles sub-orbicular, 1 mm long, swollen at the base, outside puberulous. Flowers 1¼ cm in diam. Sepals ovate or lanceolate, erect, glabrous, 3–4 mm long, margin ciliate, with 8 thick, ellipsoid, 2½–3 mm long glands, with more or less free and recurved tips. Petals yellow, patent, fleshy, glabrous, elliptical, concave, 4–5 mm

long, with sagittate base and nearly entire margin; claws 1½–2 mm long. The episepalous stamens slightly longer. Filaments glabrous, broad-triangular, 1 mm long, up to ½ connate. Anthers obovoid, cells protruding ½ mm beyond the base of the thick, glanduliform, 1 mm long connectives. Carpids ovoid, densely hirsute, 1–2 mm high, with appendages. Styles thick, straight, 1 mm long. Tops crest-shaped with arcuate, decurrent stigmas, the anterior one less curved and hardly decurrent. Samaras sericeous. Nut globose, densely sericeous, ½ cm in diam.; ventral areole ovate, acute, large, 4 mm high. Lateral segments of the wing coriaceous, obovate, entire, the lower ones up to 3 × shorter than the upper ones, 10 × 6 mm, resp. 18 × 8 mm. Dorsal winglet semi-orbicular, 4 mm high, 8 mm long. Many intermediate, obovate or linear, or rectangular, 2–8 mm high, appendages.

Distribution: From Bolivia to Guatemala; Lesser Antilles.

Locality unknown: Wullschlägel n. 918 [B.].

var. **surinamensis** (Miq.) Ndz. in Verz. Vorl. Lyc. Hos. (1909), p. 42; id. in Engl. l. c., p. 206; Pulle in Rec. Trav. Bot. Néerl. IX (1912), p. 144; — *Tetrapteris surinamensis* Miq. in Linnaea 18 (1844), p. 55; Pulle, Enum. Pl. Surin. (1906), p. 468; — *Tetrapteris puberula* Miq. in Tydschr. Nat. Gesch. X (1843), p. 84; id. in Linnaea 18 (1844), p. 56; Juss. in Arch. Mus. Paris III (1843), p. 525; Pulle, Enum. l. c., p. 467.

Leaves obovate-oblong, up to 16 cm long, 6 cm wide, very long (2–3 cm) acuminate. Ventral areole of the samara sub-orbicular. Wings oblong.

Distribution: Guiana.

Wanica-pad (Focke n. 640, type of *T. surinamensis* Miq., fr. Sept.; n. 74 [L.], fl. Aug.); lower Suriname R. (Focke n. 330, type of *T. puberula* Miq., fl. Sept.); Brownsberg (B.W. n. 6646, fl. Oct.); Saramacca R. (Pulle n. 179, fr. Jan.); without locality: Focke n. 107 [L.]; Kappler n. 62 [L.]; Hostmann n. 983 [L.] and s. n. [L.].

var. **brownsbergensis** Kosterm. l. c., p. 5.

Leaves glabrous, obovate-oblong, with acute base and short-acuminate top with blunt point. Petioles up to $1\frac{1}{2}$ cm long. Inflorescences, when fruiting up to 20 cm long.

Brownsberg (B.W. 658, fr. Sept.; v. Emden III, fr. Sept.).

7. **Tetrapteris calophylla** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 264; id. in Arch. Mus. Paris III (1843), p. 525; Griseb. in Fl. Bras. XII, 1 (1858), p. 77; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 209, t. 22, f. L.

Liane. Young parts with short, densely golden-yellow sericeous hairs. Branchlets compressed; branches cylindrical, sericeous, up to 8 mm in diam.; internodes 2–12 cm long. Leaves thick chartaceous, large, ovate or obovate, or elliptical, up to 30 cm long, and 14 cm wide, base rounded or more or less cordate, margin revolute; top obtuse, rarely with long and acute acumen. Young leaves densely sericeous; adult ones above glabrous, shining, nearly smooth, with more or less impressed midrib and primary nerves, secondary hardly prominent, reticulate; beneath sericeous, midrib and primary nerves (7–11 on each side) prominent, secondary ones more or less parallel, slightly prominent. Leaves of the inflorescence orbicular, $\frac{1}{2}$ –2 cm long, membranous, sericeous, with cordate base and acuminate or emarginate top. Petioles canaliculate, slightly sericeous or glabrous, 1–3 cm long. Stipules interpetiolar, connate, ovate-acute, or lanceolate, 2 mm long, very soon deciduous, leaving an annular scar. Umbels mostly 4-flowered, forming corymbiform, up to 3 × compound, terminal (or in the axils of the upper leaves), leaf-bearing panicles. All peduncles canaliculate or ribbed, sericeous, those of the umbels thick, 2 cm long, jointed in the middle, with 2 large bracts and stipules. Pedicels 6–10 mm long, bibracteolate in the middle, bracteate at the base. Bracts ovoid, acute, thick, outside puberulous, 2 mm long; bracteoles ovate-orbicular,

outside puberulous, 1 mm long. Flowers 17 mm in diam. Sepals broadly ovate, triangular, incurved, outside puberulous, 3–5 mm long, with 8 very thick, obovoid, $2\frac{1}{2}$ –3 mm long glands. Petals yellow, glabrous, concave, orbicular, 5–7 mm in diam.; base cordate or rounded; margin undulate and lacerate-toothed or crenulate; claws reflexed, 2 mm long; 5th petal smaller. Stamens exserted. Filaments glabrous, 2 mm long, up to $\frac{1}{3}$ – $\frac{1}{2}$ connate, the epipetalous ones broader. Anthers obovate, nearly glabrous. Carpids puberulous, with appendages. Styles exserted, the curved posterior ones much thicker and longer than the nearly straight anterior one, with contort-uncinate tops, the anterior one with obtuse top with decurrent stigma. Samaras golden-yellow sericeous. Nut semi-ovoid, 1 cm long, with broad, ovate, acute, 1 cm high ventral areole. Upper segments of the wing 3–6 × longer than the lower ones, coriaceous, entire, linear-oblong, up to $4\frac{1}{2}$ cm long, 12 mm wide; lower segments elliptical or obovate, usually 1 – $1\frac{1}{2}$ cm long, 5–7 mm wide. Dorsal crest falcate, elliptical, $1\frac{1}{2}$ mm high, 5 mm long; on each side a single, intermediate, 6 mm long winglet or small crest, or appendages wanting.

Distribution: Northern Brazil, French Guiana.

Paramaribo (Wulfschlägel n. 915 and n. 915a [B.]); near Pl. Jagtlust (Splitgerber n. 587 [L.], fl. Febr.); Guiana Goud Placer (Coll. indig. n. 96, fr. Apr.); upper Saramacca R. (Pulle n. 229, fl. and fr. Apr.).

8. **Tetrapteris crispa** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 265; id. in Arch. Mus. Paris III (1843), p. 52; Ndz. in Engl., Pfl. reich IV (1928), p. 213, t. 4, f. F, t. 22, f. K; J. F. Macbride in Field Mus. VIII (1930), p. 121; — *Tetrapteris acapulcensis* Kunth in H.B.K., Nov. gen. V (1821), p. 130 (col. ed.); D.C., Prodr. I (1824), p. 587; Juss. in Ann. sc. l. c., p. 261; id. in Arch. Mus. l. c., p. 521.

Liane. Branchlets compressed, grey-sericeous; branches glabrous, smooth, reddish, up to 4 mm in diam., with few

lenticels; internodes 1—12 cm long. Leaves membranous-chartaceous, ovate, obovate, elliptical or lanceolate-ovate, up to 15 cm long, 10 cm wide; base obtuse, acute, rounded or sub-cordate; margin slightly undulate; top slightly acuminate. Young leaves sericeous; adult ones glabrous, except the principal nerves on the lower surface; above smooth, beneath along the margin small glands, midrib prominent, primary nerves 5—6 on each side, the many secondary ones slightly prominent, somewhat parallel, veins reticulate. Leaves of the inflorescences shortly acuminate or apiculate, broadly ovate, obovate, elliptical or sub-orbicular, $\frac{1}{2}$ —3 cm long, crispy. Petioles slender, glabrescent, canaliculate above, 12—20 mm long. Stipules ovate, puberulous, $1\frac{1}{2}$ —2 mm long. Umbels usually 4-flowered, shortly peduncled, in sub-corymbose panicles, forming compound, axillary panicles. Branches and branchlets of the inflorescence with 2 conspicuous, leaf-like, sub-orbicular bracts. Pedicels 5—10 mm long, pubescent, jointed somewhat below the middle, and there bibracteolate. Bracts and bracteoles nearly equal, appressed to the petioles, ovate or ovate-lanceolate, $1\frac{1}{2}$ mm long, with thin, pilose margin, and swollen base. Flowers 1— $1\frac{1}{4}$ cm in diam. Sepals erect, glabrous, ovate, 5 mm long, with 8 thick glands, the anterior ones obovoid, 2— $2\frac{1}{2}$ mm long, posterior ones oblong, 3— $3\frac{1}{2}$ mm long, with free tops. Petals yellow, glabrous, patent, ovate, 5—7 mm long, somewhat contracted above the cordate or hastate base, lower part carinate, margin undulate; claws recurved, 1—2 mm long. Stamens glabrous, equal, only the elliptical, 1—3 mm long anthers exserted; cells protruding $\frac{1}{2}$ mm beyond the base of the sub-globose, or ellipsoid, $\frac{1}{2}$ mm long connectives. Filaments up to $\frac{1}{3}$ united. Carpids hirsute, crested. Styles slightly exserted, short, straight, the posterior ones twice as thick as the anterior, equal in length or up to $\frac{1}{2}$ mm longer; tops compressed, uncinat, stigma of the anterior style crest-shaped, of the others oblique-decurrent. Samaras

sericeous, especially the nut. Nut ovoid, thick, $\frac{1}{2}$ cm high; ventral areole ovate, acute or acuminate, 5 mm high. Upper segments of the wing entire, coriaceous, obovate-oblong, up to 3 cm long, 1.3 cm wide, with rounded tops; lower segments entire, elliptical, up to 10 mm long, 5 mm wide. Dorsal crest 3—5 mm high, 10 mm long. Intermediate appendages wanting.

Distribution: From Minas Geraes to Mexico.

Upper Suriname R., near Goddo (Stahel n. 47, fr. Jan.).

5. DOLICHOPTERYS Kosterm.

Lianes. Leaves entire, petioled. Stipules inconspicuous. Racemes terminal, elongated, branched at the base. Pedicels bracteate and bibracteolate at the base. Sepals 4, each with a sub-orbicular, radially sulcate, large gland. Flowers unknown. Samara 3 or by abortion 1, attached to a pyramidal, trigonous receptacle. Dorsal wing of the samara large, crest-shaped, lateral wings very long, erect-divaricate, narrowly oblong. Cotyledons equal, replicate.

Distribution: Species 1, endemic.

1. *Dolichopterys surinamensis* Kosterm. in Rec. Tr. Bot. Néerl. 32 (1935), p. 279; also in Med. Bot. Mus. & Herb. Utr. n. 21 (1935), p. 279.

Liane. Branchlets, petioles and inflorescences covered with velutinous, fuscous-ferrugineous pube. Branchlets thick, obsoletely angular, internodes usually 4 cm long, up to 6 mm diam. Leaves obovate-oblong, base rounded, margin hardly recurved, top emarginate, 15—20 cm long, at top 7—9 cm wide, coriaceous, rigid, above glabrous, green, shining, midrib impressed, slightly pilose at base, primary nerves (8—11 on each side) prominulous, not attaining the margin, arcuately united, veins prominulous, densely reticulate, beneath densely sub-sericeous tomentellous, midrib tomentose, strongly prominent, primary nerves prominent; secondary ones prominulous, veins obsolete. Petioles thick,

sub-angular, canaliculate, up to $2\frac{1}{2}$ cm long. Stipules not seen. Racemes forming a few-branched, many-flowered terminal panicle, up to 18 cm long. Flower clusters sessile. Pedicels thick, $1\frac{1}{2}$ mm diam., up to 8 mm long. Bracts and bracteoles small, ovate-lanceolate, densely tomentose, up to 3 mm long, deciduous. Flowers unknown. Calyx-glands 4, large, 3 mm diam., sub-orbicular, radially sulcate, hollowed in the centre. Styles subulate, curved, 3 mm long, glabrous, stigma obtuse. Samaras densely reddish-rusty sericeous-tomentose. Nut globose, tomentose, up to 13 mm diam., ventral areole flat, sub-orbicular, top acute, up to 6 mm diam. Dorsal crest chartaceous, large, ring-shaped, sub-triangular, base elongated, up to 2 cm long, obtuse, top short, obtuse, up to 12 mm long. The lateral wings chartaceous, sericeous, erect-divaricate, linear, up to 6 cm long, 9 mm wide, top rounded, margin entire, reddish (Stahel). Cotyledons equal, flat.

Distribution: Endemic.

Upper Gran Rio (Stahel n. 223, fr. March).

6. HETEROPTERIS Kunth.

Lianes, erect or climbing shrubs. Leaves opposite, mostly entire, petioled, or very rarely sessile, thick-membranous or coriaceous, glabrous or pubescent, often with glands on the lower surface. Parenchym with solitary or clustered crystals. Stipules inconspicuous. Mostly terminal racemes, or corymbs, usually forming panicles. Flowers small. Pedicels bibracteolate in the middle. Sepals 5, persistent, with 8—10 glands or glandless. Petals 5, unguiculate, glabrous, sub-orbicular or reniform, yellow, reddish or white, mostly entire, not rarely carinate. Stamens 10, all fertile, glabrous, the episepalous ones longer than the others and moreover the posterior ones generally smaller than the anterior ones. Anthers usually elliptical, erect, attached above the base, glabrous, rarely pilose, without appendages. Ovary 3-locular, 3-lobed, carpids dorsally

gibbose. Styles 3, free, nearly straight, short; top obtuse, capitellate, acute or uncinat, stigmas at the inner angles. Samaras 1—3, attached to a pyramidal torus, at last more or less free. Dorsal wing developed, with thick lower, and thin upper margin or wing entirely thickened. Cotyledons straight, slightly unequal, flat-convex.

Distribution: Species about 80, in tropical America, including the West Indies; one species in western tropical Africa.

1. a. Leaves glabrous beneath. Petioles glandless. Crystals solitary. Racemes. Androecium and gynaecium zygomorphous 2
- b. Leaves golden-yellow sericeous beneath. Petioles biglandular in the middle. Crystals in clusters. Umbels mostly 4-flowered, arranged in panicles. Androecium actinomorphic; the epipetalous stamens shorter. The 3 styles straight, with obtuse tops 1. *H. macrostachya* Juss.
2. a. Leaves very large, up to 40 cm long, 15 cm wide, with few appressed hairs beneath, and strongly prominent nerves. Petioles up to $1\frac{1}{2}$ cm long. Racemes 20—40-flowered, up to 30 cm long. Pedicel 5—10 mm long, the upper joint with the flower often deciduous, the lower part with the bracteoles at the top persistent. Top of the styles pediform, with broad claw. Wing of the samara horizontal or bent back, entirely thickened, usually without appendage 3. *H. multiflora* (D.C.) Hochreutiner
- b. Leaves up to 25 cm long, 9 cm wide, glabrous beneath, veins on both surfaces densely reticulate, nerves slightly prominent. Petioles 2—8 mm long. Racemes 15—20-flowered, $1\frac{1}{2}$ —10 cm long, forming panicles. Pedicels 2—6 mm long. Tops of the styles uncinat, rounded or angulate. Wing of the samaras only thickened along the lower margin, ascendant, upper margin with an appendage at the base 2. *H. nervosa* Juss.

1. **Heteropteris macrostachya** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 275; id. in Arch. Mus. Paris III (1843), p. 450, t. 14; Griseb. in Fl. Bras. XII, 1 (1858), p. 73; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 120; Pulle, Enum. Pl. Surin. (1906), p. 468; Ndz. in Engl., Pfl. reich IV (1928), p. 342; — *Heteropteris* (?) *apiculata* Miq., Stirp. Surin. (1850), p. 81; — *Banisteria apiculata* (Miq.) Robinson ex Small in N.-Amer. Fl. XXV, 2 (1910), p. 136; — *Banisteria obovata* Small l. c., p. 136.

