MALPIGHIACEAE (Malpighia Family)

William R. Anderson

Trees, shrubs, and lianas. Hairs unicellular, usually medifixed or submedifixed (malpighiaceous trichomes). Stipules usually present. Leaves usually opposite, often bearing large multicellular glands on petiole or blade or both; blades simple, usually entire, lobed in *Stigmaphyllon* spp. Flowers subtly to strongly zygomorphic, bisexual; sepals 5, eglandular or, most often, the lateral 4 or all 5 bearing (1)2 large multicellular abaxial glands; petals 5, distinct, clawed, alternating with sepals, imbricate, the innermost (flag) petal posterior and often different from lateral 4; stamens 10 (in ours), the anthers dehiscent by longitudinal slits; gynoecium superior, comprising (2)3 free to connate carpels, each fertile locule containing 1 pendent anatropous ovule, the styles 1 per carpel, distinct (connate in some species of *Bunchosia*). Fruits dry or fleshy, dehiscent or indehiscent, samaroid, nutlike, or drupaceous. Mature seeds without endosperm.

Anderson, W. R. 1981. Malpighiaceae. *In* B. Maguire (ed.), The Botany of the Guayana Highland — Part XI. Mem. New York Bot. Gard. **32:** 21–305.

The following references were not consulted in the preparation of this treatment. They are cited here at the request of the editor for the convenience of those who need to know what else has been published on the Malpighiaceae in the Guianas.

Görts-van Rijn, A. R. A. & M. J. Jansen-Jacobs. 1976. Malpighiaceae. *In* J. Lanjouw & A. L. Stoffers (eds.), Flora of Suriname **II(2):** 445–450. E. J. Brill, Leiden.

Jonker, F. P. 1966. Malpighiaceae. *In* A. Pulle (ed.), Flora of Suriname **II(1):** 478–480. E. J. Brill, Leiden.

Kostermans, A. J. G. H. 1936. Malpighiaceae. *In* A. Pulle (ed.), Flora of Suriname **II(1):** 146–243. J. H. De Bussy, Amsterdam.

Successful use of the keys to genera and species requires an understanding of what I mean by certain morphological terms. The most important of these are defined here; for more details, see my treatment of the Malpighiaceae of the Venezuelan Guayana (W. R. Anderson, 2001). The ancestral inflorescence of the Malpighiaceae was a raceme of cincinni, but in most genera the cincinni have been reduced to one-flowered units. Each flower is borne on a *pedicel*, whose base is defined by a joint; below the joint the stalk is called the *peduncle*, and the peduncle bears two *bracteoles*; the peduncle is subtended by a single *bract*. The peduncle has been lost in several evolutionary lines, in which case the pedicel is described as sessile, subtended then by a cluster of the bract and two bracteoles. The flower's plane of symmetry is defined by the *anterior sepal* and the *posterior petal*, which are often different from the *lateral sepals* and *lateral petals*, respectively. Of the three styles, the anterior lies on the plane of symmetry and is often unique, while the posterior two lie to the right and left of the plane of symmetry and are mirror images of each other.

1. Trees or shrubs. Fruits fleshy, unwinged, indehiscent.
   2. Leaf blades eglandular. Inflorescences terminal. Styles slender, subulate, the stigmas minute. Fruits containing 1 trilocular stone. . . . . *Byrsonima.*
   2. Leaf blades bearing abaxial glands. Inflorescences lateral, axillary. Styles stout, of uniform thickness, the stigmas large. Fruits containing 2 or 3 pyrenes, distinct or united in center.
      3. Inflorescences elongate pseudoracemes; bracteoles with one of each pair bearing 1 abaxial gland. Petals yellow; stamens ± alike; styles 2 (or 1 through fusion of 2), the stigmas terminal. . . . . *Bunchosia.*
      3. Inflorescences umbels of 2–4 flowers; bracteoles both eglandular. Petals pink or purplish; stamens heteromorphic; styles 3, the stigmas on internal angle at apex. . . . . *Malpighia.*
1. Lianas. Fruits dry, winged, breaking apart into 3 samaras (or fewer if 1 or 2 carpels abort).
   4. Specimens with flowers.
      5. Leaf blades moderately to deeply cordate at base.
         6. Styles bearing at apex a large rounded dorsal appendage 1.5–2 mm long, symmetrical on anterior style, unilateral on posterior styles. . . . . *Stigmaphyllon.*
         6. Styles rounded or truncate at apex, or extended at most into very short sharp dorsal hook.
            7. Stipules borne on stem between petioles, caducous or eventually deciduous, leaving wide scar. Inflorescences bearing many conspicuous leaflike bracts 8–25 mm long. . . . . *Tetrapterys.*
            7. Stipules borne on petiole, well above base, persistent. Inflorescences without leaflike bracts. . . . . *Hiraea.*
      5. Leaf blades cuneate to rounded or subcordate at base.
         8. Bracteoles globose-cymbiform, enclosing bud until flowers open, borne just below flower, the pedicel absent or to 2 mm long in fruit. . . . . *Mezia.*
         8. Bracteoles not globose or enclosing bud, separated from flower by well developed pedicel.
            9. Petals pink or lilac in bud and during flowering.
               10. Leaf blades persistently velutinous adaxially. Bracts and bracteoles 6–9 mm long. Sepals 5–8.5 mm long, distally inflated with aerenchyma, the lateral 4 each bearing 1 large abaxial gland. . . . . *Jubelina.*

10. Leaf blades glabrate adaxially at maturity or with hairs persistent on midrib. Bracts and bracteoles 0.5–2 mm long. Sepals 1.8–5 mm long, not inflated, the lateral 4 each bearing 2 abaxial glands.
    11. Ultimate branches of inflorescence umbels of 4–6 flowers; pedicels sessile or subsessile, raised at most on peduncles 0.5 mm long; bracts and bracteoles deciduous. Styles with terminal capitate stigmas. . . . . *Banisteriopsis.*
    11. Ultimate branches of inflorescence pseudoracemes of 7–35 flowers; pedicels raised on peduncles 1–3(5) mm long; bracts and bracteoles persistent. Styles stigmatic on the internal angle, dorsally apiculate or short-hooked at apex. . . . . *Mascagnia.*
9. Petals yellow, or yellow and red, or yellow in bud turning red or orange during flowering.
    12. Ultimate branches of inflorescence bearing (2)4–40 flowers in pseudoracemes.
        13. Petals glabrous; styles with terminal stigmas. . . . . *Banisteriopsis.*
        13. Petals (at least the lateral 4) abaxially sericeous; styles stigmatic on internal angle. . . . *Tetrapterys.*
    12. Ultimate branches of inflorescence bearing 4–6(8) flowers in umbels.
        14. Stipules borne on petiole, well above base. . . . . *Hiraea.*
        14. Stipules borne on stem between petioles, or absent.
            15. Sepals becoming revolute at apex during flowering. . . . . *Heteropterys.*
            15. Sepals appressed during flowering. . . . . *Tetrapterys.*

4. Specimens with fruits.
    16. Samara with dorsal wing dominant, the nut bearing on its sides only short winglets or crests or quite smooth.
        17. Wing of samara with abaxial edge thickened, the veins diverging and branching from it toward thinner adaxial edge. . . . . *Heteropterys.*
        17. Wing of samara with adaxial edge thickened, the veins diverging and branching from it toward thinner abaxial edge.
            18. Petioles 25–95 mm long; blades moderately to deeply cordate at base. Styles stigmatic on internal angle, each bearing at apex a large rounded dorsal appendage 1.5–2 mm long, symmetrical on anterior style, unilateral on posterior styles. . . . . *Stigmaphyllon.*
            18. Petioles 3–15 mm long; blades cuneate to rounded or subcordate at base. Styles with terminal stigmas and without any sort of dorsal appendage at apex. . . . . *Banisteriopsis.*
    16. Samara with lateral wing(s) dominant, the dorsal wing smaller or reduced to winglet or crest, absent in a few species.
        19. Samara with 4 discrete lateral wings, 2 on each side.
            20. Stipules interpetiolar or borne on petiole between base and middle, or absent. . . . . *Tetrapterys.*
            20. Stipules borne on petiole near its apex. . . . . *Hiraea.*
        19. Samara with 1 continuous lateral wing, or 2, 1 on each side.
            21. Stipules well developed, borne on petiole well above base. Samaras butterfly-shaped with 2 discrete lateral wings. . . . . *Hiraea.*
            21. Stipules very small and interpetiolar or borne on very base of petiole, or absent. Samaras with lateral wing continuous to nearly distinct at base.
                22. Bracteoles globose-cymbiform, enclosing bud until flowers open, borne just below flower, the pedicel absent or to 2 mm long in fruit. . . . . *Mezia.*
                22. Bracteoles not globose or enclosing the bud, separated from flower by well developed pedicel.
                    23. Leaf blades persistently velutinous. Bracts and bracteoles 6–9 mm long. Sepals 5–8.5 mm long, distally inflated with aerenchyma, the lateral 4 each bearing 1 large abaxial gland. Samaras 55–80 × 35–60 mm. . . . . *Jubelina.*
                    23. Leaf blades thinly sericeous to glabrate at maturity. Bracts and bracteoles 0.5–1.3 mm long. Sepals 1.8–2.5 mm long, not inflated, the lateral 4 each bearing 2 abaxial glands. Samaras to 30 mm diam. . . . . *Mascagnia.*

BANISTERIOPSIS C. B. Rob.

Lianas (our species), vines, shrubs, or rarely small trees. Stipules small, distinct, interpetiolar. Inflorescences: peduncle usually absent or very short, but well developed in a few species. Flowers: anterior sepal eglandular, the lateral 4 (in ours) biglandular; petals yellow, pink, or white; anthers alike in some species but more commonly strongly dissimilar; styles 3, the stigmas terminal, without dorsal extensions.

Fruits breaking apart into 3 samaras, samara with dorsal wing dominant, thickened on adaxial (upper) edge, the veins terminating in thinner abaxial edge; much shorter winglets or crests present on sides of nut in some species.

Gates, B. 1982. *Banisteriopsis, Diplopterys* (Malpighiaceae). Fl. Neotrop. Monogr. **30:** 1–237.

1. Larger leaf blades 4.5–9 cm long. Branches of inflorescence terminating in umbels of 4–6 flowers; bracts and bracteoles deciduous. Petals pink. . . . . *B. schwannioides.*
1. Larger leaf blades 9.5–22 cm long. Branches of inflorescence terminating in pseudoracemes of 10–40 flowers; bracts and bracteoles persistent. Petals yellow.
   2. Leaves bearing several minute glands along margin of blade, plus 1 pair of larger glands at apex of petiole. Sepals appressed during flowering; lateral petals entire, denticulate, or dentate, posterior petal short-fimbriate; anthers all with connective not glandular-swollen; styles ± equal in length. . . . . *B. wurdackii.*
   2. Leaves usually bearing 2 large glands at juncture of blade and petiole and otherwise eglandular. Sepals becoming revolute during flowering; petals all fimbriate; anthers opposite 3 anterior sepals with connective glandular-swollen; anterior style much shorter than 2 posterior styles. . . . . *B. carolina.*

Banisteriopsis carolina W. R. Anderson

Lianas. Leaves: longer petioles 9–15 mm long, eglandular or biglandular at apex; larger blades elliptic or slightly ovate, 9.5–13.2 × 5–7.3 cm, initially thinly sericeous on both sides, at maturity glabrate adaxially and very thinly sericeous (apparently glabrate) abaxially, mostly bearing a pair of bulging glands at juncture of lamina and petiole and otherwise eglandular, the base obtuse to rounded, the apex abruptly short-acuminate. Inflorescence a slender axis 15–30 cm long, axillary to a full-sized vegetative leaf and bearing several pairs of much reduced leaves, each subtending 1 pseudoraceme of 15–35 flowers; bracts and bracteoles 0.7–1 mm long, persistent; pedicels 6–7.5 mm long, occasionally sessile but mostly raised on a peduncle 0.3–1 mm long. Flowers: sepals 2 mm long, becoming revolute during flowering; petals bright yellow, glabrous, the limb fimbriate all around margin with divisions glandular, at least proximally, on posterior 3 petals; anthers glabrous, the 3 opposite anterior sepals with connective glandular and much enlarged; anterior style ca. 2 mm long, bending forward at base and then erect, the 2 posterior styles 2.7–3 mm long, lyrate, bending strongly backward at base and then sigmoid-ascending. Fruits unknown. Fl (Feb); in non-flooded moist forest.

