

## MALPIGHIACEAE Jussieu

### • Malpighia Family

William R. Anderson†<sup>1</sup>

**Herbs, subshrubs, shrubs, vines** (twining, woody to herbaceous), or **trees**, perennial, evergreen or deciduous, synoecious [dioecious or functionally dioecious]; hairs unicellular, usually 2-armed and medifixed or submedifixed [basifixed or stellate]. **Leaves** opposite [whorled, subopposite, or alternate], simple; stipules present [absent]; petiole present [absent]; blade margins usually entire [lobed], sometimes pseudodentate [ciliate at location of marginal glands or with stout bristlelike hairs], often bearing multicellular glands on margin or abaxial [adaxial] surface; venation pinnate. **Inflorescences** terminal or axillary, racemes, panicles, umbels, corymbs, or thyrses, or flowers solitary. **Flowers** bisexual [rarely unisexual], radially or bilaterally symmetric, mostly all chasmogamous, sometimes both chasmogamous and cleistogamous; perianth and androecium hypogynous [perigynous]; hypanthium absent [present]; sepals 5, distinct or connate basally, usually glandular, sometimes eglandular; petals (in chasmogamous flowers) 5, posterior (flag) petal often different from lateral 4, distinct, mostly clawed; nectary absent; stamens (in chasmogamous flowers) (2–5)[6–]10[–20], distinct or connate proximally, free; anthers dehiscing by longitudinal slits [apical or subapical pores or very short slits]; pistil 1, (2–)3-carpellate, carpels nearly distinct to completely connate in ovary [connate throughout], ovary superior, (2–)3-locular, placentation apical; ovule 1 per locule, anatropous; styles (in chasmogamous flowers) (1–)3 (usually as many as carpels but sometimes fewer by reduction [or connation]), distinct [partially to completely connate]; stigmas 1–3 (1 per style). **Fruits** drupes or schizocarps splitting into mericarps, mericarps nutlets, thin-walled cocci, or bearing wings [or vascularized setae] [berries or dry and indehiscent]. **Seeds** 1 per locule or mericarp.

Genera ca. 75, species ca. 1300 (8 genera, 9 species in the flora): nearly worldwide; tropics and subtropics.

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<sup>1</sup> Christiane Anderson completed revisions of this treatment in cooperation with the FNA editorial staff.

Malpighiaceae are far more numerous and diverse in the New World than in the Old World. Many are grown as ornamentals in warm areas of the world; they are intolerant of cold. *Malpighia emarginata* de Candolle produces a fruit that is rich in vitamin C, which has been exploited commercially as acerola. One of the most famous hallucinogens in the world, ayahuasca or caapi, is extracted from *Banisteriopsis caapi* (Grisebach) C. V. Morton, a vine native to South America but cultivated widely.

In Malpighiaceae, the ancestral inflorescence appears to be a raceme of cincinni, but in most genera the cincinni have been reduced to 1-flowered units. The pedicel is usually borne on a peduncle, the juncture marked by two bracteoles (W. R. Anderson 1981). This morphology technically makes many inflorescences in the family cymose (cymes, dichasia, or thyrses). For simplicity, however, inflorescence types are described here based on their gross morphological appearance, treating reduced cincinni as if they were single flowers.

Most New World taxa bear two (sometimes one) large multicellular glands abaxially on all five sepals or on three or four lateral sepals. Many Old World taxa and some New World taxa (including one in the flora) have the calyx glands much reduced in number and size or absent. Calyx glands always are absent from cleistogamous flowers.

SELECTED REFERENCES Anderson, W. R. 2004. Malpighiaceae. In: N. P. Smith et al., eds. 2004. Flowering Plants of the Neotropics. Princeton. Pp. 229–232. Anderson, W. R. 2013. Origins of Mexican Malpighiaceae. Acta Bot. Mex. 104: 107–156. Davis, C. C. and W. R. Anderson. 2010. A complete generic phylogeny of Malpighiaceae inferred from nucleotide sequence data and morphology. Amer. J. Bot. 97: 2031–2048. Niedenzu, F. 1928. Malpighiaceae. In: H. G. A. Engler, ed. 1900–1953. Das Pflanzenreich.... 107 vols. Berlin. Vols. 91, 93, 94[IV,141], pp. 1–870.

#### Key to plants with flowers

1. Flowers cleistogamous, to 1.5 mm diam., without visible petals, stamens, or styles. . . . . 8. *Aspicarpa* (in part), p. 363
1. Flowers chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles.
  2. Styles 1(–2) per flower.
    3. Petals densely sericeous abaxially, glabrous adaxially, white or pink, except posterior petal proximally lemon yellow, distally white or pink; stamens 10, all fertile; s Florida . . . . . 6. *Hiptage*, p. 361
    3. Petals glabrous, lemon or carrot yellow; stamens 2–5, 2 or 3 fertile, 0–3 staminodial; sw United States.
      4. Slender wiry twining vines . . . . . 7. *Cottsia*, p. 362
      4. Subshrubs or non-twining perennial herbs . . . . . 8. *Aspicarpa* (in part), p. 363
  2. Styles 3 per flower.
    5. Petals lemon yellow, sometimes becoming orange or red in age.
      6. Petals glabrous; calyx glands 0; styles slender, subulate; stigmas minute, terminal; subshrubs or shrubs . . . . . 1. *Galphimia*, p. 356
      6. Petals abaxially white-sericeous or -tomentose; calyx glands 8 (anterior sepal eglandular, 4 lateral 2-glandular); styles stout, cylindric; stigmas large, on internal angle; woody vines or shrubs with scandent or trailing branches . . . . . 4. *Callaeum*, p. 359
    5. Petals pink, pink and white, lavender, white, or red.
      7. Woody vines; s Florida . . . . . 5. *Heteropterys*, p. 360
      7. Shrubs or small trees; s Florida, s Texas.
        8. Inflorescences terminal, racemes; pedicels sessile; stipules intrapetiolar; leaves eglandular; styles slender, subulate; stigmas minute; Florida . . . . . 2. *Byrsonima*, p. 357
        8. Inflorescences axillary, umbels or corymbs; pedicels raised on peduncles; stipules interpetiolar; leaves bearing (0–)2–4 glands impressed in abaxial surface of blade; styles stout, cylindric; stigmas large; Texas . . . . . 3. *Malpighia*, p. 358

