

Excerpt from:

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7. *Byrsonima* Richard ex Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 147 (4^o ed.). 1821 [1822].

Alcoceratothrix Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 1: 45. 1901.

Trees, shrubs, or subshrubs, the leaves eglandular; stipules intra- and epipetiolar, free or partially to completely connate, persistent on the petiole (except in *B. stipulacea*). Inflorescence terminal, a raceme of few-flowered cincinni or a pseudoraceme (i.e. a raceme of 1-flowered cincinni), the bracts and bracteoles eglandular, the peduncle usually very short or absent. Flowers circinate in bud in many species. Sepals all biglandular or not rarely all eglandular, connate as far as the tips of the glands, the glands green, yellow, white, or pink. Petals yellow, white, pink, or red ("purple" in *B. fernandezii*), usually glabrous (bearing a few hairs in a few species), the lateral 4 with slender, recurved claws, the anterior pair with deeply cup-shaped limbs, the posterior pair shallower; posterior petal with a stout, erect claw and the limb smaller, flat or crumpled and often reflexed. Stamens 10, all fertile; filaments alike, flat, free or basally connate, glabrous or (usually) with some basal hairs, at least adaxially; anthers $\pm$ alike, of different lengths in some species; pollen usually tricolporate. Receptacle hirsute between filaments and ovary. Ovary with the 3 carpels completely connate, 3-locular, every locule containing 1 ovule or the anterior sterile in some species; styles 3, apical, $\pm$ alike, glabrous, subulate, often bent at the tips in bud, the stigmas minute and apical or slightly internal. Fruit a drupe, the thin flesh green turning yellow, orange, red, purple, blue, or blue-black at maturity, the stone with a hard wall, trilocular, the seeds as many as the ovules or fewer due to abortion, the embryo coiled.

Lectotype. *Byrsonima coccolobifolia* H.B.K.

Byrsonima is the largest genus in the family, comprising at least 150 species, all American. It is the most widespread and ecologically diverse genus of the subfamily Byrsonimoideae, a fact that I relate to its bird-dispersed fruits, which are unique in the subfamily (Anderson, 1978). Functionally similar fruits have evolved independently in the genera *Bunchosia* and *Malpighia*, neither of which is closely related to *Byrsonima*.

Success in identifying a *Byrsonima* to species depends on correct interpretation of the anthers. For this a dissecting microscope is usually essential, preferably one equipped with an ocular micrometer. I have included a plate (Fig 16) with photographs of the principal types of anthers, and one should use that plate as an adjunct to the key. The drawings of individual species will also help in this respect.

Key to the Species of *Byrsonima* in Guayana
(for specimens with flowers)

1. Petals yellow, sometimes turning orange or red with age.
 2. Gnarled shrubs up to 60 cm tall; leaves mostly in dense clusters without measurable internodes. 8. *B. verbascifolia*.
 2. Shrubs or trees 1–30 m tall; internodes usually over 5 mm long.
 3. Stipules free or up to $\frac{1}{2}$ connate; pedicel long-pedunculate, the primary peduncle 5–15 mm long; anthers glabrous; petals often bearing a few hairs, especially on the claw and margin of the limb. 1. *B. maguirei*.

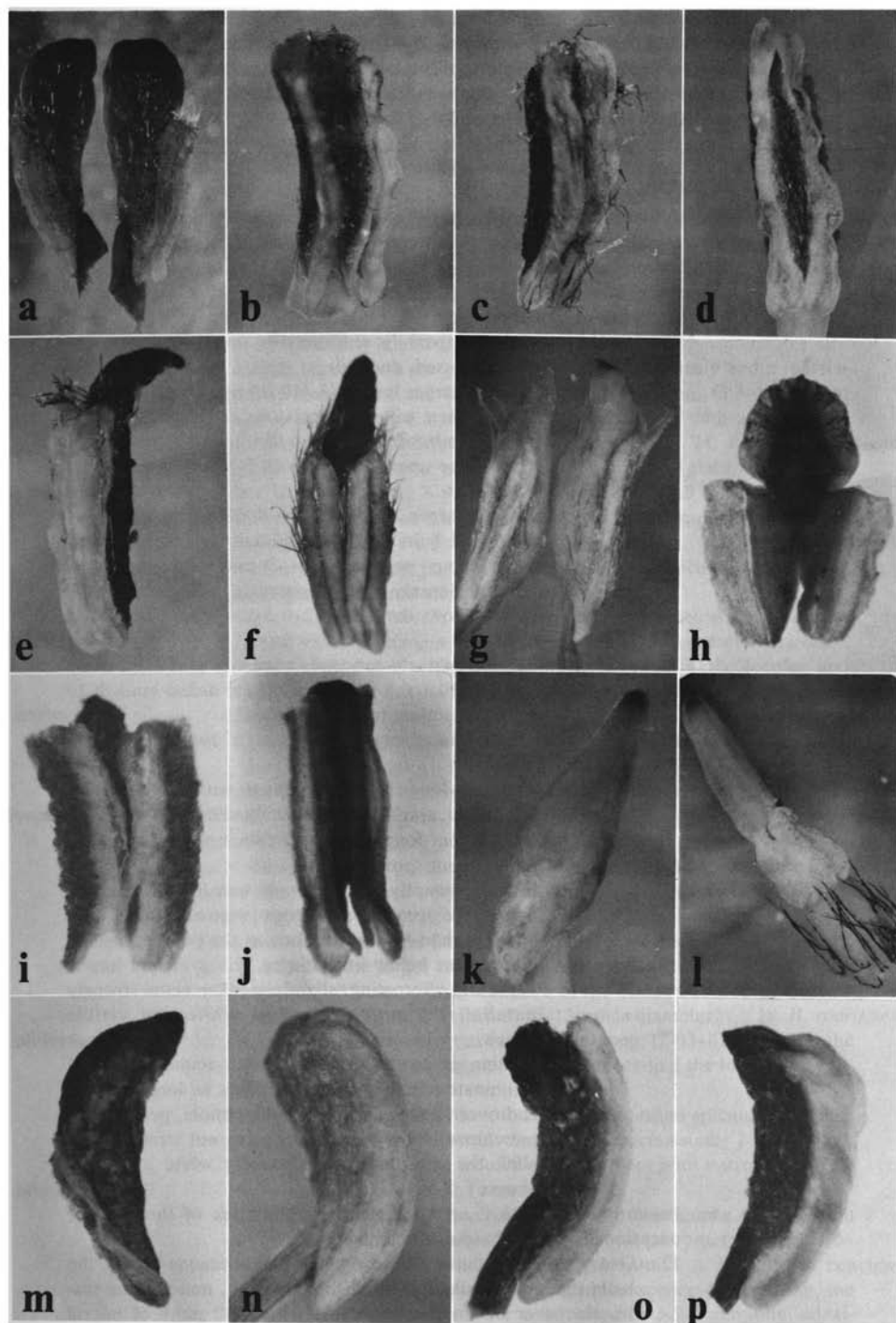


Fig 16. Anthers of *Byrsonima*. a) *B. stipulacea*, $\times 9$; b) *B. aerugo*, $\times 15$; c) *B. crassifolia*, $\times 15$; d) *B. chrysophylla*, $\times 15$; e & f) *B. coccolobifolia*, $\times 14$; g) *B. japurensis*, $\times 15$; h) *B. concinna*, $\times 20$; i) *B. laevis*, $\times 20$; j) *B. amoena*, $\times 20$; k & l) *B. christianeae*, k $\times 11$, l $\times 8$; m) *B. chalcophylla* var *carraoana*, $\times 20$; n) *B. pachypoda*, $\times 20$; o) *B. coniophylla*, $\times 15$; p) *B. nitidissima*, $\times 25$.

3. Stipules completely connate to form an entire intrapetiolar pair; pedicel sessile or short-pedunculate, the peduncle 0–2(–4) mm long; anthers sericeous or tomentose between or on both sides of the locules; petals glabrous.
 4. Lamina velutinous below, the hairs with a straight, erect stalk, the branches mostly shorter than the stalk.
 5. All or many hairs of the abaxial surface of the lamina stellate, i e with more than 2 branches; stipules (8–)10–23 mm long, deciduous. *2. B. stipulacea.*
 5. All hairs of the lamina bifurcate, i e Y-shaped with only 2 branches; stipules 5–6 mm long, persistent on the petiole. *4. B. poeppigiana.*
4. Lamina tomentose, sericeous, or glabrate below, the hairs (if any) sessile, subsessile, or with a stalk shorter than the trabecula or branches.
 6. Posterior petal eglandular.
 7. Leaves densely to sparsely sericeous or nearly glabrate, the hairs straight, appressed, parallel.
 8. Petiole of the larger leaves (7–)10–15 mm long, sericeous to glabrate, often with an admixture of long, spreading, basifixed or sub-basifixed hairs; ovary glabrous or sparsely sericeous at the apex; peduncle (0.5–)1–2(–4) mm long. *5. B. arthropoda.*
 8. Petiole of the larger leaves (15–)20–40 mm long, sericeous to glabrate, all hairs short, medifixed, appressed; ovary densely sericeous; peduncle 0–1(–2) mm long.
 9. Lamina densely and persistently ferrugineous-sericeous below, the hairs 0.2–0.5 mm long; trees 15–33 m tall. *6. B. aerugo.*
 9. Lamina sparsely sericeous to nearly glabrate below, the hairs 0.1–0.2 mm long, never dense enough to hide the lamina; trees 8–25 m tall. *7. B. crispa.*
 7. Leaves tomentose to glabrate, the hairs $\pm$ twisted, not appressed or parallel.
 10. Stipules 6 mm long; stems tomentose with an admixture of long, straight, spreading, sub-basifixed hairs. *3. B. fanshawei.*
 10. Stipules 2–4 mm long; stems sericeous or appressed-tomentose, without spreading hairs.
 11. Lamina abruptly narrowed and usually short-acuminate at the apex, mostly about twice as long as wide and less than 10 times as long as the petiole, usually glabrescent below at maturity, the principal lateral veins and alternating, slightly weaker veins strongly parallel, the reticulum often white and visible above. *9. B. crassifolia.*
 11. Lamina gradually narrowed to an acute or slightly acuminate apex, at least 2.5 times as long as wide and over 10 times as long as the petiole, persistently tomentose below, the lateral veins not strongly parallel, the reticulum not especially white or visible above. *10. B. laurifolia.*
6. Posterior petal with 2 or more glands at the apex of the claw or occasionally on the base of the limb.
 12. Ovary glabrous; lamina $\pm$ persistently subsericeous below, the hairs distinctly stalked, with slightly twisted, non-parallel trabeculae over 0.5 mm long; lamina with 8–12 pairs of lateral veins strongly raised below, parallel and anastomosing near the margin, alternating with weaker, shorter, parallel veins; lamina

- broadly elliptical, 4–7(–9) cm wide; shrubs or small trees 2–5 (–9) m tall. 11. *B. chrysophylla*.
12. Ovary sericeous; leaves appressed-sericeous to glabrate below, the hairs sessile or short-stalked, with short, straight, parallel trabeculae up to 0.5 mm long; lamina with 15–20 or more pairs of fine lateral veins parallel and anastomosing near the margin, none very prominent below; lamina narrowly elliptical, 1.7–4 (–5.5) cm wide; trees 3–25 m tall. 12. *B. spicata*.
1. Petals white, pink, red, or “purple,” often changing from white to pink or red with age.
13. Anthers hairy.
14. Leaves sessile or subsessile, the petiole up to 2 mm long. 13. *B. coccolobifolia*.
14. Leaves petiolate, the petiole of larger leaves at least 5 mm long.
15. Bracts at least 3 mm long, mostly deciduous before maturity of the fruit; locules of the anther rounded or acute at the apex.
16. Larger leaves with the petiole 5–10 mm long, densely and $\pm$ persistently tomentose, the lamina (5–)8.5–15 cm long, (3.5–)4.5–7 cm wide; anthers 1.8–2.8 mm long; ovary glabrous, with all 3 locules fertile; styles 2.7–3.7 mm long. 14. *B. schomburgkiana*.
16. Larger leaves with the petiole 25–30 mm long and glabrous, the lamina 16–20 cm long, 7–9.5 cm wide; anthers 3–3.8 mm long; ovary densely sericeous on the distal half, with only 2 locules fertile; styles 5.5–6.5 mm long. 15. *B. fernandezii*.
15. Bracts up to 1.5 mm long, persistent in fruit and after; locules of the anther extended at the apex into slender, sterile projections.
17. Lamina with the midrib $\pm$ persistently sericeous below, and with the lateral veins prominent below; sepals adaxially sparsely sericeous; anthers 3.5–4.6 mm long (including extensions of the locules and connective); styles 4–5 mm long, bent or hooked at the apex; Guyana. 16. *B. gymnocalycina*.
17. Lamina with the midrib usually soon glabrate, the lateral veins obscure or prominulous below; sepals adaxially glabrous; anthers 2–3.2 mm long; styles 3–4 mm long, $\pm$ straight; western Amazonia. 17. *B. japurensis*.
13. Anthers glabrous.
18. Locules of the anthers with the outer thecae dorsiventrally flattened, often longer than the inner thecae, and very often bearing narrow membranous longitudinal wings (Fig 16h, i, j).
19. Pedicel of old flowers and fruits straight or ascending.
20. Lamina of the larger leaves 14.5–22.5 cm long, 7–10 cm wide, the petiole 20–35 mm long; connective of the anthers exceeding the locules by 0.9–1.3 mm; fruit (dried) 10–12 mm in diameter. 18. *B. rodriguesii*.
20. Lamina of the larger leaves (4–)6–13 cm long, (2–)3–6.5 cm wide, the petiole (7–)10–20 mm long; connective exceeding the locules by 0.2–0.8 mm; fruit (dried) 4–8 mm in diameter.
21. Lamina acute or obtuse to rounded and often apiculate or retuse at the apex; stipules 1.5–5 mm long; bracts usually 2–5 mm long, rarely only 1 mm; locules of the anthers with narrow membranous wings up to 0.1 mm wide.
22. Bracts and bracteoles green; inflorescence (3–)6–16 cm long, the flowers borne 1–several per bract; stipules 1.5–2.5(–3.5) mm long, adaxially hirsute. 19. *B. concinna*.
22. Bracts and bracteoles red; inflorescence 4–5 cm long, the flowers borne 1 per bract; stipules 3.5–5 mm long, adaxially sparsely sericeous. 20. *B. rubrobracteata*.
21. Lamina acuminate, rarely acute, at the apex; stipules ca 1 mm

- long; bracts 1–1.5 mm long; locules of the anthers unwinged.
21. *B. garcibarrigae*.
19. Pedicel of old flowers and fruits decurved and often eventually twisted.
23. Sepals abaxially sericeous or appressed-tomentose; bracts 1.2–3.5 mm long; stems sericeous to glabrate.
24. Lamina narrowly elliptical, 2–3 cm wide, persistently glaucous below; sepals revolute in anthesis; filaments 2–2.3 mm long; connective of the anthers exceeding the locules by 0.5–0.8 mm; styles ca 4 mm long.
22. *B. bronweniana*.
24. Lamina elliptical or obovate, 3–4.5 cm wide, not glaucous below; sepals appressed in anthesis; filaments 2.6–2.8 mm long; connective exceeding the locules by 0.2–0.5 mm; styles ca 3 mm long.
23. *B. bracteolaris*.
23. Sepals glabrous or ciliate on the margin (very rarely with a few appressed hairs abaxially in the center in *B. amoena*); bracts 0.5–1.5 mm long; stems glabrous except short-hirsute in axils of stipules.
25. Lamina with a thick, persistent glaucescence below; inflorescence glabrous (? or soon glabrate).
24. *B. luetzelburgii*.
25. Lamina not glaucous below; inflorescence thinly sericeous to glabrate.
26. Petiole of the larger leaves (11–)15–22 mm long, the lamina 5–7 cm wide, broadly elliptical; fruit (dried) 12 mm in diameter.
25. *B. laevis*.
26. Petiole of the larger leaves (3–)5–10 mm long, the lamina 3–5.7 cm wide, obovate or occasionally elliptical; fruit (dried) 4–5.5 mm in diameter.
26. *B. amoena*.
18. Locules of the anthers cylindrical or linear and unwinged.
27. Ovary sericeous.
28. Mature lamina glabrous or glabrate below or very sparsely sericeous, the white hairs hardly visible without a lens; lamina not or hardly glaucous above.
29. Bracts and bracteoles persistent past maturity of the fruit; bracts 1–2 mm long, shorter than or as long as the bracteoles; sepals stretched but not elongated in fruit, up to 3 mm long; petiole 20–35(–45) mm long; flowers often borne 2(–3) per bract; all 3 locules of the ovary fertile.
27. *B. christianeae*.
29. Bracts and bracteoles deciduous before anthesis; bracts 4–5 mm long, about twice as long as the bracteoles; sepals accrescent in fruit, to 5–6 mm long and notably auriculate; petiole 10–20 (–23) mm long; flowers borne 1 per bract; only 2 locules of the ovary fertile.
28. *B. incarnata*.
28. Mature lamina abundantly and persistently sericeous below, not or only belatedly glabrescent, the usually dark hairs easily visible without a lens; lamina often densely glaucous above.
30. Lamina of the larger leaves 5.5–12 cm long, 2.5–7 cm wide, the stipules 3–5 mm long; inflorescence (3–)5–13 cm long.
29. *B. chalcophylla*.
30. Lamina of the larger leaves 14–17 cm long, 7.5–9 cm wide, the stipules 7–9 mm long; inflorescence (14–)25–26 cm long.
30. *B. macrostachya*.
27. Ovary glabrous.
31. Stipules 10–11 mm long, completely connate, the pair rounded at the apex; limb of the petals abaxially pilose.
31. *B. tillettii*.
31. Stipules 1.7–9 mm long, free or connate, if connate and over 6 mm long then the pair triangular, acute at the apex, sulcate in the middle; petals glabrous.