Liane or shrub. Young parts and inflorescences golden-yellow sericeous. Branchlets compressed, rufous-sericeous; branches cylindrical, glabrous, grey, striate, with many minute, white lenticels, up to 7 mm in diam., internodes 1–8 cm long. Leaves coriaceous, ovate, obovate or oblong, up to 20 cm long, 10 cm wide; base obtuse, rounded or more or less cordate, rarely cuneate; margin nearly flat; top usually shortly acuminate or apiculate, rarely emarginate or obtuse. Young leaves sericeous, above less; adult ones above glabrous or nearly so, smooth, shining, nerves not prominent, beneath golden-yellow sericeous, with a row of few, glandular dots along the margin; midrib strongly prominent, primary nerves (8–12 on each side) prominent, secondary nerves more or less parallel, slightly prominent, veins inconspicuous, densely reticulate. Leaves of the inflorescence gradually diminishing to bracts. Petioles thickish, rusty-sub-sericeous, up to 12 mm long, biglandular in the middle. Usually 4-flowered umbels, solitary or 1–3 together in a sessile or peduncled, up to 3 cm long corymb; corymbs forming a narrow, axillary or terminal, elongated, leaf-bearing panicle. Pedicels thick, compressed, sericeous, 3–8 mm long, bibracteolate at or above the middle, bracteate at the base. Bracts ovate, bracteoles orbicular, both erect, outside sericeous, inside glabrous, 1–1½ mm long. Flowers 1–1½ cm in diam. Sepals erect, ovate, acute, 2–5 mm long, outside sericeous, with 8, thick, oblong or slightly sigmoid, conglutinous or more or less connate, 2½–4 mm long glands.

Petals yellow with a brown stripe (Versteeg), fleshy, unequal, concave-carinate, ovate, 3½–6 mm long, base sagittate, margin nearly entire; 5th petal smaller, glandular-undulate at the base. Claws thick, carinate, curved, 1½–2½ mm long; 5th one straight. Stamens included, 4 mm long. Filaments outside puberulous, broad, ½ or nearly entirely united. Anthers oblong-elliptical, glabrous, bent back, 1–2 mm long; cells slightly exceeding the thick, glanduliform connectives. Ovary ovoid, 2 mm high, hirsute. Styles equal, glabrous, triangular, slightly recurved towards the top. Tops obtuse, slightly dilated. Samaras usually 2 (3rd one abortive), thick, golden-yellow sericeous, ascendant. Nut nearly globose, compressed, smooth, 1 cm in diam. Endocarp not protruding into the cells. Ventral areole flat, ovate, acute, 4 mm high. Wing semi-obovate, up to 6 cm long, 2 cm wide, lower margin thick, straight, curved at the top, upper margin thinner, wavy, curved and often contracted at the base, forming a small appendage.

Distribution: From Costa Rica to Peru; West Indies.

- f. **oblonga** Ndz. in Engl., Pfl. reich IV (1928), p. 342; Pulle, Enum. Pl. Surin. (1906), p. 468.

Leaves oblong, up to 20 cm long, 8 cm wide.

Marowijne R. (Kappler ed. Hohenack. n. 1915, fl. Aug., type of *H. apiculata* Miq.; n. 1995 [L.], fl. Aug.); Marowijne R. (Wulfschlägel n. 1900 [B.]).

- f. **ovata** Ndz. in Engl. l. c., p. 434; Pulle, Enum. l. c., p. 469.

Leaves ovate or obovate, up to 15 cm long, 10 cm wide.

Gonini R. (Versteeg n. 169, fl. Aug.); Suriname R. near Gottadam falls (Tresling n. 258, fl. July); lower Coppename R. (Went n. 145 and n. 110, fl. Aug.); without locality: Hostmann n. 897.

2. **Heteropteris nervosa** Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 26; id. in Arch. Mus. Paris III (1843), p. 461; J. F. Macbride in Field Mus. Nat. Hist.

VIII, 2 (1930), p. 120; — *Heteropteris suberosa* (Willd.) Griseb. in *Linnaea* XIII (1839), p. 229; id. in *Fl. Bras.* XII, 1 (1858), p. 68; Pulle, *Enum. Pl. Surin.* (1906), p. 469; Ndz. in *Engl., Pfl. reich IV* (1928), p. 369; — *Banisteria suberosa* Willd. *Herb. n.* 8885 (nomen nudum); Small in *N.-Amer. Fl.* XXV, 2 (1910), p. 137; — *Heteropteris Lessertiana* Juss. in *Arch. Mus. l. c.*, p. 462; — *Heteropteris Candolleana* Juss. l. c., p. 463; — *Heteropteris eglandulosa* (non Juss.) Miq. in *Linnaea* 18 (1844), p. 737, p. 54; — *Heteropteris anoptera* Juss. in *Ann. scienc. nat.* 2 sér. *Botan.* XIII (1840), p. 276; id. in *Arch. Mus.* III (1843), p. 459; Pulle, *Enum.* p. 469; Ndz. in *Pfl. reich IV*, p. 365.

Liane or shrub. Branchlets compressed, rufous-sub-sericeous; branches cylindrical, glabrous, dark-grey, at last suberous, up to 5 mm in diam., beset with tuberculate lenticels; internodes $\frac{1}{2}$ –10 cm long. Leaves entire, chartaceous or coriaceous, elliptical, obovate, oblong or lanceolate, up to 25 cm long, 9 cm wide; base obtuse or rounded, rarely acute; margin hardly recurved; top oblique-acuminate. Very young leaves slightly rufous-sericeous; adult ones soon glabrous on the shining, brown or grey upper surface, with slightly prominent nerves; beneath dull or shining, glabrous or with scattered hairs (denser along the midrib), often with a row of small glands along the margin, midrib strongly prominent, primary nerves prominent, curved, not attaining the margin, the secondary ones more or less parallel, veins densely reticulate. Petioles thick, glabrous, canaliculate above, 2–6 mm long. Leaves of the inflorescences $\frac{1}{2}$ –3 cm long, or reduced to 3–6 mm long bracts. Racemes rufous-sericeous, 15–20-flowered, up to 10 cm long, forming axillary or terminal ample panicles. Pedicels straight, mostly thickish, 2–6 mm long, bibracteolate at or slightly below the middle, bracteate at the base. Bracts and bracteoles ovate, or nearly lanceolate, acute or acuminate, more or less concave, 2–5, resp. $1\frac{1}{2}$ –3 mm long. Flowers $1\frac{1}{2}$ cm in diam. Sepals outside rufous-sericeous, ovate or nearly

lanceolate, 3–5 mm long, top revolute, glands 8, ellipsoid or oblong, 1–3 mm long, or glandless. Petals yellow, membranous, glabrous, obovate, elliptical or ovate, toothed, 5–9 mm long, the 5th one with hastate base, 4–6 mm long. Claws straight, 2–3½ mm long, the 5th one thicker and slightly longer. Stamens 4-adelphous, glabrous, the 3 opposite the styles longer and thicker than the others (3 mm), the stamen opposite the 5th petal separated from the others, curved between the posterior styles. Filaments slender, slightly connate at the base. Anthers orbicular, $\frac{1}{2}$ mm long, cells curved, slightly protruding beyond the base of the ovoid, glanduliform, dark-red connectives. Ovary globose-ovoid, sericeous, $\frac{1}{2}$ mm high. Styles glabrous, the anterior nearly straight, slightly shorter than the recurved posterior ones (3 mm); tops more or less foot-shaped, with a long claw (up to $\frac{1}{2}$ mm), claw of the anterior one longer. Samaras ascendant, rufous-sub-sericeous, nut horizontal, compressed, nearly glabrous, 7 mm long, 4 mm high, 2 mm thick. Dorsal wing nearly semi-obovate, up to $4\frac{1}{2}$ cm long, $1\frac{1}{2}$ cm wide. Outer margin slightly curved, thick; inner (ventral) margin thin, sigmoid, with an obtuse 6 mm long, 2 mm high, appendage at the base. Endocarp not protruding into the cell.

Distribution: Northern South America, from Panama to Peru; West Indies.

Gland bearing form (var. *Lessertiana* (Juss.) Griseb.).

Lawa R. (Kappler, ed. Hohenack. n. 1710, fl. Nov.; n. 2122 [D.]); Sara-creek, near Abontjoeman (Coll. indig. n. 239, fl. May); Suriname R. near Waira waira (Tresling n. 136, fl. July), near Joden-savannah (Kegel n. 1184 [G.]); Paramaribo (Wulfschlägel n. 56 [B.] p. p.); upper Suriname R. (Wulfschlägel n. 858 [B.]); sectie O (Pulle n. 201, fl. Aug.); Para district (Wulfschlägel n. 1323 [B.]); lower Saramacca R. (Kappler n. 65); upper Saramacca R. (Pulle n. 453, fl. Febr.; n. 494, fl. March); without locality: Wulfschlägel n. 56 [B.] p. p.; Hostmann n. 1107 p. p., n. 224, n. 1139.

Glandless form (var. *Candolleana* (Juss.) Ndz.).

Paramaribo (Wulfschlägel n. 56 [B.], p. p.); Bergendaal

(Focke n. 378, fr. Sept.); sectie O (B.W. n. 5372, fl. Aug.); Brownsberg (B.W. n. 6535, fr. June); Suriname R. near Kabelstation (Lanjouw n. 1229, fl. Nov.); upper Saramacca R. (Pulle n. 431, fl. Jan.); Coppename R. near Kaaianstone (Lanjouw n. 715, fl. Sept.), near Raleigh falls (Lanjouw n. 976, fl. Sept.); upper Nickerie R. (B.W. n. 1009, fl. Febr.); without locality: Hostmann n. 1107 p.p.; Kappler n. 1107a [D.]; Wulschlägel n. 56 [G.].

Vernacular names: Moeléri (Car.); Hoeliaballi (Arow.).

3. *Heteropteris multiflora* (D.C.) Hochreutiner in Bull. N.-York Bot. Gard. VI (1910), p. 277; — *Byrsonima multiflora* D.C., Prodr. I (1824), p. 589; — *Heteropteris reticulata* (Poir.) Ndz. in Arb. Bot. Inst. Lyc. II (1903), p. 54; id. in Engl., Pfl. reich IV (1928), p. 374; Pulle, Enum. Pl. Surin. (1906), p. 469; Fawcett and Rendle, Fl. Jam. IV (1920), p. 233; — *Malpighia reticulata* Poir., Enc. Bot. Suppl. IV (1816), p. 8; — *Byrsonima reticulata* D.C. l.c., p. 581; — *Banisteria reticulata* Robinson ex Small in N.-Amer. Fl. XXV, 2 (1910), p. 637; — *Heteropteris platyptera* Juss. in Arch. Mus. Paris III (1843), p. 445, t. 14.

Tree, shrub or liane. Young parts rusty-sericeous. Branchlets compressed, rusty and slightly sericeous; branches cylindrical, glabrous, up to 7 mm in diam., with tuberculate lenticels; internodes up to 13 cm long. Leaves entire, coriaceous, elliptical, ovate-oblong or lanceolate-oblong, up to 40 cm long, 15 cm wide; base obtuse or rounded; margin nearly flat; top acute often rather long-acuminate. Young leaves rufous-sericeous; adult ones above glabrous, shining, nerves slightly prominent, veins densely reticulate, beneath dull, with few, small, sericeous hairs, midrib and the curved primary nerves (6—9 on each side) strongly prominent, veins slightly prominent; often a row of few, small glands along the margin. Petioles thick, glabrous, up to 1½ cm long. Leaves of the inflorescence suddenly diminishing to small bracts. Racemes 20—40-flowered, with compressed peduncles, forming axillary and terminal, up to 30 cm long, pyramidal, rusty-sericeous, peduncled, ample

panicles. Pedicels thickish, 5—10 mm long, bibracteolate at or below the middle, bracteate at the base; the upper joint often deciduous, the lower part with the bracteoles at its top persistent, giving a characteristic appearance to the panicle. Bracts and bracteoles large, slightly concave, ovate, acute, sericeous, 2—6 mm long, persistent. Flowers 1¼—1¾ cm in diam. Sepals lanceolate or oblong, 3—6 mm long, outside sericeous, top strongly recurved, with 8 thick, oblong, 1½—3 mm long glands. Petals unequal, yellow, broadly elliptical, membranous, glabrous, 5—6 mm long, margin toothed or crenulate; the 5th one smaller with hastate base, often glandular-fimbriate at the base. Claws recurved, 2 mm long; 5th one thick, straight, 3 mm long. Stamens exserted, 4-adelphous, sigmoid. The 3 stamens opposite the styles longer than the others (3 mm); the stamen opposite the 5th petal separated from the others, curved between the posterior styles. Filaments filiform, slightly connate at the base; anthers glabrous, curved; cells protruding beyond the base of the thick, glanduliform connectives. Ovary globose, hirsute, 2 mm high. Styles exserted, nearly equal, 4 mm long, glabrous, the posterior ones sigmoid, the anterior one nearly straight; tops uncinat; claw of the anterior style up to ½ mm long. Samaras rufous-sub-sericeous, glabrescent, horizontal. Nut large, up to 2 cm long, 1¼ cm high, 6 mm thick. Endocarp not protruding into the cell. Ventral areole ovate, acute, 3 mm high. Dorsal wing entirely thick-coriaceous, fanlike veined, horizontal or bent downward, semi-orbicular, up to 3½ cm long, 2½ cm wide. Upper margin semi-circular, usually without appendage at the base; lower margin thickest, straight, or bent back.

Distribution: Northern South America, Jamaica.

Lower Marowijne R. near Albina (Versteeg n. 556, fl. July); Commewijne R. near Pl. Waiampibo (Splitgerber n. 512 [L.], fl. Jan.; s.n. [L.]); Sectie O (B.W. n. 4248, fl. Febr.); Paramaribo (Kegel n. 704 [G.]; Saramacca R. (B.W. n. 5590, fl. and fr. Jan.; Wulschlägel n. 916 [B.]

upper Saramacca R., Watramiri (B.W. n. 2664, fl. Febr.); without locality: Hostmann n. 531; s. n. [L.]; Focke n. 102 [L.]; Stahel s. n.

7. *BANISTERIA* Juss. (non Linn.).

Erect or scandent shrubs. Leaves entire, petiolate, opposite or very rarely 3-whorled, commonly leathery, glabrous or copiously pubescent, often glandular at the base. Stipules interpetiolar, inconspicuous, rarely connate, deciduous. Umbels mostly 4-flowered, usually in leafy or bracteate panicles, rarely in corymbs; very rarely racemes. Pedicels bibracteolate at or rarely slightly above the base. Sepals 5, usually with 8—10 glands. Petals 5, unequal, long-unguiculate, mostly pink, rarely yellow or white; limb very often fringed, seldom merely toothed. Stamens 10, all fertile, rarely actinomorphic, and then the episepalous stamens larger; usually zygomorphic, and then the stamens opposite the 3 anterior sepals and the 2 posterior-lateral petals enlarged; the 3 posterior ones often small. Filaments free or united at the base, usually glabrous. Anthers without appendages, or the connectives enlarged; glabrous or pilose. Ovary hirsute, 3-lobed, dorsally compressed-gibbose; styles 3, free, equal, rarely the anterior one longer than the others; tops usually truncate with mostly capitellate stigmas. Samaras 1—3, attached to a pyramidal torus, becoming free, each with a large dorsal wing, upper margin thick, lower one thin; the lateral nut smooth, verrucous, or with 1— ∞ winglets. Embryo straight, curved or inflexed; cotyledons unequal or sub-equal.

Distribution: Species 83, in tropical America, including the West Indies.

1. a. Young parts grey-pilose. Leaves with acute base, long-acuminate top and glandless margin. Petioles nearly glabrous, glandless. Anthers and styles pilose. Wing of the samara with a triangular or rounded appendage at the base 1. *B. lucida* Rich.
- b. Young parts rusty-subsericeous. Leaves with obtuse,

rounded or sub-cordate base, shortly acuminate top, and with long-stipitate glands along the margin towards the top. Petioles rusty-subsericeous, biglandular at the top. Anthers and styles glabrous. Wing without appendage .. 2. *B. leptocarpa* Benth.

1. *Banisteria lucida* Rich., Cat. Leblond in Act. soc. hist. nat. Paris I (1792), p. 109; Juss. in Arch. Mus. Paris III (1843), p. 411; Ndz. in Engl., Pf. reich IV (1928), p. 441, t. 5B, 34 J and K.; Miq., Stirp. Surin. (1850), p. 78, t. 20; Pulle, Enum. Pl. Surin. (1906), p. 468; — *Banisteria lobulata* E. Meyer, in Pl. Surin. Gött. (1824), p. 813; — *Banisteria appendiculata* Juss. in Arch. Mus. Paris III (1843), p. 413, t. 13; — *Banisteria divaricata* Juss. l. c., p. 412; — *Banisteria polita* Miq., Stirp. Surin. (1850), p. 80, t. 21; — *Banisteria calocarpa* Miq. in Linnaea XVIII (1844), p. 53; Ndz. in Engl. l. c., p. 437.