## Key to plants with fruits

1. Fruits drupes.
  2. Inflorescences terminal, racemes; pedicels sessile; stipules intrapetiolar; leaves eglandular; Florida ..... 2. *Byrsonima*, p. 357
  2. Inflorescences axillary, umbels or corymbs; pedicels raised on peduncles; stipules interpetiolar; leaves bearing (0–)2–4 glands impressed in abaxial surface of blade; Texas ..... 3. *Malpighia*, p. 358
1. Fruits schizocarps, breaking apart into samaras, unwinged nutlets, or cocci.
  3. Mericarps cocci or nutlets, unwinged but bearing dorsal keel or crest.
    4. Mericarps bearing narrow dorsal keel, walls thin, brittle; calyx glands 0 ..... 1. *Galphimia*, p. 356
    4. Mericarps with dorsal crest, walls thick, tough; calyx glands in chasmogamous flowers 8 or 10 (sepals all 2-glandular or anterior eglandular), in cleistogamous flowers 0 ..... 8. *Aspicarpa*, p. 363
  3. Mericarps samaras.
    5. Samaras bearing 2 or 3 elongate or semicircular lateral wings, dorsal wing much smaller than lateral wings or absent.
      6. Lateral wings of samara 2, semicircular; dorsal wing well developed, like lateral wings but much smaller; Texas ..... 4. *Callaeum*, p. 359
      6. Lateral wings of samara 3, elongate; dorsal wing mostly absent, occasionally present, much smaller than lateral wings; Florida ..... 6. *Hiptage*, p. 361
    5. Samaras bearing 1 elongate dorsal wing, short lateral winglets present or absent.
      7. Dorsal wing of samara thickened on abaxial edge, veins bending from it toward thinner adaxial edge; woody vines; Florida ..... 5. *Heteropterys*, p. 360
      7. Dorsal wing of samara thickened on adaxial edge, veins bending toward thinner abaxial edge; slender wiry vines; sw United States ..... 7. *Cottisia*, p. 362

1. GALPHIMIA Cavanilles, Icon. 5: 61, plate 489. 1799 • [Anagram of generic name *Malpighia*]

*Thryallis* Linnaeus 1762, name rejected [not *Thryallis* Martius 1829, name conserved]

Subshrubs or shrubs [occasionally small trees]. Leaves usually bearing glands proximally on blade margin [and/or on petiole]; stipules intrapetiolar, distinct. **Inflorescences** terminal, racemes [several grouped in panicle]. **Pedicels** sessile or raised on peduncles. **Flowers** all chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands 0 [1 very small gland at base of sinus between some or all adjacent sepals]; corollas nearly radial [moderately bilaterally symmetric], petals lemon yellow, becoming orange or red in age [suffused with red], glabrous [rarely hairy]; stamens 10, all fertile; anthers subequal; pistil 3-carpellate, carpels connate in ovary along broad adaxial faces; styles 3, subulate, slender; stigmas terminal, minute. **Fruits** schizocarps, breaking apart at maturity into 3 cocci; cocci unwinged, bearing narrow dorsal keel, walls thin, brittle.  $x = 6$ .

Species 26 (1 in the flora): Texas, Mexico, Central America, South America.

*Galphimia* is most diverse from Texas south to Nicaragua with 22 species in that region; only four species are known from South America south of the Amazon valley. *Galphimia gracilis* Bartling, native to eastern Mexico, is widely cultivated in the tropics and subtropics as an ornamental shrub.

SELECTED REFERENCE Anderson, C. E. 2007. Revision of *Galphimia* (Malpighiaceae). Contr. Univ. Michigan Herb. 25: 1–82.

1. *Galphimia angustifolia* Benth. Bot. Voy. Sulphur, 9, plate 5. 1844 • Narrowleaf goldshower [F]



*Galphimia linifolia* A. Gray;  
*Thryallis angustifolia* (Benth.)  
Kuntze; *T. linifolia* (A. Gray)  
Kuntze

Subshrubs or small shrubs to 1 m. Leaf blades linear to narrowly elliptic or narrowly lanceolate or narrowly ovate to elliptic or ovate, larger blades 2.5–4 × 0.3–2 cm, surfaces glabrous or abaxial surface with scattered hairs proximally on midrib,

usually bearing 2 glands proximally on margin above base. Inflorescences 5–18 cm, 4–13-flowered. Pedicels usually sessile, rarely raised on peduncles to 3.5 mm, much shorter than pedicels. Flowers: posterior petal sometimes a little longer than lateral petals; stamen filaments opposite sepals longer than opposite petals; anthers 0.7–0.9 mm. Cocci 3–3.5 mm.  $2n = 24$ .