32. Bracts and bracteoles mostly deciduous by anthesis or soon after, long before maturity of the fruit.
33. Lamina of the larger leaves 8–15 cm long, 4–8 cm wide; stipules 1.7–3.5 mm long; ovary with the anterior carpel sterile.
34. Inflorescence 16–24 cm long; petiole of the larger leaves 16–25 mm long; sepals eglandular or the glands rudimentary, immersed; flowers borne 2–3(–4) per bract; sepals mostly revolute in open flowers.
32. *B. wurdackii*.
34. Inflorescence 6–10 cm long; petiole of the larger leaves 10–15 mm long; sepals all biglandular, the glands normally developed, prominent; flowers borne 1–2 per bract; sepals appressed in open flowers.
33. *B. frondosa*.
33. Lamina of the larger leaves 15–25 cm long, 7–13 cm wide; stipules 4–7.5 mm long; ovary with all 3 carpels fertile.
34. *B. cowanii*.
32. Bracts and bracteoles persistent to or past maturity of the fruit.
35. Stems and petioles glabrous except for hirsute axils of stipules (in *B. kariniana* the stems and petioles sericeous when first formed, but immediately glabrescent); fruit (dried) 5–10 mm in diameter.
36. Petiole 3–5(–7) mm long, slightly shorter than the stipules to slightly longer, never twice as long; anthers with the connective equalling the locules or exceeding them by up to 0.5 mm.
37. Pedicel distally thickened, 2–3 mm in diameter at the apex, straight in bud; anthers with the locules 1.6–2.2 mm long, the connective not or hardly exceeding them, by up to 0.1 mm.
35. *B. pachypoda*.
37. Pedicel 1 mm in diameter (–1.5 mm in fruit), circinate in bud; anthers with the locules 1–1.3 mm long, the connective exceeding them by 0.3–0.5 mm.
36. *B. steyermarkii*.
36. Petiole of the larger leaves 12–19 mm long, at least twice as long as the stipules, often longer; anthers with the connective exceeding the locules by 0.7–1 (–1.5) mm.
37. *B. kariniana*.
35. Stems and petioles persistently hairy or eventually glabrescent; fruit (dried) up to 6 mm in diameter.
38. Lamina with the lateral veins very numerous and fine, not or hardly distinguishable from parallel veinlets and the reticulum; sepals abaxially thinly sericeous or tomentose, especially in the center, or glabrous, often ciliate on the margin.
39. Sepals adaxially glabrous; petiole 10–16(–23) mm long; lamina of the larger leaves 8–12(–15.5) cm long, 3–4.7(–5.2) cm wide, obtuse at the apex, usually densely glaucous below; stipules 2.5–4(–5) mm long; inflorescence 5–17 cm long, the flowers always borne 1 per bract; Alto Orinoco to middle Rio Negro.
38. *B. coniophylla*.
39. Sepals adaxially sparsely tomentose; petiole 6–8(–10) mm long; lamina of the larger leaves 4–

- 7(-8) cm long, 1.8-2.6(-3) cm wide, short-acuminate or acute at the apex, not or only thinly glaucous below; stipules 1.8-2.8 mm long; inflorescence 2-8 cm long, the flowers 1 or 2 per bract; Guyana, Surinam, northern Pará, and Roraima Territory. 39. *B. eugeniifolia*.
38. Lamina with the principal lateral veins easily distinguished from finer veins and the reticulum, usually 5-13 pairs, sometimes more in laminas over 10 cm long; sepals abaxially densely and uniformly sericeous or tomentose, sometimes glabrescent in fruit.
40. Anthers with the connective not or hardly exceeding the locules, by up to 0.2 mm; stipules usually completely and smoothly connate, rarely free at the apex; sepals strongly revolute in anthesis; hairs on the filaments kinky; fruit developing half immersed in the enlarged, disc-like receptacle. 40. *B. nitidissima*.
40. Anthers with the connective exceeding the locules by 0.3-1 mm; stipules free; sepals appressed in anthesis; hairs on the filaments straight; fruit quite superior throughout development. *B. punctulata* complex.
41. Lamina persistently velutinous below, the hairs on tissue between the veins erect, $\pm$ straight, basifixed, the hairs on the veins denser, twisted, sub-basifixed. 41. *B. cuprea*.
41. Lamina below glabrous or sparsely tomentose to glabrate between the veins, tomentose to glabrate on the principal veins, most densely so on the midrib.
42. Lamina of the larger leaves 8.5-14.5 cm long, 4-8 cm wide, the petiole 10-19 mm long; stipules 3.5-7(-8) mm long, often acuminate; reticulum usually $\pm$ concolorous with areolar tissue; inflorescence 9-18 cm long. 42. *B. punctulata*.
42. Lamina of the larger leaves 5-9 (-10.5) cm long, 3-4.5(-5) cm wide, the petiole 5-11 mm long; stipules 1.5-2.5(-3) mm long, acute or obtuse; fine reticulum visible (in dried leaves) below or, usually, on both sides as a white mesh against darker areoles; inflorescence 5-10(-12.5) cm long. 43. *B. leucophlebia*.

Key to the Species of *Byrsonima* in Guayana⁷
(for specimens with fruits)

1. Bracts and bracteoles all or most deciduous before maturity of the fruit.
 2. Hairs of the lamina more or less straight and appressed or subappressed, or the lamina glabrous or glabrate.

⁷ *Byrsonima tillettii*, which is unknown in fruit, is not included in this key.

3. Lamina glabrous or soon nearly or quite glabrate.
 4. Leaves sessile or subsessile, the petiole up to 2 mm long; lamina usually rounded or cordate at the base. 13. *B. coccolobifolia*.
 4. Leaves petiolate, the petiole at least 5 mm long; lamina tapered, cuneate, or rarely rounded at the base.
 5. Lamina with 15–20 or more pairs of fine lateral veins, none very prominent; leaves 1.7–4(–5.5) cm wide. 12. *B. spicata*.
 5. Lamina with 5–12 pairs of principal lateral veins; larger leaves 4–11 cm wide.
 6. Petiole persistently tomentose or only belatedly glabrescent; sepals membranous in fruit, the portion beyond the glands elongating to form a lingulate process at least twice as long as wide. 14. *B. schomburgkiana*.
 6. Petiole glabrous or sericeous to glabrate; sepals thick in fruit, the portion beyond the glands often somewhat accrescent but triangular, about as wide as long, often auriculate at the base.
 7. Inflorescence 6–10 cm long. 33. *B. frondosa*.
 7. Inflorescence 11–35 cm long.
 8. Stipules 1.7–3.5 mm long.
 9. Lamina of the larger leaves 16–20 cm long, 7–9.5 cm wide; trees 25 m tall; pedicel velutinous. 15. *B. fernandezii*.
 9. Lamina of the larger leaves 9.5–15 cm long, 5–8 cm wide; trees 6 m tall; pedicel sericeous or glabrescent. 32. *B. wurdackii*.
 8. Stipules 4–7.5 mm long.
 10. Flowers borne 1 per bract; pedicel velutinous; fruit sericeous to glabrate, ca 12 mm in diameter (dried). 28. *B. incarnata*.
 10. Flowers borne mostly in clusters of 2–4 per bract (greatly condensed cincinni); pedicel sericeous or glabrescent; fruit glabrous, 8–10 mm in diameter (dried). 34. *B. cowanii*.
 3. Lamina more or less persistently sericeous or subsericeous below, at least along the midrib.
 11. Stipules about $\frac{1}{2}$ to $\frac{3}{4}$ connate, the pair sulcate, bidentate at the apex; pedicel straight in fruit. Go to couplet 30 of preceding key.
 11. Stipules completely and smoothly connate, the apex entire; pedicel decurved or twisted in fruit.
 12. Leaf hairs mostly 0.5 mm long or longer, often stalked, substraight, subappressed. 11. *B. chrysophylla*.
 12. Leaf hairs mostly 0.4 mm long or shorter, sessile, quite straight and strongly appressed.
 13. Lamina with 15–20 or more pairs of fine lateral veins, none very prominent; leaves 1.7–4(–5.5) cm wide; sepals adaxially loosely sericeous. 12. *B. spicata*.
 13. Lamina with 6–10 pairs of principal lateral veins; larger leaves 5.5–10 cm wide; sepals adaxially glabrous or rarely sparsely sericeous. 5. *B. arthropoda*.
 2. Hairs of the lamina twisted or erect.
 14. Gnarled shrubs up to 60 cm tall; leaves mostly in dense clusters without measurable internodes. 8. *B. verbascifolia*.
 14. Shrubs or trees 1–30 m tall; internodes usually over 5 mm long.
 15. Sepals membranous in fruit, the portion beyond the glands elongating to form a lingulate process at least twice as long as wide. 14. *B. schomburgkiana*.
 15. Sepals thick in fruit, the portion beyond the glands often somewhat accrescent but triangular, about as wide as long, often auriculate at the base.

16. Lamina velutinous below, the hairs with a straight, erect stalk, the branches mostly shorter than the stalk.
17. All or many hairs of the abaxial surface of the lamina stellate, i e with more than 2 branches; stipules (8-)10-23 mm long, deciduous. 2. *B. stipulacea*.
17. All hairs of the lamina bifurcate, i e Y-shaped with only 2 branches; stipules 5-6 mm long, persistent on the petiole. 4. *B. poeppigiana*.
16. Lamina tomentose below, the hairs sessile, subsessile, or with a stalk shorter than the branches. Go to couplet 10 of preceding key.
1. Bracts and/or bracteoles persistent to or past maturity of the fruit.
18. Pedicel prominently pedunculate, the primary peduncle 5-15 cm long. 1. *B. maguirei*.
18. Pedicel sessile or short-pedunculate, the peduncle up to 3 mm long.
19. Stipules $\frac{1}{2}$ to completely connate.
20. Bracts 3-5 times as long as the bracteoles, strongly reflexed or revolute. Go to couplet 9 of preceding key.
20. Bracts up to twice as long as the bracteoles, sometimes the same length or shorter, appressed or spreading or somewhat reflexed.
21. Sepals membranous in fruit, the portion beyond the glands elongating to form a lingulate process at least twice as long as wide. 14. *B. schomburgkiana*.
21. Sepals thick in fruit, the portion beyond the glands often somewhat accrescent but triangular, about as wide as long, often auriculate at the base.
22. Pedicel straight or very slightly nodding in fruit.
23. Lamina of the larger leaves 18-30 cm long, 7-15 cm wide, the petiole 20-35(-45) mm long; fruit sericeous to glabrate. 27. *B. christianae*.
23. Lamina of the larger leaves 4-10.7 cm long, 1.8-5.5 cm wide, the petiole 6-19 mm long; fruit glabrous.
24. Lamina with the lateral veins very numerous and fine, not or hardly distinguishable from parallel veinlets and the reticulum; fruit (dried) 3-5 mm in diameter. Go to couplet 39 of preceding key.
24. Lamina with 7-10 pairs of principal lateral veins easily distinguished from finer veins and the reticulum; fruit (dried) 10 mm in diameter. 37. *B. kariniana*.
22. Pedicel strongly decurved and/or twisted in fruit.
25. Fruit (dried) 4-4.5 mm in diameter, developing half immersed in the enlarged, disc-like receptacle; lamina of the larger leaves 3.5-8.5 cm long, 2-4.5 cm wide, rounded or broadly obtuse at the apex, the petiole 2-6 mm long; bracts 1.5-3 mm long. 40. *B. nitidissima*.
25. Fruit (dried) 10-15 mm in diameter, quite superior throughout development; lamina of the larger leaves 10-20 cm long, 4-7 cm wide, obtuse or acuminate, the petiole (8-)10-20(-30) mm long; bracts 0.5-1.5 mm long. Go to couplet 17 of preceding key.
19. Stipules quite free or only basally connate.
26. Vegetative internodes, petioles, and abaxial surface of stipules at least initially hairy, the vestiture persistent or deciduous.
27. Internodes, petioles, and abaxial surface of stipules soon glabrescent. Go to couplet 24 of preceding key.
27. Internodes, petioles, and stipules persistently hairy, only belatedly glabrescent. Go to couplet 38 of preceding key.
26. Vegetative internodes, petioles, and abaxial surface of stipules glabrous except for hirsute axils of stipules.
28. Pedicel straight or ascending in fruit.

- 29. Petiole 3–5(–7) mm long, slightly shorter than the stipules to slightly longer, never twice as long.
- 30. Pedicel distally thickened, 2–3 mm in diameter at the apex; inflorescence sparsely sericeous or subtomentose, soon glabrescent. 35. *B. pachypoda*.
- 30. Pedicel 1 mm in diameter (–1.5 mm in fruit); inflorescence densely and persistently hairy (loosely sericeous or tomentose). 36. *B. steyermarkii*.
- 29. Petiole of the larger leaves (7–)10–35 mm long, at least twice as long as the stipules, usually 3 times as long or longer.
Go to couplet 20 of preceding key.
- 28. Pedicel decurved and often eventually twisted in fruit.
Go to couplet 23 of preceding key.

1. *Byrsonima maguirei* Anderson, sp nov

Fig 17.

Frutex vel arbor 2–8 m alta, ramis hornotinis laxae rubro- (vel brunneo-) sericeis vel tomentosis, annotinis glabris, pilis stipulis oppositis magis appressis et longius persistentibus. Lamina foliorum 5–17 cm longa, 2.2–9.5 cm lata, elliptica vel late elliptica, basi truncata vel breve angustata, margine plana vel paulo revoluta, apice obtusa, supra novella costa margineque rufotomentosa mox glabrata, lucida, costa et utrinque 8–10 nervis lateralibus et venis tertiariis impressis, subtus rufo- vel atrobrunneotomentosa demum glabrata, pilis sessilibus, tortis, non parallelis, patulis, usque 1 mm longis (ut videtur in eodem populo plantae laminis ab initio subglabris permox glabris adsunt), costa prominenti, nervis lateralibus prominulis, epidermide glauca; petiolus 10–30 mm longus, sericeo-tomentosus demum glabratus; stipulae 4–7 mm longae, late triangulares, liberae vel usque ½ connatae, abaxialiter sericeae, adaxialiter glabrae. Inflorescentia thyrsus 8–18 cm longus, rufotomentosus, cincinnis lateralibus 1–3-floriferis, bracteis 4–7 mm longis, 1–1.5 mm latis, subulatis, rectis, abaxialiter tomentosis, adaxialiter glabris, in fructu persistentibus, pedunculo florifero primario 5–15 mm longo, tomentoso, bracteolis bracteis similaribus, tantum 2.5–3.5(–4) mm longis. Pedicellus 8–10 mm longus, tomentosus, erectus vel paulo circinatus in alabastro juvenissimo rectus in fructu. Sepala glandulas 2.5–3.5 mm superantia, 2 mm lata, triangularia, apice obtusa vel rotundata et revoluta, abaxialiter tomentosa, adaxialiter glabra, omnia biglandulifera, glandulis 2.5–3 mm longis, obovatis, compressis, medio tomentosis. Petala lutea, aetate rubescentia?, saepe paucipilifera praecipue ungue margineque, 4 lateralalia patentia vel reflexa, ungue 3 mm longo, limbo 3.5–4 mm longo, 5–6 mm lato, cavo, margine eroso vel lacerato; petalum posticum erectum, ungue 3.5 mm longo crassioreque, limbo 4 mm longo, 6 mm lato, corrugato et revolutum, margine eroso. Filamenta 2.5–3 mm longa, abaxialiter glabra, adaxialiter praecipue basi hirsuta, pilis rubris et basifixis; antherae glabrae, 1.6–2 mm longae, subaequales, loculis linearibus, non alatis, apice rotundatis, connectivum aequantibus vel parum superantibus; pollen sphaeroideum, colpis (2–)3 instructum. Ovarium conicum, 1.5 mm altum, glabrum, carpello antico sterili; styli 2.5 mm longi. Fructus glaber, immaturus viridis, siccus usque 2 cm longus, 1.8 cm latus, globosus basi parum elongatus, carne tenui, nuce rugosa, loculis 2 monospermis.

Type. *Maguire, Wurdack & Maguire 42303*, scrub forest, cumbre 5–18 km W of Cumbre Camp, summit, 1200–2200 m, Cerro de la Neblina, Amazonas, Venezuela, Dec flr (holotype MICH, isotypes NY, US, VEN).