Climbing shrub. Young parts grey-pilose. Branchlets erect or patent, compressed, sulcate with very short, grey or dusky hairs; branches cylindrical, smooth, glabrous, dusky or grey, up to 5 mm in diam.; internodes 1—8 cm long. Leaves opposite, elliptical, obovate- or lanceolate-oblong, coriaceous, 5—17 cm long, 1.2—5 cm wide; base acute; margin slightly revolute; top with long (up to 2 cm), slightly obtuse acumen. Young leaves grey-pilose; adult ones glabrous, shining, black (when dried) above, with prominent midrib and curved, slightly prominent primary nerves; beneath opaque, rusty, with few scattered hairs, the midrib and the strongly curved, towards the margin disappearing primary nerves, prominent, the secondary ones reticulate. Both surfaces minutely punctulate, beneath with few, minute glands. Petioles more or less glabrous, 4—10 mm long, glandless, canaliculate above. Stipules interpetiolar, triangular, connate, deciduous, leaving an annular scar, hardly $\frac{1}{3}$ mm long. Umbels 4-flowered, usually 3—5 in axillary corymbs, many times shorter than the leaves; peduncles of the umbels slender (sometimes wanting), rusty-sericeous, with 1—3 internodes (upper one mostly longer), $1\frac{1}{2}$ — $\frac{1}{2}$ cm long,

bracteate at the joints. Pedicels slender, rusty-sericeous, $1\frac{1}{2}$ — $2\frac{1}{2}$ cm long, bracteate and bibracteolate at the base. Bracts and the somewhat united bracteoles broadly ovate, obtuse, outside rusty-sericeous 1 — $1\frac{1}{2}$ mm long. Flowers $1\frac{1}{2}$ —2 cm in diam.; buds ovoid-globose, densely sericeous. Sepals nearly orbicular, outside rusty-sericeous, 2—3 mm long, with 8 ellipsoid or rarely obovoid, thick, $1\frac{1}{2}$ —2 mm long glands. Petals yellow, outside rusty-sericeous, obovate-cochleariform, 6—11 mm long; base acute, margin fimbriate; the 5th one glandular-fringed, 4—6 mm long; claw outside sericeous, reflexed, 2 mm long, of the 5th petal thick, straight, narrowed at the top, 3—4 mm long. Stamens exerted; the 3 opposite the styles thicker and longer than the others (4 mm) with incurved filaments; the 3 posterior stamens shorter than the others, with slender filaments, curved between the posterior styles, with resupinate anthers. Filaments glabrous, united at the base; anthers obovate-oblong, pilose, with very thick connectives. Ovary densely hirsute; styles 3, attached to the ventral side of the carpids, sigmoid, gibbose at base; the posterior ones only at base, the anterior one far beyond the middle hirsute; tops obtuse, slightly capitellate, stigmas ditto. Samaras pink, sparingly rusty-sericeous; nut sub-globose, 8 mm in diam., with 6—12 veins in the lower part, and more or less imbricate, lacerate, up to 2 mm high lobes towards the top; ventral areole oblong, hardly 1 mm long; dorsal wing semi-obovate, 4—5 cm long, $1\frac{1}{2}$ — $1\frac{3}{4}$ cm wide, contracted and 4—8 mm wide at base; the thick interior margin straight, nearly at right angle curved towards the top, with a triangular or rounded, 1—7 mm high, 2—6 mm wide, appendage at the base; the thin ventral margin straight or curved, wavy. Cotyledons fleshy, sub-equal, nearly straight.

Distribution: Tropical Brazil, Guiana, West Indies.

Upper Marowijne R. (Kappler ed. Hohenack. n. 1900, type of *B. polita* Miq.; n. 61 [L.]; n. 417); Lawa R. near Cottica (B.W. n. 5315, fl. June); Perica R. (Wulfschlägel n. 1387 [B.]); Paramaribo near Heremitage (Wulfschlägel

n. 1388 [B.]); Paulus-creek, Albina, Marowijne, Saramacca (Wulfschlägel n. 54 [B.]); Joden-savannah (Focke n. 329, type of *B. calocarpa*); Brownsberg (B.W. n. 6663, fl. Sept.); upper Suriname R. (B.W. n. 5127, fr. May); Suriname R. near Cassepoeera-creek (Kegel n. 1182 [G.]); without locality: Hostmann n. 1027 (named: *Malpighia glabra* L. by Steudel) and *B. lobulata* Meyer by Benth., s. n. [L.]; Meyer n. 813 [G.], type of *B. lobulata*; Wulfschlägel s. n. [B.].

2. **Banisteria leptocarpa** Benth. in Lond. Journ. Bot. VII (1848), p. 130; Ndz. in Engl., Pfl. reich IV (1928), p. 412; — *Banisteria elegans* Tr. et Planch., subspec. *cordata* Ndz., var. *ciliata* Ndz. l. c., p. 413; Kosterm. l. c., p. 8.

Shrub, often climbing. Young parts and inflorescences with dense, short, rusty, sub-sericeous hairs. Branchlets compressed, rusty sub-sericeous; branches cylindrical, striate, fuscous, with long-persistent, rusty hairs; internodes 2—10 cm long. Leaves opposite and pseudo-alternate, coriaceous-chartaceous, ovate, oblong-ovate or obovate, up to 10 cm long, and 6 cm wide, with obtuse or rounded base, flat margin, with patelliform, especially towards the abrupt and shortly acuminate top, long-stipitate glands. Young leaves rusty sub-sericeous, adult ones nearly glabrous, except the nerves, above smooth, shining, beneath opaque, with strongly prominent midrib, the arcuate primary nerves (4—6 on each side) prominent, parallel, the secondary ones parallel, slightly prominent, veins reticulate. Petioles thick, rusty sub-sericeous, 5—13 mm long, with 2 glands at the top. Stipules interpetiolar, triangular, sericeous, hardly 1 mm long. Leaves of inflorescences abruptly diminishing to 8 mm long bracts. Umbels mostly 4-flowered on peduncles of 2 internodes, solitary or in axillary, up to 15 cm long panicles, with long, naked, compressed, common peduncles. Pedicels bibracteolate and bracteate at the base, slender, glabrous, thickened towards the top, 8—14 mm long. Bracts and bracteoles broadly ovate or orbicular, outside sericeous, 1, resp. $\frac{1}{3}$ mm long. Sepals erect, outside with few appressed hairs, inside glabrous, orbicular-ovate, 3—5 mm long, with 8

globose-ellipsoid, 1 mm long glands, or glandless. Petals yellow, slightly unequal, glabrous, limb sub-orbicular, (5th one obovate) 5—8 mm in diam., base cordate, margin of the 1st petal toothed, of the others long-fimbriate, of the 5th one glandular-fimbriate at the base. Claws straight, 1—3 mm long. Stamens glabrous, long-exserted, the 3 anterior ones curved, the 7 posterior retrorsely curved; the 3 stamens opposite the anterior sepals longer and much thicker than the others (4 mm), with very thick, sub-globose, glandular, 1 mm long, connectives, thickened towards the top, and exceeding the small cells for nearly 1 mm; the other stamens with small connectives. The 3 posterior stamens small, sigmoid between the posterior styles, the next ones with highly connate filaments, longer and thicker, than the remaining ones. Anthers elliptical, cells slightly protruding beyond the base of the connectives. Ovary long-hirsute, 3-lobed; styles 3, glabrous, exserted, 3 mm long, the posterior ones sigmoid, the anterior one nearly straight; stigmas orbicular-capitellate. Samaras erect, pubescent; nut small, smooth, attached with a slender stalk; wing yellow, nearly glabrous, slender semi-obovate, contracted at the base, 2½ cm long, 1 cm wide. Lower margin curved at the top, the thick upper margin at the base. Cotyledons 3½ mm long, linear-oblong, straight, flat, replicate.

Distribution: Guiana, Trinidad.

Glandless form: Weyne-weg, between Albina and Moengo tapoe, savannah-forest (Lanjouw n. 440, fl. Aug.).

Gland bearing form: Weyne-weg, between Albina and Moengo tapoe, savannah-forest (Lanjouw n. 502, fl. Aug.).

8. STIGMAPHYLLON Juss.¹⁾

Lianes. Leaves opposite or pseudo-alternate, entire or (often on the same plant) cleft, with 2 large glands, generally attached to the long petioles, rarely at the midrib beneath.

¹⁾ This name is differently spelled as: *Stigmatophyllum*, *Stigmaphyllum*, *Stigmatophyllon*. I use the original spelling of Jussieu.

Stipules inconspicuous or wanting. Flowers in short, dense, sessile, corymbiform racemes; racemes arranged like the flowers of a large, long-branched, lax, compound dichasium. Pedicels usually bibracteolate above the middle. Sepals 5, the 4 lateral ones biglandular. Petals 5, unguiculate, glabrous, unequal, yellow, the 4 lateral ones concave, margin toothed or fringed; the limb in bud already more or less corrugate. Stamens 10, the 4 opposite the lateral petals more or less sterile (according to Haumann Merck in Rec. Inst. Bot. Bruxelles 9 (1913), p. 21, all stamens are fertile in *S. littorale*; it is possible, that, in studying living material, this is also the case with the other *Stigmaphyllons*) the others fertile; the 3 stamens opposite the styles thicker than the alternating ones; those opposite the posterior styles longer and thicker than the 3rd one. Anthers mostly short and thick, ovate-oblong, glabrous or more or less villose; connectives thick, glanduliform. Filaments glabrous, united at the base, or up to the middle. Ovary 3-lobed, 3-locular, gibbose; styles 3, short, top usually dilated into a claw-like, foot-like, or leaf-like appendage, those of the anterior style symmetrical, of the posterior ones asymmetrical; stigmas at the inner angle, often protruding. Samaras 1—3, attached to a pyramidal, trigonous receptacle, with large, elongated dorsal wings with thick upper (ventral) and thin lower margin. Lateral nut smooth, verrucous or with 1—∞ winglets; endocarp often protruding into the cell. Cotyledons thick, often unequal, plicate, incurved at the top.

Distribution: Species 60, in tropical America, including the West Indies.

1. a. Leaves pinnately nerved. The stamens opposite the anterior style very thick, and longer than those opposite the posterior styles. Wing of the samara elongated-triangular. Cotyledons slightly unequal, corrugate and divided. 1. *S. puberum* (Rich.) Juss.
- b. Leaves palmately nerved. The stamens opposite

the anterior style slightly shorter and thinner than those opposite the posterior styles. Wing oblong-spathulate. Cotyledons entire, not corrugate, flat.

2. a. Leaves membranous, glabrous, ovate-lanceolate; base cordate; top acuminate; margin repand..... 2. **S. convolvulifolium** (Cav.) Juss.
- b. Leaves membranous-chartaceous, orbicular or more or less ovate; base reniform; top rounded, hardly acuminate or apiculate with silvery or bronze-coloured sericeous or tomentose hairs beneath; margin sub-entire with obsolete glands..... 3. **S. fulgens** (Lam.) Juss.

1. **Stigmaphyllon puberum** (Rich.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 289; id. in Arch. Mus. Paris III (1843), p. 376; Miq. in Linnaea 18 (1844), p. 52; Griseb. in Fl. Bras. XII, 1 (1858), p. 39; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 118; Ndz. in Engl., Pfl. reich IV (1928), p. 504, t. 36, f. K, L; Pulle, Enum. Pl. Surin. (1906), p. 470; Small in N.-Amer. Fl. XXV, 2 (1910), p. 144; Fawcett and Rendle, Fl. Jam. IV (1920), p. 237; — *Banisteria pubera* Rich., Cat. Leblond in Act. soc. hist. nat. Paris I (1792), p. 109; — *Banisteria fulgens* G. F. W. Meyer, Prim. Fl. Esseq. (1818), p. 181; — *Hiraea spec.* Miq. in Hostmann pl. Surin. 803a; — *Banisteria Meyeri* Splitg. msc. [L.].

Climbing shrub; young parts covered with golden-yellow, sericeous hairs. Branchlets compressed, sericeous; branches cylindrical, glabrescent, smooth, reddish-green; internodes 5—15 cm long, up to 3 mm in diam. Leaves opposite, entire, membranous, oblong, ovate or lanceolate, up to 16 cm long and 8 cm wide; base rounded or sub-cordate; margin repand; top acuminate. Young leaves sericeous; adult ones above nearly glabrous with hardly prominent nerves, beneath with appressed, mostly golden-yellow sub-sericeous hairs (arms of the hairs 1 mm long); biglandular at the base, midrib strongly prominent, primary nerves prominent, the few secondary ones hardly visible under the hairs. Petioles sericeous, thin, 1—4 cm long.

Stipules intrapetiolar, broad, sericeous, hardly ½ mm long. Peduncle axillary, compressed, sericeous, 7—20 cm long, at the top with 2 lanceolate, sericeous, 3—10 mm long bracts, with 2 large circular glands at the base; inflorescence for the rest as in the genus. Pedicels (the outer ones longest) sericeous, 3—8 mm long, bracteolate a little above the base, bracteate at the base. Bracts and bracteoles ovate-lanceolate, 1 mm long, outside sericeous. Flowers 15—20 mm in diam.; buds globose. Sepals ovate, 2½—3½ mm long, outside sericeous, with 8 ellipsoid or obovoid 1—1½ mm long glands. Petals outside red, inside more yellow (Tresling), glabrous, the 4 exterior galeate or cochleate, already corrugate in bud; base cuneate; margin fringed, 5—10 mm in diam.; the 5th one flattish, orbicular, glandular-fimbriate. Claws 2—3 mm long; the 5th one thick, contracted at the top, 3—4 mm long. The stamens opposite the lateral sepals more or less sterile; the stamen opposite the anterior style very thick, longest (5 mm), those opposite the posterior styles longer than the others; the 3 posterior stamens short and strongly incurved between the posterior styles. Anthers glabrous, elliptical; connectives (especially of the sterile ones) very thick-glandular. Filaments more or less highly united. Ovary hirsute, 1½ mm high; styles rather straight, glabrous, the anterior one slightly longer and thicker (4 mm), with a long-unguiculate, reniform-subcordate leaflet with pendulous, sagittate-acute lobes at the top; the posterior one with a falcate-acute leaflet at the top. Stigmas long-protruding at the inner angle. Samaras sericeous, mostly 2, the 3rd abortive. Nut globose, compressed, without crests; ventral areole ovate, 3 mm high. Dorsal wing dark-red (Tresling), elongated-triangular, 3 cm long, at the base 12 mm wide, at the obtuse top 6—10 mm wide; upper margin thick, straight, with an obtuse appendage at the base, lower margin nearly straight, wavy, arcuate at top and base. Cotyledons fleshy, rather unequal, corrugate and divided.

Distribution: From Costa Rica to Peru; West Indies.

Upper Cottica R. (Focke n. 715, fl. Oct.); Perica-creek (Wulfschlägel n. 1386 and s. n. [B.]); Paramaribo (Wulfschlägel s. n. [B.]; Splitgerber n. 129 [L.], type of *Banisteria Meyeri* Splitg., fl. Nov.); Paulus-creek (Wulfschlägel n. 52 [B.]); Contiano (Soeprata n. 20, fl. July); Slootwijk (Soeprata n. 5H, fl. July); Susannadaal (Soeprata n. 8G, fl. July); Pl. Jordaan (Focke n. 554, fl. Oct.); Pl. La Poule (Samuels n. 176 [D.]); Suriname R. near Koemba falls (Tresling n. 230, fl. July); Saramacca R. (Wulfschlägel n. 52 [B.]); without locality: Hostmann n. 803, 803a [G.] 965, 191; Focke s. n. [L.]; Wulfschlägel s. n. [B.]; Meyer s. n. [G.].

2. *Stigmaphyllon convolvulifolium* (Cav.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 289; id. in Arch. Mus. Paris III (1843), p. 374; Griseb. in Fl. Bras. XII, 1 (1858), p. 38; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 118; Ndz. in Engl., Pfl. reich IV (1928), p. 489, t. 36, f. F; Pulle, Enum. Pl. Surin. (1906), p. 469; Small in N.-Amer. Fl. XXV, 2 (1910), p. 143; — *Banisteria convolvulifolia* Cav., Diss. IX (1790), p. 428, t. 256; — *Banisteria dichotoma* G. F. W. Meyer, Prim. Fl. Esseq. (1818), p. 181; D.C., Prodr. I (1824), p. 588; — *Stigmaphyllon latifolium* Benth. in Lond. Journ. Bot. VII (1848), p. 128; Pulle, Enum., p. 470.