Banisteriopsis schwannioides (Griseb.) B. Gates FIG. 172

Lianas. Leaves: longer petioles 3–7 mm long, eglandular; larger blades ovate or elliptic to orbicular, 4.5–9 × 2.2–4.8 cm, tomentose to glabrate adaxially, persistently sericeous abaxially, bearing a pair of glands abaxially at base beside midrib and often 1–2 smaller pairs distally between midrib and margin, the base broadly cuneate or truncate to subcordate, the apex acuminate to apiculate. Inflorescences terminal or axillary, cymose, the ultimate branches umbels of 4–6 flowers; bracts and bracteoles 1.2–2 mm long, deciduous during or soon after flowering; pedicels 11–24 mm long, sessile or subsessile, the peduncle to 0.5 mm long. Flowers: sepals 3–5 mm long, appressed during flowering; petals pink, glabrous, dentate to fimbriate; anthers glabrous or sparsely pilose, the anterior 5 with enlarged glandular connectives, those opposite anterior-lateral sepals with connectives much exceeding locules; anterior style much thicker than posterior 2, the stigmas capitate. Samaras with dorsal wing 27–30 × 11–13 mm, the nut tuberculate to aculeate on sides. Fl (Nov); in nonflooded moist forest.

The Saül collections of this species have the leaf hairs more appressed than other populations, which all occur along the Amazon River in Brazil. Also, their petals are more deeply dissected and the anther locules are sparsely pilose, whereas they are glabrous in the Amazon. Perhaps eventually the French Guianan population will prove to be taxonomically recognizable, but for now it is best left in *B. schwannioides*, which it resembles in most characters.

Banisteriopsis wurdackii B. Gates

Lianas. Leaves: longer petioles 7–12 mm long, biglandular at apex; larger blades ovate to broadly elliptic, 10–22 × 4.5–11 cm, glabrous adaxially, sparsely sericeous abaxially, bearing minute glands on margins, the base cuneate to obtuse or rarely cordate, the apex short- to long-acuminate. Inflorescences axillary, paniculate, the ultimate branches pseudoracemes of 10–40 flowers; bracts and bracteoles 0.6–1 mm long, persistent; pedicels 6–12 mm long, subsessile, the peduncle 0.5–2 mm long. Flowers: sepals 1.2–1.6 mm long, appressed during flowering; petals glabrous, yellow, the lateral 4 entire or denticulate, the posterior short-fimbriate with basal fimbriae often glandular; anthers glabrous, the connectives not glandular-swollen; styles ± equal, the stigmas truncate. Samaras with dorsal wing 24–38 × 10–15 mm; nut bearing on each side a single wing parallel to areole, 4–10 × 2–4 mm, rarely absent. Fr (Dec); in nonflooded moist forest.

BUNCHOSIA Kunth

Trees or shrubs. Stipules small, distinct, borne on base of petiole. Leaves: petioles eglandular; blades usually bearing glands impressed in abaxial surface. Inflorescences elongate axillary pseudoracemes; bracts eglandular; bracteoles with 1 or both usually bearing 1(2) abaxial glands. Flowers: petals glabrous, yellow; anthers ± alike; carpels 2 (in our species) or 3; styles as many as carpels, distinct or partially to completely connate, stout, the large terminal stigmas subpeltate or apparently capitate. Fruits drupaceous, containing as many pyrenes as carpels in common fleshy exocarp, yellow, orange, or red at maturity, the pyrenes elongate, round or elliptic in transverse section, free from each other at maturity, with smooth, brittle, cartilaginous wall.

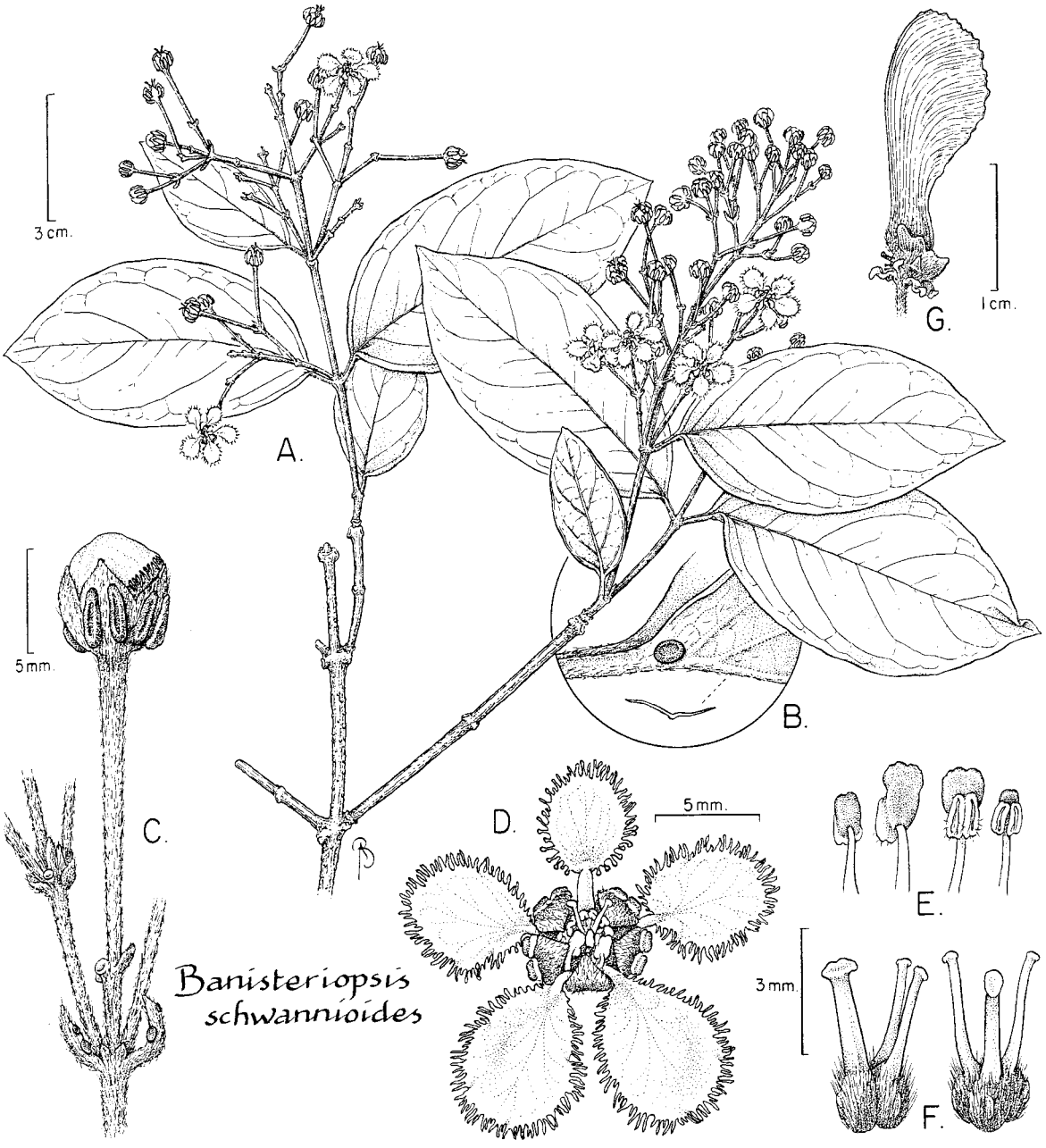

FIG. 172. MALPIGHIACEAE. *Banisteriopsis schwannioides* (A–F, *Mori et al. 21590*; G, *Ducke 11018* from Brazil). **A.** Part of stem with leaves and inflorescences. **B.** Detail of base of leaf showing abaxial gland and hair. **C.** Detail of cymose inflorescence showing one of the four flowers of the central umbel (in bud), the pedicels of three of the four flowers in the umbel on the left, and only the stalk of the umbel on the right; the bracts and bracteoles that subtend the pedicels are deciduous during or soon after flowering. **D.** Apical view of flower with posterior petal uppermost. **E.** Abaxial (left) and adaxial (right) views of anthers, the middle two from stamens opposite the anterior-lateral sepals, the outer two from stamens opposite the anterior-lateral petals. **F.** Lateral (left) and frontal (right) views of gynoecium; note that the anterior style is much thicker than the two posterior styles. **G.** Samara with large dorsal wing and outgrowths on side of nut.

1. Leaf blades nearly or quite glabrate at maturity, plane or slightly revolute at margin. Pseudoracemes usually bearing 20–40 or more flowers, 1 per bract. Style(s) glabrous, ca. 1.5 mm long. Dried fruits to 16 mm long, 16 mm diam., the apex rounded, the wall granulate. . . . . *B. decussiflora.*
1. Leaf blades thinly but persistently sericeous abaxially, undulate and crispate at margin. Pseudoracemes bearing 10–20 flowers, sometimes 2 (1 above the other) in axil of 1 bract. Style sericeous, ca. 3–3.5 mm long. Dried fruits 20–28 mm long, 15–20 mm diam., the apex beaked, the wall smooth. . . . . *B. glandulifera.*

Bunchosia decussiflora W. R. Anderson FIG. 173

Shrubs or trees, 3–12(25) m tall. Leaves: longer petioles 6–15 mm long; larger blades elliptic or slightly ovate or obovate, 13–23 × 4.5–8.5 cm, nearly or quite glabrate at maturity, the base cuneate, the apex acuminate, the margins plane or slightly revolute. Inflorescences usually 7–15 cm long, bearing 20–40 or more flowers, 1 per bract. Flowers: ovary bicarpellate, sericeous, the style usually 1 (formed from 2 completely connate) or occasionally 2 (ca. 1/2-connate), 1.5 mm long, glabrous. Fruits 9–16 × 9–16 mm (dried), orange to red, the apex rounded, the wall granulate. Fl (Jan, Jul); in forest.

Bunchosia glandulifera (Jacq.) Kunth

Shrubs or small trees, 2–6(8) m tall. Leaves: longer petioles 6–8 mm long; larger blades elliptic or ovate, 11–18 × 5.5–10(12) cm, thinly but persistently sericeous abaxially, the base cuneate to rounded and often slightly attenuate, the apex long-acuminate, the margins undulate and crispate. Inflorescences 4–11 cm long, bearing 10–20 flowers, sometimes 2 (1 above the other) in axil of same bract. Flowers: ovary bicarpellate, sericeous, the style 1 (formed from 2 completely connate styles), 3–3.5 mm long, sericeous. Fruits 20–28 × 15–20 mm (dried), orange to red, the apex with elongate beak, the wall smooth. Cultivated for the large edible fruits; not native or naturalized in our area.

BYRSONIMA Kunth

Trees or shrubs. Leaves, bracts, and bracteoles eglandular. Stipules intra- and epipetiolar, distinct or partially to completely connate. Inflorescences terminal, racemes of few-flowered cincinni or pseudoracemes (i.e., raceme of 1-flowered cincinni). Flowers: sepals all eglandular or all biglandular; petals yellow, white, pink, or red; anthers ± alike; styles 3, slender and subulate, the stigmas minute and apical or slightly internal. Fruits drupes, the thin flesh turning yellow, orange, red, purple, blue, or blue-black at maturity, the single stone with hard wall, trilocular.

1. Stipules distinct, 1.5–3 mm long. Inflorescence bracts 0.8–1.5 mm long. Petals white turning pink or red; anthers glabrous; ovary glabrous. Fruits 5–8 mm diam. (dried), glabrous. . . . . *B. densa.*
1. Stipules completely connate, at least 2.5 mm long. Inflorescence bracts 3.5–10 mm long. Petals yellow; anthers sericeous; ovary sericeous or short-velutinous. Fruits 10–18 mm diam. (dried), sericeous or tomentose to glabrate.
   2. Stipules 2.5–4.5 mm long, persistent on base of petiole. Leaf blades sericeous to glabrate abaxially, the hairs all sessile, straight, appressed, 2-branched. . . . . *B. aerugo.*
   2. Stipules (8)12–25 mm long, deciduous before leaves. Leaf blades velutinous abaxially, some hairs stalked and stellate (i.e., with more than 2 branches). . . . . *B. stipulacea.*

Byrsonima aerugo Sagot FIG. 174, PL. 80b

Trees, (4)15–45 m tall. Stems tightly sericeous. Stipules 2.5–4.5 mm long, completely connate, persistent. Leaves: longer petioles (15)20–40 mm long; larger leaf blades elliptic or slightly obovate, 11–22(25) × 4–9(11) cm, densely ferruginous-sericeous abaxially, the hairs sometimes patchily deciduous and blade eventually nearly glabrate, the hairs sessile, straight, appressed, the base cuneate or attenate, the apex acute or usually acuminate. Inflorescences: bracts 3.5–5 mm long; bracteoles 0.6–1.5 mm long. Flowers: petals yellow; anthers 2–3 mm long, sericeous, especially between locules, the connective equalling locules or extended beyond them to 0.6 mm; ovary densely sericeous. Fruits 10–13 mm diam. (dried), sericeous to glabrate, yellow. Fl (May), fr (Jun); in nonflooded moist forest.