Distribution. Known only from the Cerro de la Neblina. Paratypes: VENE-

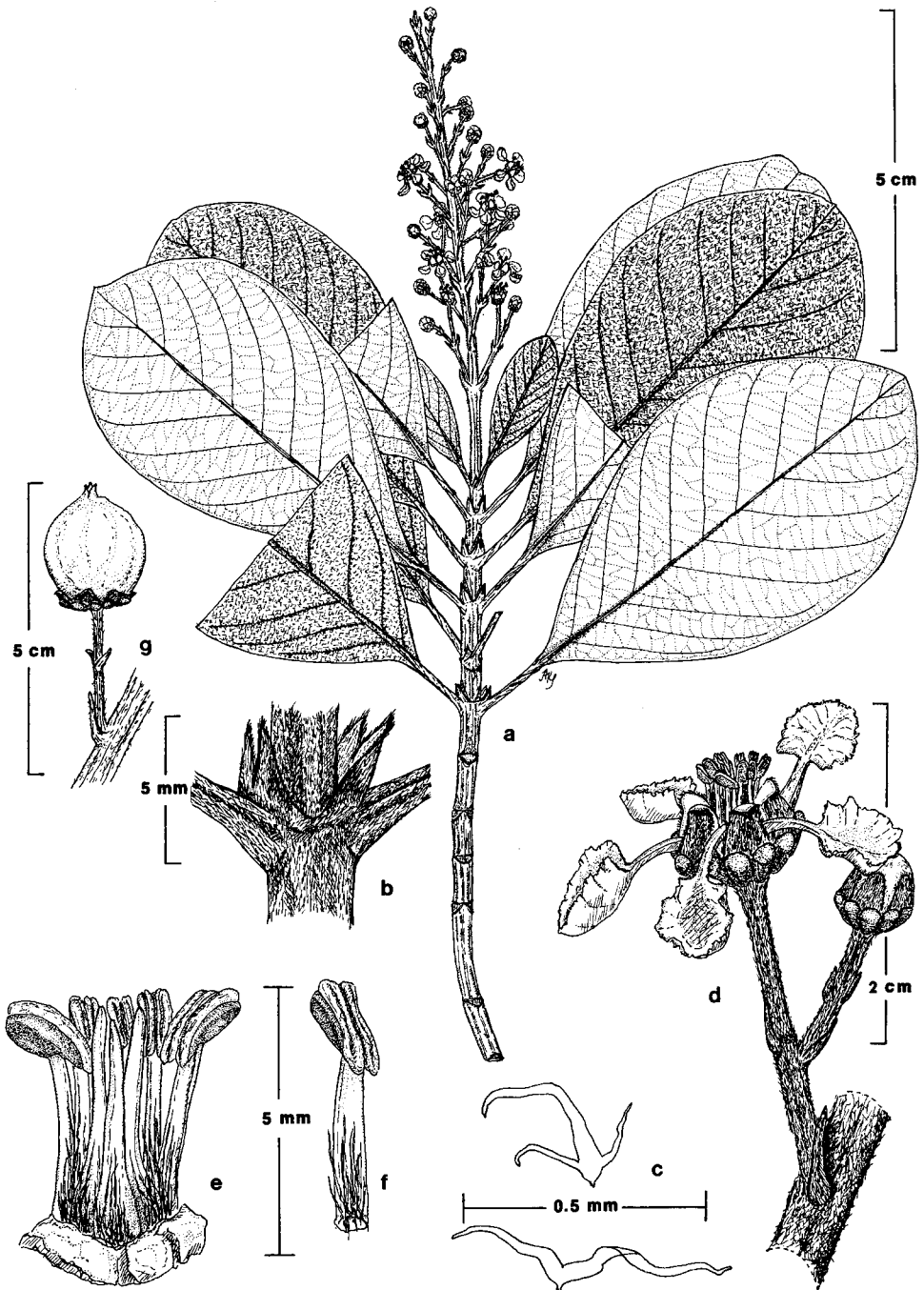


Fig 17. *Byrsonima maguirei*. a) Flowering branch; b) stipules; c) hairs from inflorescence; d) flower; e) gynoecium and five stamens; f) stamen, adaxial view; g) fruit. a-f drawn from *Maguire et al* 42303, g from *Maguire et al* 42312 by Annette Seidenschnur Mahler.

ZUELA. Amazonas: Cerro de la Neblina, cumbre 5–18 km W of Cumbre Camp, frt, *Maguire et al 42304* (MICH, NY, VEN); NW head of Cañon Grande, flr/frt, *Maguire et al 42312* (NY, VEN); scrub forest between E and N head of Cañon Grande, flr, *Maguire et al 42445* (NY, VEN); all collected in December, 1957.

Of the several new species of *Byrsonima* found in Guayana, this is one of the most interesting and distinctive. It is therefore appropriate that it be named in honor of Bassett Maguire, intrepid explorer of the Guayana Highland and specialist in the systematics of Clusiaceae.

Byrsonima maguirei is notable for its large tomentose to glabrate leaves, free to half-connate stipules, long peduncles (most species of the genus have the pedicels sessile or subsessile), long, straight, persistent bracts and bracteoles, hairs on some petals (the petals are quite glabrous in most species), conical ovary with one carpel sterile, and large fruits.

2. *Byrsonima stipulacea* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 332. 1840. Fig 16a.

Byrsonima longibracteata Martius, Flora 24 Beibl. 61. 1841, nom superfl. Type = type of *B. stipulacea*.

Byrsonima rugosa Bentham, London Jour. Bot. (Hooker) 7: 118. 1848. Type. *Robt. Schomburgk II 870/Rich. Schomburgk 1379*, Guyana (K).

Byrsonima coleostachya Grisebach, Linnaea 22: 3. 1849. Type. *Rich. Schomburgk 1603*, upper Cuyuni River, Guyana (GOET? NY!).

Alcoceratothrix longibracteata (Martius) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 1: 45. 1901.

Alcoceratothrix rugosa (Bentham) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 1: 45. 1901.

Alcoceratothrix stipulacea (Adr. Jussieu) Niedenzu in Engler, Pflanzenr. IV. 141: 762. 1928.

Trees 8–25 m tall; stems velutinous, the vesture a mixture of shorter hairs and straight, basifixed, spreading hairs up to 3 mm long, persistent or eventually (usually in subsequent seasons) deciduous. Lamina of the larger leaves 12–27 cm long, 6–13 cm wide, elliptical or rhombic, sometimes somewhat ovate or obovate, cuneate at the base, slightly revolute, acute or obtuse at the apex, sometimes acuminate or rounded, velutinous to glabrescent above with a mixture of long, basifixed simple hairs, stalked stellate hairs, and sessile stellate hairs, persistently velutinous below with most hairs stalked-stellate but the midrib and lateral veins with an admixture of long basifixed simple hairs, rugose above, the midrib, lateral veins, and scalariform tertiary veins quite prominent below; petiole 12–27 mm long, velutinous like the stems with the long spreading hairs sometimes deciduous; stipules (8–)12–25 mm long, amplexicaulous, abaxially velutinous like the stems and petioles, occasionally glabrescent, adaxially glabrous, completely connate to form an intrapetiolar pair rounded or obtuse or rarely acute at the apex, lineate with many fine parallel veins, the pairs interpetiolarly short-connate soon tearing apart, each pair deciduous independently of and often well before the leaf. Inflorescence 8–21 cm long, velutinous, the flowers borne singly or in clusters (condensed cincinni) of 2–3 per bract; bracts 6–10 mm long, ca 2 mm wide, linear or narrowly triangular, straight or reflexed but not revolute, mostly deciduous before or during anthesis; peduncle none or up to 1 mm long; bracteoles 2.5–5 mm long, 1.3–2 mm wide, triangular, deciduous. Pedicel 10–13(–19) mm long, velutinous, straight or slightly circinate in bud, straight or slightly decurved in fruit. Sepals all biglandular or all eglandular, 2.5–4 mm long, 2–2.5 mm wide,

lingulate, rounded at the apex, strongly revolute, velutinous on both sides, ac-crescent and somewhat auriculate in fruit, the glands 2–3.5 mm long. Petals yellow, glabrous, erose or subentire. Filaments 1.5–2.3 mm long, basally connate, abaxially nearly glabrous, adaxially short-hirsute at the base; anthers 2.2–4.2 mm long, heterogeneous in the same flower, the locules linear, 1.5–3.2 mm long, loosely sericeous on both sides, free at the apex, the connective usually exceeding the locules by 0.4–1.1 mm, rounded or obtuse at the apex. Ovary conical, ca 1.5 mm high, densely short-velutinous with an overlay of appressed hairs, all 3 locules fertile; styles 4–5.3 mm long. Fruit globose, up to 18 mm in diameter, orange-yellow, tomentose to glabrate, “acidulous, edible,” the nut ca 9 mm in diameter, deeply rugose.

Type. *Mart. Hb. Fl. Bras.* 567, “in sylvis ad Ilheos,” Bahia, Brazil (holotype P, isotypes MO! NY!).

Distribution. Atlantic lowlands from Espírito Santo, Brazil, north through the Guianas to Terr. Delta Amacuro in Venezuela, and inland to Bolívar and adjacent Terr. Roraima. Guayana collections: GUYANA. Near Mazaruni Forest Station, Essequibo County, *Archer* 2435 (NY); Mazaruni River *Jenman* 5371 (NY); Mt. Ayanganna, mixed evergreen forest on talus from cliffs, elev 900 m, *Tillett et al* 45161 (K, MICH, NY, US). VENEZUELA. Bolívar: Selvas pluviales, Urimán, 400 m, *Bernardi* 915 (NY); Alto Caroní, *Bernardi* 1516 (VEN); cabeceras del Río Hacha, 700–750 m, *Bernardi* 2866 (VEN); SE de Santa Elena de Uairén, 900 m, *Bernardi* 6724 (NY); selva pluvial montaña, Paujil, 120 km S de El Dorado, 1000 m, *Bernardi* 6799 (NY); Cerro Upuima, Caroní, 1300 m, *Cardona* 2239 (VEN); entre Km 88 y 126, *Ant. Fernández* 1108 (MY); cumbre of La Escalera, Río Uiriyuk, 1000 m, *Maguire et al* 46882 (NY, VEN); Quebrada O-paru-má, between Santa Teresita de Kavanayén and Río Pacairao, 1065–1220 m, *Steyermark* 60431 (NY); S of El Dorado, Km 42–65, 230 m, *Steyermark* 86669 (NY, VEN); E of Cerro El Picacho, 45 km N of Tumeremo, 600–650 m, *Steyermark* 89094 (MICH, NY); Auyan-tepuí, 1000–1480 m, *Steyermark* 94170 (VEN); vic. Cerro Uei, between Luepa and Cerro Venamo, 1100 m, *Steyermark & Nilsson* 460 (NY, VEN); base of SW-facing escarpment, Amurí-tepuí, Chimantá Massif, 1365 m, *Steyermark & Wurdack* 1372 (NY, VEN); El Dorado-Sta Elena de Uairén, Km 109, 540 m, *Trujillo* 3611 (MY); La Escalera, *Trujillo* 11620 (MY). BRAZIL. Roraima, Serra dos Surucucús: *Prance et al* 10071 (MICH, NY), 13577 (MICH, NY); *Rosa* 292 (MICH).

Collected in flower and fruit in most months.

This species is unusual in its stellate hairs and deciduous stipules. Niedenzu segregated it as the genus *Alcoceratothrix* (elk-horn-hair), but I reject that genus. *Byrsonima stipulacea* is the extreme in a series of closely related species, some with stellate hairs, some with only bifurcate or otherwise typically malpighiaceae hairs. Therefore, the only basis for recognizing *Alcoceratothrix* becomes the large deciduous stipules of this species, and that, while an interesting feature, is not sufficient basis to justify separating this species from its close relatives in *Byrsonima*.

3. *Byrsonima fanshawei* Anderson, sp nov

Fig 18g–i.

Arbor 6 m alta, trunco 4 cm diametro, ramis tomentosis tarde glabratis, pilis primum rufis mox canescentibus, mixtis et medifixis valde tortis appressisque et

sub-basifixis rectis patulisque. Foliorum majorum lamina 10–12.7 cm longa, 5–7 cm lata, elliptica vel obovata, basi cuneata, apice obtusa vel rotundata, supra tomentosa demum glabrata praeter costam, rugosa venis impressis, subtus pertinaciter tomentosa vel demum glabrata, pilis laminae ipsae medifixis, sessilibus vel subsessilibus, ca 0.5 mm longis, tortis, irregulariter stellatis brachiis 2–5 inaequalibus, pilis costae mixtis et pilis laminae similaribus et pilis sub-basifixis, rectis, patulis, non stellatis, 1.5–2 mm longis; petiolus 11–15 mm longus, pertinaciter tomentosus; stipulae 6 mm longae, abaxialiter tomento-sericeae demum glabrae, adaxialiter glabrae, in petiolo persistentes, omnino connatae, pari late ovato apice obtuso. Inflorescentia pseudoracemosa 6.5–9 cm longa, tomentosa, bracteis 4–5 mm longis, 1–1.5 mm latis, anguste triangularibus, rectis, abaxialiter sericeis, adaxialiter glabris, in fructu deciduis, pedunculo florifero 0–0.5(–1) mm longo, bracteolis bracteis similaribus, tantum 1.5–2 mm longis. Pedicellus (in fructu) ca 10 mm longus, tomentosus, decurvatus. Sepala (in fructu) glandulas 4–6 mm superantia, 3.5–4.5 mm lata, ovata, apice obtusa, parum revoluta, utrinque tomentosa (adaxialiter sparsius), omnia biglandulifera, glandulis 2–2.6 mm longis. Petala et antherae non cognitae. Ovarium tomentosum, 3-loculare, loculis omnibus fertilibus; styli ca 4 mm longi. Drupa (sicca, paulo immatura) 8–9 mm diametro, globosa apice paulo producta, tomentosa praecipue versus apicem, 3-sperma vel abortu 2–1.

Type. *Maguire & Fanshawe 23270*, bush island on savanna, Kaieteur Plateau, British Guiana [Guyana], May frt (holotype NY, isotype MO).

Byrsonima fanshawei is known only from the type, which was collected in fruit, so the petals and anthers are unknown; the petals will almost certainly prove to be yellow and the anthers are probably sericeous, at least between the locules. The species seems to be most closely related to *B. stipulacea*, from which it differs in its shorter persistent stipules, sessile or subsessile leaf-hairs, and smaller fruits. The leaves of the type are also more broadly obtuse than is usual in *B. stipulacea*. The epithet honors D. B. Fanshawe, one of the collectors of the type.

4. *Byrsonima poeppigiana* Adr. Jussieu, Ann. Sci. Nat. 2^o Sér. Bot. 13: 335. 1840.

Trees 7–24 m tall; branches velutinous or sub-sericeous to glabrate. Lamina of the leaves 10–19 cm long, 4.5–9 cm wide, obovate (or elliptical), attenuate (or cuneate) at the base, slightly revolute at the margin, rounded or broadly obtuse and short-acuminate at the apex, soon glabrate above except velutinous on the midrib proximally, thinly but persistently velutinous below, the hairs up to 0.5 mm long, erect, bifurcate, the branches mostly shorter than the stalk; midrib and lateral veins prominent below; petiole 6–15(–18) mm long, velutinous like the lamina with a proximal admixture of straight, sub-basifixed hairs 1.5 mm long; stipules 5–6 mm long, connate, the pair rounded at the apex, abaxially velutinous. Inflorescence 10–16 cm long, velutinous; bracts 2–4 mm long, up to 1 mm wide, subulate, spreading to strongly reflexed, mostly caducous; peduncle 1–2 mm long (–3 mm in fruit), 1–2-flowered; bracteoles mostly 0.8–1.5(–2) mm long, up to 1 mm wide, triangular, eventually deciduous. Pedicel 6–8 mm long, velutinous, circinate in bud, decurved in fruit. Sepals all biglandular, 1.5–2 mm long, broadly triangular, obtuse or rounded at the apex, revolute, abaxially sericeous, adaxially glabrous, accrescent and slightly auriculate in fruit. Petals yellow, glabrous. An-