Climbing shrub or liane. Young parts with grey-sericeous hairs. Branchlets compressed, velutinous, soon glabrescent; branches cylindrical, fulvous or reddish, striate, up to 4 mm in diam.; internodes 5–20 cm long. Leaves opposite, palmately nerved, entire, membranous, ovate or ovate-lanceolate, up to 15 cm long and 11 cm wide; base cordate, margin slightly repand, with sessile or ciliiform glands; top acuminate. Young leaves sub-sericeous; adult ones with long-persistent hairs, glabrescent, except along the nerves; nerves not prominent above; beneath midrib and primary nerves prominent, the secondary ones nearly parallel, 3–6 mm from each other, slightly prominent; veins laxly reticulate. Petioles slender, glabrous, 2–7 cm long, with 2 large glands at the top. Stipules very small, soon deciduous. Peduncles compressed,

puberulous, up to 10 cm long, with 2 ovate, acute, 3 mm long bracts with large circular glands at the top; the branches up to 7 cm long; inflorescences for the rest as in the genus. Pedicels sericeous, becoming thicker towards the top, 3–15 mm long (the outer ones longest), articulate and bracteolate at or above the middle, bracteate at the base. Bracts ovate-lanceolate, acute; bracteoles ovate, acute, outside sericeous, 1–1½ mm long. Flowers 2–3 cm in diam.; buds globose. Sepals outside sericeous, orbicular-ovate, 2–3½ mm long, the 4 lateral ones with 8 ellipsoid, 1–1½ mm long glands. Petals outside yellow, inside more reddish (Versteeg) with irregular dots at the margins, glabrous; limb orbicular, 8–12 mm in diam. (5th one 5–7 mm) with fringed margin, the 4 lateral ones concave. Claws recurved, 2–3 mm long, the 5th one with contracted top, 3–4 mm long. The 4 stamens opposite the lateral sepals more or less sterile; the 3 stamens opposite the styles thicker and longer than the others (2 mm), the stamen opposite the anterior style slightly shorter and thinner than the other 2. Anthers glabrous, elliptical, connectives (especially of the sterile ones) very thick, glandular, sub-globose. Filaments glabrous, more or less highly connate. Ovary hirsute; styles 3, 2½ mm long, hirsute at the base or higher up, the anterior style with a symmetrical, horizontal, reniform, plicate, 1 mm long leaflet at the top, the slightly curved posterior ones with an asymmetrical, semi-reniform, 1 mm long, pendulous leaflet at the top; stigmas long-protruding at the inner angles. Samaras 2, 3rd one abortive, with green, sericeous nut and red, glabrous wing. Nut obovoid-cylindrical, 3 mm high, radially crested, the crests enlarging to winglets at the top; ventral areole obovate, slightly concave, 3 mm high. Dorsal wing spathulate, nearly erect, 3–5 cm long, up to 1½ cm wide; upper margin thick, straight, rounded at the top, with an obtuse, 4 mm high appendage at the base; lower margin thin, curved, wavy at the top. Cotyledons oblong-ovate, flat, nearly equal, entire, replicate.

Distribution: Northern Brazil, Guiana, Venezuela, West Indies.

Marowijne R. near Armina falls (Lanjouw n. 528, fl. Aug.); upper Marowijne R. (Kappler ed. Hohenack, n. 1899 [L.], s. n., fl. Aug.); Tapanahoni R. (Versteeg n. 861, fl. and fr. Sept.); Gonini R. (Versteeg n. 47, fl. and fr. Aug.); Paramaribo (Wulfschlägel n. 914 [B.] and s. n. [B.]; coll. indig. n. 155; Kegel n. 126 [G.], fl. July); Suriname R. near Waktibasoe (Tresling n. 35, fl. July), near Petodam falls Tresling n. 364, fl. Aug.); Sara-creek, Dam (B.W. n. 3449, fl. Dec.); Coppename R. (Boon n. 1104, fl. and fr. Sept.; n. 1048, fl. and fr. Aug.); locality unknown: Essed n. 35a, fl. Febr.; Hostmann n. 146, type of *S. latifolium* Benth. n. 706 [L.], s. n. [L.]; Meyer n. 170 [G.], type of *Banisteria dichotoma* G. F. W. Meyer.

Vernacular names: Koni koni réré; koni koni cassaba rerei; koni koni cassava; Konijnen cassave (S.D.).

3. *Stigmaphyllon fulgens* (Lam.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 289; id. in Arch. Mus. Paris III (1843), p. 370; Griseb. in Fl. Bras. XII, 1 (1858), p. 39; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 118; Ndz. in Engl., Pfl. reich IV (1928), p. 492; Pulle, Enum. Pl. Surin. (1906), p. 470; — *Banisteria fulgens* Lam., Enc. Bot. I (1783), p. 368; Cav., Diss. IX (1790), p. 426, t. 253; — *Banisteria splendens* D.C., Prodr. I (1824), p. 588; — *Stigmaphyllon hypoleucum* Miq. in Linnaea XVIII (1844), p. 51.

Climbing shrub or liane. Young parts sericeous-tomentose. Branchlets compressed, grey-sericeous-tomentose; branches cylindrical, with long-persistent hairs, glabrescent, fulvous, reddish or grey, striate; internodes 5–20 cm long. Leaves opposite, entire, membranous or chartaceous, orbicular or ovate, up to 17 cm long and wide; base reniform or more or less cordate; margin repand, coarsely crenate or sub-entire, with sessile, obsolete glands; top rounded, shortly acuminate or apiculate; palmate at the base, penninerved at the top. Young leaves sericeous; adult ones rather glabrous above, with hardly prominent nerves; beneath with silvery or bronze, short, very

dense, sericeous hairs, midrib and primary nerves prominent, the few secondary ones 3–4 mm from each other, nearly parallel, not prominent. Petioles thick, sericeous, up to 7 cm long, with 2 large, patelliform, sessile glands at the top. Stipules interpetiolar, very broad, emarginate, hardly 1 mm long, glabrous. Peduncles puberulous, compressed, up to 18 cm long, with 2 orbicular, acute, 1½ mm long bracts with 2 large globose glands at the top. Inflorescences for the rest as in the genus. Pedicels sericeous, becoming thicker towards the top, 7–12 mm long, jointed, swollen and bracteolate at the middle, bracteate at the base. Bracts and bracteoles ovate, acute, outside sericeous, 1 mm long. Flowers 15–17 mm in diam.; buds globose. Sepals ovate, acutish, 2–3½ mm long, outside sericeous, the 4 lateral ones with 8 yellow, ellipsoid, 1–1½ mm long glands. Petals terra-cotta, with yellow spot in the middle (Lanjouw), glabrous, obovate or sub-orbicular, already corrugate in bud, the 4 lateral ones concave, 6–7 mm in diam. with toothed margins; claws slender, 1–2 mm long, of the 5th one 2–3 mm long. The 4 stamens opposite the lateral sepals sterile; the 3 stamens opposite the styles thicker and longer than the others (3 mm), the stamen opposite the anterior style slightly shorter and thinner than the other 2. Filaments glabrous, more or less highly united. Anthers glabrous, elliptical, with very thick (especially those of the sterile ones) sub-globose, glandular connectives. Ovary sericeous, 1½ mm high; styles 3, glabrous, 3 mm long with long-protruding stigmas at the inner angles; the anterior one straight and thinner than the others with a symmetrical, horizontal, unguiculate, obcordate, plicate leaflet at the top; the posterior ones sigmoid with an asymmetrical, pendulous, semi-reniform leaflet. Samaras 2, 3rd one abortive, red, puberulous. Nut semi-globose, 4–6 mm high with a lacerate, 1–3 mm high crest at each side, parallel to the dorsal wing; ventral areole ovate, acute, 3 mm high. Dorsal wing oblong-spathulate, sub-erect, up to 4½ cm

long, and 1½ cm wide, slightly contracted above the broad base, wine-red (Lanjouw); upper margin thick, straight, with rounded top, with an obtuse or rounded, 1—3 mm high appendage at the base; lower margin thin, arcuate, wavy. Cotyledons fleshy, unequal, the small one plicate at the top, the larger one replicate.

Distribution: Northern Brazil, Guiana, Venezuela, West Indies.

Upper Cottica R. (Focke n. 683, fl. Oct., type of *S. hypoleucum* Miq.); Charlottenburg (Hostmann & Kappler n. 696 [D.]); Pl. Voorburg (Wulfschlägel n. 53 [B.]); Pl. Republiek (Gonggrijp n. 49, fl. and fr. Sept.); savannah near Republiek (Kuyper n. 12, fl. Oct.); Sectie O (B.W. n. 5861, fl. and fr. June); Suriname R. near Kabelstation (Lanjouw n. 1325, fl. and fr. Nov.; n. 1185, fl. Nov.); upper Suriname R. near Goddo (Stahel n. 146, fl. Jan.); lower Saramacca R. near Mindrinetti (Pulle n. 34, fr. Nov.); Saramacca R. (Wulfschlägel n. 53 [B.]); Donder-creek (B.W. n. 831, fl. Jan.); without locality: Hostmann n. 1029; coll. unknown, comm. Miq. s. n. [G.].

Vernacular names: Akoeli kjejeré (Car.); Kalia (Arow.); Faja Djon; Konijnen-kassave (S.D.).

9. BRACHYPTERYS Juss.

Litoral, erect shrubs or woody vines. Leaves opposite, entire, petioled, thick-membranous or chartaceous, pinnatinerved. Top of the petiole or base of the midrib with 2 glands. Stipules minute. Flowers solitary or in peduncled, umbel-like corymbs. Bracts large. Flowers yellow. Sepals 5, persistent, with 8 glands. Petals unguiculate, unequal. Stamens 10, more or less fertile. Filaments united at the base. Anthers without appendages; connectives large. Ovary 3-locular. Styles 3, divaricate; top ending in a leaf-like appendage or claw. Fruit with 1—3 cocci. Cocci sub-globose with a small dorsal winglet or crest. Cotyledons unequal, the large, conduplicate one embedding the hardly conspicuous other one.

Distribution: Species 2, in tropical America and West Indies.

1. **Brachypterys ovata** (Cav.) Small in N.-Amer. Fl. XXV, 2 (1910), p. 138; Fawcett and Rendle, Fl. Jam. IV (1920), p. 235; — *Banisteria ovata* Cav., Diss. IX (1790), p. 429, t. 257; D.C., Prodr. I (1824), p. 590; — *Banisteria picta* Kunth, Nov. gen. et spec. V (1821), p. 124 (col. ed.); — *Banisteria brachyptera* D.C. l. c., p. 591; — *Brachypterys borealis* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 291; id. in Arch. Mus. Paris III (1843), p. 356, t. XI, f. 16; Griseb. in Fl. Bras. XII, 1 (1858), p. 35; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 117; Miq. in Linnaea 18 (1844), p. 51; — *Stigmatophyllum ovatum* (Cav.) Ndz. in Ind. lect. Lyc. Braunsb. (1900), p. 31; id. in Engl., Pfl. reich IV (1928), p. 515, t. 38, f. A—D; Pulle, Enum. Pl. Surin. (1906), p. 470.

Shrub, with erect, climbing or pendulous, slender branches. Branchlets compressed, canaliculate, as all the young parts with grey, very short, sericeous hairs; branches nearly cylindrical, smooth, greyish or brownish, striate, up to 5 mm in diam.; internodes 2—6(—15) cm long. Leaves opposite, entire, chartaceous, pinnately nerved, ovate, lanceolate-ovate or lanceolate, 4—11 cm long, 2—5 cm wide; base rounded, acute or cuneate; margin flat; top acute or slightly obtuse. Young leaves sericeous; adult ones glabrous, green above, the nerves not prominent; beneath with persistent, glaucous, soft, lanuginose-sericeous hairs, the midrib strongly prominent with 2 glands at the base; the primary nerves hardly prominent, the few secondary ones laxly reticulate, not prominent. Stipules interpetiolar, very small. Petioles nearly glabrous, slender, canaliculate above, 1—1½ cm long. Pseudo-umbels, 2—8-flowered, shortly stalked and enveloped by 2 orbicular-ovate or orbicular leaves, 1—4 cm in diam., with 2—5 mm long pedicels, at the end of a compressed, axillary, puberulous, up to 7 cm long peduncle; stalk of the umbel slender, now and then dichotomous. Pedicels glabrous, slender, thickened towards the top, 1½—3 cm long, bracteate at the base, and bibracteolate somewhat above the base. Bracts and bracteoles ovate, acute, outside sericeous,

1 mm long. Flowers 2—3½ cm in diam.; buds globose. Sepals outside glabrous, ovate, 3—4 mm long, margin ciliate, with 8 oblong, 2½—3 mm long glands. Petals yellow, unequal, flat, sub-orbicular, 7—13 mm in diam., with cuneate base; claws slender, 2—4 mm long. Stamens all fertile, 4 of them somewhat reduced; the 3 stamens opposite the styles longer and thicker than the others (5 mm), the stamen opposite the anterior style slightly shorter than the other 2. Anthers glabrous, elliptical, with thick, glanduliform connectives; filaments glabrous, broad, rather highly united at the base. Ovary sericeous, 2 mm high, deeply 3-sulcate; styles 3, equal, straight, glabrous, 3 mm long, attached to the ventral side of the carpids, top with a long, dorsal, slightly curved, compressed claw, stigmas protruding at the inner angle. Fruit mostly dicoccous (one abortive), cocci nutlike, puberulous, green, attached to a very high, pyramidal torus. Nut sub-globose, 1 cm in diam., with warty ridges at the sides; dorsal winglet acute, triangular, thick, 3—5 mm high; ventral areole circular, 6 mm in diam. One cotyledon reduced, 1½—2 mm long, embedded in the large, fleshy, 14 mm long other one.

Distribution: Coast vegetation of South America and the West Indies.

Cottica R., Matappica-creek (Focke n. 275, fl. Dec.); lower Commewijne R., Nijl en Spijt (Tulleken n. 136 [L.], fl. Sept.); Paramaribo (Wulfschlägel n. 51 [B.]; Tulleken n. 19 [L.], fl. and fr. July, n. 136 [L.]); Wolfenbittel (Went n. 5, fl. July); Sloopwijk (Soeprata n. 8H, fl. July; n. 21J, fl. July); Tourtonne straat (Soeprata n. 6B, fl. June); Tourtonne-land-creek (Soeprata n. 2B, fr. June); Combé (Went n. 337, fr. and fl. Oct.); Combéweg (Went n. 569, fl. Jan.); Zanderij I (Samuels n. 520 [D.]); Suriname R. (Splitgerber n. 12 [L.], type of *Banisteria riparia* Splitg. msc.); Para district (Kuyper n. 24, fl. Dec.; Versteeg n. 465, fl. June); W-Coronie, swamp (Lanjouw n. 1071, fl. Oct.); Side-creek of Corantijne R. near Nw-Nickerie on salty clay (Lanjouw n. 644, fl. Aug.); locality unknown: Menge n. 51, ex. reliq. Wulfschlägel [B.]; Hostmann ed. Kappl. n. 278 [D.]; Hostmann n. 278 [L.], s. n. [L., U.]; Stabel s. n.; Obermüller s. n. [L.]; Eyken-Sluiters n. 10D [L.].

10. SPACHEA Juss.

Trees or scandent shrubs. Young parts rufous-, or rusty-hirsute, rather soon glabrescent. Leaves opposite, entire, petioled, thin, soon glabrous, usually white-punctulate or glandular beneath. Stipules united, intrapetiolar. Short, terminal, rusty-pilose, many-flowered pseudo-racemes, with pendulous flowers; often 1—3 flowers on minute bracteate peduncles. Pedicels bibracteolate at the base, one of the bracteoles dorsally with a terminal, oblique gland. Sepals 5, broad, persistent, not accrescent, 4 of them, rarely all, biglandular. Petals 5, longer than the sepals, unguiculate, broad, glabrous, entire or toothed, red or pink. Stamens 10, sometimes 1—4 of them abortive. Filaments glabrous, united at the base into a hirsute ring; anthers glabrous, without appendages. Ovary 2—3-lobed, 2—3-locular, glabrous. Styles 2 or 3, short, truncate, stigma truncate or bilobed. Fruit attached to a flat or concave torus, consisting of 2 or 3 smooth, bony, not dehiscent cocci. Seeds sub-globose; testa membranous.

Distribution: Species 4 in tropical South America, including the West Indies

1. *Spachea elegans* (G. F. W. Meyer) Juss. in Deless., Icon. III (1837), p. 19, t. 31; id. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 326; id. in Arch. Mus. Par. III (1843), p. 326, t. VIII, f. 9; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 116; Pulle, Enum. Pl. Surin. (1906), p. 470; Ndz. in Engl., Pfl. reich IV (1928), p. 586, t. 42, f. K; — *Spachea elegans* (G. F. W. Meyer) Juss., var. *oblonga* Ndz. in Arb. Bot. Inst. Braunsb. V (1914), p. 18; id. in Engl., Pfl. reich l. c., p. 587; — *Malpighia elegans* G. F. W. Meyer, Prim. Fl. Esseq. (1818), p. 178; — *Byrsonima elegans* D.C., Prodr. I (1824), p. 580; — *Spachea ossana* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 326; id. in Arch. Mus. Par. III (1843), p. 327, t. VIII, f. 9; Small in N.-Amer. Fl. XXV, 2 (1910), p. 150; — *Byrsonima Herbert-Smithii* Rusby, Descr. of Amer. Pl. (1920), p. 37.