This species is very close to *Byrsonima crispa* A. Juss., which is not known from the Guianas but extends from eastern Brazil through much of Amazonia. The only real difference between them is that the leaves of *B. crispa* are never densely sericeous as in *B. aerugo*; they have similar hairs, but they are very sparse, hardly visible without a lens. When the leaves of *B. aerugo* are glabrescent, as they tend to be in the populations in our area, the similarity of the two species is inescapable. *Byrsonima crispa* is much the older of the two names.

Byrsonima densa (Poir.) DC.

Trees, 5–30(40) m tall. Stems glabrous except hirsute in axils of stipules. Stipules 1.5–3 mm long, distinct, persistent. Leaves: longer petioles 7–12 mm long, sericeous to glabrate; larger blades elliptic or obovate, 9–12(13.5) × 3.8–5(7) cm, initially sericeous but soon nearly or quite glabrate, the base cuneate, the apex obtuse, acute, or abruptly short-acuminate. Inflorescences: bracts 0.8–1.5 mm long; bracteoles 0.5–1 mm long. Flowers: petals white turning pink or red; anthers 0.9–1.2 mm long, glabrous, the connective exceeding locules by 0.2–0.5 mm; ovary glabrous. Fruits 5–8 mm diam. (dried), green contrasting with subtending red sepals, glabrous. Fl (May), fr (Nov); in nonflooded moist forest.

Byrsonima stipulacea A. Juss. PL. 80c

Trees, 8–25 m tall. Stems velutinous. Stipules (8)12–25 mm long, amplexicaulous, completely connate, each pair deciduous independently of and often well before leaf. Leaves: longer petioles 12–27 mm long, velutinous; larger leaf blades elliptic or rhombic, 12–27 × 6–13 cm, velutinous (to glabrescent adaxially) with mixture of long, basifixed simple hairs, stalked stellate hairs, and sessile stellate hairs, the base cuneate, the apex acute or obtuse, sometimes acuminate or rounded. Inflorescences: bracts 6–10 mm long; bracteoles 2.5–5 mm long. Flowers: petals yellow; anthers 2.2–4.2 mm long, loosely sericeous on both sides, the connective usually exceeding locules by 0.4–1.1 mm; ovary densely short-velutinous with overlay of appressed hairs. Fruits 12–18 mm diam. (dried), tomentose to glabrate, orange-yellow. Fr (Dec, Aug); in nonflooded moist forest.

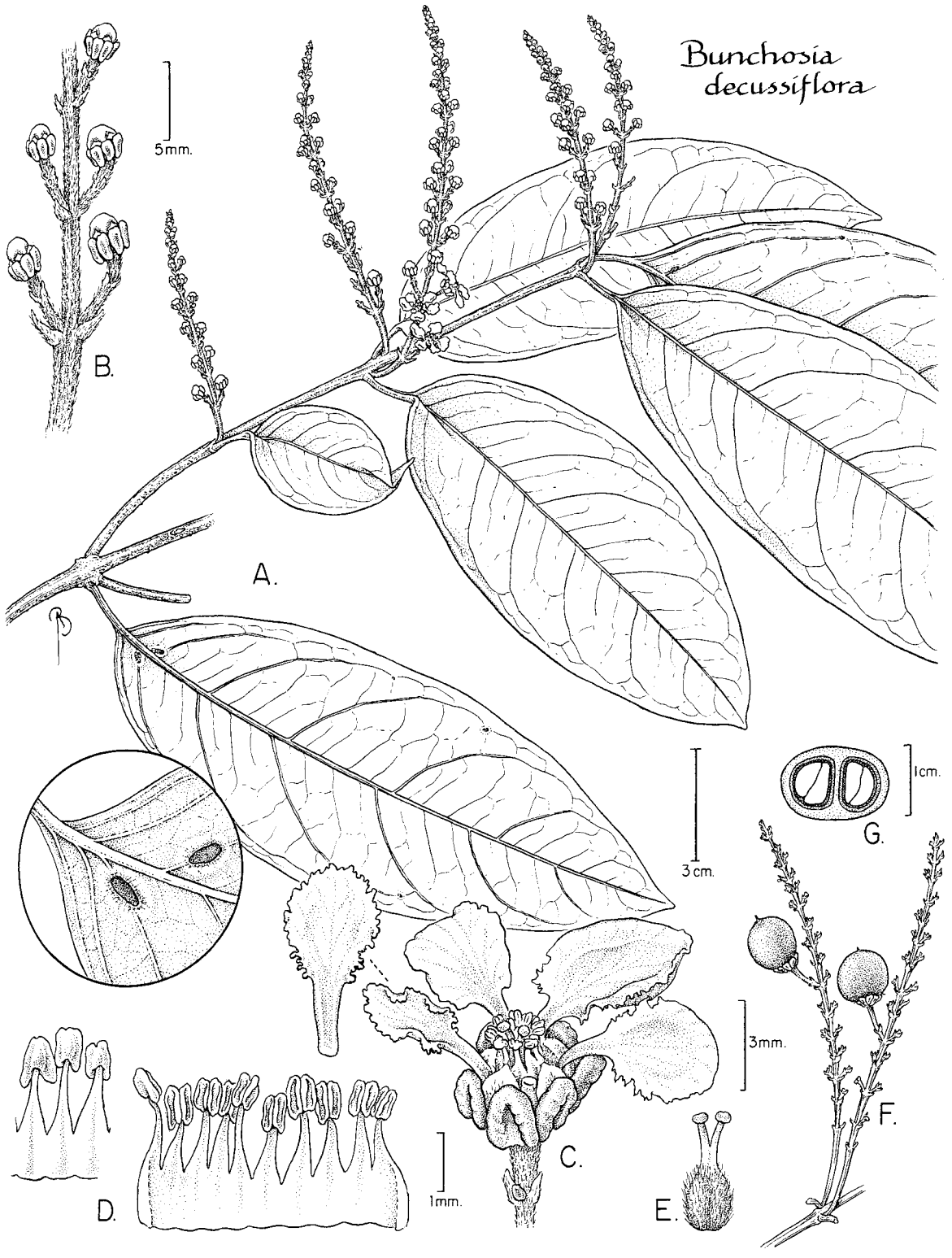

FIG. 173. MALPIGHIACEAE. *Bunchosia decussiflora* (A–E, *Cremers 7560* from Mana River, French Guiana; F, *Silva & Brazão 60764* from Brazil; G, *Cremers 6531* from between Sommet Tabulaire and Massif des Emerillons, French Guiana). **A.** Part of stem with leaves and inflorescences and detail of abaxial leaf base showing glands. **B.** Part of decussate pseudoraceme with flower buds. **C.** Oblique-lateral view of flower with posterior petal to left and also shown adaxially above left; one posterior-lateral petal has been removed; note gland on one bracteole. **D.** Adaxial view of opened androecium (right) and abaxial view of part of androecium with three stamens (left). **E.** Bicarpellate gynoecium, the two styles half-connate. **F.** Fruiting pseudoracemes. **G.** Transverse section of fruit, showing two large seeds, each enclosed in a thin, cartilaginous endocarp, the two pyrenes borne in thin common flesh.

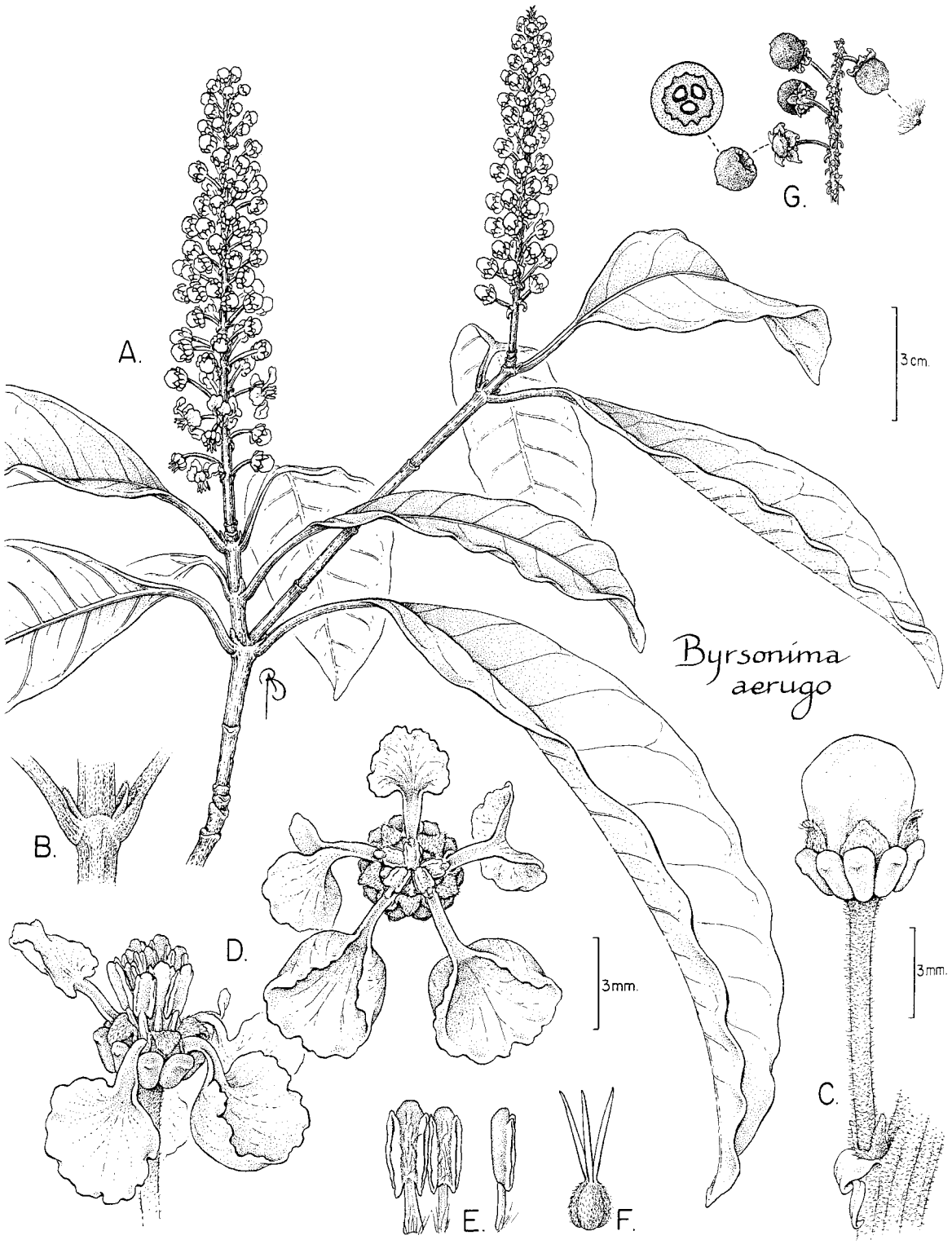

FIG. 174. MALPIGHIACEAE. *Byrsonima aerugo* (A–F, *Mori et al. 22196*; G, *Liesner 19586* from Venezuela). **A.** Stem with leaves and inflorescences. **B.** Node showing petiole bases and connate intrapetiolar stipules. **C.** Flower bud with sessile pedicel subtended by two short bracteoles and one long, reflexed bract; note oil glands on calyx. **D.** Lateral (left) and apical (right) views of flowers. **E.** Adaxial (left) and lateral (right) views of stamens. **F.** Gynoecium. **G.** Part of infructescence (right) with one fruit removed (near left), and transverse section of fruit (far left), showing three seeds in a common stony endocarp surrounded by fleshy mesocarp; detail of sericeous apex of fruit (above, far right).

HETEROPTERYS Kunth

Lianas (our species), vines, shrubs, or small trees. Stipules very small, distinct, triangular, borne on or beside base of petiole, or absent. Leaves usually bearing glands. Inflorescences umbels, corymbs, or pseudoracemes, these single or grouped in axillary or terminal racemes or panicles. Flowers: petals mostly yellow or pink; anthers ± alike; styles 3, the apex with large, usually internal stigma and dorsally rounded, truncate, acute, or hooked. Fruits breaking apart into 3 samaras, the samara with dorsal wing dominant, thickened on abaxial (lower) edge and usually bent upward, the veins terminating in thinner adaxial edge; much shorter winglets or crests present on sides of nut in some species.