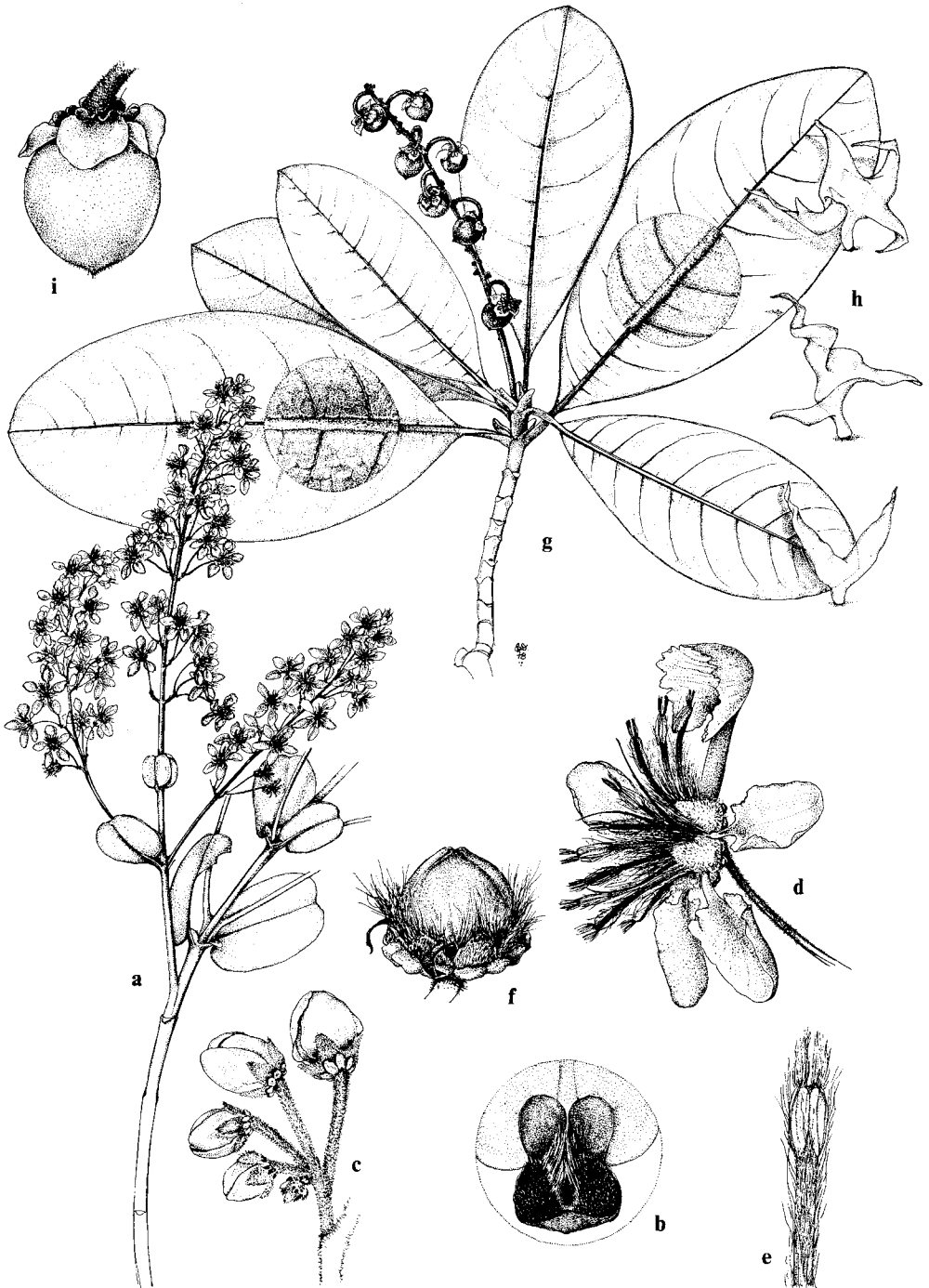


Fig 18. *Blepharandra intermedia* and *Byrsonima fanshawei*. a-f, *Blepharandra intermedia*: a) Flowering branch, $\times 0.5$; b) stipules and petiole, adaxial side, $\times 2.5$; c) cincinnus, $\times 2.5$; d) flower, $\times 3.5$; e) stamen, $\times 7.5$; f) fruit, $\times 6$. g-i, *Byrsonima fanshawei*: g) Fruiting branch, $\times 0.5$; h) hairs from abaxial surface of lamina, $\times$ ca 50; i) fruit, $\times 2.5$. Drawn by Karin Douthit, a-b and d-f from Pires *et al* 14493, c from Pires & Leite 14840, g-i from Maguire & Fanshawe 23270.

thers 2–3 mm long, loosely sericeous, especially between the locules, the connective equalling or slightly exceeding the locules, the locules narrowly linear, separated on the connective, free at the apex. Ovary conical or cylindrical, 1 mm high, glabrous or sparsely sericeous at the apex; styles 3.5 mm long. Immature fruit 10 mm long, 7 mm in diameter, ovoid with an attenuate apex, glabrous or with a few hairs at the apex.

Type. *Poeppig* 2690, Ega [=Tefé], “ostia flum. Teffé,” Amazonas, Brazil, Oct flr (holotype P? isotypes F! NY!).

Distribution. Upper Río Negro and upper Rio Amazonas. VENEZUELA. Amazonas: Río Negro, Santa Rosa de Amenadona, en selva alta, tierra firme, 100 m, Mar flr/frt, *Ll. Williams* 14706 (F, MICH, VEN); Río Casiquiare between mouth of Río Siapa and mouth of Río Paciba, 100–130 m, Jul flr/frt, *Wurdack & Adderley* 43632 (MICH, NY, US, VEN). PERU. Loreto: Mishuyacu, near Iquitos, 100 m, Dec flr, *Klug* 692 (NY); Río Momón, trocha de Momoncillo, Distr. Iquitos, Mar frt, *Revilla* 309 (MICH), Nov flr, *Revilla* 1838 (MICH); Iquitos, *Tessmann* 5063 (NY).

The collections called var *velutina* by Niedenzu represent two other species.

5. *Byrsonima arthropoda* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 335. 1840.

Byrsonima schultesiana Cuatrecasas, Webbiana 13(2): 603. 1958. Type. *Schultes & Cabrera* 12562, Soratama, Río Apaporis, 250 m, Amazonas-Vaupés, Colombia, Jun flr (holotype US! isotype NY!).

“Bush” or tree 6–20(–25) m tall, the stems loosely sericeous to glabrate. Lamina of the larger leaves 12–18 cm long, 5–10 cm wide, obovate (or elliptical), cuneate or attenuate at the base, short-acuminate or obtuse at the apex, thinly sericeous, ± glabrate above at maturity, persistently sericeous to eventually glabrate below, the hairs 0.2–0.4 mm long, fusiform, sessile, appressed, the lateral veins prominent below, the reticulum prominulous below or on both sides; petiole (7–)10–15 mm long, sericeous to glabrate, often with an admixture of long, spreading, basifixed or sub-basifixed hairs; stipules 3–6 mm long, connate, the pair rounded or occasionally acute and usually slightly reflexed at the apex, abaxially sericeous, adaxially glabrous. Inflorescence 8–14(–19) cm long, velutinous or appressed-tomentose; bracts 2–4(–6) mm long, up to 0.8 mm wide at base, subulate, spreading to strongly reflexed or revolute, mostly deciduous before or during anthesis; peduncle (0.5–)1–2.5(–4) mm long, 1–2-flowered; bracteoles 0.5–1(–2) mm long, up to 1.5 mm wide, triangular, eventually deciduous. Pedicel 4–9 mm long, velutinous to subsericeous, slightly circinate in bud, decurved or twisted in fruit. Sepals all biglandular, 1–1.5 mm long and wide beyond the glands, broadly triangular, obtuse or rounded and revolute at the apex, abaxially sericeous, adaxially glabrous or rarely sparsely sericeous, accrescent and slightly auriculate in fruit. Petals yellow, glabrous. Anthers 1.9–2.9 mm long, loosely sericeous, especially between the locules, the connective equalling or slightly exceeding the locules, the locules narrowly linear, separated on the connective, often free at the apex. Ovary 1–1.5 mm high, conical or ovoid, glabrous or sparsely sericeous at the apex; styles 2.8–3.3 mm long. Fruit ca 10 mm in diameter (dry), ovoid or spheroidal with a slightly protuberant apex, glabrous or with a few hairs at the apex.

Type. *Poeppig* 2214, Yurimaguas, Maynas, Peru (holotype G).

Distribution. Forests of western Amazonia. COLOMBIA. Amazonas-Vaupés: Soratama, Río Apaporis, 250 m, *García-Barriga* 14108 (NY, US), *Schultes & Cabrera* 12562 (NY, US), 12820A (US), 15002 (NY, US), 19585 (NY, US), 19850 (NY, US); Jinogojé, mouth of Río Piraparaná, Río Apaporis, *Schultes & Cabrera* 19815 (US). Amazonas: Leticia, *Schultes & López* 10400e (US). Putumayo: Mocoa, 500–600 m, *García-Barriga* 3661 (COL). BRAZIL. Amazonas: Tabatinga, *Ducke* 1863 (A); Acanauê, Rio Japurá, *Rodrigues & Coelho* 1397 (INPA); Fonte Boa, Rio Solimões, *M. Silva* 2187 & 2193 (NY); inter Barcellos et San Isabel, Rio Negro, *Spruce* 1919 (NY); Bom Fim, Rio Juruá, *Ule* 5043 (MG). Acre: Rio Moa, 15 km NW of Cruzeiro do Sul, Rio Juruá, *Prance et al* 2790 (MICH). PERU. Loreto: Caserio, Iquitos, *Revilla* 188 & 294 (MICH); Puerto Margarita, Requena, 223 m, *Schunke* 6401 (F); Maynas, Río Yaguasyacu, tributary of Río Ampiyacu, *Gentry & Revilla* 20349 (MICH); Maynas, Río Javari, above Atalaia del Norte, *Gentry & Revilla* 20940 (MICH).

Collected in flower and fruit from October to June.

This species is closely related to *Byrsonima poeppigiana*, from which it differs reliably only in the form of the leaf hairs. *Byrsonima schultesiana* is a form in which the short, sessile, appressed hairs persist on the leaves; its bracteoles are also unusually sericeous. However, the extensive series of collections that show this feature all represent one population, at Soratama. Other populations, even from Colombia, vary in the persistence of the hairs, and when all the collections cited above are considered it becomes very difficult to maintain *B. schultesiana*. Cuatrecasas described the petals as white or pink, on the basis of the labels with *García-Barriga* 14108 (white) and *Schultes & Cabrera* 19585 (pink). However, all other collections have been said to have yellow petals, including the type of *B. schultesiana*, and it seems very probable that this species has yellow petals like those of its close relatives.

6. *Byrsonima aerugo* Sagot, Ann. Sci. Nat. 6° Sér. Bot. 12: 178. 1881. Fig 16b.

Byrsonima ferruginea Humboldt, Bonpland & Kunth var *macrophylla* Bentham, London Jour. Bot. (Hooker) 7: 119. 1848. Type. *Robt. Schomburgk II* 811, Roraima, "British Guiana" [Bolívar, Venezuela] (holotype K, isotype NY!).

Trees 15–33 m tall; branches tightly sericeous. Lamina of the larger leaves (12–)14–21(–25) cm long, (4.5–)6–9(–11) cm wide, elliptical or slightly obovate, cuneate or attenuate at the base, acute or usually acuminate at the apex, glabrate above at maturity or somewhat sericeous, especially near the base and on the midrib, densely and persistently ferrugineous-sericeous below, the hairs 0.2–0.5 mm long, subsessile, straight and tightly appressed, parallel, usually so dense and persistent as to completely hide the lamina, the midrib and 9–13 pairs of major lateral veins prominent below; petiole (15–)20–40 mm long, sericeous or glabrescent; stipules 2.5–4 mm long, connate, the pair acute or obtuse at the apex, abaxially sericeous, adaxially glabrous. Inflorescence 7–13(–19) cm long, sericeo-velutinous; bracts 3.5–5 mm long, 0.8–1.3 mm wide, subulate, strongly reflexed or circinate-revolute, deciduous or persistent; peduncle 0.5–1(–2) mm long, 1(–2)-flowered; bracteoles 0.6–1.5 mm long, 1–1.5 mm wide, triangular, deciduous or persistent. Pedicel 8–12 mm long in flower, up to 14 mm long in fruit, pilose-

sericeous, straight and ascending in bud and fruit. Sepals all biglandular, 1.5–2.5 mm long, triangular, obtuse at the apex, revolute, abaxially sericeous, adaxially sparsely to densely sericeous or velutinous, accrescent in fruit up to 6 mm long. Petals yellow, glabrous. Anthers 2–3 mm long, sericeous, especially between the locules, the connective equalling the locules or extended beyond them up to 0.6 mm (both extremes and intermediates occurring in the same flower), the locules narrowly linear, 1.6–2.5 mm long, sometimes free at the apex. Ovary conical, 1.5 mm high, densely sericeous; styles 3–3.3 mm long. Fruit yellow, 11 mm in diameter (dried), globose, sericeous on the distal half to glabrate, excavated at the base where borne on a rounded torus.

Lectotype. *Sagot 102*, Karouany, French Guiana (P, NY!).

Distribution. Rain forests of French Guiana, Surinam, Guyana, and eastern Venezuela. Collections from Guayana: VENEZUELA. Bolívar: Río Apacará, region de Urimán, 400–500 m, *Bernardi 1502* (NY, VEN); entre Río Ikabarú y Río Blanco, *Bernardi 6588* (NY); bosques de Marivaca 17 km al sur de Los Castillos, *Bernardi 7862* (NY); NE of Upata, 500 m, *Breteler 5094* (VEN); Río Icabarú, Caroní, 500 m, *Cardona 2150* (VEN) & *2151* (VEN); camino a Itteipó, puerto del Río Tirica, Caroní, *Cardona 2164* (US, VEN); La Isabel a Río Grande, El Palmar, Dto. Piar, *Conejos 74* (VEN); Roraima, *Robt. Schomburgk II 811*, type of *B. ferruginea* var *macrophylla* & syntype of *B. aerugo* (NY); 15–35 km S of El Dorado, 200–250 m, *Steyermark 111252* (MICH). Terr. Delta Amacuro: E de Río Grande, ENE de El Palmar, *Blanco 277* (NY). GUYANA. Kaieteur Falls, Potaro River, *De La Cruz 4389* (NY); opposite Kubinang village, between Kukui River and Kako River, upper Mazaruni River basin, 460 m, *Tillett & Tillett 45432* (K, MICH, NY, US).

Collected in flower and fruit from June to December.

For an excellent discussion of the nomenclature of *Byrsonima aerugo*, see Sandwith, Kew Bulletin **1935**: 311–313. Note also that *B. aerugo* is very close to *B. crispa*, and if the two should ever be combined, *crispa* is much the older epithet.

7. *Byrsonima crispa* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. **13**: 335. 1840.

Byrsonima carmeniana Cuatrecasas, Webbia **13**(2): 615. 1958. Type. *Cuatrecasas 8896*, Cerro de La Sardina, 500 m, Florencia, Caquetá, Colombia, Mar flr (holotype US! isotypes COL, F!).

Trees 8–25 m tall; branches tightly sericeous. Lamina of the leaves (8–)11–19 (–22) cm long, (3–)4.5–7(–8) cm wide, elliptical, attenuate at the base, attenuate or usually acuminate at the apex, glabrate above at maturity or obscurely sericeous, especially on the midrib, sparsely sericeous to nearly glabrate below, the hairs 0.1–0.2 mm long, sessile, straight and tightly appressed, parallel, never dense enough to hide the lamina, the midrib, lateral veins, and reticulum prominent below; petiole 20–30 mm long, sericeous to glabrate; stipules 3–4.5 mm long, connate, the pair acute or obtuse at the apex, abaxially sericeous, adaxially sparsely sericeous or glabrous. Inflorescence 6–14 cm long, sericeo-velutinous; bracts (2.5–)3–4.5(–6) mm long, up to 1 mm wide, subulate, strongly reflexed or circinate or helically revolute, deciduous or persistent; peduncle 0–1(–2) mm long, 1(–2)-flowered; bracteoles 0.5–1(–1.5) mm long, 1–1.5 mm wide, triangular, usually persistent to maturity of the fruit. Pedicel 7–11 mm long in flower, up to

13 mm in fruit, loosely sericeous, straight or slightly circinate in bud, mostly straight and ascending in fruit. Sepals all biglandular, 1.5–2 mm long, triangular or lingulate, obtuse at the apex, revolute, abaxially sericeous, adaxially slightly to densely sericeous or velutinous near the apex, accrescent in fruit. Petals yellow, glabrous. Anthers 1.5–2.5 mm long, sericeous, especially between the locules, the connective equalling the locules or extended beyond them up to 0.6 mm (both extremes and intermediates occurring in the same flower), the locules narrowly linear, sometimes free at the apex. Ovary conical or compressed-hemispheroidal, 1.5 mm high, densely sericeous, especially on the distal half; styles 2.6–3.2 mm long. Fruit yellow, 10–13 mm in diameter (dried), globose, sericeous at the very apex, excavated at the base where borne on a rounded torus, the nut rugose.

Type. *Poeppig 3003*, "Insula Colares, ostia fluvii Amazonici," Pará, Brazil (holotype P).

Distribution. In forests on terra firme, scattered throughout Amazonia, north to the Orinoco, south to Bahia. COLOMBIA. Caquetá: Type of *B. carmeniana*, q v. Meta: Acacías, 450 m, Aug flr, *Jaramillo et al 440* (US); Sierra de La Macarena, 800 m, Jan frt, *Philipson et al 2211* (US) & Sep flr, *Plowman et al 4246* (MICH). VENEZUELA. Amazonas: Orinoco River, southern part of Isla del Raton, elev 90 m, Nov frt, *Breteler 4797* (MICH, VEN, WAG). VENEZUELA-BRAZIL BOUNDARY. Amazonas: Sierra Parima, headwaters of Rio Padauri, Feb flr, *Cardona 1449* (F, US, VEN). The other collections seen are from Manaus and east, Santarém and vicinity, Belém and vicinity, the Serra do Cachimbo, and southernmost Bahia.

This species is very similar to *Byrsonima aerugo*. They differ in their stature (*B. aerugo* is usually taller) and in the vesture of the leaves, which are very densely and persistently sericeous below in *B. aerugo*. The two taxa have not been collected in the same area.

8. *Byrsonima verbascifolia* (Linnaeus) de Candolle, Prodr. 1: 579. 1824.

Malpighia verbascifolia Linnaeus, Sp. Pl. 426. 1753.

Byrsonima verbascifolia var *denudata* Cuatrecasas, Webbia 13(2): 605. 1958. Type. *Cuatrecasas 7713*, San José del Guaviare, Vaupés, Colombia (holotype COL, isotypes F, NY! US).