Tree or shrub, 3—13 m high. Young parts and inflorescences rufous-hirsute. Branchlets glabrescent, rufous, 1—2 mm in diam.; branches grey, canaliculate, with few, tuberculate lenticels, $3\frac{1}{2}$ mm in diam.; internodes $\frac{1}{2}$ —4 cm long. Leaves membranous-chartaceous, oblong or elliptical-oblong, up to 20 cm long, 3—7½ cm wide; base acute; top acuminate or mucronate. Young leaves rusty-sericeous, soon glabrous, except midrib beneath; adult ones rather smooth with prominent midrib beneath, primary (7—10 on each side) and secondary nerves slightly prominent and densely reticulate on both surfaces; lower surface punctulate, with 2 large, orbicular glands at the base. Petioles puberulous, up to 1 cm long. Stipules sericeous, 3—4 mm long, leaving an annular scar. Terminal, rusty-hirsute, up to 50-flowered, up to 15 cm long pseudo-racemes; flower-bearing peduncles patent, 1 mm long. Pedicels reflexed when flowering, when fruiting erect, sericeous, 5—8 mm long, bibracteolate at the base. Bracts triangular-acute or subulate, persistent, sericeous, 2—10 mm long; the glandless bracteoles subulate with ovate base, 2—4 mm long, the others partly transformed into a large gland. Flowers 1—1½ cm in diam. Sepals elliptical or orbicular, 3—5½ mm long, outside glabrous, except at the base; margin ciliate with 8—10, often 1 or 2 pairs united, thick, ellipsoid or oblong, 2—4 mm long glands with free and often recurved tops. Petals pink, fleshy, usually reflexed; limb orbicular, or ovate-or obovate-orbicular, 3—4 mm long, glabrous, with fringed margin; claws 2—3½ mm long. Stamens nearly equal, filaments thick, glabrous, the bases united into a hirsute ring; anthers elliptical, glabrous, $\frac{3}{4}$ —1½ mm long. Carpids 2, slightly united, 1½ mm high, ellipsoid-ovoid, glabrous; styles 2, sigmoid-patent, thick, glabrous, 1½ mm long. Fruit dehiscent into 2 glabrous, whitish-green, areolate, semi-ovoid nuts. Embryo incurved; cotyledons plicate.

Distribution: Guiana, Trinidad, St. Vincent.

Commewijne R. near Pl. Waiampibo (Splitgerber n. 510

[L.], fl. Jan.); upper Saramacca R. near Janbasigado (Pulle n. 160, fl. Jan.); Coppename R., Raleigh falls (Lanjouw n. 966, fr. Sept.); Kabalebo R., Kabori, tree 690 (B.W. n. 5948, fl. July; n. 4935, ster. Dec.); without locality: Kegel n. 254 [D.].

var. **obovata** Ndz. in Arb. Bot. Inst. Braunsb. V (1914), p. 18; id. in Engl. l. c., p. 587.

Leaves oblanceolate, obovate; base acute; with mostly short obtuse acumen; up to 14 cm long, and 7 cm wide. Gland not larger than the bracteole.

Distribution: Guiana, Amazonian district.

Locality unknown: Leschenault (ex Niedenzu); Hostmann n. 57 [D.], n. 1043 (named *Byrsonima densa* by Steudel) and s. n.

11. MALPIGHIA Linn.

Low trees, shrubs or shrublets. Leaves opposite, entire or spiny-toothed, usually petiolate, coriaceous, chartaceous or membranous, glandless, glabrous, softly or coarsely pubescent (with sometimes stinging hairs). Stipules slender, inconspicuous, deciduous. Flowers in axillary and terminal, many-flowered corymbs or umbels, rarely solitary. Pedicels bibracteolate in the middle or at $\frac{1}{4}$ from the base. Bracteoles small, glandless. Flowers zygomorphous. Sepals 5, persistent, not accrescent, with 6—10 large, sessile glands; the 6 posterior glands equal, more or less longer than the 0—4 anterior ones. Petals 5, orbicular, concave, unguiculate, glabrous, red, pink or white; the 2 anterior ones (exterior in bud) at the base only, the intermediate ones up to the middle or higher, the fifth, posterior one, along the whole margin toothed or ciliate, or sometimes with very long fringes; the anterior and intermediate ones oblique, with broad, toothed, ciliate or fringed anterior part, posterior part small, with entire margin. Stamens 10, all fertile, glabrous, slightly incurved or recurved, the epipetalous shorter than the alternating ones, but those opposite the 2 intermediate

petals always thicker; filaments rather long, united as far as the middle, or at the base only; anthers ovate, sub-cordate; connectives usually inconspicuous. Ovary 3-lobed, 3-locular, glabrous; styles 3 (or less), always free, with oblique, obtuse or dilated top with stigmas at the inner angle; the posterior styles equal, the anterior one shorter. Drupes globose, thick-fleshy, attached to a flat or concave torus, with 3 pyrenes; pyrenes 3—5-crested, often transversally ribbed. Endocarp bony, seeds ovoid, cotyledons nearly straight or shortly uncinata, radicle short.

Distribution: Species about 36, in tropical America, including the West Indies.

1. a. Leaves membranous or chartaceous, elliptical-, linear-, or obovate-oblong; margin entire. The 2 stamens opposite the intermediate petals not longer than the next ones. Tops of the styles obtuse or swollen or more or less uncinata 1. *M. puniceifolia* L.
- b. Leaves rigid-coriaceous, orbicular or elliptical; margin with large teeth, ending in coarse spines. Anthers of the 2 stamens opposite the intermediate petals thicker, and with more curved filaments than the next ones. Tops of the styles oblique-pediform, uncinata 2. *M. coccigera* L.

1. *Malpighia puniceifolia* L., Spec. Pl. ed. II, 1 (1762), p. 609; D.C., Prodr. I (1824), p. 578; Juss. in Arch. Mus. Par. III (1843), p. 264, t. 4; Griseb. in Fl. Bras. XII, 1 (1858), p. 31; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 116; Ndz. in Engl., Pfl. reich IV (1928), p. 622; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 156; Fawcett and Rendle, Fl. Jam. IV (1920), p. 226; — *M. puniceifolia* L., var. *vulgaris* Ndz. in Ind. lect. Lyc. Braunsb. (1899), p. 8; id. in Engl. l. c., p. 623.

Shrub or tree, 2—5 m high. Branches becoming spiniform, dark-grey, striate, with few, orbicular, tuberculate lenticels; internodes $\frac{1}{2}$ —3 cm long. Leaves entire, crowded, membranous or chartaceous, elliptical- or obovate-oblong or lanceolate-

oblong, with obtuse top; up to 7 cm long, 2—3 cm wide; base acute or obtuse. Young leaves sericeous with thin or pungent hairs (arms of the hairs 1—2½ mm long), very soon glabrescent. Adult leaves with prominent midrib, hardly prominent primary nerves above, inconspicuous beneath, veins indistinct. Petioles glabrous, 2—4 mm long. Corymbs or umbels 1—6-flowered, with short, 1—10 mm long peduncle, or sessile. Pedicels sericeous, 6—15 mm long, bibracteolate below the middle. Bracts and bracteoles lanceolate, sericeous, 1—1½, resp. ½—1 mm long. Flowers 1½ cm in diam.; buds sub-globose, 4 mm high. Sepals ovate, 2½—3 mm long, outside sericeous, 2 sepals with 2, the next ones with 1 ellipsoid, 2 mm long gland, the 5th sepal glandless. Petals pink or violet, sub-orbicular, the 4 anterior broadly elliptical with hastate base, the 5th one fan-shaped, with cuneate base, already corrugate when flowering and hence looking smaller. The 5th petal fringed along the whole margin, the others at the base only. The 2 posterior epipetalous stamens much larger than the others and somewhat larger than the episepalous ones. Filaments (2 excepted) filiform, united at base; anthers elliptical. Ovary ovoid, glabrous; styles 3, the posterior ones longer and thicker than the anterior one, tops obtuse or swollen (in var. *obovata* more or less uncinata); stigmas at the inner angle. Drupe red, broadly ovoid or sub-globose, slightly sulcate, 10—16 mm high, with obtuse base. Pyrenes 3-crested; crests thin, 1½—3 mm high, the interspaces with transverse, muricate ridges.

Distribution: Northern South America as far as Panama, West Indies. Cultivated.

var. *obovata* Ndz. in Ind. lect. Lyc. Braunsb. (1899), p. 8; id. in Engl. l. c., p. 623.

Leaves obovate or ovate. Umbels 1—4-flowered. Top of the styles uncinata, compressed.

Paramaribo near Tourtonne straat (Soeprata n. 3B, fl. June; Wulfschlägel s. n. [B.]); locality unknown: Splitgerber n. 482 [L.]; Pulle n. H. 39; Wulfschlägel n. 76 p. p. [B.], 913 [B.].

Vernacular name: Kersenboom (S.D.).

2. *Malpighia coccigera* Linn. Spec. Pl. I (1753), p. 426, n. 6; Jacq., Ic. (1776—1783) t. 470; Bot. Reg. VII (1821), t. 568; Juss. in Arch. Mus. Par. III (1843), p. 336; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 117; Duss., Fl. Antill. (1897), p. 114; Small in N.-Americ. Fl. XXV, 2 (1910), p. 160; Fawcett and Rendle, Fl. Jam. IV (1920), p. 229; Ndz. in Engl., Pfl. reich IV (1928), p. 636, t. 44, f. K, L; — *Malpighia coccifera* Cav., Diss. VIII (1789), p. 408, t. 235, f. 2; — *M. heteranthera* R. Wight, Ill. Ind. Bot. I (1831), t. 49.

Climbing, creeping or erect shrub, or treelet. Branchlets thin, 1—2 mm in diam., flexible, dark, scabrous; branches thin, 2—3 mm in diam., glabrous, grey with verrucous lenticels; internodes $\frac{1}{2}$ —2 cm long. Leaves rigid-coriaceous, orbicular, elliptical, varying to ovate or obovate; base rounded or subcordate; top rounded or emarginate-tricuspidate; 1—3 cm long, $\frac{1}{2}$ —2 cm wide; margin recurved, quite entire in the younger leaflets, in the older ones with large, distant teeth, ending in coarse, 1—2 mm long spines. Young leaves very soon glabrescent; adult ones glabrous, deepgreen, shining above, with slightly prominent midrib, primary nerves (3—8 on each side) and laxly reticulate secondary ones; beneath less shining, with less prominent nerves. Petioles very short, thick or wanting. Stipules lanceolate, 1—2 mm long. Flowers in axillary, 2-flowered umbels, or mostly solitary. Pedicels slender, glabrous, reddish-green, 1—2 cm long, bracteate at the base, jointed $\frac{1}{3}$ — $\frac{1}{2}$ from the base, somewhat below the joint bibracteolate. Bracts and bracteoles ovate, obtuse, $\frac{1}{2}$ —1 mm long, outside and membranous margin hirsute. Flowers 1—2 $\frac{1}{2}$ cm in diam.; buds sub-globose, 3 mm in diam. Sepals ovate or oblong, erect, glabrous (except below the glands), greenish; margin whitish;

2—4 mm long, $\frac{1}{2}$ —1 mm wide, one glandless, the 2 next ones each with 1 gland, the remaining ones with 2 glands; glands oblong, erect, green, shining, 2—2 $\frac{1}{2}$ mm long, with free tops. Petals pink or whitish, scentless, membranous, glabrous, unequal; limb of the largest petal orbicular, 6—10 mm long with cuneate base; margin fringed; the smallest petal with cordate base, 4—4 $\frac{1}{2}$ mm long, the next ones oblique, fimbriate at one side; the 2 petals opposite the glandless sepal approximate. Claws long, narrow, 1 $\frac{1}{2}$ —5 mm long. Stamens glabrous, the 2 opposite the larger styles extrorsely convex, larger than the others (3—5 mm); the 3 stamens opposite the glandless sepal smallest (1—1 $\frac{1}{2}$ mm); of the larger 3 opposite them the middle one straight, the outer ones recurved. Anthers oblong, $\frac{1}{2}$ —1 $\frac{1}{2}$ mm long. Ovary 3-sulcate, green, shining, 1 mm long; styles 3, the larger ones incurved, 3 $\frac{1}{2}$ —4 $\frac{1}{2}$ mm long, the 3rd one thinner, slightly curved, 1 $\frac{1}{2}$ —2 mm long; tops oblique, pediform, uncinat; stigmas at the inner angle. Drupe sub-globose, red, 1 cm in diam., 3-, or by abortion 2-furrowed. Exocarp thin, endocarp membranous, dorsally ribbed.

Distribution: West Indies; cultivated in the Tropics.

var. *microphylla* Ndz. in Ind. lect. Lyc. Braunsb. (1899), p. 19; id. in Engl. l. c., p. 636.

Leaves generally $\frac{3}{4}$ cm long, $\frac{1}{2}$ cm wide, the larger one orbicular, 1 cm in diam. Flowers 12—15 mm in diam.

Locality unknown: Menge-Wulfschlägel s. n. [B.].

12. BUNCHOSIA L. C. Rich. ex A. L. de Juss.

Low trees or shrubs. Young parts either sericeous (feet of the hairs short and slender) or more or less hispid, or tomentose (feet of the hairs rather long and thick). Leaves opposite, entire, petioled, usually thickish, glabrous or scarcely or densely pubescent, often with glands. Stipules interpetiolar, distinct or united, acute, more or less linear-lanceolate, hardly 1—2 mm

long. Racemes axillary, elongated, usually many-flowered. Pedicels bibracteolate at or above the base, one of them usually with a large, dorsal or slightly lateral, orbicular, decurrent gland. Sepals 5, persistent, bigandular, often 2 or 4 pairwise united, hardly accrescent. Petals 5, unguiculate, orbicular-reniform, limb reflexed, glabrous, toothed or undulate. Stamens 10, all fertile; filaments united at the base, glabrous, anthers glabrous; connectives usually inconspicuous. Ovary 2—3-locular, glabrous or sericeous. Styles 2—3, free or more or less united; stigmas oblique-capitellate. Drupe attached to a flat or slightly concave torus, ovoid, globose or reniform, yellow, red or brown, with 2—3 pyrenes, without crests. Cotyledons straight or slightly uncinat, flat-convex.

Distribution: Species about 50, in tropical continental America and the West Indies.

1. a. Leaves membranous, above more puberulous than beneath; top acuminate; 6—14 very small glands along the basal margin. The 5th petal (and often one of the others) somewhat glandular at the base; margin lacerate-toothed. Ovary sericeous 1. **B. glandulifera** (Jacq.) Kunth
- b. Leaves chartaceous or coriaceous, glabrous; top with acute or blunt, rather long acumen; 2 glandular dots beneath at the base, or glands wanting. All petals with glands along the whole margin. Ovary glabrous. 2. **B. nitida** (Jacq.) L. C. Rich.

1. **Bunchosia glandulifera** (Jacq.) Kunth, Nov. gen. V (1821), p. 119 (coll. ed.); D.C., Prodr. I (1824), p. 581; Juss. in Ann. sc. nat. 2e sér. Bot. (1840), p. 324; id. in Arch. Mus. III (1843), p. 338; Ndz. in Engl., Pfl. reich IV (1928), p. 652, t. 45, f. A, K; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 162; — *Malpighia glandulifera* Jacq., Collect. IV (1790), p. 207, V, p. 5, f. 3; — *Malpighia glandulosa* Jacq. Icon. rar. III (1786), p. 469; — *Bunchosia hypoleuca* Miq., Stirp. Surin. (1850), p. 77.

Shrub or tree. Young parts more or less sericeous (arms of the hairs 500 μ long, 40 μ thick; wall 1 μ thick; straight; feet nearly wanting). Branchlets glaucescent, compressed, slightly sericeous; branches glabrous, grey, cylindrical, with many prominent, orbicular or elliptical, white lenticels; internodes 1—5 cm long, up to $\frac{1}{2}$ cm in diam. Leaves membranous, broadly ovate or obovate or elliptical, 4—19 cm long, 3—11 cm wide, base obtuse or rounded; margin revolute; top acuminate. Young leaves sericeous; adult ones glaucescent, above with few hairs, nerves impressed, beneath sparingly grey-sericeous, midrib strongly prominent, primary nerves slightly prominent, the few secondary ones lax-reticulate; 6—14 glandular dots in a row, 1 cm from the margin. Petioles thin, slightly sericeous, broadly canaliculate above, 4—10 mm long. Stipules acute, sericeous, 1—2 mm long. Racemes axillary, erect, 4—11 cm long, with thick (1—3 mm in diam.) slightly sericeous rachis, thickening towards the insertion of each pedicel. Peduncle 3—4½ cm long, naked or with reduced leaves. Pedicels 5—13 mm long, sericeous, bibracteolate at or slightly below the middle, bracteate at the base, thickening towards the top. Bracts lanceolate, acute (upper ones ovate, acute), outside sericeous, 2—6 mm long. Bracteoles ovate, sericeous, 1—1½ mm long, both, or one of them with a large gland. Flowers 15—18 mm in diam. Sepals ovate, 3½—5 mm long, outside nearly glabrous, margin ciliate; with 8—9 obovate or oblong, 2—4 mm long glands (the united ones often longer). Petals yellow, glabrous, nearly equal, concave, ovate, obovate or sub-orbicular, 4—8 mm long, base decurrent, margin lacerate; claws recurved, 3—4 mm long. The 5th petal glandular at the base (often also one of the others). Stamens exserted, the episepalous ones slightly longer, (3½ mm). Filaments broad, glabrous, up to $\frac{1}{3}$ united. Anthers elliptical, glabrous, conspicuously protruding beyond the base of the yellow, semi-globose connectives. Ovary sericeous, ovoid-oblong, slightly compressed, 2 mm high, 2-celled. Style 1,

exserted, sericeous, thick, cylindrical, 3 mm long, with 2 polygonous, peltate stigmas. Drupe ovate, glabrous, fleshy, outside yellowish, inside scarlet, up to 2 cm in diam.