Heteropterys oligantha W. R. Anderson
FIG. 175; PART 1: FIG. 6 as *H. siderosa*

Lianas. Stipules apparently absent. Leaves: longer petioles 4–10 mm long; larger leaf blades elliptic, 8–16.5 × 3–7.5 cm, bearing several abaxial glands scattered on proximal half between midrib and margin, the base cuneate to rounded, the apex abruptly short-acuminate. Inflorescences axillary panicles 3–5(10) cm long, always shorter than subtending leaf, with branches terminating in umbels of 4 flowers sometimes subtended by an additional pair of flowers. Flowers: sepals becoming revolute at apex during flowering, all eglandular or the anterior eglandular and the lateral 4 biglandular; petals abaxially sericeous on claw, yellow. Samaras falcate, the nut nearly horizontal and the wing strongly ascending; nut of samara cylindrical but laterally compressed, 5–8 mm long, smooth-sided; wing of samara 40–50 × 13–17 mm. Fl (Feb), fr (Apr); in moist forest.

HIRAEA Jacq.

Lianas, occasionally shrubby. Stipules borne on petiole, most often at or above middle, usually long and subulate. Leaves usually bearing glands; tertiary veins often strongly parallel. Inflorescences axillary, usually 1–several umbels of 4 or many flowers; pedicels sessile. Flowers: sepals all eglandular or anterior eglandular and lateral 4 biglandular; petals yellow or yellow with red markings (almost completely red during flowering in *H. morii*); anthers ± alike; styles 3, the apex with large internal stigma and dorsally rounded to prominently hooked. Fruits breaking apart into 3 samaras, the samara with largest wings lateral, usually with 2 discrete wings, then butterfly-shaped, the dorsal wing small, sometimes reduced to a crest or lost, intermediate winglets or slender projections rarely present.

1. Petioles 20–40 mm long; blades densely and persistently velutinous abaxially, the hairs Y- or T-shaped. . . . . *H. gracieana.*
1. Petioles 4–15 mm long; blades sericeous to glabrate abaxially at maturity, the hairs (if present) sessile, straight, appressed.
   2. Stipules 1–2 mm long. Leaf blade margins eglandular. Inflorescences 1–7 unbranched, 4-flowered umbels arranged vertically. Posterior petal eglandular. Samaras with dorsal wing absent or represented by rounded crest 0.2(0.5) mm high. . . . . *H. affinis.*
   2. Stipules 2.5–5.5 mm long. Leaf blade margins eglandular or, usually, bearing small glands distally. Inflorescences 1–2 mostly ternate cymes of 4-flowered umbels, sometimes only 1 of 3 umbels of cyme developing. Posterior petal glandular-dentate or glandular-fimbriate. Samaras with dorsal wing small but present, at least 1.5 mm high (samara not yet known for *H. morii*).
      3. Larger leaf blades 8–16 × 3–7 cm; secondary veins connected by cross-veins 1–1.5 mm apart. Pedicels 9–14 mm long. Petals yellow, sometimes turning reddish in age. . . . . *H. fagifolia.*
      3. Larger leaf blades 16–19 × 7.5–11 cm; secondary veins connected by cross-veins 2–4 mm apart. Pedicels 15–17 mm long. Petals red. . . . . *H. morii.*

Hiraea affinis Miq. PART 1: FIG. 6

Stems sericeous to glabrate. Stipules 1–2 mm long. Leaves: longer petioles 4–11 mm long; larger blades elliptic or obovate, 11–23 × (4)5–12 cm, apparently glabrous (actually often sparsely sericeous abaxially with tiny straight white appressed hairs), eglandular on margins, the base rounded or cordate, the apex obtuse, acute, or short-acuminate; secondary veins connected by parallel cross-veins mostly 2–5 mm apart. Inflorescences 1–7 unbranched, 4-flowered umbels arranged in vertical row in axil; pedicels (9)11–18 mm long, sericeous. Flowers: petals light yellow, all eglandular; styles with rounded dorsal hook at apex. Samaras with lateral wings 40–56 × 22–30 mm, the dorsal wing absent or represented by a rounded crest 0.2(0.5) mm high. Fr (May); in nonflooded moist forest.

Hiraea fagifolia (DC.) A. Juss. PL. 80d

Stems sericeous to glabrate. Stipules 2.5–5 mm long. Leaves: longer petioles (4)6–10(15) mm long; larger blades elliptic or somewhat ovate or obovate, 8–16 × 3–7 cm, soon glabrate except for sericeous abaxial midrib, eglandular on margins or bearing few small buttonlike glands distally, the base cuneate to rounded, the apex mostly acuminate (occasionally acute or obtuse); secondary veins connected by parallel cross-veins 0.5–1.5 mm apart. Inflorescences mostly cymes of 3 4-flowered umbels, sometimes only 1 of 3 umbels developing, sometimes 2 cymes present, one borne above the other, loosely sericeous; pedicels 9–14 mm long, sericeous. Flowers: petals yellow, sometimes turning reddish in age, the lateral 4 eglandular, the posterior glandular-dentate or glandular-fimbriate; styles with short acute or obtuse dorsal hook at apex. Samaras mostly butterfly-shaped, with unlobed membranous lateral wings

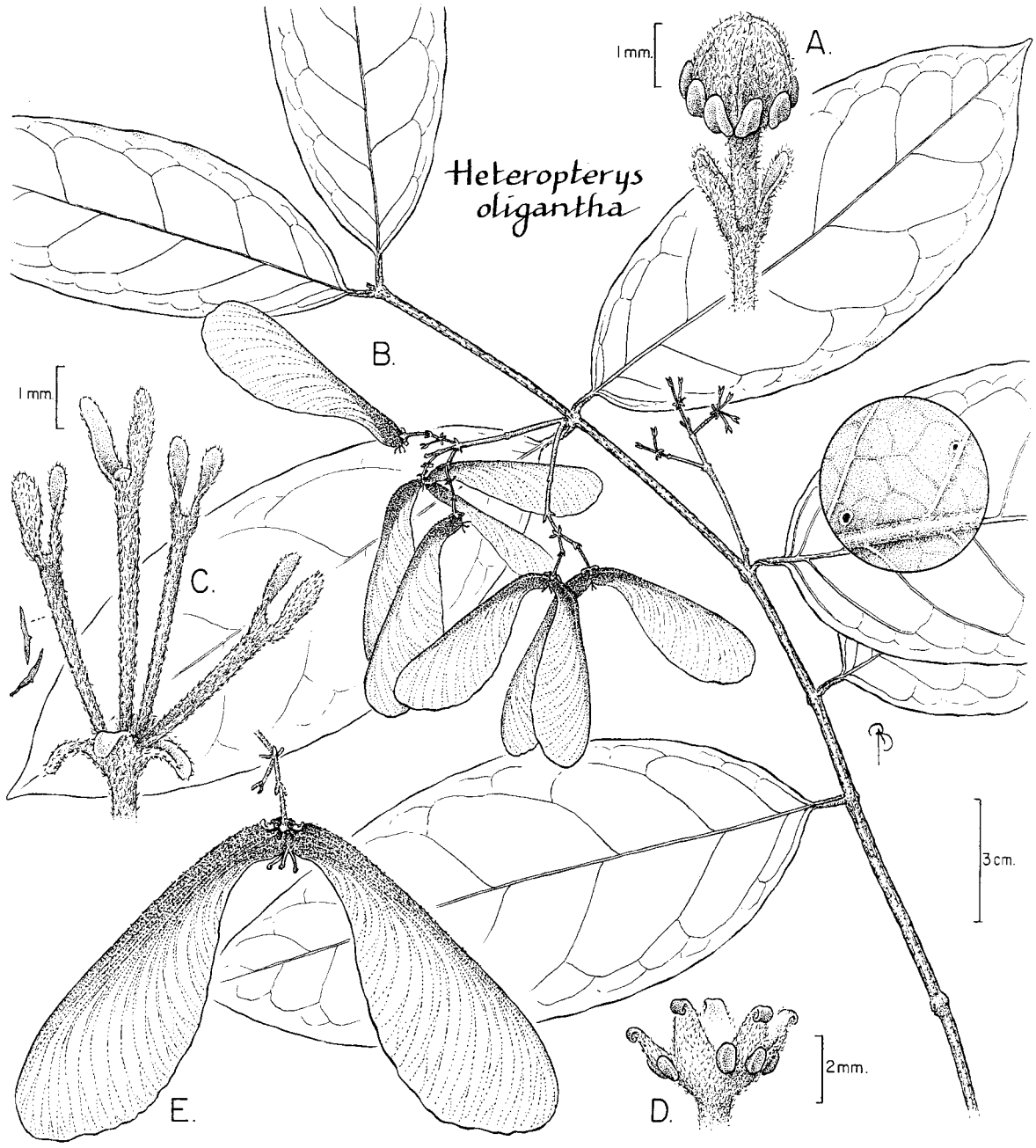

FIG. 175. MALPIGHIACEAE. *Heteropterys oligantha* (A, *Oldeman 2034*; B–E, *Mori & Pipoly 15549*). **A.** Lateral view of flower bud with sepals completely concealing petals. **B.** Part of stem with leaves and infructescences and detail of abaxial leaf surface showing dark bordered glands. **C.** Umbel of four peduncles subtended by reflexed bracts, each peduncle bearing at its apex two long, narrow, erect or spreading bracteoles with detail of malpighiaceous hairs. **D.** Lateral view of old flower with revolute sepals, four of the five sepals abaxially biglandular. **E.** Fruit comprising two samaras; the third carpel has aborted.

20–32 × 15–16 mm and dorsal wing 2–5 × 1.5–2 mm, but sometimes lateral wings coriaceous and irregularly lobed or reduced. Fl (Feb, Apr), fr (Apr); in moist forest.

Hiraea gracieana W. R. Anderson FIG. 176

Stems, leaves (at least abaxially), and inflorescences persistently velutinous, the hairs Y- or T-shaped. Stipules 3–5 mm long. Leaves: longer petioles 20–40 mm long; larger blades broadly elliptic or obovate, 19–34 × 11.5–18 cm, bearing small buttonlike glands distally on margins, the base broadly cuneate or rounded, the apex obtuse or rounded and abruptly short-acuminate and often apiculate; secondary veins connected by parallel cross-veins 2–6 mm apart. Inflorescences compact cymes of 3–7 4-flowered umbels, occasionally 2 cymes, one borne above the other; pedicels 16–25 mm long, persistently velutinous. Flowers: petals bright