Gnarled shrubs up to 60 cm tall, the leaves borne in dense sessile clusters on the thick corky stem, the internodes essentially none. Lamina of the larger leaves 14–25(–33) cm long, 5–13(–15) cm wide, obovate or spatulate, attenuate at the base, often grading into a winged petiole, usually obtuse or rounded and apiculate at the apex, occasionally retuse, densely and usually persistently villous above and woolly below, rarely eventually subglabrate above or on both sides, the reticulum usually prominulous above and quite prominent below (but hidden by the vesture); petiole 10–35(–80) mm long, often winged and grading into the lamina, woolly or villous; stipules 6–12 mm long, connate, the pair triangular, abaxially villous, the hairs darker brown than on the petiole, adaxially glabrous. Inflorescence (15–)18–35(–42) cm long, villous or woolly, pseudoracemose or thyriform with the lowest cincinni pedunculate and several-flowered; bracts 5–11 mm long, 1–2 mm wide, narrowly triangular or subulate, abaxially woolly, adaxially glabrous, mostly deciduous during or soon after anthesis; bracteoles like the bracts but shorter, about half as long. Pedicel 5–10 mm long, tomentose-

villous, circinate in bud, decurved (always?) in fruit. Sepals all biglandular, 1.5–3 mm long beyond the glands, 1–2 mm wide, obtuse or rounded and revolute at the apex, abaxially densely tomentose, adaxially glabrous, accrescent in fruit; glands 1–2 mm long. Petals yellow, glabrous. Anthers 1.8–3.3 mm long, loosely tomentose to glabrate, the connective not or hardly exceeding the apex of the locules. Ovary densely appressed-villous, 1.5–2 mm high, all 3 locules fertile; styles 3–3.5 mm long. Fruit ca 15 mm in diameter, yellow (?), globose, thinly villous.

Type. Linnaean Herbarium, genus 588 sheet 10 in Savage's catalogue. See discussion below.

Distribution. Open savannas of South America from Colombia and Venezuela south to Paraná; also reported by Niedenzu from Cuba. Collections from Guayana: VENEZUELA. Bolívar: Río Hacha, región de Canaima, 300 m, *Agostini* 357 (VEN); sabanas de Urimán, Río Caroní, 350–400 m, *Cardona* 1161 (VEN); Caicara-Tauca, Dto. Sucre, *Ant. Fernández* 1714 (MY); Kavanayén, *Lasser* 1902 (VEN); Canaima, 400 m, *Rutkis & Foldats* 502 (VEN); Kavanayén NW to Río Karuai, 1220 m, *Steyermark* 59385 (NY); Los Hicoteos, *Tamayo* 2188 (US, VEN); Sta Elena, Cerro Akurimá, *Tamayo* 2827 (US, VEN); La Paragua, 70 m, *Williams* 12544 (VEN) & 12776 (US, VEN); Maripa, 100 m, *Williams* 11968 (US, VEN). Amazonas: Sabanas Budare, Alto Ventuari, 300 m, *Cardona* 151 (VEN); open scrub savanna on white sand, 3 km SW of Base Camp, Cerro Sipapo, 200 m, *Maguire & Politi* 28969 (MICH, NY, VEN). BRAZIL. Terr. Roraima: Bôa Vista, *Fróes* 22913 (IAN), *Rodrigues & Aubreville* 668 (IAN, INPA); Surumú, entre o rio e a serra de Mairari, *M. Silva* 43 (NY); Frechal, *Tate* 26 (NY); Limão, *Tate* 84 (NY); S. Marcos, *Ule* 7807 (MG).

Collected in flower in all months except July and August.

The specimen in the Linnaean Herbarium is labelled in Linnaeus' hand and is presumably the type. However, if it is the type it is certainly not an Aublet collection from French Guiana, as stated by Cuatrecasas (1958, p 605), since Aublet first went to French Guiana in 1762 (Stafleu 1971, p 282). There is nothing on the sheet to indicate the source of the specimen, neither the collector nor the country of origin. Linnaeus said in the protologue only "Habitat in America calidiore."

This species is quite variable through its range; the description above is based only on the collections cited.

Two additional Venezuelan collections deserve special comment. They are *Maguire et al* 32045, Santa Bárbara, Amazonas (NY, VEN), and *Killip* 37232, El Negro, between Ciudad Bolívar and El Cristo, Bolívar (VEN). Both are atypical in their elongated internodes, short leaves with $\pm$ unwinged petioles, and small bracts. They may represent some unrecognized taxon close to *Byrsonima verbascifolia* sensu stricto, but it also seems quite possible that they resulted from hybridization between *B. verbascifolia* and the ubiquitous *B. crassifolia*.

9. *Byrsonima crassifolia* (Linnaeus) Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 149 (4^o ed.). 1821 [1822]. Fig 16c.

Malpighia crassifolia Linnaeus, Sp. Pl. 426. 1753.

Byrsonima ferruginea Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 151 (4^o ed.), tab. 446. 1821 [1822]. Type. *Humboldt & Bonpland*, Orinoco, Venezuela (P).

Shrubs or small trees (0.8–)1–5(–10) m tall; stems appressed-tomentose, the wood soon fissured by elongated lenticels. Lamina of the larger leaves 6.5–11 (–15.5) cm long, 3–6.5(–8) cm wide, elliptical or broadly elliptical or somewhat obovate or suborbicular, cuneate or attenuate at the base, usually abruptly short-acuminate at the apex, occasionally obtuse or rounded, densely tomentose to glabrate on both sides, belatedly glabrescent on the midrib, the vestiture often deciduous in a characteristic patchy manner below, the hairs eventually changing from brown to gray; parallel lateral veins and the reticulum prominulous, usually white above or on both sides; petiole 8–13(–19) mm long, tomentose or eventually glabrescent; stipules 2–3(–4) mm long, connate, the pair obtuse or rounded at the apex, abaxially tomentose-sericeous, adaxially glabrous. Inflorescence 7–13(–17) cm long, appressed-tomentose or tomentose; bracts 1.5–3(–5) mm long, ca 1 mm wide, broadly to narrowly triangular, appressed or spreading but not revolute, usually deciduous before maturity of the fruit, often much earlier; peduncle 0–2(–3) mm long, 1–2(–3)-flowered; bracteoles like the bracts but 0.7–1.5(–2) mm long, deciduous. Pedicel 6–12(–14) mm long, tomentose or subsericeous, circinate in flower, decurved in fruit. Sepals all biglandular, 1.5–2 mm long beyond the glands, obtuse or rounded at the apex, eventually revolute, abaxially tomentose, adaxially glabrous or rarely sparsely tomentose, not or only slightly accrescent in fruit; glands 2–2.5 mm long. Petals yellow, glabrous, all eglandular. Anthers 1.8–3 mm long, the connective equalling the locules or extended beyond them up to 0.2(–0.4) mm, the locules 1.8–3 mm long, pilose with few to many spreading hairs on both sides, linear, attached at the apex. Ovary 1.3–2 mm high, glabrous or sparsely to densely tomentose-sericeous, all 3 locules usually fertile; styles 3–3.5(–4) mm long. Fruit yellow, glabrous or sparsely tomentose to glabrate, 8–10 mm in diameter (dried), globose or depressed-globose.

Type. Linnaean Herbarium, genus 588 sheet 8 in Savage's Catalogue. See discussion below.

Distribution. Savannas from Mexico to southern South America, often the dominant species; also common in the West Indies. Collections from Guayana: GUYANA. Upper Mazaruni River, *De La Cruz* 2212 (NY); Kaieteur Plateau, *Maguire & Fanshawe* 23260 (NY); Kamarang River, *Pinkus* 18 (NY); Ayanganna Plateau, upper Mazaruni River, *Tillett et al* 44869 (NY) & 45247 (K, MICH, NY). VENEZUELA. Bolívar: Catarata Camá, 1090–1120 m, *Badillo & Holmquist* 6304 (MY); Cerro Perro, *Cardona* 754 (NY, VEN); Urimán, *Cardona* 1160 (NY, VEN) & 1633 (US, VEN); Río Jakmerú, *Cardona* 1854 (NY, US, VEN); región de El Palmar, Upata y Guasipati, 300 m, *Cardona* 2123 (VEN); Alto Caroní, *Cardona* 2551 & 2831 (VEN); Río Perro de Agua, Dto. Sucre, *Ant. Fernández* 1598 (MY); Kavanayén, 1300 m, *Ferrari* 1042 (MY); Río Paragua, between La Paragua and Salto de Auraima, 260 m, *Killip* 37279 (VEN); Sta Elena, *Lasser* 1281 (NY); Kavanayén, *Lasser* 1753 (NY, VEN); SE Kavanayén, 1300 m, *Maguire* 33709 (MICH, NY, VEN), *Maguire et al* 33996 (MICH, NY, US, VEN); Cerro Toribia, 450–500 m, *Maguire et al* 35945 (NY, VEN); Arabupu, *Pinkus* 67 (NY); Canaima, 400 m, *Steyermark* 106361 (NY); below Uarama-tepuí, 1220 m, *Steyermark & Nilsson* 662 (NY, VEN); El Chaparro, Medio Caura, 140 m, *Williams* 11535 (US, VEN); Guayapo, Bajo Caura, 100 m, *Williams* 11730 (US, VEN) & 11971 (VEN); La Ceiba, Medio Paragua, 70 m, *Williams* 12633 (US, VEN); La Frontera, E of Cerro Bolívar, 550 m, *Wurdack* 34465 (NY, VEN); 1–3 km E of Río Orinoco,

between mouth of Río Horeda and Cerro Gavilan, *Wurdack & Monachino 39903* (MICH, NY, US, VEN). Amazonas: W base of Cerro Parú, 200 m, *Cowan & Wurdack 31481* (MICH, NY, VEN); Puerto Ayacucho, *Holt & Gehriger 411* (NY, US); Cerro Moriche, Río Ventuari, *Maguire et al 30837* (NY) & *30872* (NY, VEN); Santa Barbara, *Maguire et al 32050* (NY, VEN); Palomal, 100–120 m, *Maguire et al 36086* (MICH, NY, US, VEN); Serranía Parú, *Phelps & Hitchcock 452* (NY); Esmeralda, *Steyermark 57751* (NY), *Tate 203* (NY); Puerto Ayacucho, *Williams 13467* (VEN), *15942* (NY, US, VEN); Esmeralda, *Williams 15328* (US, VEN). BRAZIL. Terr. Roraima: Boa Vista, *Black 51–12532* (IAN); Serra Tepequem, 800–900 m, *Maguire & Maguire 40052* (MG, NY), *Prance et al 4292* (NY); Boa Vista, *Rodrigues & Aubreville 660* (IAN, MG); Rio Branco, S. Marcos, *Ule 7803* (MG).

Collected in flower and fruit in all months.

This species is exceedingly variable, and careful revision of the complex may result in the recognition of several natural taxa. The traditionally cited non-Guayan synonyms are omitted here, because I am not at this time confident of their correct disposition. In the area of Guayana the species is homogeneous and easily recognized. The description given above is based only on the collections cited.

Cuatrecasas (1958, p 610) has pointed out that if the type of *Malpighia crassifolia* came from Jamaica, the name is probably currently misapplied, since *Byrsonima crassifolia* in our sense seems not to occur in Jamaica. Fortunately, there is no reason to suppose the type did come from Jamaica. Cuatrecasas mentions specimens of Browne in the Linnaean Herbarium, but no specimen of Browne could be the type of a Linnaean name published in 1753, since Linnaeus acquired Browne's material only in 1758 (Stearn, 1957, p 108). The only reference to Jamaica in the protologue is "Tiliae affinis" etc. of Sloane, and that is cited with a question mark. Linnaeus gave as place of origin only "America calidiore." According to Savage (1945) there are two specimens under *Malpighia crassifolia* in the Linnaean Herbarium. The first (genus 588 sheet 8) is labelled "Malpighia/ 3 crassifolia" in Linnaeus' hand; 3 is the number assigned to this species in the *Species Plantarum*. This is probably the type, if the type is extant. Judging from the photograph on microfilm I would guess that it agrees well with our current concept of the species. We shall probably never know where it came from, but given the wide distribution of the species it is not surprising that a specimen reached Linnaeus before 1753. The other specimen (sheet 9) is labelled "Malpighia crassifolia varietas Br." in Linnaeus' hand. It resembles *Byrsonima coriacea* of Jamaica. Linnaeus presumably acquired it in 1758 and filed it here because of its general resemblance to *Byrsonima crassifolia*.

10. *Byrsonima laurifolia* Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 150 (4° ed.). 1821 [1822].

Shrub 1 m tall; branches sericeous, the hairs dark brown turning gray. Lamina of the leaves 11.5–14 cm long, 4–6 cm wide, narrowly elliptical or ovate, attenuate at the base, gradually narrowed distally to an acute or slightly acuminate apex, tomentose above to glabrate except on the midrib, persistently tomentose below (or eventually glabrescent?), the short hairs turning from ferruginous to gray;

principal lateral veins few (ca 5–7 on each side), not strongly parallel, the reticulum not especially white or visible above; petiole 8–9 mm long, tomentose; stipules 3–3.5 mm long, connate, abaxially sericeous. Inflorescence (immature) 11 cm long, tomentose; bracts 2.5–3.5 mm long, ca 1 mm wide, triangular, not revolute, densely tomentose; peduncle none; bracteoles similar to the bracts but 1–2 mm long. Pedicel tomentose, circinate in bud. Sepals all biglandular, abaxially densely tomentose, adaxially tomentose near the margin. Petals yellow, glabrous. Anthers sericeous, especially between the locules, the connective equalling or slightly exceeding the locules, the locules linear, attached at the apex. Ovary densely tomentose.

Type. *Humboldt & Bonpland*, Llanos de Cumaná, prope Alto del Pyritál, Sucre? Venezuela, Mar flr (P).

Distribution. Known only from the type and the following collection. VENEZUELA. Bolívar: Gallery forest and grassland, 2–10 km from El Dorado-Santa Elena Road on road to Kavanayén, 1200–1250 m, Mar flr, *Gentry et al 10504* (MICH).

This interesting collection does not fit satisfactorily with any of the common yellow-flowered species of Guayana. With its tomentose leaves, short bracts, and circinate buds it is most like *B. crassifolia*, but it differs from that species in the shape of the leaves, the persistence of the foliar vesture, the venation of the lamina, and the shortness of the petiole. The ovary is also densely hairy, which is known but rare in *B. crassifolia*. The specimen I have seen is only in bud, hence the incompleteness of the description. I may be misapplying the name *Byrsonima laurifolia* by using it for this plant. My identification is based only on Kunth's description, the microfiche photograph of his type, and the photograph of the duplicate in Berlin. That is scant basis for an identification in this very difficult group of species.

11. *Byrsonima chrysophylla* Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 150 (4^o ed.). 1821 [1822]. Fig 16d.

Shrubs or small trees 2–5(–9) m tall; stems sericeous to glabrate. Lamina of the leaves broadly elliptical, cuneate or obtuse at the base, acuminate at the apex, 7–17 cm long, 4–7(–9) cm wide, revolute, soon glabrate above except on midrib, densely sericeous to subtomentose below, the hairs brown, short-stalked, not parallel, over 0.5 mm long, usually persistent (except in vicinity of Manaus); principal lateral veins 8–12 pairs anastomosing at margin, alternating with weaker veins; petiole 5–15 mm long, sericeous; stipules 2–3 mm long, connate, abaxially sericeous. Inflorescence (4–)7–15 cm long, sericeous; bracts 1–3 mm long, narrowly triangular, spreading to revolute, deciduous; peduncle 0–1 mm long, 1(–2)-flowered; bracteoles like the bracts, but 1–1.5 mm long. Pedicel 5–11 mm long, loosely sericeous, circinate in bud, usually decurved in fruit. Sepals all biglandular or all eglandular, broadly triangular, obtuse or rounded at the apex, appressed or revolute, 1.5–2 mm long, loosely sericeous on both sides. Petals yellow, glabrous, the posterior petal bearing 2 glands at apex of claw. Anthers 2–3 mm long, sericeous, especially between the locules, the connective equalling or slightly exceeding the apex of the locules, the locules narrowly linear and often free at the

apex. Ovary glabrous. Fruit yellow, globose, ca 10 mm in diameter (dried), glabrous.

Type. *Humboldt & Bonpland*, San Carlos del Río Negro, Amazonas, Venezuela (P).