Distribution: Northwestern South America, Guiana, West Indies.

Paramaribo (Splitgerber n. 998 [L.], fl. May, named *Bunchosia glauca* Splitg.); Wilhelmina mountains (B.W. n. 7145, fl. June); without locality: Focke n. 1258, type of *B. hypoleuca* Miq.; Wulfschlägel n. 1901 [D.]; Blochmann [D.].

2. **Bunchosia nitida** (Jacq.) L. C. Rich. ex A. L. de Juss. in Ann. Mus. XVIII (1811), p. 481; D.C., Prodr. I (1824), p. 329; Juss. in Arch. Mus. Paris III (1843), p. 336; Ndz. in Engl., Pfl. reich IV (1928), p. 657, t. 3, f. P; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Americ. Fl. XV, 2 (1910), p. 163; — *Malpighia nitida* Jacq., Enum. Pl. Carib. (1760), p. 21; Cav., Diss. VIII (1789), p. 411, t. 239, f. 1.

Shrub. Very young parts with few, appressed, sericeous hairs. Hairs compass-needle-shaped, 300 μ long, 30–45 μ in diam., wall 1 μ thick, feet nearly wanting. Branchlets slender, nearly cylindrical, glabrous, greyish or brownish; branches grey or dark-brown, 3–5 mm in diam. with many orbicular or at last transverse, linear, small lenticels; internodes 1–7 cm long. Leaves chartaceous or coriaceous, elliptical or oblong, to ovate-lanceolate or oblong-lanceolate, up to 17 cm long, 7 cm wide; base acute or narrowed; margin recurved; top with rather long acute or blunt acumen, or obtuse. Young leaves very soon glabrescent; adult ones glabrous, green and shining on both surfaces, above smooth, beneath midrib prominent, primary nerves (4–9 on each side) slightly prominent, veins densely reticulate; on each side of the midrib at the base a glandular dot or glands wanting. Petioles slender, glabrous, 4–14 mm long. Stipules distinct, small, glabrous, triangular. Racemes axillary, simple (or more or less paniculate), many-flowered, oblique-erect, up to 10 cm long. Rachis thickish, compressed,

pubescent; peduncle 1–3 cm long. Pedicels thickish, pubescent, 4–13 mm long, bibracteolate at $\frac{1}{3}$ – $\frac{1}{2}$ of the length, bracteate at the base. Lower bracts lanceolate, sparingly haired, $1\frac{1}{2}$ –3 mm long, upper ones ovate-lanceolate or ovate, smaller. Bracteoles broadly ovate, acute, 1 mm long, generally one of them with a very large gland at the base, the other with a small gland, or glandless. Flowers 12–17 mm in diam.; buds ovoid, 4–5 mm long. Sepals not accrescent, glabrous, ovate to oblong, 4–5 mm long, margin ciliate, with 8 or 7, obovate, obovate-oblong or oblong glands, the united ones trapezoid or obcordate, $1\frac{1}{2}$ –3 mm long. Petals white, glabrous, membranous, orbicular, ovate or obovate, 4–8 mm long, the whole margin usually glandular-toothed; claws rather straight, 3–4 mm long, the 5th one thicker. Stamens glabrous, exserted, nearly equal. Filaments thin, up to $\frac{1}{3}$ united, 2–3 mm long. Anthers sub-globose, $\frac{1}{2}$ mm long, cells long-protruding beyond the base of the semi-globose, yellow connectives. Ovary glabrous, ovoid, 2-lobed, 2-celled. Styles 2, glabrous, partly or entirely conglutinate, 2 mm long. Stigmas distinct, capitellate or disc-shaped. Drupe globose, 2-lobed, yellow or reddish, 13–16 mm in diam.

Distribution: Northern South America, West Indies.

Lower Suriname R. near Pl. Jagtlust (Splitgerber n. 401, [L.], fl. Dec.).

13. **BYRSONIMA** L. C. Rich. ex A. L. de Juss.

Shrubs, shrublets, often scandent, or low trees, rarely (B. coriacea and B. Aerugo) high trees. Young parts sericeous or tomentose, with forked, antler-shaped or compass-needle-shaped hairs. Leaves opposite, entire, varying in size, sessile or petioled, usually thick, glandless, reticulate. Petioles often short and thick. Stipules intrapetiolar, usually flat, connate, persistent, or rarely deciduous, small, rarely very large. Usually many-flowered terminal racemes, sometimes compound at the

base. Pedicels generally bibracteolate at the base. Bracts and bracteoles small or moderate. Sepals 5, persistent, sometimes markedly accrescent, broad, biglandular or (often in the same species) glandless; glands contiguous. Petals 5, long-unguiculate; limbs orbicular or cochleariform with cordate or reniform base, glabrous, yellow, red or white; margin nearly entire, toothed or incised; claws semi-circular recurved. 5th Petal flattish, corrugate, with thick, straight claw. Stamens 10, all fertile; filaments nearly equal, hardly united at the base; the united part, like the receptacle densely hirsute (hairs forked with sub-parallel arms). Anthers long, linear, oblong, ovoid, or obovoid, glabrous or pilose, often with large connectives. Pollen up to 15 μ in diam. Ovary 3-lobed, 3-locular, ovoid or globose, rarely conoid, glabrous or (often in the same species) sericeous. Styles 3, subulate, straight, or curved only at the top; stigma subulate. Drupe attached to a flat or slightly concave torus, ovoid or globose, yellow, orange or red, with one 3-locular pyrene, with 3, or by abortion less, seeds. Exocarp thin, fleshy; endocarp bony or woody, with sharp ridges. Cotyledons sub-equal, circinnate.

Distribution: Species about 100, in tropical America, including the West Indies.

1. a. Leaves densely reticulate, primary, secondary and tertiary nerves parallel, forming nearly rectangular areoles. Stipules very large, more than 2 cm long, membranous, deciduous. Hairs antler-shaped or stellate..... 9. **B. stipulacea** (Juss.) Niedenzu.
- b. Leaves reticulate, secondary and tertiary nerves not parallel. Stipules small, up to 1 cm long, coriaceous, persistent. Hairs compass-needle-shaped or bifurcate (except: *B. verbascifolia*)..... 2
2. a. Anther cells as long as the connectives 3
- b. Anther cells shorter than the connectives; top of the connective ending in a thick, conoid or obtuse, nearly straight or recurved appendage (see also *B. Aerugo*) 7

3. a. Leaves very short-petioled or sessile; adult leaves very densely sub-velutinous, velutinous, or lanuginose beneath. Arms of the hairs up to 2 mm long, with very long ($\frac{1}{2}$ mm) feet 4
- b. Leaves petioled. Beneath with long-persistent sub-sericeous or sub-velutinous hairs, generally glabrescent (exc. *B. Aerugo*). Arms of the hairs $\frac{1}{3}$ —1 mm long, with short (50—100 μ) feet ... 5
4. a. Leaves obovate, oblanceolate or elliptical-oblong, up to 14 cm long and 8 cm wide; base decurrent into the petiole. Leaves grey- or slightly rufous-sub-velutinous or sericeous-tomentose beneath; feet and arms of the hairs slender. Stipules 3—5 mm long. Racemes 3—8 cm long 4. **B. cydoniifolia** Juss.
- b. Leaves spatulate, sessile, up to 35 cm long and 20 cm wide. Leaves very densely velutinous or tomentose beneath; feet and arms of the hairs long and thick. Stipules 5—12 mm long. Racemes elongate, 10—25 cm long 5. **B. verbascifolia** (L.) Rich.
5. a. Bracts and bracteoles coriaceous, persistent, on both sides sericeous. Bracts small (1—5 mm), bracteoles equal in length or smaller. Feet of hairs short (up to 60 μ), slender, arms straight.. 6
- b. Bracts and bracteoles thin, deciduous, outside velutinous, inside nearly glabrous, linear-lanceolate, large (2—6, resp. 1—3 mm long). Feet of the hairs rather long (up to 110 μ), arms nearly straight, or slightly flexuous 1. **B. crassifolia** (L.) Rich.
6. a. Tree or treelet. Leaves elliptical-, or oblong-lanceolate, up to 18 cm long and 5½ cm wide, shining above, with long-persistent hairs beneath, glabrescent. Bracts and bracteoles straight, ovate, acute, 2 resp. $\frac{1}{2}$ —1 mm long. Anthers linear-oblong, glabrous or sericeous between the parallel cells; cells not longer than the connective. Ovary glabrous, or at first sericeous 2. **B. coriacea** (Swartz) Kunth.
- b. Stout trees, up to 35 m high. Leaves elliptical,

elliptical-oblong or obovate-oblong, up to 25 cm long and 10 cm wide, shining, mostly pruinose above; densely rusty-farinose-sericeous beneath. Bracts lanceolate or linear, obtuse, uncinata or circinnate, 4—5 mm long; bracteoles ovate, 1 mm long. Anther cells diverging, with hornlets at the top, as long as or slightly longer than the sericeous thick, clavate, red connectives. Ovary sericeous.

- 3. **B. Aerugo** Sagot.
 7. a. Top of the anther cells obtuse or rounded. Bracts and bracteoles 1—3½ mm long. Ovary glabrous. 8
 b. Bracts and bracteoles short, hardly 1 mm long. Top of the anther cells mucronulate, with ¾—1½ mm long hornlets. Ovary densely sericeous, except at the base 8. **B. obversa** Miq.
 8. a. Leaves oblanceolate, oblong or oblong-lanceolate with cuneate base. Petioles 2—10 mm long. Sepals outside sericeous, inside glabrous. Anthers glabrous; appendage of the connective very large (12 mm). 6. **B. densa** (Poir.) D.C.
 b. Leaves elliptical, ovate, obovate or sub-orbicular, with cordate and often narrowed base. Petioles short (1½—½ mm). Sepals outside glabrous, inside sericeous. Anthers densely strigose at the top; appendage of the connective ½—⅓ of the length of the cells 7. **B. coccolobifolia** Kunth.

1. **Byrsonima crassifolia** (L.) Rich. ex A. L. de Juss. in Ann. Mus. Par. XVIII (1811), p. 481, emend. Ndz.; Kunth in H.B.K., Nov. gen. V (1821), p. 115 (coll. ed.); D.C., Prodr. I (1824), p. 579; Juss. in Arch. Mus. Par. III (1843), p. 291; Miq., Stirp. Surin. (1850), p. 86; id. in Linnaea 18 (1844), p. 50; Griseb. in Fl. Bras. XII, 1 (1858), p. 18; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 114; Triana and Planch. in Ann. sc. nat. 4e sér. Bot. XVIII (1862), p. 312; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 168, p. p.; Ndz. in Engl., Pfl. reich IV (1928), p. 718; — *Malpighia crassifolia* L., Spec. Pl. I (1753), p. 426, n. 3; Aubl., Pl. Guia. I (1775), p. 457, III t. 182; — *Malpighia Moureila* Aubl. l. c., p. 459, t. 241; Cav., Diss. VIII (1789), p. 412,

t. 241; — *Byrsonima rhopalaeifolia* Kunth l. c., p. 114; D.C. l. c., p. 580; — *Byrsonima montana* Kunth l. c., p. 115; — *B. ferruginea* Kunth l. c., p. 116, t. 446; D.C. l. c., p. 579; Juss. l. c., p. 291; — *B. cubensis* Juss. l. c., p. 292; — *B. crassifolia* (L.) Kunth, var. *typica* Ndz. in Arb. Bot. Inst. Lyc. I (1901), p. 16; id., in Engl. l. c., p. 720.

Small shrub, or low, stunted tree, up to 10 m high. Wood rather heavy, strong (Pfeiffer). Young parts with short, rusty or rufous-velutinous hairs. Hairs compass-needle-shaped, with nearly straight or slightly flexuous, 400—600 µ long arms, 25—50 µ in diam.; feet thin, 50—110 µ long. Branchlets cylindrical, sulcate, rusty-sub-velutinous, up to 3 mm in diam.; branches cylindrical, glabrous, grey, up to 5 mm in diam.; internodes ½—6 cm long, those at the end of the branches often reduced. Leaves coriaceous, varying in size and shape, oblong or elliptical to ovate or obovate, 3—20 cm long, 2—15 cm wide; base obtuse or slightly acute, slightly decurrent into the petiole; margin revolute; top acute, ± short-acuminate or slightly obtuse. Young leaves rusty-velutinous; adult ones glabrescent, shining above, with long-persistent hairs along the slightly prominent midrib, beneath dull, sub-velutinous, at last glabrescent, except along the strongly prominent midrib, primary nerves (7—10 on each side) prominent, arcuate at the margin, veins densely reticulate. Petioles slightly velutinous or glabrous, ½—2½ cm long. Stipules persistent, thick, ovate or ovate-lanceolate, velutinous, 3—5 mm long. Racemes or pseudo-racemes, peduncled, terminal, elongate, many-flowered, rufous-velutinous, 4—12½ cm long. Pedicels velutinous, 7—12 mm long, bracteate and bibracteolate at the base, 1—3 on 0—4 mm long peduncles. Bracts and bracteoles triangular or ovate, acute, deciduous, crisp, outside velutinous, inside nearly glabrous, 2—3, resp. 1—3 mm long. Flowers 1—2 cm in diam.; buds ovoid, 5 mm long. Sepals erect, or slightly recurved at the top, ovate, outside sericeous, 3—5 mm long, with oblong, 2—3 mm long, glabrous glands. Petals patent, yellow, turning

reddish when fading, glabrous, concave, orbicular-reniform, with nearly entire margin, 5—9 mm in diam., with 3—5 mm long claws; 5th petal flattish, irregular-slashed, 3—4 mm long, with thick claw. Stamens nearly equal, exserted. Filaments glabrous, except base, 2—3 mm long, hardly connate at the base. Anthers linear or oblong, usually pilose; cells as long as or slightly longer than the 2—3½ mm long, inside pilose, connectives. Ovary sub-globose, glabrous or slightly sericeous. Styles in youth curved at the top, glabrous, as long as the stamens. Torus-hairs rusty, ½—⅓ of the length of the filaments. Drupe globose, green, at last yellowish, with a sour flavour, 5—8 mm in diam., 3- (or by abortion 1- or 2-)celled. Exocarp thin-fleshy, endocarp woody, minutely verrucous or ribbed.

Distribution: Mexico, Central America, Northern South America, West Indies.

Patrick savannah (Boldingh n. 3904a, fl. Oct.; Coll. indig. n. 178, fl. May); Joden savannah (Focke n. 348, fl. Oct.; Wulfschlägel n. 47 p. p. [B.]); Zanderij I (Samuels n. 302 [L.], fl. May; Kuyper n. 71, fl. July; B.W. n. 5491, fl. Dec.); Sectie O (Lanjouw n. 153, fl. July; Pulle n. 145, fr. Aug.; B.W. n. 471, fl. and fr. Oct.; B.W. n. 2820, fl. Apr.); Sectie O, tree n. 528 (B.W. n. 2555, fl. Dec.; n. 1206, fl. and fr. Oct.; n. 1805, fl. June; n. 2608, fl. and fr. Jan.; n. 4681, fl. May; n. 4752, fl. Oct.; n. 5072, fl. Febr.); savannah near Berlijn (Essed n. 34 b-d, fl. Jan.); savannah near Brownsberg (Lanjouw n. 1254, fl. Nov.); Para district near savannah Kompas (Went n. 366, fl. Sept.); Dondercreek (B.W. n. 828, fl. Jan.; Pulle s. n.); without locality: Hostmann et Kappler 1009a; Splitgerber s. n., mis. de Vriese [L.].

var. **cinerea** (Poir.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. (1901), p. 17; id. in Engl. l. c., p. 722; — *Malpighia cinerea* Poir., Suppl. IV (1813), p. 7; — *Byrsonima cinerea* D.C. l. c., p. 580; Juss. in Arch. Mus. Par. l. c., p. 281; Griseb. in Fl. Bras. l. c., p. 12; id. in Fl. Brit. W.-Ind. Isl. l. c., p. 114.

Lower leaf surface with persistent, grey-sericeous hairs.

Distribution: Brazil, Guiana.

Zanderij I (B.W. n. 563); Para district, Pl. Onoribo (Wulfschlägel n. 46 [B.]); near Joden savannah, pl. Berlijn (Kegel 1146 [G.] and s. n. [ex hb. Garcke; D.]); Pl. Berlijn (Wulfschlägel n. 49 named *B. spicata* by Pulle [B.]); upper Suriname R. (Focke n. 233, fl. Nov.); without locality: Hostmann n. 126; n. 146a [G.]; n. 810 p. p. [U, D.]; Wulfschlägel 47 p. p. [G.].

var. **Spruceana** Ndz. in Arb. Bot. Inst. l. c., p. 18; id. in Engl. l. c., p. 722; — *B. Spruceana* Ndz. in Engl.-Prantl Nat. Pflz.fam. Nachtr. zu III, 4 (1897), p. 207.