Flowering and fruiting Apr–Nov. Open rocky shrublands, mostly on limestone; 60–700 m; Tex.; Mexico (Baja California Sur, Coahuila, Durango, Nuevo León, San Luis Potosí, Sinaloa, Sonora, Tamaulipas).

2. *BYRSONIMA* Richard ex Kunth in A. von Humboldt et al., Nov. Gen. Sp. 5(fol.): 114; 5(qto.): 147; plates 446–449. 1822 • [Greek *byrsa*, leather, alluding to use of bark of some species in tanning; meaning of suffix obscure]

Shrubs or trees [subshrubs]. Leaves eglandular; stipules intrapetiolar, distinct or partially [completely] connate. Inflorescences terminal, racemes [sometimes racemes of few-flowered cincinni]. Pedicels sessile [raised on short peduncles]. Flowers all chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands [0 or] 10 (sepals all 2-glandular); corollas bilaterally symmetric, petals white or pink, becoming red in age [light or medium yellow or red], glabrous [rarely hairy]; stamens 10, all fertile; anthers subequal; pistil 3-carpellate, carpels completely connate in ovary; styles 3, subulate, slender; stigmas terminal [slightly internal], minute. Fruits drupes, yellow or brownish [orange, red, purple, blue, or blue-black], stone 1, 3-locular, wall hard, smooth or rugose.  $x = 12$ .

Species ca. 135 (1 in the flora): Florida, Mexico, West Indies, Central America, South America.

1. *Byrsonima lucida* (Miller) de Candolle in A. P. de Candolle and A. L. P. de Candolle, Prodr. 1: 580. 1824 • Locustberry [F]



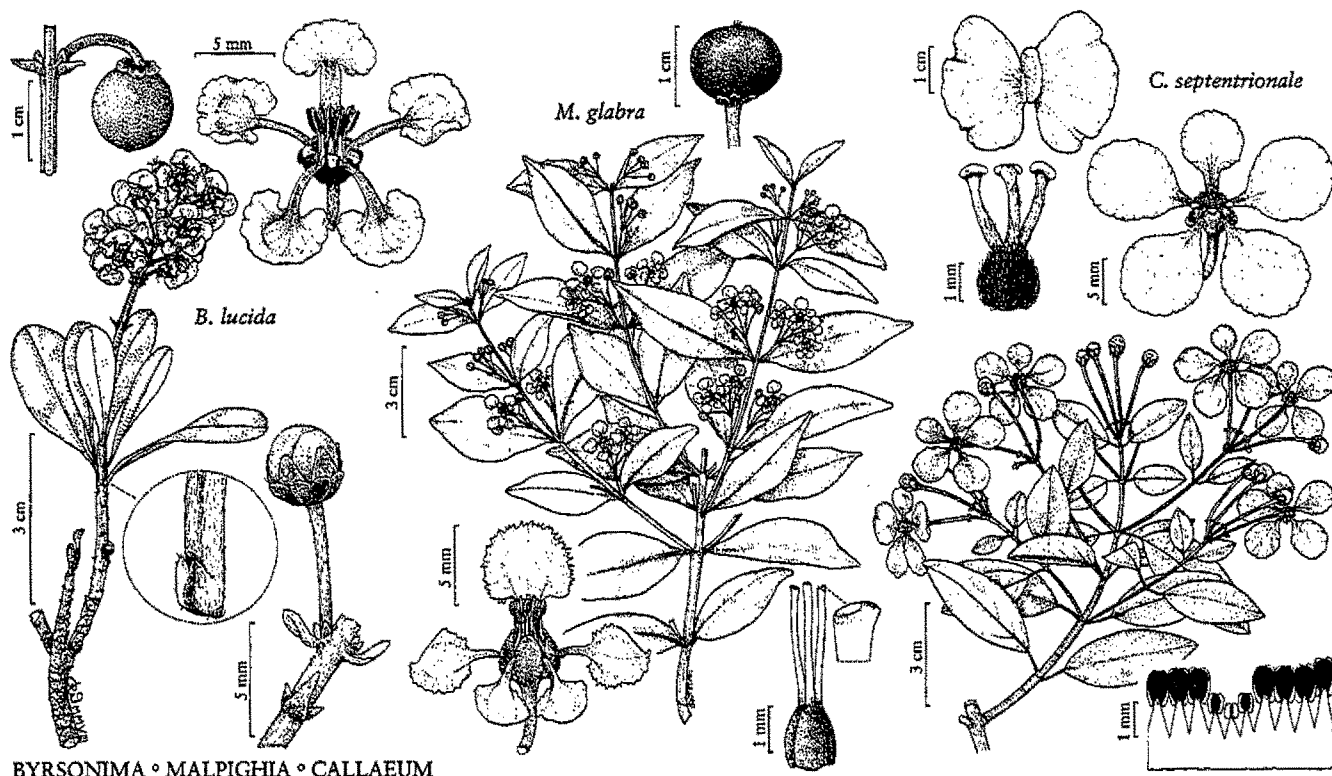
*Malpighia lucida* Miller, Gard.  
Dict. ed. 8, Malpighia no. 9. 1768;  
*Byrsonima biflora* Grisebach;  
*B. cuneata* (Turczaninow)  
P. Wilson; *M. cuneata* Turczaninow

Shrubs or trees 1–6 m. Leaves often clustered at tips of shoots; blade obovate, larger blades 20–30 × 9–19(–24) mm, base cuneate or gradually narrowed, apex rounded or obtuse, surfaces very sparsely sericeous to soon glabrate.