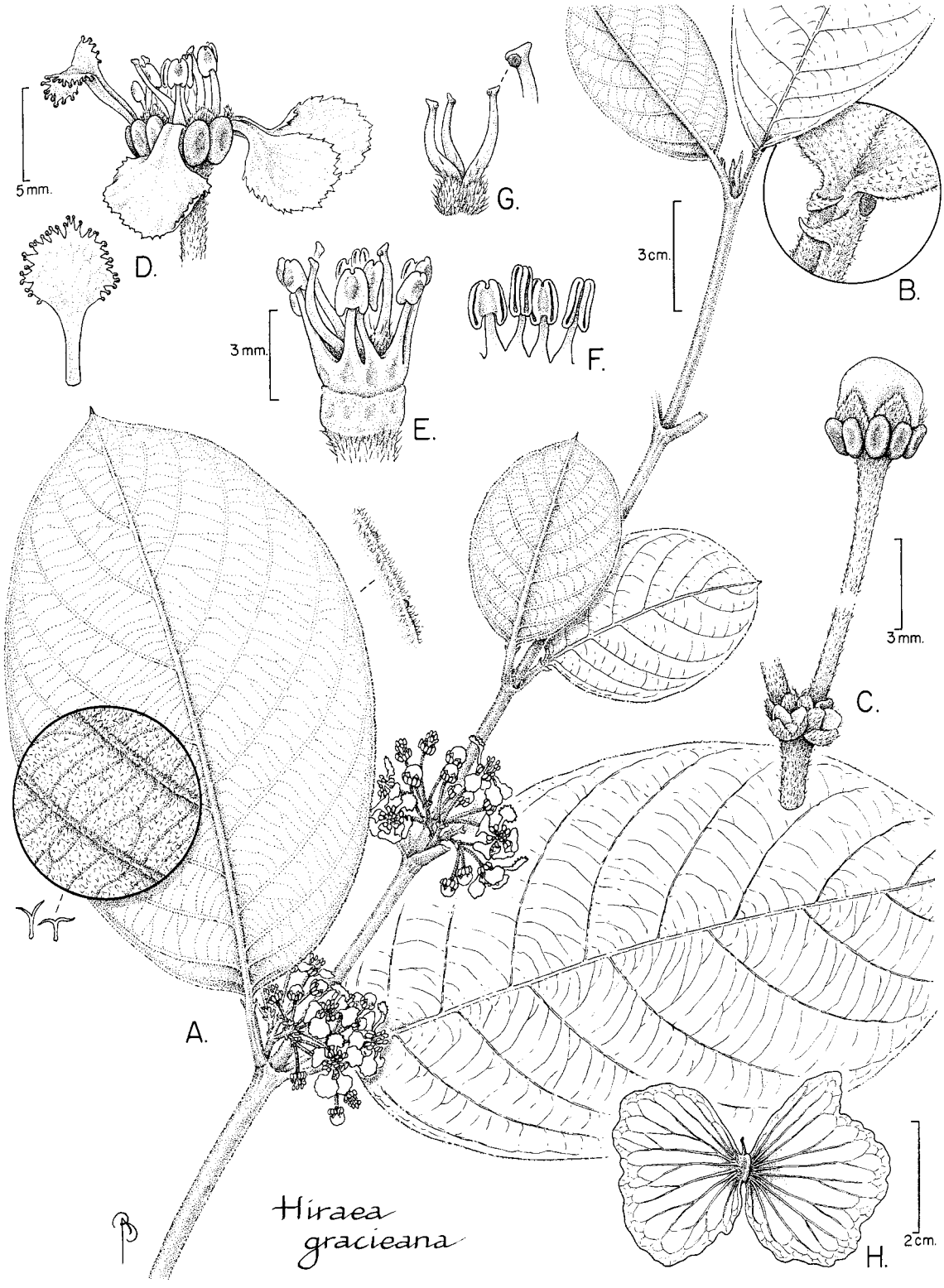

FIG. 176. MALPIGHIACEAE. *Hiraea gracieana* (*Mori et al. 22751*). **A.** Apex of stem with leaves, inflorescences, and details (left) of gland-bearing leaf margin (right) and abaxial leaf surface with stalked malpighiaceous hairs (left). **B.** Detail of apex of petiole with adaxial stipules and abaxial glands. **C.** Part of inflorescence showing one four-flowered umbel (two flowers removed), each pedicel subtended by two bracteoles and one bract. **D.** Lateral view of flower, the posterior petal uppermost (above) and adaxial view of posterior petal (below). **E.** Lateral view of flower with perianth removed; note connate bases of filaments. **F.** Adaxial view of part of androecium. **G.** Lateral view of gynoecium, the anterior style to the right and detail of apex of anterior style. **H.** Abaxial view of samara.(Reprinted from W. R. Anderson, Mem. New York Bot. Gard. 46(2), 1994.)

yellow, the lateral 4 eglandular, the posterior glandular-dentate; styles with a very short dorsal point at apex. Samaras with lateral wings 25–38 × 20–25 mm, the dorsal wing 3–5 × 1–1.5 mm. Fl (Nov), fr (Nov); in nonflooded moist forest.

Hiraea morii W. R. Anderson

Stems and leaf blades loosely sericeous to glabrate. Stipules 2.5–5.5 mm long. Leaves: longer petioles 8–15 mm long; larger blades obovate, 16–19 × 7.5–11 cm, bearing small buttonlike or short-cylindrical glands distally on margins, the base rounded, the apex short-acuminate to rounded; secondary veins connected by parallel cross-veins 2–4 mm apart. Inflorescences single cymes of 3 short-stalked, 4-flowered, side-by-side umbels with common stalk ± completely suppressed, sericeous to subvelutinous; pedicels 15–17 mm long, thinly sericeous, the hairs fusiform, short-stalked, ca. 0.5 mm long. Flowers: petals yellow in bud, red during flowering, the lateral 4 eglandular, the posterior glandular-dentate; styles with short acute dorsal projection at apex. Samaras unknown. Fl (Apr); in secondary vegetation.

JUBELINA A. Juss.

Lianas. Stipules small, triangular, borne on base of petiole. Leaves: petioles eglandular; blades usually bearing abaxial impressed glands; tertiary veins strongly parallel. Inflorescences decompound, the flowers ultimately borne in umbels of 4 or corymbs of 6; bracts and bracteoles large, pubescent on both sides. Flowers: calyx with anterior sepal eglandular and 1 large gland on each of 4 lateral sepals; petals pink or yellow; styles 3, the apex with large stigma on internal angle, dorsally truncate or short-hooked. Fruits breaking into 3 samaras, the samara with large lateral wings dominant, distinct at apex, confluent to nearly distinct at base, and smaller semicircular central dorsal wing.

Anderson, W. R. 1990. The taxonomy of *Jubelina* (Malpighiaceae). Contr. Univ. Michigan Herb. **17:** 21–37.

Jubelina rosea (Miq.) Nied. FIG. 177, PL. 81a

Stems, leaves, and inflorescence velutinous, the hairs Y-shaped. Leaves: longer petioles 7–21 mm long; larger blades obovate to broadly elliptic to rotund, 10–20 × 5–13 cm, bearing several glands abaxially in a row, the base cuneate or truncate, the apex rounded or short-acuminate. Inflorescences: bracts and bracteoles pink, 6–9 mm long; peduncles 1–3 mm long; pedicels 6–12 mm long. Flowers: sepals pink, 5–8.5 mm long, reflexed, distally inflated with aerenchyma; petals pink, the lateral 4 mostly abaxially sericeous, the posterior glabrous. Samaras roughly elliptic in outline, 55–80 × 35–60 mm, with corrugated and deeply lobed wing between large membranous outer lateral wing and central dorsal wing. Fl (Sep); in nonflooded moist forest.

MALPIGHIA L.

Shrubs or small trees. Stipules small, borne on stem between petioles. Leaves: petioles eglandular; blades usually bearing 2(10) glands abaxially. Inflorescences axillary corymbs or umbels; bracts and bracteoles eglandular; pedicels pedunculate. Flowers: petals pink, pale purple, or white; stamens 10, glabrous; ovary with 3 carpels usually completely connate, the 3 locules all fertile, the styles 3, the apex with large internal or subterminal stigma, dorsally rounded, truncate, or hooked. Fruit fleshy drupes (or berries), red or orange, with 3 pyrenes united in center or free at maturity but then usually retained in common fleshy exocarp, the hard wall of each pyrene showing rudimentary dorsal and lateral wings and sometimes rudimentary intermediate winglets or dissected outgrowths.

Malpighia emarginata DC.

Shrubs or small trees, 2–6 m tall, much branched with stiff branchlets. Leaves sometimes crowded in dense shoots with very short internodes, the same plants also bearing stems with well developed internodes; longer petioles (1)2–4 mm long; larger blades ovate, elliptic, or obovate, 2.5–10 × 1.4–5 cm, bearing 2(4) glands abaxially, sparsely sericeous or glabrate, the base cuneate or rounded, the apex most often rounded or obtuse, but sometimes emarginate and apiculate. Inflorescences umbels, sessile or raised on a stalk 1–3(5) mm long and containing 2–4 flowers. Flowers: calyx bearing 6–10 glands; petals pink or purplish, the lateral 4 with narrow abaxial keel; stamens heteromorphic, those opposite posterior-lateral petals with thicker filaments and larger anthers than others; styles dorsally truncate or apiculate at apex. Fruits to 17 × 22 mm, red. Cultivated for the edible fruit rich in vitamin C; not native or naturalized in our area. *Acerola* (origin unknown), *Barbados cherry* (English), *cerise de Cayenne* (Créole).

MASCAGNIA (DC.) Colla

Vines, mostly lianas. Stipules small, free, triangular, borne between petioles or on base of petiole. Leaves usually bearing glands. Inflorescences mostly axillary or terminal pseudoracemes, sometimes congested and reduced to form corymbs or umbels, single or grouped in panicles; floriferous peduncle usually well developed. Flowers: petals yellow or yellow and orange, pink, lilac, or white; stamens 10, the anthers ± alike; ovary with 3 carpels connate along central axis, all fertile, the styles 3, the apex with large internal stigma, dorsally rounded, truncate, acute, or short-hooked. Fruits breaking into 3 samaras, the samara with its largest wings lateral, a single wing continuous at base or at both base and apex, or 2 discrete wings, the dorsal wing small, sometimes reduced to a crest or lost.

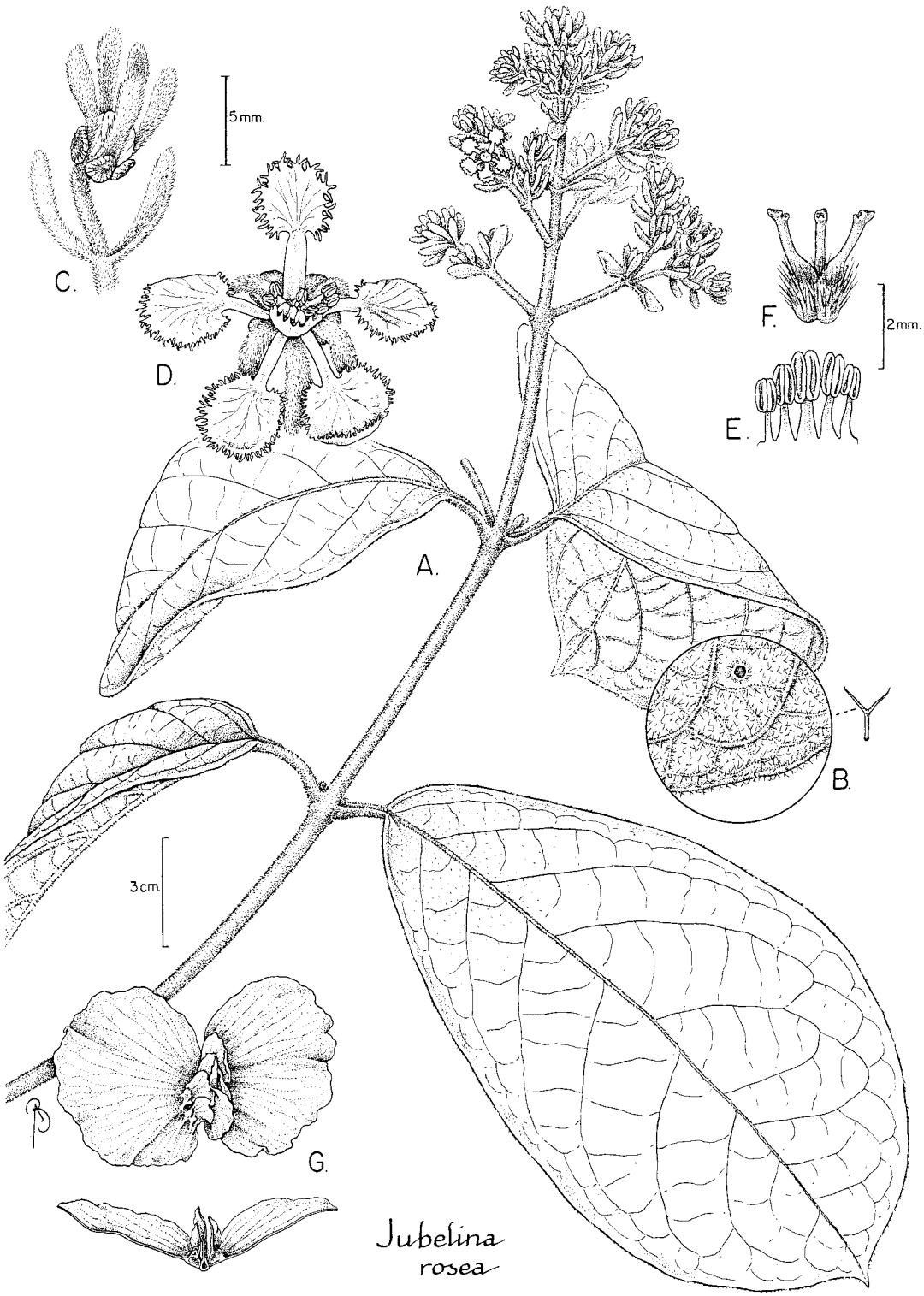

FIG. 177. MALPIGHIACEAE. *Jubelina rosea* (A–D, *Mori et al. 20929*; E, F, *Mori & Bolten 8551* from Surinam; G, *Mori & Bolten 8399* from Surinam). **A.** Apex of stem with leaves and inflorescence. **B.** Detail of abaxial leaf surface showing gland and stalked, bifurcate hair. **C.** Flower bud showing spatulate bracteoles and sepals, each lateral sepal bearing one large abaxial gland. **D.** Oblique-apical view of flower, the posterior petal uppermost. **E.** Adaxial view of part of the androecium, the central stamen opposite one of the posterior-lateral petals. **F.** Lateral view of gynoecium with anterior style in center. **G.** Abaxial view of samara (above) and medial section of samara (below).