Distribution. Drainages of the upper Río Orinoco, the Río Vaupés, and the Río Negro; reported from Peru. Selected collections from Guayana and nearby: VENEZUELA. Amazonas: Foot of Duida, along Orinoco, *Fariñas et al* 325 (VEN); region of San Fernando de Atabapo, *Foldats* 3621 (NY, VEN); Culebra Savanna, Río Cunucunuma, 200 m, *Maguire et al* 29423 (MICH, NY, VEN); Santa Barbara, *Maguire et al* 30814 (MICH, NY, US, VEN); Yavita-Pimichín trail near Pimichín, Río Guainía, *Maguire & Wurdack* 36327 (MICH, NY, VEN); San Carlos de Río Negro, 120 m, *Rutkis* 232 (VEN) & *Schultes & López* 9379 (NY, US); vic. San Fernando de Atabapo, road to Tití, 100 m, *Steyermark* 58418 & 58419 (both NY); San Carlos de Río Negro, 125 m, *Steyermark & Bunting* 102719 (NY, VEN); Sierra Parima, near Simarawochi, Río Matacuni, 795–830 m, *Steyermark* 106978 (NY); Yavita, 128 m, *Ll. Williams* 13901 (NY, US, VEN); San Carlos de Río Negro, 100 m, *Ll. Williams* 14548 (US, VEN); Esmeralda, 143 m, *Ll. Williams* 15319 (US, VEN); between San Fernando de Atabapo and Río Orinoco, 125–150 m, *Wurdack & Adderley* 42669 (MICH, NY, VEN). BRAZIL. Amazonas: Rio Içana, Tunuí, *Black* 48–2598 (IAN); Castanheiro, Rio Negro, *Ducke* [RB 35600] (RB); Ilha Carambana, above Tapurucuara, *Egler* 576 (NY); Uaupés, Rodovia Perimetral Norte, *Nascimento et al* 27 (IAN); Uaupés, Rio Negro, *Oliveira* 2165 (IAN); Camanaus, Rio Negro, *Pires* 362 (IAN); Pari-Cachoeira, alto Rio Negro, *Pires & Silva* 8042 (UB); Tapuruquara, *Prance et al* 15619 (NY); Iauareté, Rio Uaupés, *Ribeiro* 944 (MICH); São Gabriel, *Schultes & López* 8769 (NY, US); Serra Wabeesee, below Bela Vista, Rio Uaupés, between Ipanoré and confluence with Rio Negro, *Schultes & Pires* 9137 (US); São Marcelino, Igarapé Uabá, Rio Negro between Cocuí and mouth of Rio Içana, *Schultes & López* 9558 (US); Camanaus, Rio Negro, *Tate* 122 (NY). COLOMBIA. Vaupés: Headwaters of Río Papurí, Río Paca, *Allen* 3054 (COL); San Felipe, *Romero Castañeda* 1217 (COL); Yavaraté, *Romero Castañeda* 3650 (COL).

This species is frequently encountered in or at the edge of savannas, and also along rivers; *Steyermark* 106978 is interesting as the first collection I have seen from uplands, but it too was growing in a savanna. *Byrsonima chrysophylla* seems to occur all the way down the Rio Negro to Manaus, where it is common. However, specimens from Manaus are somewhat different from those of the upper Rio Negro and Río Orinoco, especially in the tendency of the leaves to become glabrate.

12. *Byrsonima spicata* (Cavanilles) de Candolle, Prodr. 1: 580. 1824.

Malpighia spicata Cavanilles, Diss. 8: 409, tab. 237. 1789.

Byrsonima propinqua Benthham, London Jour. Bot. (Hooker) 7: 120. 1848. Type. *Robt. Schomburgk II* 743, Roraima, "British Guiana" [Bolívar, Venezuela] (holotype K, isotype NY!).

Byrsonima coriacea var *spicata* (Cavanilles) Niedenzu in Engler, Das Pflanzenreich IV. 141: 700. 1928.

Trees 3–25 m tall; stems tightly sericeous, glabrate in age. Lamina of the leaves

narrowly elliptical or obovate, acute or attenuate at the base, acute or acuminate at the apex, 6.5–11(–13) cm long, 1.7–4(–5.5) cm wide, sericeous above at first, at maturity $\pm$ glabrate except often sericeous on the midrib, tightly sericeous to belatedly glabrate below, the hairs nearly or quite sessile, straight, to 0.5 mm long; lateral veins 15–20 or more pairs, fine; petiole 5–10 mm long, sericeous; stipules 1–3 mm long, connate, abaxially sericeous. Inflorescence 4–10 cm long, sericeous; bracts 1–2.5 mm long, narrowly triangular, spreading to revolute, deciduous; peduncle 0–1 mm long, 1(–2)-flowered; bracteoles like the bracts, but 0.5–1 mm long. Pedicel 7–8 mm long, sericeous, circinate in very young buds, mostly decurved in fruit. Sepals biglandular, broadly triangular, exceeding the glands up to 1.5 mm, loosely sericeous on both sides; glands yellow. Petals yellow, glabrous, the posterior petal bearing 2 or more glands at apex of claw or on base of limb, the limb corrugated. Anthers 2–2.5 mm long, sericeous, especially between the locules, the connective equalling or slightly exceeding the apex of the locules, the locules narrowly linear and often free and slightly flared at apex. Ovary sericeous. Fruit yellow-orange, globose, 10–12 mm in diameter (dried), sericeous to glabrate.

Type. Santo Domingo (P?).

Distribution. West Indies and northern South America. Collections from Guyana and nearby: VENEZUELA. Amazonas: Río Coro-Coro, Yutaje, 250 m, *Steyermark et al 113966* (MICH). Bolívar: Pto Ordaz-San Félix, *Aristeguieta 5340* (VEN); 40 km SE of Tumeremo, near Río Botanamo, 100 m, *Little 17586* (VEN); Mount Roraima District, vic. Arabupu [Arabopó], 1260 m, *Pinkus 72* (NY, US) & 95 (NY); vic. Tumeremo, 305 m, *Steyermark 60935* (NY); Altiplanicie de Nuria, 540 m, *Steyermark 86483* (NY, VEN) & 400 m, *Steyermark 88289* (NY); 4 km up Río Asa from Raudal Cotua, 290 m, *Steyermark 86801* (NY, VEN); 2 km SE of Los Patos, N of Río Hacha, 15 km N of Río Supamo, 365 m, *Steyermark 86985* (NY, VEN); region of El Palmar, *Trujillo 2300* (MY); eastern outlier of Cerro Marimarota, (Cerro La Puerta), 100–250 m, *Wurdack & Monachino 41389* (MICH, NY, US, VEN). GUYANA. Upper Mazaruni River, *De La Cruz 2035* (GH, NY) and Kamakusa, *De La Cruz 4173* (MO, NY); Kanuku Mts, *Smith 3350* (NY). BRAZIL. Terr. Roraima: Serra da Lua, Dormida, *Prance et al 9289* (MICH, NY); S. Marcos, *Ule 7804* (MG). SURINAM. Tafelberg, 570 m, *Maguire 24724* (NY).

Collected in flower and fruit most often from August to January.

Byrsonima propinqua is a variant of this species with the leaves larger and more persistently sericeous than is typical. Steyermark's recent collection from Amazonas is very similar to the type of *B. propinqua*. A more interesting form is the plant collected by Pinkus at Arabopó near Mount Roraima. It has much denser and more persistent foliar hairs than usual, giving it a very different aspect similar to that of *B. chrysophylla*. The elevation is also unusual. However, in most characters these collections agree with *B. spicata*. The two sheets of *De La Cruz 4173*, from the Upper Mazaruni River in Guyana, are rather different from each other. The sheet at MO is $\pm$ typical *B. spicata*, except that the leaves are large à la *propinqua*. However, the sheet at NY is intermediate between *B. spicata* and *B. aerugo*. This intermediacy is shown in size and shape of leaves, prominence of veins, length and curvature of bracts, and curvature of the pedicel.

Since both species are known from the Upper Mazaruni, this collection may well be of hybrid origin.

13. *Byrsonima coccolobifolia* Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 148 (4° ed.). 1821 [1822]. Fig 16e, f.

Byrsonima sessilifolia Benthām, London Jour. Bot. (Hooker) 7: 124. 1848. Type. *Robt. Schomburgk* 1st. Coll. s n (K).

Shrubs or small trees 1–5 m tall, the young stems glabrous or very sparsely sericeous and soon glabrate, the epidermis and later the bark exfoliating. Lamina of the larger leaves 7–14 cm long, 5–9 cm wide, ovate, rhomboidal, or obovate, rounded or slightly cordate at the base, acute, obtuse, rounded, or emarginate at the apex, at first bearing a few hairs but very soon quite glabrate, the lateral veins prominulous on both sides, the margin and veins below often white; petiole 0–2 mm long, thick, glabrate; stipules 1–2 mm long, connate, the pair wider than long, broadly rounded, abaxially loosely sericeous to glabrate, adaxially glabrous. Inflorescence 9–17 cm long, loosely sericeous or tomentose to glabrate; bracts 2–3.5(–5) mm long, 1–2 mm wide, ovate to lingulate, mostly deciduous before maturation of the fruit; peduncle none, the flowers borne 1 per bract; bracteoles like the bracts but smaller. Pedicel 4–8 mm long, (–12 mm in fruit), loosely sericeous or tomentose, circinate in bud, twisted and/or decurved in fruit. Sepals all biglandular, 2–2.5 mm long beyond the glands, 1.5–2 mm wide, ovate or lingulate, obtuse or rounded at the apex, abaxially glabrous or proximally sericeous, adaxially densely sericeous except near margin, reflexed in anthesis, accrescent in fruit; glands 2–2.8 mm long. Petals pink and white, glabrous, the limb much wider than long, several petals exposed in bud. Anthers 2.4–4 mm long, sericeous on both sides of the locules, especially distally, the locules 2–3 mm long, linear, rounded and often detached at the apex, the connective extended (0–)0.2–1.3 mm beyond the locules, the extension tapered distally and usually recurved. Ovary 1–1.5 mm high, cylindrical, glabrous, all 3 locules fertile; styles 3.7–5.5 mm long, bent at the apex. Fruit green (yellow at maturity?), 7–8 mm in diameter (dried), globose or ovoid, glabrous, the nut rugose.

Type. *Humboldt & Bonpland*, Villa de Cura, Aragua, Venezuela (P).

Distribution. Savannas of the West Indies and South America from Venezuela south to Paraguay. Guayana collections: VENEZUELA. Bolívar: Río Hacha, Canaima, Feb flr, *Agostini 359* (VEN); Ciudad Piar, 450 m, Apr flr, *Aristeguieta 2205* (VEN); Fundacion Road, 420–510 m, May flr, *Maguire & Wurdack 35771* (VEN), May frt, *Maguire & Wurdack 35772* (VEN); Río Carrao, SW of Saltas Canaima, May flr, *Rutkis & Foldats 507* (VEN); San Félix, May flr, *Steyermark 86265* (VEN); San Félix-Puerto Ordaz, elev 20 m, Jun flr, *Steyermark 94288* (VEN); sabana de Guayapo, Bajo Caura, 100 m, Apr flr, *Williams 11779* (US, VEN); La Ceiba, Medio Paragua, 70 m, Mar frt, *Williams 12647* (US, VEN); Caicara, Alto Orinoco, 100 m, Jun flr, *Williams 13280* (VEN). BRAZIL. Terr. Roraima: Bôa Vista, Sep flr, *Black 51–13789* (IAN); Lake Maiú, 40 km NW of Bôa Vista, Jan frt, *Prance et al 9138* (MICH, NY); Bôa Vista, Nov flr, *Rodrigues & Aubreville 659* (INPA, MG); S. Marcos, Rio Branco, Jan flr, *Ule 7806* (MG).

14. *Byrsonima schomburgkiana* Bentham, London Jour. Bot. (Hooker) 7: 123. 1848.

Trees 4–18 m tall, rarely shrubs only 1–2 m tall; stems densely tomentose or sericeous to glabrate. Lamina of the larger leaves (5–)8.5–15 cm long, (3.5–)4.5–7 cm wide, obovate, cuneate to rounded at the base, obtuse or abruptly acuminate to rounded and usually apiculate at the apex, often glaucous below, tomentose but soon glabrate on both sides except often persistently tomentose on the midrib, especially proximally, the margin usually white, the lateral veins prominulous below or on both sides; petiole 5–10 mm long, densely and persistently tomentose or belatedly glabrescent; stipules 2–4 mm long, smoothly connate, abaxially sericeous, adaxially glabrous. Inflorescence 8–20 cm long, densely tomentose; bracts 3–5(–9) mm long, 0.8–1 mm wide, narrowly lingulate, spreading, abaxially tomentose, mostly deciduous but occasionally persistent in fruit; peduncle 0–0.5 mm long, 1-flowered; bracteoles like the bracts but shorter. Pedicel 5–10 mm long (–13 mm in fruit), tomentose, hardly circinate in bud, straight or decurved in fruit. Sepals all biglandular, 2–2.5 mm long beyond the glands, 1.7–2 mm wide, lingulate, strongly revolute in anthesis, abaxially densely tomentose, adaxially proximally tomentose, distally thinly tomentose to glabrous, accrescent (mostly elongated) in fruit; glands 2–2.5 mm long. Petals pink or pink and white, glabrous, the outermost covering all others in bud. Anthers 1.8–2.8 mm long, loosely sericeous or tomentose on the locules, especially distally, the locules 1.3–1.9 mm long, rounded or acute and detached at the apex, the connective extended (0.3–) 0.5–1.1 mm beyond the locules, the extension globular, obtuse or rounded, straight or slightly recurved. Ovary 1.2–1.5 mm high, ovoid, glabrous, all 3 locules fertile; styles 2.7–3.7 mm long, straight or slightly curved distally. Fruit yellow, 6–9 mm in diameter (dried), glabrous, the nut rugose; accrescent sepals 5–10 mm long, 2–3.5 mm wide, lingulate, membranous, veiny.

Lectotype. *Robt. Schomburgk I 786*, British Guiana [Guyana] (GH! K, US!).

Distribution. GUYANA. Rupununi River, seasonal forest on foothills, *Forest Dept. 5635 & 5651* (NY); riparian fringe, Orinduik, Ireng River, *Forest Dept. 7815* (NY); *Rich. Schomburgk 777* (NY, syntype); scrub savanna, Karenambo, Rupununi basin, *Smith 2224* (NY); Yupukari, Rupununi basin, patch of forest in scrub savanna, *Smith 2266* (NY); Isherton, Rupununi basin, edge of forest, *Smith 2450* (NY). VENEZUELA. Bolívar: Parque Caroní, San Félix-Pto Ordaz, *Aristeguieta 5845* (MY, NY, VEN); orilla de caño, entre Río Perro de Agua y Río Juasjualito, Dto Sucre, *Ant. Fernández 1643* (MY). BRAZIL. Terr. Roraima: Rio Branco, Fazendas S. Bento, Capela e Bom Intento, *Black 51–13295* (IAN); 50 km from Bôa Vista, by stream, 120 m, *Coradin & Cordeiro 687* (MICH); Surumú region, 15 km NNE of Pereira Village, 170 m, *Coradin & Cordeiro 915* (MICH); high forest border of open grass country, Porto Alegre, Rio Acary, *Fróes 23113* (IAN, UB); Rio Branco, Igarapé da Normândia, *Jaccoud* [INPA 262] (IAN, INPA, MG); Cajú, Rio Quino to right fork headwaters Rio Cotingo, 750 m, *Maguire & Maguire 40363* (MG, NY); boca do R. Ajarani com o R. Branco, *Pires et al 14377* (MICH); R. Anauá, catinga, *Pires et al 14485* (MICH); Serrinha, Rio Mucajaí, 500 m, *Prance et al 4226* (MICH, NY); Rio Surumú, *Rodrigues & Mello 4350* (INPA); Cunha Puca, *Ule 7607* (MG); Serra do Mel, Surumú, *Ule 8184* (MG).

Collected in flower and fruit mostly from August to February, rarely in March and April.

15. *Byrsonima fernandezii* Cuatrecasas, Webbia 13(2): 612. 1958.

Tree 25 m tall, the stems sericeous to glabrate. Lamina of the larger leaves 16–20 cm long, 7–9.5 cm wide, elliptical or somewhat obovate, cuneate or slightly attenuate at the base, rounded and apiculate at the apex with the apiculum ca 5 mm long, glabrous on both sides, coriaceous, the principal lateral veins about 7–9 on each side, prominulous, not connected by numerous or parallel tertiary veins; petiole 25–30 mm long, glabrous; stipules 2.5 mm long, connate, rounded. Inflorescence 11–18 cm long, short-velutinous; bracts 4–5 mm long, 2–2.5 mm wide, narrowly triangular, most apparently deciduous before or during anthesis; peduncle 1–2(–3) mm long, 1–2(–3)-flowered; bracteoles 1.5–2 mm long, 1–1.5 mm wide, ovate, caducous. Pedicel 9–13 mm long, velutinous, circinate in bud. Sepals all biglandular, ca 1.5–2 mm long beyond the glands, 2 mm wide, rounded at the apex, revolute, densely tomentose-sericeous on both sides, the glands 2.5–3.5 mm long. Petals “moradas” (purple? dark red?), glabrous, the outermost conical-galeiform. Filaments 2.5 mm long, free, densely hirsute; anthers 3–3.8 mm long, very densely appressed-hirsute for their whole length with the straight, $\pm$ basifixed hairs ca 1.5 mm long, the locules 2–2.3 long, linear, rounded at the apex, the connective extended beyond the locules 0.9–1.7 mm, the extension slender, tapering to an acute apex, straight or recurved. Ovary 2 mm high, cylindrical, densely sericeous on the distal half, only 2 of the locules fertile; styles 5.5–6.5 mm long, bent at the apex. Fruit unknown.

Type. *Alvaro Fernández* 2028, San Joaquin, riberas del Río Inírida, Vaupés, Colombia, 230 m, Jan flr (holotype COL, isotype US!).

Distribution. Known only from the type.