Inflorescences 2.5–5 cm, 6–10(–16)-flowered. Pedicels straight in bud, somewhat decurved in fruit. Flowers: anthers glabrous, locules rounded at apex, connectives equaling or exceeding locules to 0.3 mm; ovary glabrous. Drupes 8–12 mm diam. (dried), ovoid to spheroid with short apical beak when immature, glabrous.

Flowering most commonly Jan–Jun; fruiting Feb–Jul. Hammocks in dry rocky pinelands and sandy palm-pine woods; 0–10 m; Fla.; West Indies (Bahamas, Greater Antilles, Lesser Antilles, Virgin Islands).

*Byrsonima lucida*, native in the flora area only to Miami-Dade and Monroe counties, is widely cultivated in peninsular Florida as an ornamental shrub; it probably has little or no tolerance for frost or temperatures below freezing.



BYRSONIMA • MALPIGHIA • CALLAEUM

3. MALPIGHIA Linnaeus, Sp. Pl. 1: 425. 1753; Gen. Pl. ed. 5, 194. 1754 • [For Marcello Malpighi, 1628–1694, Italian anatomist]

**Shrubs or small trees.** Leaves usually bearing (0–)2–4[–10] glands impressed in abaxial surface of blade; stipules interpetiolar, mostly distinct. **Inflorescences** axillary, dense corymbs or umbels. **Pedicels** raised on peduncles. **Flowers** all chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands 6(–10) (3 sepals each bearing 2 large glands, others very rarely bearing 1–4 smaller glands); corollas bilaterally symmetric, petals pink, lavender, or white, glabrous [glabrate]; stamens 10, all fertile; anthers subequal or 2 opposite posterior-lateral petals larger; pistil 3-carpellate, carpels completely [rarely proximally] connate in ovary; styles 3, cylindric, stout; stigmas on internal angle or subterminal, large. **Fruits** drupes [berries or very rarely breaking into separate pyrenes], red [sometimes orange]; pyrenes 3, connate in center or distinct at maturity but then usually retained in common exocarp, walls hard, bearing rudimentary dorsal and lateral wings and sometimes rudimentary intermediate winglets or dissected outgrowths.  $x = 10$ .

Species ca. 50 (1 in the flora): Texas, Mexico, West Indies, Central America, South America.

*Malpighia coccigera* Linnaeus, dwarf- or Singapore-holly, native to the West Indies, is grown as an ornamental. *Malpighia emarginata*, acerola or Barbados cherry, native to Mexico and Central America, is widely cultivated for its fruits, which are rich in vitamin C.

1. *Malpighia glabra* Linnaeus, Sp. Pl. 1: 425. 1753

- Wild crapemyrtle [F]



*Malpighia puniceifolia* Linnaeus;  
*M. semeruco* A. Jussieu

Shrubs or small trees 1–6 m. Leaf blades narrowly to broadly elliptic or ovate, larger blades 3–10 × 1.5–5 cm, apex usually acuminate, occasionally acute, surfaces glabrous or bearing a few fine, straight, appressed

hairs. Inflorescences 1.5–3(–3.5) cm, (3–)4–10(–12)-flowered. Flowers: petals pink or pink and white or lavender-pink; anthers glabrous; ovary glabrous; styles nearly straight, parallel or divergent distally, ± alike. Drupes 7–13 mm diam., spheroid.  $2n = 20$  (Costa Rica).

Flowering Sep–Apr; fruiting Oct–May. Roadside thickets, sandy plains; 0–100 m; Tex.; e, s Mexico; West Indies (Greater Antilles); Central America; South America.

*Malpighia glabra*, native in southernmost Texas, is rarely cultivated as an ornamental shrub in Texas, but many of the plants sold under that name are actually *M. emarginata*. *Malpighia emarginata* resembles *M. glabra*, but its leaves are usually rounded or obtuse at the apex and often emarginate or apiculate, and some pairs of leaves are crowded in dense shoots with very short internodes, while others are separated by much longer internodes (versus all more or less evenly spaced in *M. glabra*).

4. CALLAEUM Small in N. L. Britton et al., N. Amer. Fl. 25: 128. 1910 • [Greek *kallaion*, cockscomb, alluding to lobed or corrugated outgrowths on samara between lateral and dorsal wings in the type species, *C. nicaraguense*]

Shrubs or woody vines, branches scandent or trailing. Leaves bearing small glands on distal ½ of petiole and/or on blade margin near base; stipules borne on petiole at or just distal to base, distinct. Inflorescences axillary or terminal, few-flowered umbels, corymbs, or short pseudoracemes. Pedicels raised on peduncles. Flowers all chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands 8 (anterior sepal eglandular, 4 lateral 2-glandular); corollas bilaterally symmetric, petals lemon yellow, densely white-sericeous or -tomentose [glabrous] abaxially; stamens 10, all fertile [posterior 3 occasionally sterile]; anterior 7 anthers notably larger than posterior 3; pistil 3-carpellate, carpels completely connate in ovary; styles 3, cylindric, stout; stigmas on internal angle, oblate, large. Fruits schizocarps, breaking into 3 samaras; samaras bearing 2 semicircular lateral wings and 1 well-developed dorsal wing, like lateral wings but notably [somewhat] smaller; nut wall thick, tough.  $x = 10$ .

Species 11 (1 in the flora): Texas, Mexico, Central America (to Nicaragua), South America.