Mascagnia divaricata (Kunth) Nied. FIG. 178, PL. 81b

Lianas. Leaves: longer petioles 10–19(24) mm long; larger blades narrowly to broadly ovate, 6–13 × 3.5–6.5(8) cm, thinly sericeous to glabrate at maturity, the base broadly cuneate to rounded, the apex gradually to abruptly acuminate. Inflorescences paniculate, velutinous, the hairs short and gray, the ultimate branches pseudoracemes of 7–35 flowers; bracts and bracteoles 0.5–1.3 mm long, persistent; pedicels 5–10(12) mm long, raised on peduncles 1–3(5) mm long. Flowers: sepals 1.8–2.5 mm long, the anterior eglandular, the lateral 4 biglandular; petals lilac or pinkish lilac, sometimes with yellow area at base of limb; anthers pilose, the connective not exceeding locules; styles dorsally apiculate or short-hooked at apex. Samaras subcircular, (18)20–30 × (18)20–28 mm, the lateral wing continuous at base and divided to halfway to nut at apex, the dorsal wing 4–6 × 1.5–4.5 mm. Fl (Mar, May), fr (Sep); in nonflooded moist forest.

MEZIA Nied.

Lianas, shrubs, or small trees. Stipules minute, interpetiolar, caducous, or absent. Leaves: petioles eglandular; blades usually bearing abaxial impressed glands. Inflorescences axillary and terminal, often decompound, the flowers ultimately borne in umbels of 4; bracts smaller than bracteoles; peduncle well developed; bracteoles borne just below flower, globose-cymbiform, large, the inner enclosing bud until flowers open, the outer enclosing bud and inner bracteole; pedicel absent or very short, to 2 mm long in fruit. Flowers: sepals narrowly oblong or spatulate, the anterior eglandular, the lateral 4 each bearing 2 large compressed glands, these distinct or partially to completely connate; petals yellow or the posterior petal yellow and red, stamens 10, dimorphic, the 5 opposite sepals differing from 5 opposite petals in size and shape, and sometimes in pubescence; styles 3, the apex with large internal stigma, dorsally truncate or short-hooked or pedaliform. Fruits breaking into 3 samaras, each bearing 2 large lateral wings, the wings distinct or more often confluent at base, a smaller dorsal wing, and often additional wings, winglets, or crests between them or outside lateral wings.

1. Petals abaxially loosely white-tomentose in center, the posterior petal without marginal glands; filaments tomentose, connate only at base; anthers tomentose at base. Samaras with single flat winglet between lateral and dorsal wings and a flat crest or winglet on nut outside lateral wing. ..... *M. angelica.*
1. Lateral petals abaxially brown-sericeous in center, the posterior petal glabrous, glandular-fimbriate; filaments glabrous, connate for 1/2–2/3 of length; anthers glabrous. Samaras with space between lateral and dorsal wings filled by complex of irregular, ruffled, interconnected crests and winglets, the nut without crest or winglet outside lateral wing. ..... *M. includens.*

Mezia angelica W. R. Anderson FIG. 179, PL. 81c

Lianas. Leaves: longer petioles 15–30 mm long; larger blades elliptic or somewhat ovate or obovate, 12–20(24) × 4.5–7.6(9.8) cm, sericeous to glabrate, the base cuneate to truncate, the apex abruptly short-acuminate. Inflorescences: bracts 3.5–6.5 mm long; bracteoles 5–7(8) mm long, the apex emarginate or bifid. Flowers: sepals with glands nearly or completely connate; petals abaxially loosely white-tomentose in center, the posterior petal distally yellow, proximally red and dentate or short-fimbriate, eglandular; filaments tomentose, especially distally, connate only for basal 0.5–1 mm, the anthers tomentose at base; styles pedaliform at apex (i.e., with a short, broad abaxial extension resembling from above the sole of a shoe). Samaras oblate, 55–80 × 45–60 mm, the lateral wing 25–34 mm wide, continuous at base, incised to nut at apex, the central dorsal wing 7–14 mm wide, with 1 flat winglet 3–7 mm wide present on each side of and parallel to central dorsal wing; nut bearing on each side a flat crest or winglet 1–9(15) mm wide, outside of and parallel to lateral wing. Fl (Sep), fr (Sep); in nonflooded moist forest.

Mezia includens (Benth.) Cuatrec.

Lianas. Leaves: longer petioles 14–27 mm long; larger blades elliptic, sometimes slightly ovate or obovate, 13–20 × 6–10.5 cm, sericeous to glabrate, the base cuneate to rounded or slightly attenuate, the apex abruptly short-acuminate. Inflorescences: bracts 3–4(5) mm long; bracteoles 6.5–12 mm long, the apex entire. Flowers: sepals with glands compressed but distinct; lateral petals abaxially brown-sericeous in center, the posterior petal yellow with red veins in center, glabrous, glandular-fimbriate all around margin; filaments glabrous, 1/2–2/3 connate, the anthers glabrous; styles acute or truncate at apex. Samaras subcircular, 70–100 × 50–90 mm, the lateral wing 30–45 mm wide, continuous at base, incised to nut at apex, the central dorsal wing 7–10 mm wide, the space between lateral and dorsal wings filled by complex of irregular, ruffled, interconnected crests and winglets; nut without crest or winglet outside lateral wing. Fr (Aug); in nonflooded moist forest.

STIGMAPHYLLON A. Juss.

Vines. Stipules interpetiolar, distinct, inconspicuous. Leaves: petioles usually long, bearing 2 large glands at apex; blades entire or lobed. Inflorescences dichasia of congested pseudoracemes, these usually corymbose or umbellate. Flowers: anterior sepal eglandular, the lateral 4 biglandular; petals yellow or yellow and red; anthers 10, very unequal; styles 3, the apex stigmatic on internal angle, dorsally truncate, hooked, or (most often) bearing a foliaceous appendage, symmetrical on anterior style, unilateral on posterior styles. Fruits breaking into 3 samaras, the samara with dorsal wing dominant, thickened on adaxial (upper) edge, the veins terminating in thinner abaxial edge, with much shorter winglets or crests present on sides of nut in some species.

Anderson, C. 1997. Monograph of *Stigmaphyllon* (Malpighiaceae). Syst. Bot. Monogr. **51:** 1–313.

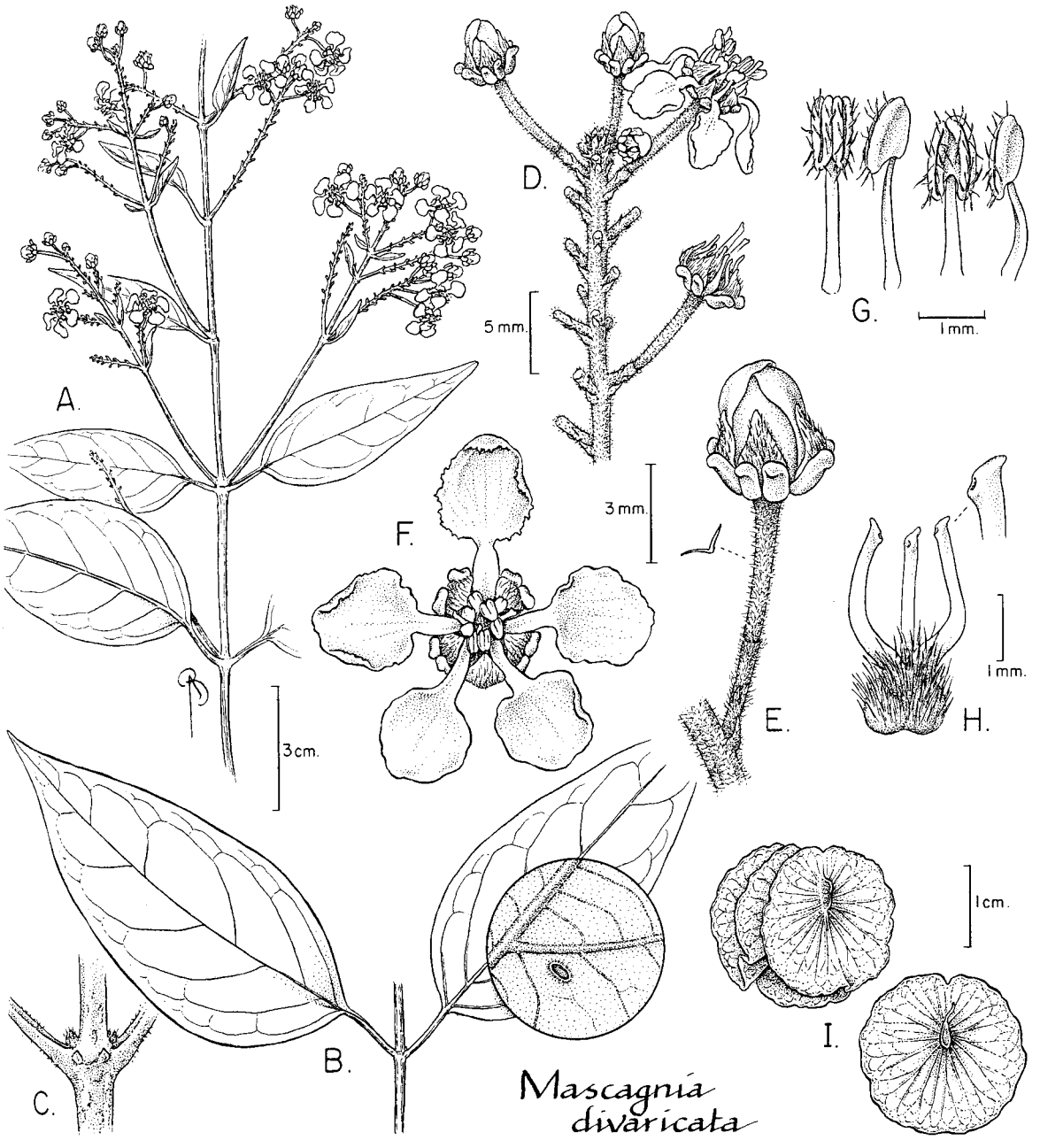

FIG. 178. MALPIGHIACEAE. *Mascagnia divaricata* (A–H, *Mori et al. 22205*; I, *Nee 38580* from Bolivia). **A.** Part of stem with leaves and inflorescences. **B.** Larger leaves and detail of abaxial surface with gland. **C.** Node showing small triangular, interpetiolar stipules. **D.** Distal portion of pseudoraceme with flower, buds, and old flower. **E.** Lateral view of flower bud showing bract on inflorescence axis, peduncle bearing bracteole near middle, pedicel beyond joint, and detail of hair. **F.** Apical view of flower, the posterior petal uppermost. **G.** Adaxial (far left and third from left) and lateral (second and fourth from left) views of stamens. **H.** Lateral view of gynoecium with anterior style in center (left) and detail of one style apex (above). **I.** Complete fruit with abaxial view of one samara (above) and adaxial view of one separated samara (right). (Reprinted from W. R. Anderson, Contr. Univ. Michigan Herb. 21, 1997.)

Stigmaphyllon sinuatum (DC.) A. Juss

FIG. 180, PL. 81f; PART 1: FIGS. 4, 6, PL. Xb

Vines. Leaves: longer petioles 25–95 mm long; larger blades broadly ovate to circular, 8–16 × 7.5–15 cm, ± densely and persistently sericeous abaxially, the hairs sessile, straight, tightly appressed, the base moderately to deeply cordate, the apex mostly obtuse to rounded. Flowers: styles all with large, rounded, horizontal or pendent folioles 1.5–2 mm long. Samaras 34–45 × 12–17 mm, the nut bearing an often dissected lateral crest to 2 mm wide. Fl (Aug, Nov, Feb), fr (Aug, Dec); in nonflooded moist forest and secondary vegetation.