Leaves lanceolate, 7—12 cm long, 1½—3 cm wide; densely prominulous reticulate; shining above, below dull, glabrescent. Petioles nearly 1 cm long. Anthers pilose. Ovary puberulous.

Distribution: Para, Guiana, Venezuela, Colombia.

Without locality: Splitgerber a. 1837 (ex Ndz.).

Vernacular names: Moeleidan, Moeréiran, Moeléi, Moeréi, Moelehi (Car.); Hori, Hoelia, Horia (Arow.); Sabana kwarie, Moeli, Moeléi (N.E.); Savanna kwarie (S.D.); Sabana mango (Sar.).

2. **Byrsonima coriacea** (Swartz) Kunth in H.B.K., Nov. gen. V (1821), p. 113 (coll. ed.), emend. Ndz.; D.C., Prodr. I (1824), p. 580; Small in N.-Amer. Fl. XXV, 2 (1910), p. 167; Fawcett and Rendle, Fl. Jam. IV (1920), p. 221, p. p., f. 74; — *Malpighia coriacea* Swartz, Prodr. (1788), p. 74; — *Byrsonima coriacea* (Swartz) Kunth, var. *Swartziana* Ndz. in Engl. l. c., p. 699.

Shrub or tree, up to 40 m high. Bark dark-brown with white spots. Young parts densely rusty- or rufous-sericeous. Hairs compass-needle-shaped, with straight, 300—500(—1000) µ long, thick hairs, with short, 10—50(—70) µ long, thin feet. Branchlets cylindrical, striate, sericeous; branches glabrous, grey, striate, up to 4 mm in diam.; internodes ½—4(—10) cm long, often reduced at the top of the branch. Leaves coriaceous, lanceolate, up to 18 cm long, and 5½ cm wide; base narrowed or cuneate, tapering into the petiole; margin slightly revolute; top acute or acuminate, acumen generally blunt. Young leaves

densely sericeous, adult ones above light-green, glabrous (along midrib long-persistent hairs), shining, nerves slightly prominent, beneath light-brown, with long-persistent hairs, glabrescent, with slightly prominent nerves. Petioles sericeous, 4—15 mm long. Stipules broadly ovate, thick, persistent, $1\frac{1}{2}$ —4 mm long, outside sericeous. Racemes or rarely pseudo-racemes, terminal, peduncled, 15—40-flowered, up to 15 cm long, rusty-sericeous. Pedicels slender, sericeous, 6—15 mm long, bracteate and bibracteolate at the base, on 0— $2\frac{1}{2}$ mm long peduncles. Bracts and bracteoles thick, straight, persistent, ovate, acute, outside sericeous, inside slightly pilose, 2, resp. $\frac{1}{2}$ —1 mm long. Flowers $1\frac{1}{2}$ cm in diam.; buds globose-ovoid, 5—6 mm long. Sepals ovate, top recurved, sericeous, 3— $3\frac{1}{2}$ mm long, with ellipsoid, glabrous, 2 mm long glands, or glandless. Petals glabrous, yellow, concave, reniform, 5—6 mm long, 7—8 mm wide, with reflexed 3—4 mm long claws; 5th petal flattish, corrugate, with hastate base, 5×3 mm, with thick, straight, $2\frac{1}{2}$ mm long claw. Stamens nearly equal, exserted. Filaments glabrous, 1—2 mm long, hardly connate at the base. Anthers linear-oblong, 3 mm long, glabrous or sericeous between the parallel cells, nearly as long as the connectives. Torus-hairs 1—2 mm long. Ovary ovoid, glabrous or at first sericeous; styles glabrous, 5 mm long. Drupe yellow, globose, up to 14 mm in diam.; exocarp thin-fleshy, endocarp bony, verrucous,

Distribution: Jamaica.

var. *spicata* (Cav.) Ndz. in Engl. l. c., p. 700; — *Malpighia spicata* Cav., Diss. VIII (1789), p. 409, t. 237; — *Byrsonima spicata* Rich. ex A. L. de Juss. in Ann. Mus. Paris XVIII (1811), p. 481; Kunth in H.B.K., Nov. gen. l. c., p. 113; D.C., Prodr. I (1824), p. 580; Griseb. in Fl. Bras. XII, 1 (1858), p. 12; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 115; Juss. in Arch. Mus. Paris III (1843), p. 294; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 168; — *Byrsonima lanceolata* Miq. in Linnaea 18 (1844), p. 602; — *Byrsonima*

crassifolia, forma *angustifolia* Miq. l. c., p. 736; — *Byrsonima Hostmanni* Benth. in Lond. Journ. Bot. VII (1848), p. 120.

Leaves oblong-lanceolate or elliptical-lanceolate, chartaceous, with many (15—40 on each side) parallel, distinct primary nerves.

Distribution: Tropical South America, including the West Indies.

Glandbearing form: Zanderij I, tree n. 146 (B.W. n. 3375, fr. Oct.); Para (Splitgerber n. 991 [L.], fl. March); Onoribo (Focke n. 876, type of *B. lanceolata* Miq., fl. March); Pl. Berlijn, Onoribo, Para (Wulfschlägel n. 48 [B.]); without locality: Hostmann n. 1009, type of *B. Hostmanni* Benth., and of *B. crassifolia*, forma *lanceolata* Miq.; Focke n. 373; Hohenacker, Arzn. n. 438 [D.]; Nolte [G.]; Wulfschlägel n. 46, 48, 49 [G.].

Glandless form: Osembo (Essed n. 33a, fl. Jan.); Zanderij I, tree n. 146 (B.W. n. 439, fl. Nov.; n. 1207, fl. Oct.; n. 2285, fl. Aug.; n. 2515, fl. Dec.; n. 3902, fl. July; n. 4786, fl. Sept.).

f. *propinqua* (Benth.) Ndz. in Arb. Bot. Inst. Lyc. I (1901), p. 5; id. Engl. l. c., p. 701; — *Byrsonima propinqua* Benth. in Lond. Journ. Bot. VII (1848), p. 120; — *B. coriacea* $\times$ *B. crassifolia* Ndz. l. c.

Anther cells on both sides pilose. Adult leaves golden-yellow-sericeous beneath.

Patrick savannah (Boldingh n. 3889, fl. Oct.); Joden savannah (Tulleken n. 166 [L.], fl. Aug.; Kegel n. 1147 [G.]); Berlijn, Para (Wulfschlägel n. 50 [B.]); Republiek (Kuyper n. 8, fl. Oct.).

Vernacular names: Holia, Hoelia (Arow.); Moeleri, Moeléri, Moeroei (Car.); Savanna or sabana kwarie (N.E.).

3. *Byrsonima Aerugo* Sagot in Ann. sc. nat. 6e sér. XII (1881), p. 178; Sandwith in Kew Bull. 5 (1935), p. 311; — *Byrsonima altissima* auctt., non Aublet, Ndz. in Engl. Pf. reich IV (1928), p. 716, f. 46H.

Stout trees, up to 35 m high, stem up to 1 m in diam., bark thick, reddish, wood hard, reddish. Young parts densely reddish

or rusty-farinose or -sericeous. Hairs compass-needle-shaped, with straight, 200–300 μ long, thick (15–30 μ) arms, and slender, short, 10–40 μ long feet. Branchlets sericeous, sulcate, cylindrical, up to 3 mm in diam.; branches cylindrical, glabrous, greyish, striate, up to 4 mm in diam. Leaves thick-coriaceous, elliptical, ovate- or obovate-oblong, 8–15 cm long, 3½–7½ cm wide; base acuminate, decurrent; margin revolute; top acuminate or acute. Young leaves densely rusty-sericeous, adult ones above glabrous, often pruinose, nerves slightly prominent, beneath densely rusty farinose-sericeous, primary nerves (8–10 on each side) strongly prominent, arcuate, not attaining the margin, secondary ones slightly prominent, reticulate. Petioles canaliculate, nearly glabrous, flattish above, 1–4 cm long. Stipules persistent, connate, ovate-acute, outside sericeous, 2–4 mm long. Racemes rufous-sericeous, 6–8 cm long, peduncles 1–2 cm long. Pedicels sericeous, slender, 4–15 (when fruiting) mm long, bracteate and bibracteolate at the base. Bracts coriaceous, persistent, circinnate, linear, outside sericeous, inside nearly glabrous, greenish, 4–5 mm long. Bracteoles coriaceous, persistent, straight, slightly concave, orbicular, outside sericeous, inside nearly glabrous, 1 mm long. Flowers up to 1½ cm diam.; buds ovoid, 4 mm long. Sepals triangular-obtuse, recurved at the top, sericeous (outside more densely), 2–3 mm long, with large, yellow, oblong, 1½–2 mm long glands. Petals yellow or white (Benoist), patent, glabrous, orbicular, cochleate, 5–9 mm in diam., base hastate or cordate, claws semi-circular recurved, 4 mm long, 5th petal flat, ovate, corrugate, with sagittate base, 3 mm long, claw thick, straight, 4½ mm long. Stamens nearly equal, only anthers exerted. Filaments broad, glabrous, 2 mm long, hardly connate at the base. Anthers 2½–3 mm long, cells extrorsely curved at the top, with lyre-haped hornlets, as long as, or slightly longer than the sericeous, thick, clavate, red connectives; cells long-protruding beyond the base of the connectives. Receptacle

with 1–1½ mm long hairs. Ovary sericeous, ovoid; styles as long as the stamens. Drupe semi-globose, reddish, 9 mm in diam., hollow below. Exocarp thin-fleshy, endocarp bony, thick, verrucous.

Distribution: French Guiana.

var. **occidentalis** Ndz. in Arb. Bot. Inst. Lyc. Braunsb. I (1901), p. 15; id. in Engl. l. c.

This variety differs from the typical form (var. *orientalis* Ndz. l. c.) in the size of all its parts, and the less pruinose leaves. Leaves up to 22 cm long, 9 cm wide. Primary nerves 10–15. Stipules 3 mm long. Racemes up to 8 cm long; peduncles 1–2 cm long; bracts 4 mm long.

Distribution: Brit. Guiana.

Brownsberg, tree n. 1134 (B.W. n. 1707, ster. March; n. 2072, fr. July; n. 2877, fl. May; n. 2930, fr. and fl. June); tree n. 83 (B.W. n. 3272, fr. Sept.); tree n. 1156 (B.W. n. 1759, ster. Apr.; n. 2073, fr. July).

4. **Byrsonima cydoniifolia** Juss. in St. Hil. Fl. Bras. mer. III (1832), p. 58; id. in Arch. Mus. Par. III (1843), p. 281; Griseb. in Fl. Bras. XII, 1 (1858), p. 6; Pulle, Enum. Pl. Surin. (1906), p. 472; Ndz. in Engl., Pfl. reich IV (1928), p. 731.

Shrub or treelet, up to 6 m high. Young parts grey- or reddish-velutinous. Hairs compass-needle-shaped, arms flexuous, ½–1½ mm long, feet 250–400 μ long; both 15–30 μ in diam. Branchlets cylindrical, thickish, up to 4 mm in diam., grey-velutinous; branches cylindrical, glabrous, suberous, grey, striate, 4 mm in diam., ringed at the nodes; internodes 0.1–3 cm long. Leaves chartaceous, obovate, oblanceolate or elliptical, 5–14 cm long, 2–8 cm wide; base cuneate, long-decurrent into the petiole; margin flat; top rounded, obtuse or acute, often slightly emarginate. Young leaves grey- or reddish-velutinous or subsericeous; adult ones smooth, puberulous above, with partly (except midrib) disappearing hairs; beneath grey-

velutinous, midrib strongly prominent, primary nerves (7—10 on each side) prominent, arcuate ascendent, not attaining the margin, veins nearly invisible under the hairs, reticulate. Petioles short (in consequence of the long-decurrent leaf-blades) 0—5, rarely up to 15 mm long, reddish-velutinous, thickish. Stipules broadly ovate-triangular, obtuse, thick, outside hirsute, inside glabrous, 3—5 mm long. Pseudo-racemes closely packed, many-flowered, terminal, velutinous, up to 18 cm long; peduncles 1—4 cm long. Pedicels generally 2—4 on a very short peduncle, thickish, erect or patent, velutinous, 8—17 mm long, bracteate and bibracteolate at the base. Bracts and bracteoles subulate, deciduous, thin, outside velutinous, inside glabrous, 5—7, resp. 1—2½ mm long. Flowers 1½ cm in diam., buds sub-globose, up to 6 mm long. Sepals ovate, with recurved top, outside sericeous-tomentose, inside glabrous, 4 mm long, with cuneate-obovate 2—3 mm long glands. Petals yellow, glabrous, thickish, orbicular, cochleate, 6 mm in diam.; base cordate; margin entire; claws strongly recurved, 4 mm long; 5th petal flat, reniform, 3 × 5 mm, wrinkled, with erose-toothed margin; claw thick, 4 mm long. Stamens exserted, the epipetalous ones slightly shorter. Filaments flat, glabrous, united and densely haired at the base; torus densely haired, hairs 2—2½ mm long. Anthers elliptical, oblong or linear-oblong, 2—3 mm long; cells hirsute, parallel, at the top as long as, at the base slightly longer than the thick, oblong, red connectives. Ovary conoid, 3-sulcate, glabrous or pilose, 2 mm high. Styles glabrous, 3 mm long. Drupe globose, 8 mm in diam., endocarp woody, slightly verrucous.

Distribution: Brazil, Bolivia, Guiana.

Upper Suriname R. (Hostmann and Kappler, ed Hohenack. n. 1296 [L.], p. p.) named by Steud.: *B. verbascifolia* D.C.).

5. *Byrsonima verbascifolia* (L.) Rich. ex A. L. de Juss. in Ann. Mus. Paris XVIII (1811), p. 481; Kunth in H.B.K., Nov. gen. V (1821), p. 113 (coll. ed.); D.C.,

Prodr. I (1824), p. 579; Juss. in St. Hil. Fl. Bras. mer. III (1832), p. 57; Griseb. in Fl. Bras. XII, 1 (1858), p. 5; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 114; Pulle, Enum. Pl. Surin. (1906), p. 472; Small in N.-Amer. Fl. XXV, 2 (1910), p. 170; Ndz. in Engl., Pfl. reich IV (1928), p. 735; — *Malpighia verbascifolia* L., Spec. Pl. I (1735), p. 426, n. 4; Aubl. Pl. Guia. I (1775), p. 460, III t. 184; Cav., Diss. VIII (1789), p. 411, t. 240; — *Malpighia crassifolia* Vellozo, Fl. flum. IV (1827), t. 170, (1825), p. 193.

Tortuous, small trees, up to 3 m high, with knotted, dwarfish trunk. Bark dark-red; wood reddish. Young parts with very dense, hispid-velutinous, partly rigid, tomentum. Hairs varying in shape and length, arms mostly serpentine, up to 2 mm long, feet up to 300 µ long. Branchlets cylindrical, thick, velutinous, up to 1 cm in diam.; branches glabrous, very thick, suberous, epidermis coming off in rings; internodes ¼—2 cm long. Leaves sessile, but not amplexicaul, tufted on spurlike branchlets, coriaceous, oblong-oblancoate, obovate or spatulate, up to 35 cm long, and 20 cm wide; base gradually narrowed or cuneate, long-decurrent into the petiole; margin flat; top rounded or notched. Young leaves densely velutinous-tomentose; adult ones above smooth, hispid, or sometimes glabrescent, beneath velutinous-tomentose, nerves hardly prominent, hidden by the sometimes rufous hairs. Petioles very short or wanting. Stipules broadly ovate or triangular, united, outside reddish-velutinous, inside glabrous, 5—12 mm long. Racemes or pseudo-racemes, terminal, long-hispid or velutinous, 8—25 cm long. Peduncle 0—6 cm long, with stipules or bracts at the base. Pedicels tomentose, mostly thick, 5—16 mm long, bracteate and bibracteolate at the base; on 0—2 mm long peduncles. Bracts and bracteoles thin, lanceolate, linear, or filiform, often with 2—3½, resp. 1—1½ mm broad base; outside tomentose, inside glabrous, 5—25, resp. 3—9 mm long. Flowers 1½—2 cm in diam.; buds ovoid, up to 5 mm long. Sepals ovate, obtuse, outside tomentose, inside glabrous, nearly

straight, 3—6 mm long, when fruiting slightly accrescent, with obovate 2—3 mm long glands. Petals yellow, sub-orbicular, concave, up to 10 mm in diam., with cordate base, toothed margin, and reflexed, 4 mm long claws; 5th petal flat, orbicular-reniform, corrugate, 4—5 mm long, with thick, straight, 4—5 mm long claw. The epipetalous stamens slightly shorter; only anthers exerted. Anthers glabrous or pilose, 2 mm long, cells parallel, at the top nearly as long as, at the base longer than the red, thick connectives. Filaments glabrous, $2\frac{1}{2}$ —3 mm long, hardly connate at the base. Receptacle with 2—3 mm long hairs. Ovary hirsute or glabrous (not in Surinam specimens); styles glabrous, 3 mm long. Drupe globose, 1 cm in diam.; exocarp thin, fleshy, endocarp woody.