In his revision of *Callaeum*, D. M. Johnson (1986c) cited a specimen of *C. macropterum* (de Candolle) D. M. Johnson, *Palmer s.n.* in 1869 (NY), as coming from Arizona, “without definite locality.” That species occurs in Sonora, Mexico, fairly close to the U.S. border, but no other collection is known from north of the border. R. McVaugh (1956b) said that in 1869 Palmer collected in Arizona but was in southernmost Arizona only a short time; from Tucson he took a coach south into Sonora, where he collected in several areas, including the Yaqui River. There are two sheets of *C. macropterum* at NY labeled as *Palmer s.n.* in 1869, one with a label giving the locality as “Arizona,” the other with a label giving the locality as “Yaqui River Sonora.” The specimens look as if they were parts of the same gathering. Given McVaugh’s cautionary notes on the inaccuracies found in many of the labels placed on Palmer’s collections after his return to Washington, I believe that the specimen cited by Johnson as coming from Arizona probably actually originated on the Yaqui River in Sonora, and am excluding *C. macropterum* from this treatment.

1. *Callaeum septentrionale* (A. Jussieu) D. M. Johnson,  
Syst. Bot. 11: 343. 1986 [F]



*Hiraea septentrionalis* A. Jussieu,  
Ann. Sci. Nat. Bot., sér. 2, 13: 259.  
1840; *H. greggii* S. Watson;  
*Mascagnia septentrionalis*  
(A. Jussieu) Grisebach

Leaf blades lanceolate to elliptic-ovate, larger blades 20–70(–95) × 6–40 mm, base cuneate to rounded, apex acute or acuminate, abaxial surface tomentose or sparsely sericeous to glabrate, adaxial surface glabrous, bearing 1–3 small glands on each side near petiole apex or blade margin. Pedicels 6–24 mm, 1.8–5 times as long as peduncles. Samaras orbiculate or butterfly-shaped, lateral wings 10–42(–55) × 16–21 mm, dorsal wing 10–17 × 6 mm.  $2n = 20$  (Mexico).

Flowering year-round, most commonly May–Sep; fruiting Jun–Oct. Brushy woodlands; 100–200 m; Tex.; e Mexico.

*Callaeum septentrionale* is distinctive in the flora area, being the only native species of Malpighiaceae with hairy petals and orbiculate or butterfly-shaped samaras with dominant lateral wings. The posterior three anthers are smaller than the anterior seven, and the stigma, borne on the internal angle of the style, is oblate (wider than high). The species has the ability to climb, but when growing without support it can be shrubby, with the branches then often trailing. *Callaeum septentrionale* is known in the flora area only from south of Laredo, but it is to be sought in southern Texas near the Mexican states of Nuevo León and Tamaulipas. It is sometimes cultivated as an ornamental in southern Arizona and southern California; *C. macropterum* (de Candolle) D. M. Johnson is also cultivated in southern Arizona. There is no evidence that either species has become naturalized in either state.

5. **HETEROPTERYS** Kunth in A. von Humboldt et al., Nov. Gen. Sp. 5(fol.): 126;  
5(qto.): 163; plate 450. 1822 (as *Heteropteris*), name and orthography conserved

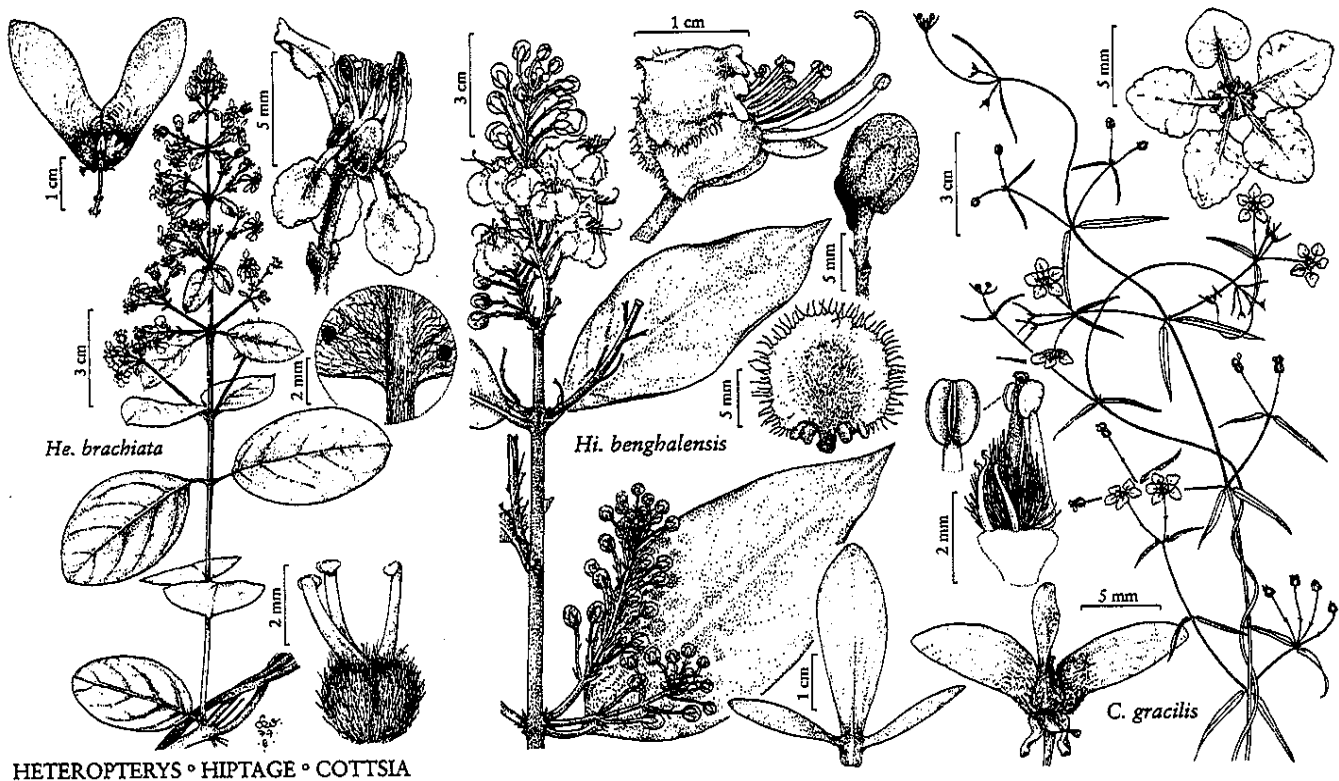
- [Greek *heteros*, different, and *pteron*, wing, alluding to dorsal wing of samara being thickened on abaxial edge and bent upward, opposite of arrangement in other genera with dorsal-winged samaras] [I]