This very distinctive and interesting plant has incredibly hairy anthers that mimic and even surpass those of a *Blepharandra*. Cuatrecasas described a section to accommodate it (Section *Kerozeugma*), but it resembles in many respects species in Niedenzu's Section *Acrotheca* (eg *B. gymnocalycina*) and could perhaps be placed there, even though it lacks an apical extension of the locules, which Niedenzu used to define the section. It is certainly more similar to species in Niedenzu's Subsection *Uroceras* than are the species of the other Subsection, *Brachyceras*.

16. *Byrsonima gymnocalycina* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 334. 1840.

Byrsonima ceranthera Benth, London Jour. Bot. (Hooker) 7: 121. 1848. Type. *Robt. Schomburgk* I 525, Essequibo & Rupununi, Guyana, flr (holotype K, isotypes BM, F! MO!).

Shrubs or small trees to 6 m tall, the stems loosely sericeous to glabrate. Lamina of the larger leaves 11–16(–20) cm long, 4–6.5(–7.5) cm wide, elliptical, cuneate at the base, slightly revolute, obtuse or abruptly short-acuminate at the apex, sericeous to glabrate above, the hairs on the midrib longer persistent, sericeous to belatedly glabrate below, with longer, looser, darker hairs on the veins and short, white appressed hairs on the lamina between, the lateral veins prom-

inent below; petiole 10–20(–30) mm long, sericeous to glabrate; stipules 3–4(–5) mm long, connate, the pair obtuse or rounded at the apex, abaxially sericeous, adaxially glabrous. Inflorescence 8–15 cm long, sericeous; bracts and bracteoles 0.8–1.5 mm long, ovate or triangular, persistent in fruit; peduncle 0–1(–2) mm long, 1-flowered. Pedicel 5–9 mm long, loosely sericeous, circinate in bud, twisted and decurved in fruit. Sepals 1.5–2.5 mm long, 2–2.5 mm wide, obtuse, revolute at the apex, abaxially sericeous, adaxially sparsely sericeous, accrescent in fruit, all biglandular with the glands 2.5–4 mm long or all apparently eglandular, actually bearing rudimentary subdermal nonfunctional glands. Petals “pink” or “white,” glabrous, the anterior 2 rounded-galeiform, the posterior 3 with the limb $\pm$ flat or corrugated. Anthers 3.5–4.6 mm long, densely appressed-hirsute for their whole length, the locules with the fertile part 2.6–3.5 mm long, drawn out at the apex in slender, sterile extensions 0.7–1.3 mm long, the connective extended beyond the fertile part of the locules (0.2–)0.5–1.5 mm, the extension slender and tapering distally, usually recurved. Ovary 1.5–2 mm high, cylindrical or conical, densely sericeous, especially distally, only 2 of the locules fertile; styles 4–5 mm long, bent at the apex. Fruit red, 12–15 mm in diameter (dried), 10–12 mm high, ovoid, $\pm$ beaked at the apex, glabrate or sericeous at the apex, borne on a broad, flat, accrescent calyx and receptacle, the nut prominently ribbed and rugose.

Type. *Parker*, Demerara, Guyana, frt (K).

Distribution. GUYANA. Marshall Falls, Mazaruni River, Apr frt, *Forest Dept.* 5484 (NY, RB); Essequibo, below Arisaru, river bank, Sep flr, *Forest Dept.* 6146 (NY, US); bank of Potaro River, Tumatumari, Jul frt, *Gleason* 357, Jul flr, *Gleason* 392, Jul bud, *Gleason* 393 (all NY); Bootooba, Demerara River bank, Mar frt, *Persaud* 61 (F), Oct flr, *Persaud* 167 (F, NY); Essequibo River, rocky bank and islets at first Falls, Sep flr, *Sandwith* 206 (NY, RB).

17. *Byrsonima japurensis* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 335. 1840.

Fig 16g.

Byrsonima inundata Benthams, London Jour. Bot. (Hooker) 7: 122. 1848. Type. *Robt. Schomburgk* I 909, Rio Negro, Amazônia, probably in Brazil, flr (holotype K, isotype MO!).

Byrsonima uvulifera Spruce ex Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 1: 37. 1901. Type. *Spruce* 3315, ad flumina Casiquiari, Vasiva et Pacimoni, Amazonas, Venezuela, frt (isotype NY!).

Byrsonima fluminensis Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 1: 43. 1901. Lectotype: *Martius*, Rio Japurá, Amazônia, Brazil.

Byrsonima japurensis subsp. *silvatica* Cuatrecasas, *Webbia* 13(2): 626. 1958. Type. *Schultes & Black* 8435, Loretoyacu River, Amazonas, Colombia, Oct flr/frt (holotype US!).

Byrsonima japurensis subsp. *fluminensis* (Niedenzu) Cuatrecasas, *Webbia* 13(2): 627. 1958.

Shrubs or trees 3–21 m tall; stems sericeous, soon glabrate. Lamina of the larger leaves 10–17 cm long, 4–7 cm wide, elliptical or slightly ovate, cuneate at the base, obtuse or usually acuminate at the apex, sparsely sericeous below to (usually) quite glabrate, the lateral veins obscure or prominulous; petiole (8–)12–20(–25) mm long, sparsely sericeous to glabrate; stipules 1.5–3(–4.5) mm long, connate, the pair acute to rounded, abaxially sericeous to glabrate, adaxially glabrous. Inflorescence 6–18 cm long, sericeous or subtomentose to glabrate; bracts and bracteoles 0.5–1(–1.5) mm long, triangular or rounded, the bract often shorter than the bracteoles, all persistent to maturity of the fruit and after; pe-

duncle 0–0.5 mm long, 1-flowered. Pedicel 6.5–10 mm long, sericeous or tomentose, circinate in bud, twisted and/or decurved in fruit. Sepals all biglandular, 1.5–2 mm long beyond the glands, 1.5–2.2 mm wide, triangular, reflexed at the apex in anthesis, abaxially sericeous, adaxially glabrous; glands ca 2 mm long. Petals pink or white, glabrous, the lateral 4 all concave, the anterior 2 deeply cup-shaped. Anthers 2–3.2 mm long, sparsely to densely sericeous, the locules with the fertile part 1.3–2.5 mm long, drawn out at the apex in slender, sterile extensions 0.3–1.1 mm long, the connective extended beyond the fertile part of the locules 0.3–1.2 mm, the extension tapering distally, straight or recurved. Ovary ca 1 mm high, ovoid, sericeous or glabrous, only 2 of the locules fertile; styles 3–4 mm long, $\pm$ straight. Fruit red, 10–12 mm in diameter (dried), 10–13 mm high, ovoid to globose, $\pm$ beaked at the apex, especially when immature, glabrous or glabrate.

Type. *Martius*, Japurá, Amazonas, Brazil, Dec flr (M).

Distribution. Along rivers in western Amazonia, from Manaus west to Loreto, from Acre north to the middle Orinoco. Collections from Guayana: VENEZUELA. Bolívar: La Paragua, 70 m, *Williams 12579* (MICH, US, VEN); Río Paragaza, 50–100 km from mouth, 110 m, *Wurdack & Monachino 41063-A* (MICH, NY, US, VEN). Amazonas: Río Orinoco 10 km above Río Atabapo, *Level L-119* (MICH, NY, US, VEN); Río Siapa, Río Casiquiare, 130 m, *Maguire & Wurdack 34838* (MICH, NY, US, VEN); Mavaca, *Lizot* (MICH); Capihuara, Casiquiare, 120 m, *Williams 15615* (US, VEN). COLOMBIA. Meta: La Serranía, Río Ariari, Laguna de Aguasucia, 300 m, *Jaramillo et al 1028* (COL). Vaupés: Río Vaupés, Mitú-Mirití, *Cuatrecasas 6912* (US); Río Inírida, Río Papunáua, 200 m, *Alvaro Fernández 2215* (US); Río Piraparaná, *García-Barriga 14321* (US); Río Micaya, *Gutiérrez & Schultes 648* (NY); Lagos de Pasos, *Gutiérrez & Schultes 848* (GH, MICH); Caño Arara, *Gutiérrez & Schultes 886* (NY); Mitú and vicinity, *Schultes et al 24260 & 24363* (ECON); lower Río Kubiyú, *Zarucchi 1271* (MICH); Río Vaupés near Mitú, *Zarucchi 2111 & 2221* (MICH). Amazonas-Vaupés: Soratama, *Schultes & Cabrera 13534* (US) & *13767* (NY, US); Raudal Yayacopi, *Schultes & Cabrera 15507* (GH, US); Jinogojé, *Schultes & Cabrera 16594* (US), *17604* (US), *19817* (NY, US), *19867* (COL, GH). BRAZIL. Amazonas: Castanha, Paduiri, Rio Negro, *Fróes 22584* (IAN, UB); Rio Demeni, Pai Raimundo, *Fróes & Addison 29009* (IAN); Itaubal, Rio Aracá, *Fróes & Addison 29263* (IAN); Macará, Rio Negro, *Pires 261* (IAN); Rio Negro between Rio Curicuriari & Barcellos, *Schultes & López 8882* (US); between Manaus and Barcellos, *Spruce 1911* (GH); mouth of Rio Negro, *Spruce 1628*, syntype of *B. fluminensis* (NY). Terr. Roraima: Canto Galo, Rio Mucajá between Pratinha and Rio Apiaú, *Prance et al 3984* (MICH, NY).

Collected in flower mostly from August to November, in fruit from November to June.

I am unable to find adequate bases for maintaining the various segregates from this species. The “best” of them is *Byrsonima inundata*, and there is a certain similarity to the populations of the Rio Negro that gives them some claim to status. However, most of the characters of that group occur elsewhere in the range of *B. japurensis*, eg relatively short extensions of the anther locules and a sericeous ovary. The only reliable basis for recognizing *B. inundata* is that the leaf is obtuse instead of short- to long-acuminate. However, if one arranges col-

lections geographically from the Rio Negro upstream to the Río Vaupés in Colombia, one sees a gradual shift in shape of the lamina, with no clear morphological discontinuity. Assigning the intermediate collections to one species or the other seems to be entirely arbitrary, and I cannot find a defensible way to do it, so I have defined the species broadly.

18. *Byrsonima rodriguesii* Anderson, sp nov

Fig 19.

Arbor 12–18 m alta, ramis vegetativis glabris praeter axillas hirsutas stipularum. Lamina foliorum majorum 14.5–22.5 cm longa, 7–10 cm lata, elliptica, basi cuneata vel attenuata, apice abrupte breviacuminata, glabra, nervis lateralibus et reticulo utrinque prominulis; petiolus 20–35 mm longus, glaber; stipulae 4–5 mm longae, liberae, late ovatae, abaxialiter glabrae, adaxialiter dense appresso-hirsutae. Inflorescentia 9–11 cm longa, appresso-tomentosa, floribus plerumque 2 fasciculatis (vero in cincinno sessili 2-floro portatis), bracteis 2.5–3.5 mm longis, 1.5–2.5 mm latis, triangularibus, glabris vel sparsim sericeis, reflexis vel revolutis, post maturitate fructus persistentibus, pedunculo nullo vel in fructu usque 1 mm longo, bracteolis bracteis similaribus sed minoribus praecipue brevioribus. Pedicellus 7–9 mm longus (–12 mm in fructu), appresso-tomentosus, circinatus in alabastro, rectus vel ascendens et crassior in fructu. Sepala omnia biglandulifera, glandulas 1.5 mm superantia, 2.5 mm lata, rotundata, utrinque glabra vel basi sparsim sericea, margine breviter ciliata, appressa, in fructu accrescentia, glandulis 3–4 mm longis. Petala “alba et rubra” (primum alba demum rubra?), glabra, 4 lateralialia limbo 5–7 mm longo latoque, profunde concavo, extimo altera in alabastro omnino tegenti, ungue ca 2.5 mm longo; petalum posticum limbo 3–3.5 mm longo, 3.5–4 mm lato, corrugato, ungue 2.5–3 mm longo. Filamenta 2.5 mm longa, usque $\frac{1}{4}$ connata, abaxialiter glabra, adaxialiter basi hirsuta; antherae 2–2.5 mm longae, glabrae, loculis 1–1.4 mm longis, dorsiventraliter complanatis, connectivo loculos 0.9–1.3 mm superanti, recto vel reflexo. Ovarium glabrum, carpellis omnibus fertilibus; styli 3.5–4 mm longi, versus sepalum anticum curvati. Fructus (siccus) 10–12 mm diametro, globosus, viridis, glaber, nuce rugosa.

Type. *Rodrigues, Byron [Albuquerque] & Coelho 2843*, mata de terra firme, solo argiloso, Manaus, Km 56 da BR 17, Amazonas, Brazil, 30 Nov 1961 fr (holotype INPA 10193, isotypes MICH, SP 75084).

Paratypes. BRAZIL. Amazonas: Estrada Manaus–Itacoatiara, Km 150, May frt, *Loureiro et al* [INPA 35770] (INPA, NY); Estrada Manaus–Itacoatiara, Km 68, mata da t. firme, solo argiloso, Apr frt, *Rodrigues 8799* (INPA, MICH, NY).

This species is named in honor of Dr. William Rodrigues, student of Myristicaceae and collector of the type. The flattened anthers, ascending pedicel in fruit, and persistent bracts and bracteoles indicate that its closest relatives are *Byrsonima concinna* and *B. densa*. Of these two it is most like *B. concinna* in its glabrous vegetative parts, large bracts and bracteoles, and outer petal completely covering the others in bud. It is distinguished from both *B. concinna* and *B. densa* by its large leaves and stipules, large fruit, and long extension of the anther’s connective.

This is not a species of Guayana. It is included here because of its apparent relationship to *Byrsonima concinna*, an endemic of upland Guayana.

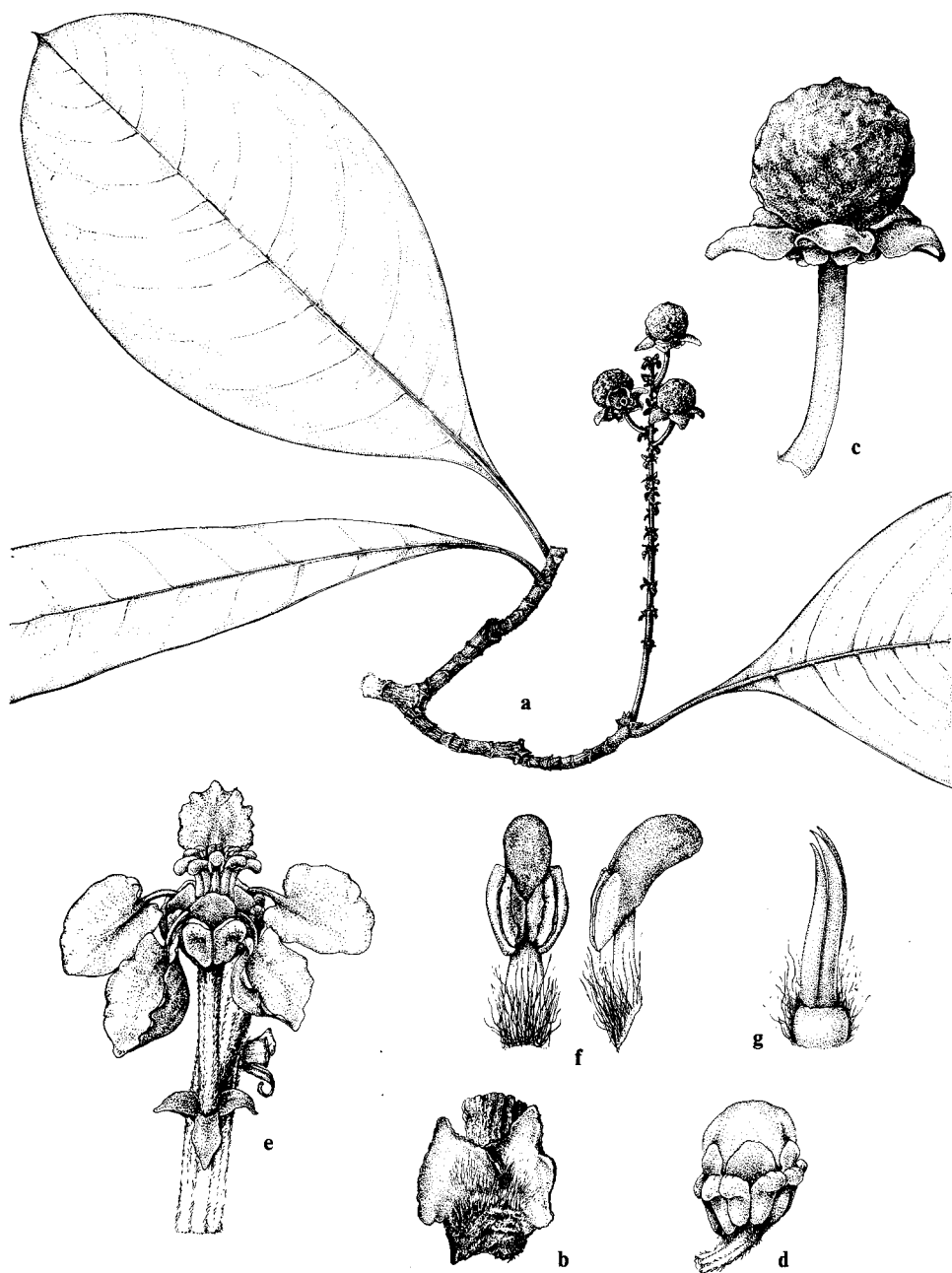


Fig 19. *Byrsonima rodriguesii*. a) Fruiting branch, $\times 0.5$; b) stipules, adaxial side, most hairs removed, $\times 2.5$; c) fruit (dried), $\times 2$; d) bud, $\times 2.5$; e) flower, $\times 2.5$; f) stamens, $\times 7.5$; g) gynoecium (glabrous ovary shown surrounded by hairs on the receptacle), $\times 5$. Drawn by Karin Douthit, a-c from Rodrigues 8799, d-g from Rodrigues et al 2843.