Distribution: Northern South America, including the West Indies.

Subspec. *villosa* Griseb. in *Linnaea* XIII (1839), p. 250; id. in *Fl. Bras.* XII, 1 (1858), p. 5; Pulle, *Enum.* (1906), p. 472; Ndz. l. c., p. 736.

Leaves up to 35 cm long, reticulate; above densely hispid, glabrescent, beneath densely velutinous-tomentose. Hairs of the upper surface often sessile, with one reduced arm, seeming simple, beneath with nearly equal, flexuous arms. Bracts and bracteoles filiform, up to $2\frac{1}{2}$, resp. 1 mm long. Sepals accrescent, up to 15 mm long. Ovary generally hirsute. Drupe up to $1\frac{1}{4}$ cm in diam.

f. *spathulata* Ndz. in *Arb. Bot. Inst. Lyc. Braunsb.* (1901), p. 29; id. in *Engl. l. c.*, p. 737.

Leaves spathulate, up to 35 cm long, $17\frac{1}{2}$ cm wide, base gradually narrowed, wing-like decurrent into the petioles.

Upper Suriname R. (Hostmann and Kappler ed. *Hohenack.* n. 1296 p. p.).

6. *Byrsonima densa* (Poir.) D.C., *Prodr.* I (1824), p. 580; Juss. in *Ann. sc. nat. 2e sér. Bot.* XIII (1840), p. 334;

id. in *Arch. Mus. Paris* III (1843), p. 303; Ndz. in *Engl.*, *Pfl. reich* IV (1928), p. 744; Benoist in *Arch. Bot.* V (1931), p. 162; — *Malpighia densa* Poir., *Enc. méth. Suppl.* IV (1797), p. 7; — *Byrsonima amazonica* Griseb. in *Fl. Bras.* XII, 1 (1858), p. 14; Ndz. in *Engl. l. c.*, p. 744; — ? *Byrsonima punctulata* Juss. in *Ann. sc. nat. 2e sér. Bot.* XIII (1840), p. 335; id. in *Arch. Mus. l. c.*, p. 309; Griseb. in *Fl. Bras. l. c.*, p. 15; Ndz. in *Engl. l. c.*, p. 744.

Shrub or tree, up to 20 m high, trunk up to 60 cm in diam., wood soft, bark rather thin (v. Emden). Young parts rusty-pilose, soon glabrous. Branches cylindrical, glabrous, or with few, straight hairs, grey, 3 mm diam., striate, with lenticels; branches cylindrical, glabrous, 4 mm diam., with many lenticels; internodes $\frac{1}{2}$ —3(—8) cm long, nodes annular. Leaves chartaceous-coriaceous, oblanceolate, oblong or oblong-lanceolate, 3—12(—15) cm long, $1\frac{1}{2}$ —4(—6) cm wide; base cuneate, decurrent into the petiole; margin revolute; top obtuse or rounded, often oblique, or shortly acuminate. Young leaves glabrous; adult ones above smooth, shining, nerves slightly prominent, beneath mostly dull, with strongly prominent midrib, primary nerves (8—10 on each side) straight, ascendent, arcuate at the margin and there united with the next ones, veins densely reticulate. Petioles thickish, marginate, glabrous, 2—10 mm long. Stipules united, free above the middle, divided into 2, triangular, acute, $1\frac{1}{4}$ mm long segments, thick, outside glabrous, with thick, long-persistent hairs at the base of the inside, conspicuous after the falling off of the leaves. Terminal, densely-packed, 5—10 cm long racemes, with lax, rufous hairs on the rachis; peduncle $1\frac{1}{2}$ —3 cm long. Pedicels slender, rufous-puberulous, at first reflexed, at last erect-patent, 7—12 mm long, bracteate and bibracteolate at the base. Bracts and bracteoles persistent, thickish, broadly ovate or sub-orbicular, outside glabrous, inside and margin puberulous, 1— $1\frac{1}{2}$, resp. 1 mm long. Flowers fragrant, 7—10 mm in diam.; buds sub-globose, 3 mm in diam. Sepals ovate, concave, top curved,

outside slightly sericeous, 2—2½ mm long, with ovoid-cuneate glabrous, 1—1½ mm long glands. Petals reddish or white, glabrous, thickish, sub-orbicular, cochleate; margin nearly entire or erose; 3—3½ mm in diam., with reflexed, 2 mm long claw; 5th petal flattish, sub-orbicular, erose, 3 mm long, with straight and thicker, 3 mm long claw. Stamens exserted, the epipetalous ones slightly longer. Filaments fleshy, glabrous, except at the inside of the base (hairs 1 mm long), 2½ mm long, hardly united. Anthers transversally attached with parallel, glabrous, distinct, elliptical, 7 mm long cells, pendulous from the cordate, red, small connectives, with a very large, obtuse-conoid, straight, 1¼ mm long appendage. Ovary conoid, glabrous; styles glabrous, 3 mm long. Drupe globose, 4 mm in diam., shining; exocarp thin-fleshy; endocarp thick, woody, with high radial and transverse ridges, 3 (or by abortion 2- or 1-) seeded.

Distribution: Guiana, Amazonian district.

Cottica (B.W. n. 5335, fl. June); Patrick savannah (Coll. indig. n. 203, fl. May); Brownsberg (B.W. n. 3858, fl. May; n. 6452, fl. Apr.; n. 6829, fl. Apr.; v. Emden s. n., fr. Sept.); Brownsberg, tree n. 1231 (B.W. n. 6661, fr. Oct.; n. 6740, fl. June).

Vernacular name: Hoeliadamaro (Arow.).

var. **emarginata** Kosterm. l. c., p. 10.

Leaves oblanceolate, with emarginate top, clustered at the end of very short branches; internodes 1—5 mm long.

Kabalebo R. near Dalgerberg (Pulle n. 395, fr. Sept.).

7. **Byrsonima coccolobifolia** Kunth in H.B.K., Nov. gen. V (1821), p. 114 (coll. ed.); D.C., Prodr. I (1824), p. 580; Juss. in St. Hil. Fl. Bras. mer. III (1832), p. 85; id. in Arch. Mus. Par. III (1843), p. 302; Griseb. in Fl. Bras. XII, 1 (1858), p. 17; Small in N.-Amer. Fl. XXV, 2 (1910), p. 170; Ndz. in Engl., Pfl. reich IV (1928), p. 749, f. 47, f. C, D; — *Byrsonima sessilifolia* Benth. in Lond. Journ. Bot. VII (1848), p. 124; Sandwith in Kew Bull. 5 (1935), p. 311.

Low trees or shrubs, with the leaves clustered at the end of the branches. Only very young parts and pedicels rusty-sericeous. Hairs compass-needle-shaped, with straight, 150—500 µ long arms, 20—30 µ in diam.; feet 15 µ long. Branchlets glabrous, cylindrical, angular or striate, grey, fulvous, up to 3 mm in diam.; branches cylindrical, very suberous, greyish, up to 6 mm in diam.; internodes ½—6 cm long. Leaves sessile or sub-sessile, coriaceous, elliptical, ovate, obovate, ovate-lanceolate or sub-orbicular, up to 15 cm long and 10 cm wide; base sub-cordate or often narrowed; margin flat; top obtuse or rounded, often emarginate. Young leaves glabrous; adult ones minutely punctulate; midrib and primary nerves (8—12 on each side) prominent, veins densely reticulate. Petioles thick, glabrous, ½—1½ mm long. Stipules deciduous, broadly ovate or sub-orbicular, outside sericeous, inside glabrous, 2—3 mm long. Usually simple, peduncled, terminal, straight, glabrous (except pedicels), up to 15 cm long racemes; rachis angular with long-persistent hairs. Pedicels rufous-sericeous, thickish, 5—9 mm long, bracteate and bibracteolate at the base. Bracts and bracteoles lanceolate-ovate or ovate, acute, persistent, sericeous at margin and base, 2—3½, resp. 1—1½ mm long. Flowers up to 14 mm in diam.; buds ovoid, 5 mm long. Sepals ovate, top recurved, outside glabrous, inside sericeous, 3—4½ mm long, with oblanceolate, white or reddish, glabrous, 2 mm long glands. Petals glabrous, pink, reddish or lilac, concave, sub-orbicular, with cordate base, entire margin, 4—6 mm long, and strongly reflexed 2—3 mm long claws; 5th petal flat, reniform, corrugate, 5 mm long, with thick, straight, canaliculate, 4 mm long claw. Stamens nearly equal, exserted. Filaments glabrous, except at base, fleshy, flat, 2 mm long, hardly connate at the base. Anthers linear, 2—3½ mm long, cells densely strigose at the obtuse and usually free top; connective glabrous, with a conical, straight, or recurved appendage, ½—⅓ of the length of the cells. Torus-hairs slightly longer than the filaments.

Ovary ovoid, glabrous, sulcate; styles glabrous, 4–5 mm long. Drupe globose, top acute, up to 8 mm in diam. Exocarp thin-fleshy, endocarp bony, verrucous.

Distribution: Northern South America, West Indies.

Saramacca R., Poika savannah (B.W. n. 305, fl. May); Coesewijne savannah (B.W. n. 5131, fl. May); Corantijne R., Oreala savannah (Pulle n. 535, fl. Sept.).

Vernacular names: Alatakoea, Moelei (Car.).

8. *Byrsonima obversa* Miq., Stirp. Surin. (1850), p. 76; Pulle, Enum. Pl. Surin. (1906), p. 472; Ndz. in Engl., Pfl. reich IV (1928), p. 757.

Trees. Young parts rusty-sericeous. Branchlets angular or sulcate, sericeous, up to 3 mm in diam.; branches glabrous, grey, up to 4 mm in diam.; internodes $\frac{1}{2}$ –5(–10) cm long. Hairs compass-needle-shaped, arms nearly straight, 250–350 μ long, 15–20 μ in diam., the wall partly verrucous, feet funnel-shaped, up to 12 μ long. Leaves thin-coriaceous, obovate or oblanceolate, 4–12 cm long, 2–6 cm wide; base cuneate or acute, decurrent into the petioles; margin flat; top broadly rounded or rarely obtuse, subapiculate. Young leaves very soon glabrous; adult ones rusty-red, glabrous, shining above, with hardly prominent nerves; beneath pallid, very densely, minutely punctulate, midrib and the parallel, erect-patent primary nerves (8–11 on each side) slightly prominent, veins reticulate. Petioles sub-sericeous, glabrescent, canaliculate above, 4–8 mm long. Stipules connate, ovate-orbicular, outside sericeous, inside glabrous, 1–1½ mm long. Racemes rufous-subsericeous, terminal, peduncled, up to 12 cm long. Pedicels slender, sericeous, often circinnate, $\frac{1}{2}$ –1 cm long, bracteate and bibracteolate at the base. Bracts and bracteoles thickish, persistent, slightly concave, ovate or orbicular, outside sericeous, hardly 1 mm long. Flowers up to 1½ cm in diam. Sepals erect, ovate or obtuse-triangular, sub-sericeous, 2–3 mm long, with ellipsoid or oblanceolate, pink (Lanjouw), 2–3 mm long glands. Petals

glabrous, pink, concave, sub-orbicular, 4–6 mm long, base cordate, margin nearly entire or toothed, with reflexed 2 mm long claws; 5th petal flat, ovate, corrugate, 2 mm long, base hastate, claw thick, straight, 2½ mm long. Stamens exerted, nearly equal. Filaments glabrous, 1–2 mm long, hardly connate at the base. Anthers linear, cells appressed-hirtellous, tips ending in setaceous, $\frac{3}{4}$ –1½ mm long hornlets, longer than or nearly equal to the thick, clavate, glabrous, often slightly recurved, appendage of the sericeous, 4 mm long, connectives. Torus-hairs one half the length of the filaments. Ovary ovoid, densely sericeous, except at base; styles glabrous, 4 mm long. Drupe globose, apiculate, 1 cm in diam., with persistent accrescent calyx. Exocarp thin-fleshy, endocarp bony, verrucous.

Distribution: Guiana, Para.

Tapanahoni R. (Versteeg n. 682, fl. July); Cottica R. near Moengo (Lanjouw n. 458, fl. Aug.); Brownsberg (B.W. n. 6681, fr. Nov.); upper Suriname R. near Dottera Soela (Tresling n. 294, fl. Aug.); lower Coppename R. (Went n. 143, fl. Aug.); Kabalebo R., Watramiri-creek, tree n. 1620 (B.W. n. 1890, ster. June; n. 3885, fl. July; n. 4040, fr. Oct.; n. 4426, fr. Oct.; n. 5004, fr. Dec.); without locality: Hostmann n. 665 (type specimen); Hostmann ed. Hohenacker n. 665a [D.].

Vernacular names: Madabrieballi (Arow.); Weneran (Car.).

9. *Byrsonima stipulacea* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 332; id. in Arch. Mus. Paris III (1843), p. 287; Griseb. in Fl. Bras. XII, 1 (1858), p. 18; — *Byrsonima longibracteata* Mart. in Regensb. Fl. 24. Beiblft. (1841), p. 61; — *Alcoceratothrix longibracteata* (Mart.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. I (1901), p. 45; — *Alcoceratothrix stipulacea* (Juss.) Ndz. in Engl., Pfl. reich IV (1928), p. 762.

Tree, up to 30 m high, wood medium hard and heavy, light to dark reddish brown. Young parts reddish-velutinous. Branchlets cylindrical, velutinous, glabrescent, brown or greyish, up to 5 mm in diam.; branches cylindrical, twisted, glabrous,

grey-suberous, up to 7 mm in diam.; internodes $\frac{1}{2}$ —6 cm long. Leaves entire, bullate, coriaceous, ovate, obovate or oblong, up to 18(-25) cm long, $3\frac{1}{2}$ —8(—10) cm wide; base acute or cuneate, long-decurrent into the petiole; margin revolute; top acute or shortly acuminate, rarely obtuse. Young leaves rufous-velutinous; adult ones above smooth, glabrous (except at the base), dark (when dried), with impressed nerves, beneath rufous-velutinous, midrib strongly prominent, primary nerves parallel, curved at the margin, and there anastomosing, strongly prominent, secondary and tertiary nerves prominent, parallel, forming nearly rectangular areoles. Hairs antler-shaped or stellate, with 100—180 μ long feet, 25 μ in diam., the arms 30—60 μ long. Petioles thick, densely hispid-velutinous, 6—20 mm long. Stipules intrapetiolar, membranous, outside velutinous, inside glabrous, deciduous, very large, ovate-lanceolate, acute or obtuse, 6—22 mm long, up to 8 mm wide, closing round the branches or racemes. Racemes straight, terminal, velutinous, up to 20 cm long, base enclosed by 2 stipuliform bracts; peduncle $\frac{1}{2}$ —4 cm long. Pedicels rufous-velutinous, becoming thicker towards the top, up to 13 mm long, bracteate and bibracteolate at the base. Bracts ovate-lanceolate, acute, outside velutinous, 6—12 mm long, 2—3 mm wide, deciduous; bracteoles ovate, acute, 3—6 mm long, 1—3 mm wide, outside velutinous, deciduous. Flowers up to 2 cm in diam.; buds globose, 4 mm high. Sepals thick, ovate, strongly recurved at the top, velutinous on both sides, 5 mm long, with oblong, 2—3 mm long, glands or glandless. Petals yellow, reflexed, glabrous, concave, sub-orbicular, 6—8 mm long, with cordate base and nearly entire margin, with 3 mm long claws; 5th petal flat, ovate or reniform 3 mm long, corrugate, base hastate, margin sub-glandular fringed, with thick, straight, $3\frac{1}{2}$ mm long claw. Stamens nearly equal, exserted. Filaments glabrous, halfway connate, flat, the episepalous ones broader, 2 mm long. Anther-cells linear, 2 mm long, densely hirsute, with long hairs

at the top, at the base auricled; connective dark, glabrous, oblong, with often recurved, cylindrical appendage, 1 mm longer than the cells. Torus hairs half the length of filaments. Ovary ovoid-pyramidal, sericeous; styles glabrous, thicker in the middle. Drupe globose, yellow, top apiculate, up to $1\frac{1}{2}$ cm in diam. Calyx enlarged in fruit, woody. Exocarp fleshy, 5 mm thick, endocarp woody, slightly ribbed.

Distribution: Bahia, Guiana.

gland-bearing form: (*Alcoceratothrix rugosa* (Benth.) Ndz. in Arb. Bot. Inst. l. c., p. 45; id. in Engl. l. c., p. 763; — *B. rugosa* Benth. in Lond. Journ. Bot. VII (1848), p. 118; Griseb. in Fl. Bras. l. c., p. 18).

Brownsberg (B.W. n. 6903, fl. Aug.; n. 6585, fr. June); along railway, km 15,5 (B.W. n. 6361, fl. Jan.).