*Banisteria* Linnaeus, name rejected

Woody vines [shrubs or small trees]. Leaves bearing glands on blade [and/or petiole, rarely eglandular]; stipules borne on [beside] base of petiole [absent], distinct. Inflorescences axillary or terminal or both, umbels or corymbs [pseudoracemes], these single or grouped in racemes or panicles. Pedicels raised on peduncles [sessile]. Flowers all chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands 0 or 8 (sepals all eglandular or 4 lateral 2-glandular); corollas bilaterally symmetric, petals pink or pink and white [white, light yellow, bronze, or dark red], glabrous [rarely hairy]; stamens 10, all fertile; anthers ± alike; pistil 3-carpellate, carpels connate proximally in ovary; styles 3, cylindric; stigmas on internal angle [very rarely terminal], large. Fruits schizocarps, breaking into 3 samaras; samaras bearing 1 elongate dorsal wing [rarely rudimentary or absent] thickened on abaxial edge, veins bending toward thinner adaxial edge, and usually single or double crown of short, irregular lateral winglets [crests] on each side [winglets and crests absent]; nut wall thick, tough.  $x = 10$ .

Species 140+ (1 in the flora): introduced, Florida; Mexico, West Indies, Central America, South America, Africa.

*Heteropterys* is almost exclusively a New World genus, with a single species in West Africa.



1. *Heteropterys brachiata* (Linnaeus) de Candolle in  
A. P. de Candolle and A. L. P. de Candolle, Prodr.  
1: 591. 1824 (as *Heteropteris*) [F] [I]



*Banisteria brachiata* Linnaeus,  
Sp. Pl. 1: 428. 1753;  
*Heteropterys beecheyana*  
A. Jussieu

Leaf blades elliptic, larger  
blades 4–8.5(–9.5) × (2–)3–6  
(–7) cm, base cuneate or  
rounded, apex rounded or  
slightly emarginate, obtuse, or

acute and often apiculate, abaxial surface moderately to  
densely and usually persistently tomentose, occasionally

tardily glabrescent, adaxial surface tomentose to  
glabrate, bearing 1–4 pairs of peltate glands abaxially  
near base and occasionally 1–2 additional pairs distally.  
**Inflorescences:** umbels or corymbs (2–)3–6-flowered.  
**Samaras** 18–32 mm; nut 3–4 mm diam., winglets 1–3.5  
mm high.

Flowering and fruiting Nov–Dec. Hammocks; 0–10 m;  
introduced; Fla.; s Mexico; Central America; w South  
America.

*Heteropterys brachiata* is cultivated as an ornamental  
and locally naturalized in southernmost Florida.

6. **HIPTAGE** Gaertner, Fruct. Sem. Pl. 2: 169, plate 116, fig. 4. 1790, name conserved

• [Greek *hiptamai*, to fly, alluding to wind-dispersed samaras] [I]

Shrubs or woody vines. Leaves usually bearing glands at apex of petiole or on blade at base  
or distally, on or near margin; stipules interpetiolar, occasionally minute or apparently lacking.  
**Inflorescences** axillary or terminal, usually elongate, occasionally condensed, racemes, these  
sometimes grouped in terminal panicles. **Pedicels** raised on peduncles. **Flowers** all chasmogamous,  
6+ mm diam., showy with visible petals, stamens, and styles; calyx gland 1, decurrent, below  
posterior petal and between 2 adjacent sepals [2–10 (in 1–5 adjacent pairs), rarely 0]; corollas  
bilaterally symmetric, petals white or pink except posterior proximally yellow, distally white or



pink [all white or pink], densely sericeous abaxially [in 1 species sparsely sericeous proximally], glabrous adaxially; stamens 10, all fertile; anther opposite anterior sepal largest, other 9 subequal; pistil 3-carpellate, carpels completely connate in ovary; style 1, on anterior carpel, tapered, curved toward posterior petal; stigma on internal angle or terminal but bent inward, small [large]. Fruits schizocarps, breaking into 3 samaras; samaras bearing 3 elongate lateral wings, 1 straddling plane of symmetry at apex of carpel, other 2 shorter, 1 on each side of plane of symmetry; dorsal wing usually absent, occasionally 1, much smaller than lateral wings; nut wall thick, tough.

Species 25+ (1 in the flora): introduced, Florida; se Asia (India & Pakistan to Taiwan), w Pacific Islands (Indonesia, Philippines).