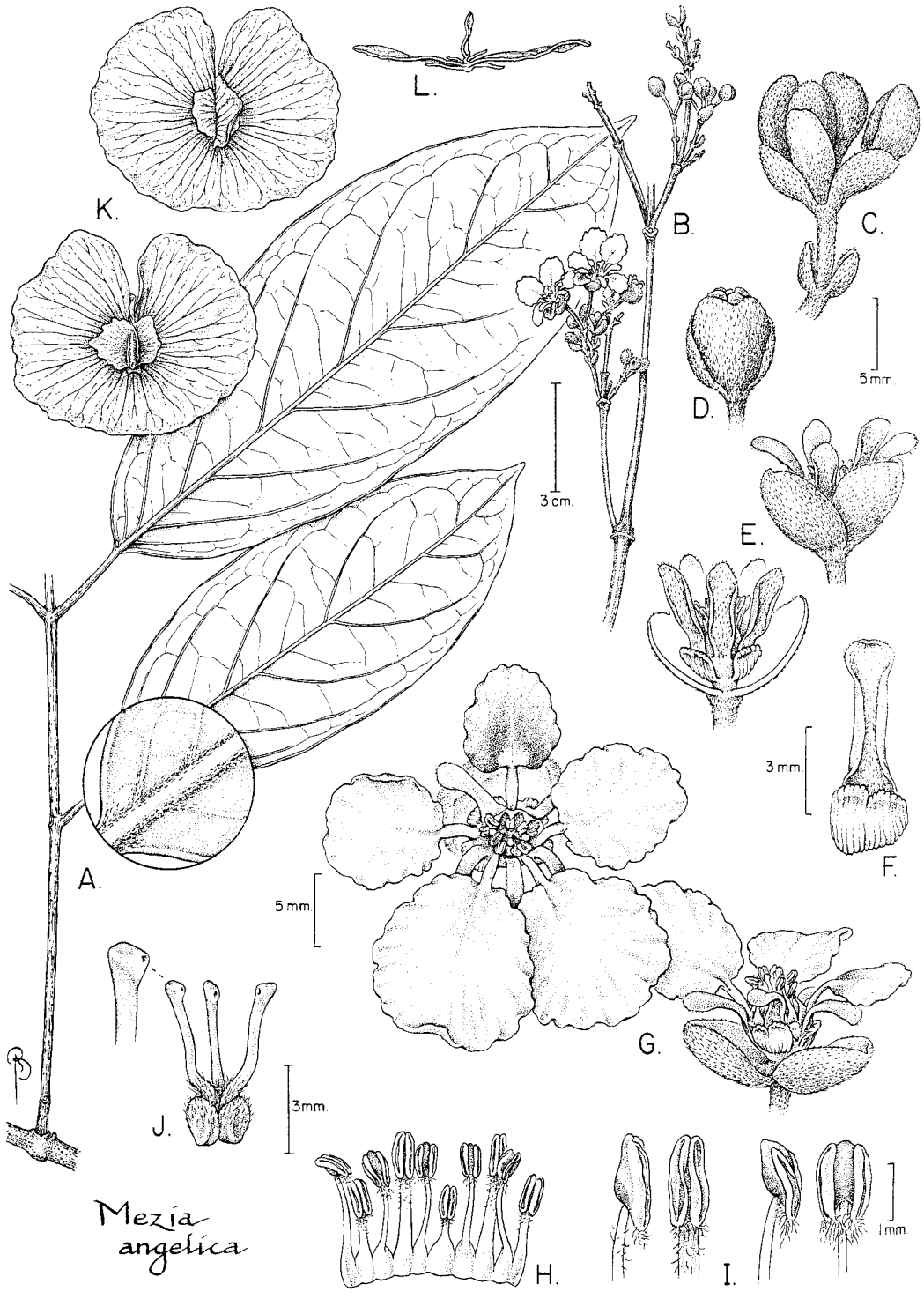

FIG. 179. MALPIGHIACEAE. *Mezia angelica* (A-J, *Mori et al. 20945*; K, L, *Silva 2830* from Brazil). **A.** Part of stem with leaves and detail of abaxial base of blade showing persistent hairs. **B.** Part of inflorescence with flowers and flower buds. **C.** Lateral view of umbel with four flower buds, each bud enclosed by two bracteoles and subtended by one bract, the stalk of the umbel bearing a pair of sterile bracts. **D.** Lateral view of flower bud about to open, with the two bracteoles being forced apart by the enlarging sepals. **E.** Lateral view of flower with petals removed, with the two subtending bracteoles intact (right) and with the bracteoles half cut away (below) to show sepals, with the eglandular anterior sepal in center. **F.** Abaxial view of one lateral sepal bearing a large double gland formed from two nearly connate glands. **G.** Apical view of flower (above left) with posterior petal uppermost and lateral view of flower (right) with two petals removed and the posterior petal to the right. **H.** Adaxial view of androecium opened with the shortest stamen (fifth from right) opposite the posterior petal. **I.** Lateral (far left) and adaxial (near left) views of anthers opposite petals and lateral (near right) and adaxial (far right) views of anthers opposite sepals. **J.** Lateral view of gynoecium with anterior style in center (right) and detail of one style-apex (above left). **K.** Abaxial (above) and adaxial (below) views of samaras. **L.** Medial section of samara showing large lateral wing, smaller dorsal wing (pointing up), single winglets between dorsal and lateral wings, and single winglets outside lateral wing.

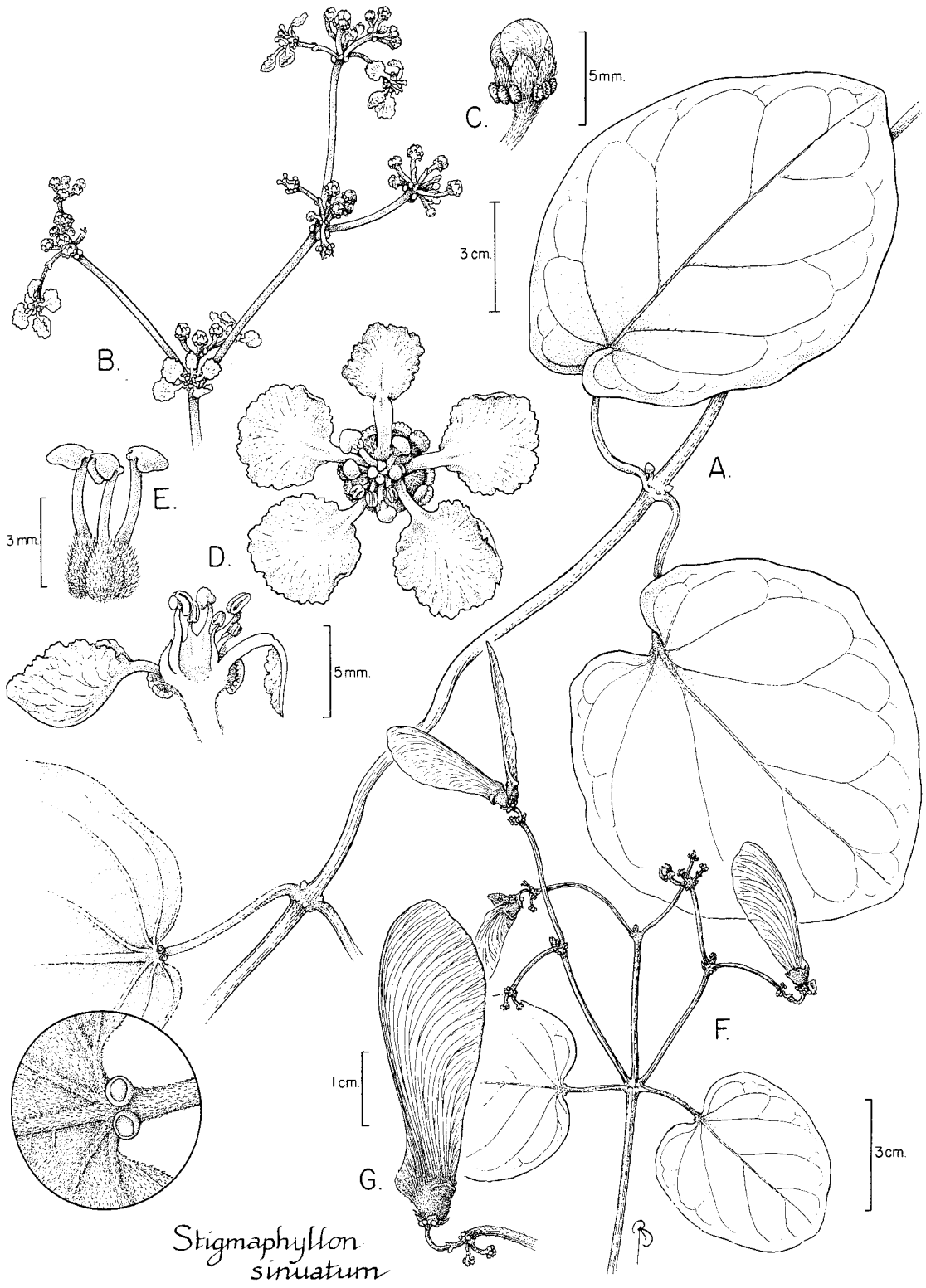

FIG. 180. MALPIGHIACEAE. *Stigmaphyllon sinuatum* (A, B, unvouchered field sketches; C–G, *Mori & Gracie 22849*). **A.** Part of leafy stem of liana showing detail (below) of glands at the apex of petiole on abaxial surface. **B.** Inflorescence. **C.** Lateral view of flower bud with paired glands at base of four lateral sepals. **D.** Apical view of flower (right) with posterior petal uppermost and longitudinal section of flower (below) with gynoecium removed and posterior petal to right; note unequal anthers. **E.** Gynoecium showing styles with large apical folioles. **F.** Apex of stem with infructescence. **G.** Samara.

TETRAPTERYS Cav.

Lianas, vines, or occasionally shrubs. Stipules small, interpetiolar or borne on petiole, or absent. Leaves usually bearing glands. Inflorescences umbels, corymbs, or pseudoracemes, these often grouped in panicles. Flowers: petals yellow or pink; stamens ± alike; styles 3, the apex with internal to apical stigma, dorsally smooth or truncate or short-hooked. Fruits breaking into 3 samaras, each samara with its largest wings lateral, usually 4 discrete wings, the dorsal wing smaller, sometimes reduced to crest or lost, intermediate winglets or outgrowths present between lateral and dorsal wings in some species.

1. Leaf blades eglandular or bearing glands on margin. Branches of inflorescence terminating in pseudoracemes of (2)4–8(10) flowers. Sepals revolute during flowering; petals (at least the lateral 4) abaxially sericeous. . . . *T. acutifolia.*
1. Leaf blades bearing glands on abaxial surface between midrib and margin. Branches of inflorescence terminating in umbels of 4–6 flowers. Sepals appressed during flowering; petals glabrous.
   2. Stipules distinct, persistent or eventually deciduous, leaving 2 tiny interpetiolar scars. Inflorescences with nonfloriferous bracts inconspicuous, narrowly lanceolate, mostly ≤3 mm long. Calyx glands (if present) usually becoming stalked in older flowers and fruit; styles slender, with small, discrete, nearly terminal stigmas. . . . . *T. mucronata.*
   2. Stipules connate in interpetiolar pairs, caducous or eventually deciduous, leaving a single large scar. Inflorescences containing conspicuous, often orbicular, foliaceous bracts, much smaller and thinner than vegetative leaves but much larger than floriferous bracts, these deciduous and usually absent from fruiting specimens. Calyx glands sessile; styles stout, the large stigmas internal and decurrent.
      3. Vegetative stems densely and ± persistently sericeous through first year of growth. Leaf blades abaxially persistently sparsely sericeous, the very short hairs evenly distributed over whole surface, bearing a cluster of 3–10 glands on each side of midrib abaxially. Sepals abaxially densely and persistently sericeous. Samaras with upper lateral wings at least 3 times as long as lower wings. . . . *T. glabrifolia.*
      3. Vegetative stems soon glabrescent to glabrate in first year of growth. Leaf blades abaxially soon glabrate or with some hairs persistent on midrib, bearing 0–1 gland on each side near base abaxially. Sepals abaxially glabrous or sparsely to moderately sericeous, often with marginal fringe of tiny hairs. Samaras with upper lateral wings to 2.5(3) times as long as lower wings.
         4. Leaf blades with abaxial glands at base, if present, 1–2.5 mm long. Some or all calyx glands asymmetrical, earshaped; limb of anterior-lateral petals 6–12 mm long. Nut of samara bearing several prominent outgrowths between lateral and dorsal wings, and usually a small rounded crest outside lateral wings, the samara with lateral wings subequal or the lower wings somewhat longer. . . . . *T. megalantha.*
         4. Leaf blades with abaxial glands at base, if present, to 0.5 mm long. All calyx glands symmetrical, elliptic or obovate; limb of anterior-lateral petals 4–5.5 mm long. Nut of samara smooth between lateral and dorsal wings (occasionally with 1 small outgrowth), and smooth outside lateral wings, the samara with upper lateral wings distinctly longer than lower. . . . . *T. crispa.*

Tetrapterys acutifolia Cav.