1. *Hiptage benghalensis* (Linnaeus) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 136. 1874 • *Hiptage*

[F] [I]



*Banisteria benghalensis* Linnaeus, Sp. Pl. 1: 427. 1753

Branches spreading. Leaf blades elliptic or ovate, larger blades 10–16 × 4–7 (–9.5) cm, base cuneate, apex acuminate, abaxial surface glabrescent or sparsely sericeous, hairs short, straight, adaxial surface

glabrous, bearing 2 larger glands at base and usually several small impressed glands in an inframarginal row.

Flowers very fragrant; calyx gland 3–5 mm; petals long-fimbriate. Samaras: upper central wing 37–45 (–52) mm, 2 lower lateral wings 17–27 mm.

Flowering and fruiting Apr–May. Hammocks; 0–10 m; introduced; Fla.; Asia.

*Hiptage benghalensis* is thought to be native from India and Sri Lanka to the Philippines, but it is difficult to know the true natural range because it has been cultivated as an ornamental for a long time and escapes readily, spreading aggressively and becoming a serious pest. The species is cultivated as an ornamental and locally naturalized in southernmost Florida.

7. *COTTISIA* Dubard & Dop, Rev. Gén. Bot. 20: [358–]359, fig. 1. 1908 • [Based on an anagram of Scott; for George Francis Scott Elliot, 1862–1934, Scottish botanist]

Vines, twining, wiry, slender, with woody base, sometimes seeming shrubby when grazed. Leaves usually bearing pair of stalked glands or eglandular processes on blade margin near base; stipules interpetiolar, distinct. Inflorescences terminal on lateral shoots, 2–4-flowered umbels. Pedicels raised on peduncles. Flowers all chasmogamous, 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands usually 8 (anterior sepal usually eglandular, 4 lateral usually 2-glandular); corollas bilaterally symmetric, petals lemon yellow, glabrous; stamens [2] (4–)5, 2 fertile, opposite posterior-lateral sepals, [0–](2–)3 staminodial, opposite anterior and anterior-lateral sepals, (staminodial filaments rudimentary); fertile anthers subequal, staminodial anthers absent; pistil 3-carpellate, carpels completely connate in ovary; style 1, borne on anterior carpel, cylindric; stigma terminal, capitate [truncate], large. Fruits schizocarps, breaking into 3 samaras; samaras bearing 1 elongate dorsal wing thickened on adaxial edge, veins bending toward thinner abaxial edge, lateral wings absent; nut reticulate and often parallel-rugose on sides, wall thick, tough.  $x = 10$ .

Species 3 (1 in the flora): sw United States, n Mexico.

1. *Cottisia gracilis* (A. Gray) W. R. Anderson & C. Davis,  
Contr. Univ. Michigan Herb. 25: 163. 2007 [F]



*Janusia gracilis* A. Gray,  
Smithsonian Contr. Knowl.  
3(5): 37. 1852

Leaf blades very narrowly lanceolate or elliptic, larger blades 12–40(–50) × (1.5–) 3–7(–9) mm, length 4–10 times width, base cuneate or rounded, apex acute, obtuse,

or occasionally rounded, margins very often bearing few to many cilia or toothlike projections distally, surfaces persistently sericeous or sometimes glabrescent.

Pedicels 4–8 mm, 0.7–1.8 times as long as peduncles. Samaras 9–15(–17) mm, nut 1.5–2.5 × 3–4.5 mm.  $2n = 40$  (Mexico).

Flowering and fruiting Mar–Oct(–Jan). Open rocky slopes and deserts; 300–1600(–2100) m; Ariz., N.Mex., Tex.; Mexico (Baja California, Baja California Sur, Chihuahua, Durango, Nuevo León, Sonora, Zacatecas).

*Cottisia gracilis* is widespread in Arizona, absent only from the northeastern part of the state, but otherwise in the flora area is restricted to southern New Mexico and trans-Pecos Texas.

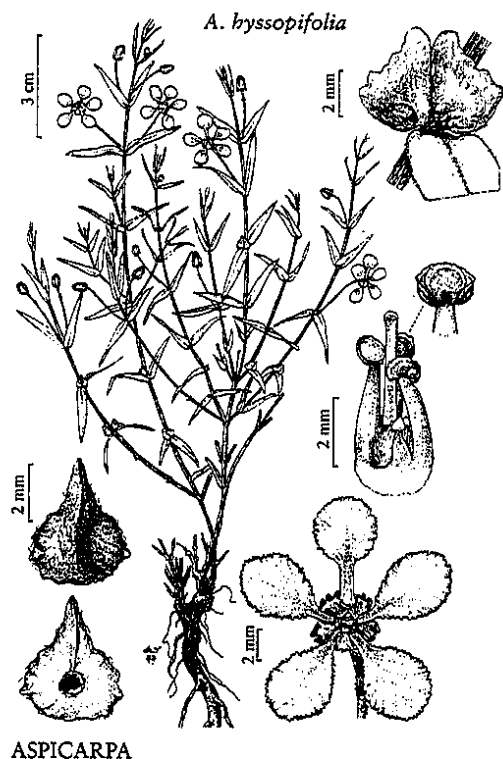
8. **ASPICARPA** Richard, Mém. Mus. Hist. Nat. 2: 396, plate 13. 1815 • [Greek *aspis*, shield, and *karpos*, fruit, alluding to shape of nutlet of *A. hirtella* in abaxial view]