Lianas, sometimes shrubby when growing in open places without support. Stipules absent or minute (to 0.3 mm long), borne on petiole between base and middle. Leaves: longer petioles 4–7 mm long; larger leaf blades ovate or elliptic, 8–14 × 3–6.4 cm, eglandular or bearing several small glands on margins, the base cuneate to rounded, the apex acuminate to acute or obtuse. Inflorescence branches terminating in short, crowded pseudoracemes of (2)4–8(10) flowers, these often corymbose and sometimes approaching umbels when internodes very short. Flowers: sepals becoming revolute during flowering, the anterior eglandular, the lateral 4 biglandular, the glands sessile; petals abaxially sericeous (posterior petal sometimes nearly glabrous), yellow; styles stout, the stigma internal, dorsally rounded at apex. Samaras with lateral wings subequal, 7–15 mm long, the dorsal wing 2–3 mm wide; nut bearing several winglets or irregular outgrowths between lateral and dorsal wings. Fl (Feb).

Tetrapterys crispa A. Juss.

Lianas. Stems initially white- or tawny-sericeous, soon glabrescent to glabrate. Stipules connate in interpetiolar pairs, caducous. Leaves: longer petioles 12–22(27) mm long; larger blades elliptic or slightly ovate or obovate, 13–20 × (5.5)6–12 cm, eglandular abaxially at base or bearing a single gland to 0.5 mm diam. on each side and with distal row of tiny glands set in from margin, soon glabrate except for often sericeous abaxial midrib, the base cuneate to rounded or occasionally shallowly cordate, the apex short-acuminate. Inflorescence branches terminating in umbels of 4 flowers; reddish nonfloriferous bracts conspicuous in flower, 8–25 mm long. Flowers: sepals appressed during flowering, abaxially glabrous or with a few hairs beside glands and often bearing marginal fringe of tiny hairs, the anterior eglandular, the lateral 4 biglandular, the glands symmetrical, elliptic or obovate, sessile; petals glabrous, yellow turning orange with age, the limb of anterior-lateral petals 4–5.5 mm long; styles stout, the posterior two thicker than anterior one, the stigmas internal, large and decurrent. Samaras with upper lateral wings (15)22–38 mm long, always distinctly longer than lower wings (6)10–15(20) mm long, the dorsal wing 2–6 mm wide; nut smooth between lateral and dorsal wings (occasionally bearing 1 small outgrowth), without crests or winglets outside lateral wings. Fl (Aug, Feb), fr (Nov, Mar); in nonflooded moist forest and cloud forest.

There are several collections from central French Guiana that are closest to *T. crispa* but atypical in some characters. Their leaves are too small, and their samaras have too many outgrowths between the lateral and dorsal wings. I originally identified some of these plants as *T. discolor* (G. Mey.) DC., but on closer examination I have

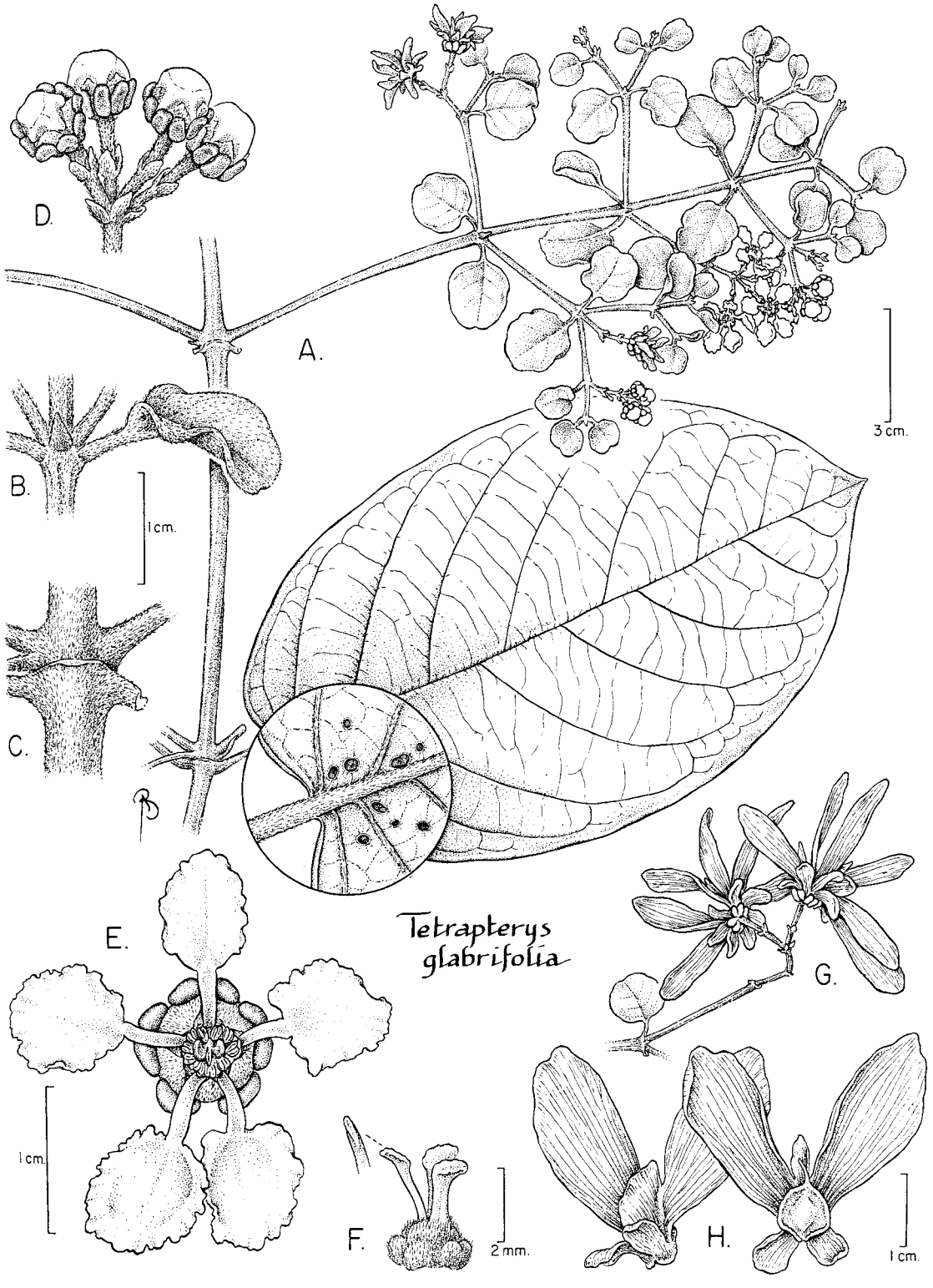

FIG. 181. MALPIGHIACEAE. *Tetrapterys glabrifolia* (A–F, *Mori et al. 22873*; G, H, *Mori & Pipoly 15630*). **A.** Part of stem with leaf and inflorescence and detail of abaxial surface of leaf showing impressed glands; note the rounded non-floriferous bracts in inflorescence. **B.** Node of inflorescence showing triangular interpetiolar stipule pair. **C.** Older node showing corky scar left after loss of stipule pair. **D.** Lateral view of umbel of four flower buds subtended by four bracts, each flower with a pair of bracteoles just below the peduncle-pedicel joint. **E.** Apical view of flower with the posterior petal uppermost. **F.** Lateral view of gynoecium (right) with anterior style to left and adaxial view of anterior style (above) showing decurrent stigma. **G.** Intact fruits, each comprising three samaras. **H.** Abaxial (left) and adaxial (right) views of separated samaras.

concluded that true *T. discolor* is not present in our area. I suspect that the intermediate plants in our area represent the results of hybridization between *T. crispa* and *T. megalantha*. The collections before me that seem intermediate are *Granville 8661* (CAY), *Mori & Pipoly 15609*, *Mori & Gracie 21095*, and *Mori & Pepper 24277* (all NY).

Tetrapterys glabrifolia (Griseb.) Small

FIG. 181, PL. 81d; PART 1: FIG. 6 as *T. crispa*

Lianas. Stems densely golden-sericeous, the hairs persistent at least during first year. Stipules connate in interpetiolar pairs, caducous or eventually deciduous. Leaves: longer petioles 13–21 mm long; larger blades elliptic to suborbicular or somewhat ovate or obovate, 11–25 × 7–15.5 cm, with a cluster of 3–10 glands on each side of midrib abaxially, these 0.3–0.7 mm diam. and distally few to many smaller glands (0.2–0.3 mm diam.) scattered over surface between midrib and margin, appearing nearly glabrous to naked eye but actually sparsely but persistently sericeous abaxially, the very short hairs evenly distributed over whole surface, the base broadly cuneate or rounded to cordate, the apex abruptly short-acuminate to rounded and apiculate. Inflorescence branches terminating in umbels of 4 flowers; reddish nonfloriferous bracts conspicuous in flower, 8–25 mm long. Flowers: sepals appressed during flowering, densely and persistently sericeous abaxially, the anterior eglandular, the lateral 4 biglandular, the glands elliptic or obovate, symmetrical or somewhat asymmetrical and earshaped, sessile; petals glabrous, yellow turning orange with age, the limb of anterior-lateral petals 6.5–8 mm long; styles stout, the posterior two notably thicker than anterior one, the stigmas internal, large and decurrent. Samaras with upper lateral wings 30–40 mm long (to 70 mm long in western Amazonia), the lower wings 8–11 mm long (to 17 mm in western Amazonia), the dorsal wing 4–7 mm wide; nut smooth between lateral and dorsal wings, without crests or winglets outside lateral wings. Fl (Feb, Apr), fr (Feb); in nonflooded moist forest.

This species is very close to *T. calophylla* A. Juss., which was described from French Guiana. The main, and perhaps only, difference between them is that in *T. calophylla* the leaf blade is obviously densely metallic-sericeous abaxially, whereas in *T. glabrifolia* the hairs are so sparse that the blade appears to the naked eye to be glabrous or nearly so. *Tetrapterys glabrifolia* was originally described as a variety of *T. calophylla*, which is a much older name.

Tetrapterys megalantha W. R. Anderson PL. 81e

Lianas. Stems initially thinly white-sericeous, soon glabrate. Stipules connate in interpetiolar pairs, caducous. Leaves: longer petioles (9)11–20 mm long; larger leaf blades elliptic or slightly ovate or obovate, (8)10–16 × 5–8.2 cm, eglandular abaxially at base or (often on same plant) bearing a single gland 1–2.5 mm long on each side and several smaller glands distally set in from margin, soon glabrate, the base cuneate or slightly decurrent to rounded, the apex abruptly short-acuminate. Inflorescence branches terminating in umbels of 4 flowers; reddish nonfloriferous bracts conspicuous in flower, 8–25 mm long. Flowers: sepals appressed during flowering, abaxially glabrous or occasionally loosely sericeous, often bearing marginal fringe of tiny hairs, the anterior eglandular, the lateral 4 biglandular, some or all glands asymmetrical, earshaped, sessile; petals glabrous, the limb yellow, the claw red, the limb of anterior-lateral petals 6–12 mm long; styles stout, the posterior two thicker than anterior one, the stigmas internal, large and decurrent. Samaras with lateral wings 14–25 mm long, the upper and lower wings subequal or the lower wings somewhat longer, the dorsal wing 4–7(10) mm wide; nut bearing several prominent outgrowths between lateral and dorsal wings, usually with a rounded crest 1–2 mm wide outside lateral wings. Fl (Dec, Jan), fr (Feb); in nonflooded moist forest.

Specimens from French Guiana and Surinam have smaller petals and less strongly asymmetrical calyx glands than those from Guyana, but we still have so few collections of this species in flower that it is difficult to know how much significance to attach to those differences. Specimens from the Sentier Botanique, just east of Eaux Claires, have unusually small leaves and unusually hairy sepals. For specimens that are intermediate between *T. megalantha* and *T. crispa*, see the discussion under *T. crispa*.

Tetrapterys mucronata Cav.

Lianas. Stipules minute, interpetiolar, distinct, persistent or deciduous. Leaves: longer petioles 5–14 mm long; larger leaf blades ovate or elliptic, 6–15 × 3–8 cm, 2 impressed abaxial glands at base and usually few to many smaller glands distally between margin and midrib, the base cuneate to rounded, the apex acuminate to obtuse. Inflorescence branches terminating in umbels of 4–6 flowers; nonfloriferous bracts inconspicuous, mostly narrowly lanceolate, ≤3 mm long. Flowers: sepals appressed during flowering, all eglandular or the lateral 4 biglandular, the glands becoming stalked in age; petals yellow, glabrous; styles slender, tapered distally, the small discrete stigma internal or nearly terminal, dorsally rounded at apex. Samaras with upper lateral wings 10–20 mm long, the lower wings 5–11 mm long, the dorsal wing 2–4 mm wide; nut usually bearing several aculeate outgrowths between lateral and dorsal wings. Fl (Sep); in nonflooded moist forest.