Herbs or subshrubs, perennial, non-twining, base woody. Leaves eglandular; stipules interpetiolar, distinct. Inflorescences of chasmogamous flowers terminal, several-flowered umbels or corymbs, or axillary single flowers; of cleistogamous flowers axillary, clusters or single flowers. Pedicels of chasmogamous flowers raised on peduncles, of cleistogamous flowers ± sessile. Flowers chasmogamous and cleistogamous [all chasmogamous]. Chasmogamous flowers 6+ mm diam., showy with visible petals, stamens, and styles; calyx glands 8 or 10 (sepals all 2-glandular or anterior eglandular); corollas bilaterally symmetric, petals carrot yellow or lemon yellow, outermost sometimes with red blotch, glabrous; stamens 5, 3 fertile, opposite anterior and posterior-lateral sepals, 2 staminodial opposite anterior-lateral sepals, (staminodial filaments shorter to somewhat longer than those of fertile stamens), [all fertile]; fertile anthers subequal, staminodial anthers rudimentary; pistil 3-carpellate, carpels nearly distinct in ovary; styles 1(–2)[–3], 1 on anterior carpel, 2d style occasionally on 1 posterior carpel, cylindric; stigmas terminal, capitate or truncate, large. Cleistogamous flowers to 1.5 mm diam., without visible petals, stamens, or styles; calyx glands 0; petals 0 or 1–2, rudimentary; stamens represented by 1–2 minute sessile anthers; pistil 2-carpellate, carpels nearly distinct in ovary; style 0 or 1, rudimentary. Fruits schizocarps, breaking into nutlets (3 in chasmogamous flowers, 2 in cleistogamous flowers); nutlets unwinged, bearing dorsal crest and often narrower lateral crest around periphery; wall thick, tough.  $x = 40$ .

Species 9 (2 in the flora): sw United States, Mexico, South America.

*Aspicaarpa* comprises three species in Mexico, with two of those in the flora area, and six species in South America south of the Amazon valley.

1. Chasmogamous flowers in (2–)4(–7)-flowered umbels, occasionally corymbs, terminating leafy shoots; petals carrot yellow; plants erect or decumbent with branches ascending; blades of larger leaves 6–23 mm wide, length 1.3–2.5 times width; staminodes equaling or longer than fertile stamens, surpassing sepals; nutlets with dorsal crest entire ..... 1. *Aspicaarpa hirtella*
1. Chasmogamous flowers borne singly in axils of full-sized leaves; petals lemon yellow, outermost sometimes with red blotch; plants erect or spreading-ascending; blades of larger leaves 2–8 mm wide, length (2.2–)2.7–7(–8.3) times width; staminodes shorter than fertile stamens, ± hidden by sepals; nutlets with dorsal crest coarsely toothed ..... 2. *Aspicaarpa byssopifolia*



1. *Aspicarpa hirtella* Richard, Mém. Mus. Hist. Nat.  
2: 396, plate 13. 1815



*Aspicarpa longipes* A. Gray;  
*A. urens* Lagasca

Herbs or subshrubs erect, 10–20 cm, or decumbent, branches 10–60(–100) cm. Leaves: petiole 1–3 mm; blade narrowly to broadly lanceolate or ovate, larger blades 15–45 × 6–23 mm, length 1.3–2.5 times width, base rounded or shallowly cordate, apex usually obtuse, occasionally acute, surfaces thinly sericeous or velutinous, hairs strongly appressed to V-shaped, more persistent abaxially than adaxially. Chasmogamous flowers in (2–)4(–7)-flowered umbels, occasionally corymbs, terminating leafy shoots; petals carrot yellow; staminodes equaling or longer than fertile stamens, surpassing sepals. Cleistogamous flowers often borne singly, or in clusters raised on slender axillary stalk, 5–55 mm, also sessile or subsessile in axils of full-sized leaves. Nutlets 3–3.5 mm diam., smooth or rugose, dorsal crest 0.5–0.8 mm, entire, extended forward 1–1.5 mm.  $2n = 80$ .

Flowering and fruiting (May–)Jul–Sep(–Oct). Dry rocky slopes among boulders, grassy slopes with oaks, pines, junipers; 1200–2000 m; Ariz., N.Mex., Tex.; Mexico.

In the flora area, *Aspicarpa hirtella* is restricted to southeastern Arizona, southwestern New Mexico, and trans-Pecos Texas.

2. *Aspicarpa hyssopifolia* A. Gray, Boston J. Nat. Hist.  
6: 167. 1850 [F]



Herbs or subshrubs erect or spreading-ascending, 8–30 cm. Leaves: petiole 0.5 mm; blade narrowly lanceolate, larger blades 10–25 × 2–8 mm, length (2.2–)2.7–7(–8.3) times width, base rounded, apex acute or slightly obtuse, surfaces thinly sericeous to glabrescent, hairs persisting longest on margins and abaxial midrib. Chasmogamous flowers borne singly in axils of full-sized leaves; petals lemon yellow, outermost sometimes with red blotch; staminodes shorter than fertile stamens, ± hidden by sepals. Cleistogamous flowers sessile or subsessile in axils of full-sized leaves, sometimes absent. Nutlets 2.5–3 mm diam., rugose or bearing toothlike protuberances, dorsal crest 0.5–1 mm, coarsely toothed, extended forward 1.5–2 mm.  $2n = 80$ .

Flowering and fruiting Apr–Nov. Brushy, dry, calcareous slopes; 50–900 m; Tex.; Mexico (Coahuila, Nuevo León, Tamaulipas).

In the flora area, *Aspicarpa hyssopifolia* is found only in southern and western Texas.