19. *Byrsonima concinna* Bentham, London Jour. Bot. (Hooker) 7: 122. 1848.

Fig 16h.

Shrubs or small trees 1.2–8(–15) m tall; vegetative stems glabrous except hirsute in axils of stipules. Lamina of the larger leaves (4–)6–11(–13) cm long, (2–)3–6.5 cm wide, elliptical or obovate, attenuate or cuneate at the base, acute or obtuse to rounded and often apiculate at the apex, glabrous, coriaceous, the lateral veins and reticulum usually moderately prominent below or on both sides; petiole (7–)10–20 mm long, glabrous; stipules 1.5–2.5(–3.5) mm long, free, ovate, obtuse or rounded at the apex, abaxially glabrous, adaxially hirsute. Inflorescence (3–)6–16 cm long, usually simple, rarely basally ternate, sericeous or tomentose; bracts (1–)2–5 mm long, 1.2–3.5 mm wide, ovate or triangular, green, straight or revolute, glabrous or sparsely tomentose, persistent in fruit and after; peduncle none, the flowers 1–several in axil of each bract; bracteoles like the bracts or smaller. Pedicel (4–)5–11 mm long (–13 mm in fruit), sericeous or tomentose, circinate in bud, straight or ascending in old flowers and fruit. Sepals all biglandular, 1–2(–3) mm long beyond the glands, 1.5–2 mm wide, rounded at the apex, ciliate on the margin, glabrous on both sides or thinly to (rarely) densely sericeous or tomentose, revolute in anthesis, accrescent (especially elongated) in fruit; glands 1.6–2.7 mm long, pink or white. Petals white, turning pink in age, the posterior sometimes yellow, glabrous, the outermost covering all others in bud. Filaments 2–3 mm long, straight or slightly incurved at the apex, abaxially $\pm$ glabrous, adaxially short-hirsute basally; anthers 1.2–2.1 mm long, glabrous, the locules 0.9–1.6 mm long, dorsiventrally flattened and bearing narrow membranous longitudinal wings up to 0.1 mm wide, the connective exceeding the locules by (0.2–)0.4–0.8 mm, the extension globose, glandular, inserted slightly between the locules. Ovary 0.9–1.4 mm high, glabrous, all 3 locules fertile; styles 2.5–3.5 (–4.5) mm long. Fruit 4–8 mm in diameter (dried), ovoid, globose, or depressed-globose, green (mature?), glabrous, the nut rugose.

Type. *Robt. Schomburgk II 587/Rich. Schomburgk 912*, Roraima, “British Guiana” [Bolívar, Venezuela] (holotype K, isotypes F! [587], NY! [912], W [587]).

Distribution. Mostly in eastern Guayana, with outliers on Cerros Yutaje, Sipapo, and Neblina. GUYANA. Krabu Savanna, Weramu Trail, *Forest Dept.* 7979 (NY); Imbaimadai Savannas, Upper Mazaruni River, 550 m, *Maguire 32187* (K, MICH, NY); Waipa Trail from N Kopinang Savanna, southern Pakaraima Mts, 825 m, *Maguire et al 46099A* (K, MICH, NY, US). VENEZUELA. Bolívar: Cerro de las Guacamayas, 800–1000 m, *Bernardi 1645 & 1655* (VEN); región de Urimán, 350 m, *Bernardi 1686* (NY, VEN); Río Torono, *Cardona 845* (NY, US, VEN); Cerro Upuima, Caroní, 1300 m, *Cardona 2237* (US, VEN); Auyan-tepuí, 1600–1700 m, *Cardona 2622* (NY, VEN) & 2626 (GH, NY, VEN); Salto Angel, *Foldats 7067* (VEN); Uaipan-tepuí, 1200 m, *Koyama & Agostini 7358* (NY, VEN); Uarupata to Ilu-tepuí, 1000 m, *Maguire 33215* (MICH, NY, VEN); Río Chicanán 2 km S of Río Chibau, 100 m, *Maguire et al 53532* (MICH, NY, VEN); Triana Savanna, Cerro Pitón, Cordillera Epicara, *Maguire et al 53605* (MO, MY, NY, VEN); Quebrada Pitón, Cerro Pitón, 400 m, *Maguire et al 53708* (MICH, NY, VEN); Uaipán-tepuí, 1700 m, *Phelps & Hitchcock 361* (NY, VEN); mesa between Ptari-tepuí and Sororopán-tepuí, 1615 m, *Steyermark 60278* (NY, VEN),

1120 m, *Steyermark* 60716 (NY, VEN) & 60742 (VEN); Sierra Auraima, Raudal de El Perro, Río Paragua, 400 m, *Steyermark* 90825 (NY) & 90829 (US); Río Churún, Auyan-tepuí, 1660–1690 m, *Steyermark* 93258 (MICH, NY, VEN), 93762 (VEN), 93795 (NY, VEN); Auyan-tepuí, 1500 m, *Steyermark* 94118 (NY, VEN); savanna of Uarama-tepuí above Río Uarama above Km 150, NE of Luepa, 1220 m, *Steyermark & Nilsson* 700 (VEN); Río Caroní near rapids just below Urimán, 394 m, *Steyermark & Wurdack* 61 (MICH, NY, US, VEN); Río Tirica below upper falls, Chimantá Massif, 1940 m, *Steyermark & Wurdack* 545 (NY, VEN); below upper falls of Caño Mojado, 1895–1910 m, *Steyermark & Wurdack* 948 & 1091 (F, NY, VEN); cumbre de Cerro Guaiquinima, 750 m, *Steyermark et al* 113307 (MICH), 1560 m, 113528 (MICH); Auyan-tepuí, 1100 m, *Tate* 1177 (NY), 1850 m, *Tate* 1180 (NY, VEN), 1100 m, *Tate* 1183 (NY, VEN). Amazonas: Cerro Yutaje, savanna, 1250 m, *Maguire & Maguire* 35187 (MICH, NY, VEN), 2100 m, *Maguire & Maguire* 35312 (MICH, NY, US, VEN); Cerro Sipapo, 1800–2000 m, *Maguire & Politi* 28361 (NY, VEN); Cerro de la Neblina, Cañón Grande SSW of Cumbre Camp, 1200–2200 m, *Maguire et al* 42506 (MICH, NY, US, VEN). BRAZIL. Terr. Roraima: Serra dos Surucucús, 1800 m, *Prance et al* 9921 (MICH, NY); Uferwald beim Dorfe, Roraima, 1200 m, *Ule* 8623 (MG).

Collected in flower and/or fruit in all months except June and July.

This upland species shows the same sort of distribution and variability as *Blepharandra hypoleuca*. This variation is most noteworthy in the size of the bracts and bracteoles and fruits. The small bracts and bracteoles found in some populations are unfortunate, since the usually long bracts and bracteoles are the easiest way to distinguish this species from its relatives of the Amazonian lowlands. However, the variation in bracts and bracteoles is continuous and I can find no way to split the species on that basis. In most characters this species is a reasonably coherent morphological entity, and there is no other species with alate anthers in eastern Guayana (except for the segregate *B. rubrobracteata*), so from a practical point of view it should be easy to apply this name in spite of the variation included in the description.

The plants from Cerros Yutaje and Sipapo are interesting for their very short, stout pedicels. If one were going to recognize infraspecific taxa in this species, those isolated populations could surely comprise such a segregate.

20. *Byrsonima rubrobracteata* Anderson, sp nov

Fig 26.

Frutex usque 5 m altus, ramis vegetativis glabris praeter axillas hirsutas stipularum. Lamina foliorum majorum 5.5–10 cm longa, 3–6 cm lata, elliptica vel obovata, basi attenuata, margine revoluta, apice rotundata vel paulo apiculata vel retusa, glabra, coriacea, nervis reticuloque subtus obscuris, supra obscuris vel prominulis; petiolus 10–15 mm longus, glaber; stipulae 3.5–5 mm longae, liberae, late ovatae, abaxialiter glabrae, adaxialiter sparsim sericeae. Inflorescentia 4–5 cm longa, appresso-tomentosa, floribus singulis et pro parte maxima in dimidio distali confertis, bracteis 2.5–3.5 mm longis latisque, late ovatis, rubris, appressis vel paulo revolutis, glabris praeter marginem ciliatam, post maturitate fructus persistentibus, pedunculo nullo, bracteolis bracteis similaribus vel paulo minoribus. Pedicellus 9–13 mm longus, appresso-tomentosus, in alabastro circinatus, in fructu rectus. Sepala omnia biglandulifera, glandulas ca 2 mm superantia, 2.5–

3 mm lata, apice rotundata, carnosa, appressa apice revoluta, abaxialiter proximaliter sparsim sericea, margine ciliata, adaxialiter glabra, in fructu rosea et moderate accrescentia, glandulis alboroseis 2–2.5 mm longis. Petala alba demum rosea vel rubra, glabra. Filamenta 2.6–2.9 mm longa, abaxialiter glabra, adaxialiter basi brevihirsuta; antherae 1.4–1.7 mm longae, loculis 1–1.4 mm longis, dorsiventraliter complanatis et anguste alatis, connectivo rhomboideo, loculos 0.3–0.4 mm superanti. Ovarium glabrum, carpellis omnibus fertilibus; styli ca 3 mm longi. Fructus immaturus viridis, 6–7 mm diametro (siccus), globosus vel ovoideus, glaber, calyce rubro accrescenti subtentus, nuce rugosa.

Type. *Tillett, Tillett & Boyan 45128*, low forest (8–10 m) on shoulder of E flank, about [sic] Thompson Camp, Mt. Ayanganna, upper Mazaruni River basin, 1418 m, 14 Aug 1960 flr/frt (holotype MICH, isotypes K, NY, US).

This species is similar to *Byrsonima concinna*, from which it differs in its red bracts and bracteoles, its short, dense inflorescence with only one flower per bract, the long stipules only sparsely sericeous adaxially, and the coriaceous, revolute lamina, which is $\pm$ rounded at the apex and has the reticulum obscure below.

21. *Byrsonima garcibarrigae* Cuatrecasas, *Webbia* 13(2): 621. 1958.

Trees 6–20 m tall; vegetative stems glabrous except hirsute in axils of stipules. Lamina of the larger leaves 9–12.5 cm long, 3.5–5 cm wide, elliptical, attenuate or cuneate at the base, acuminate or rarely acute at the apex, glabrous, the lateral veins prominulous on both sides; petiole 15–20 mm long, glabrous; stipules ca 1 mm long, free, broadly rounded, abaxially glabrous, adaxially hirsute. Inflorescence 6–16 cm long, tomentose, the flowers borne 1(–2) per bract; bracts 1–1.5 mm long and wide, triangular, often revolute, glabrous or bearing a few hairs, persistent, probably past maturity of the fruit; peduncle none; bracteoles like the bracts or smaller. Pedicel 4.5–6 mm long, subsericeous to subvelutinous, circinate in bud, straight in old flowers and young fruits. Sepals all biglandular, 1.7–2 mm long and wide, obtuse or rounded, glabrous except at base and ciliate on margin, reflexed in anthesis, accrescent in fruit; glands 1.9–2.2 mm long, pink. Petals white (pink in age?), glabrous, the outermost concealing all others during enlargement of the bud. Anthers 1.2–1.5 mm long, glabrous, the locules 0.8–1 mm long, dorsiventrally flattened, the connective exceeding the locules by 0.4–0.6 mm, the extension globose, inserted slightly between the locules. Ovary glabrous, all 3 locules fertile; styles ca 3 mm long. Mature fruit unknown.

Type. *García-Barriga 14107*, Soratama, entre los ríos Kananarí y Pacoa, Río Apaporis, Amazonas, Colombia, 250 m, Dec flr (holotype US! isotype NY!).

Distribution. Northwestern Amazonia. BRAZIL. Amazonas: CEPLAC, Km 29 Manaus-Itacoatiara Road, Sep flr, *Pennington et al P22759* (MICH). COLOMBIA. Vaupés: Río Kananarí y Cerro Isibukuri, Nov flr, *García-Barriga 13769* (NY, US), Sep flr, *Schultes & Cabrera 14683* (COL, GH). Amazonas-Vaupés: Río Apaporis, entre los ríos Kananarí y Pacoa, 250 m, Dec flr, *García-Barriga 13835* (NY, US).

This species is very similar to *Byrsonima densa* (Poiret) DC. (= *B. amazonica* Grisebach), and I shall not be surprised if the two are eventually united on the strength of collections that combine the characters that presently distinguish them. Those characters are summarized in this couplet:

1. Pedicel 4.5–6 mm long; petiole of larger leaves 15–20 mm long; outermost petal concealing all others during enlargement of the bud; vegetative parts glabrous (except stipules axially). *B. garcibarrigae*.
1. Pedicel 6–11 mm long; petiole usually less than 10 mm long; 3–4 petals visible in enlarging bud; vegetative parts often initially sericeous, soon glabrate. *B. densa*.

Most collections of *Byrsonima densa* have been from northeastern Amazonia (Pará, Amapá, French Guiana, Surinam). However, *Fróes 22804* (IAN), from the Rio Negro, seems to be referable to that species, so the apparent geographic disjunction of the two may be an artifact of inadequate collecting.

22. *Byrsonima bronweniana* Anderson, sp nov

Fig 20.

Frutex vel arbor 2–3(–8) m alta, ramis vegetativis sericeis mox glabrat. Lamina foliorum majorum 5–9.5 cm longa, 2–3 cm lata, anguste elliptica, basi cuneata, apice rotundata vel obtusa, interdum retusa, primum sparsim sericea mox vel demum glabrata, coriacea et margine revoluta stramineaeque, subtus pertinaciter glauca, nervis lateralibus numerosis, parallelis, tenuibus, obscuris vel prominulis, reticulo aequaliter prominulo; petiolus 6–13 mm longus, sparsim sericeus vel glabratus; stipulae 1–2 mm longae, liberae, obtusae vel rotundatae, abaxialiter sericeae vel glabratae, adaxialiter appresso-hirsutae. Inflorescentia 7–13 cm longa, sericea, interrupta, floribus singulis, bracteis 1.2–3.2 mm longis, 1–2(–3) mm latis, ovatis vel triangularibus, sericeis, post maturitate fructus persistentibus, pedunculo nullo, bracteolis bracteis similaribus sed minoribus. Pedicellus 6–8 mm longus (–11 mm in fructu), sericeus vel glabrescens, in alabastro circinatus, in fructu et floribus vetustioribus decurvatus et demum tortus. Sepala omnia biglandulifera, glandulas 1.5–1.8 mm superantia, 1.5–2 mm lata, rotundata, abaxialiter sericea, adaxialiter glabra, per anthesin revoluta, in fructu accrescentia praecipue elongata, glandulis 1.5–2 mm longis. Petala alba demum rosea, glabra, persistentia in fructu immaturo. Filamenta sepalis opposita 2–2.3 mm longa, petalis opposita 2.5–3 mm longa, basi usque 0.7 mm connata, abaxialiter glabra, adaxialiter in dimidio proximali hirsuta; antherae 1.7–2.1 mm longae, glabrae, loculis 1–1.3 mm longis, dorsiventraliter complanatis, anguste alatis ala membranacea 0.08–0.15 mm lata, connectivo loculos 0.5–0.8 mm superanti, globoso, glanduloso, inter loculos inserto. Ovarium glabrum, carpellis omnibus fertilibus; styli ca 4 mm longi. Fructus ruber, 5.5–7 mm diametro (siccus), globosus, interdum petalis persistentibus subtentus, nuce rugosa.

Type. *Maguire, Wurdack & Maguire 34612A*, waterside, along Yapacana Caño from laguna to mouth, Alto Río Negro, Amazonas, Venezuela, 125 m, 20 Mar 1953 flr (holotype MICH, isotypes NY, US, VEN).

Distribution. Along rivers, Alto Río Orinoco to Alto Río Negro. VENEZUELA. Amazonas: Orilla inundada del Río Temi, alrededores de Yavita, 125–140 m, Jul flr/frt, *Bunting et al 4051* (U); a lo largo del Río Temi, Yavita, 125 m, Apr frt, *Steyermark & Bunting 102941* (NY, VEN); selva inundada, Río Atabapo, cerca Isla el Zapo, 90 m, Aug frt, *Vareschi & Jaffe 8006* (VEN); riberas bajas y anegadas del Caño San Miguel, Río Guainía, 127 m, Mar flr, *Ll. Williams 14876* (F, MO, US, VEN). BRAZIL. Igarapé Toury, afl. do Rio Negro, margem do rio, Mar flr, *Fróes 27901* (IAN, UB); Igarapé Jurupari, afl. do R. Uaupés, Apr flr, *Fróes 28217* (IAN, UB).

Dr. Cuatrecasas called this species *Byrsonima angustifolia* H.B.K. in his Prima

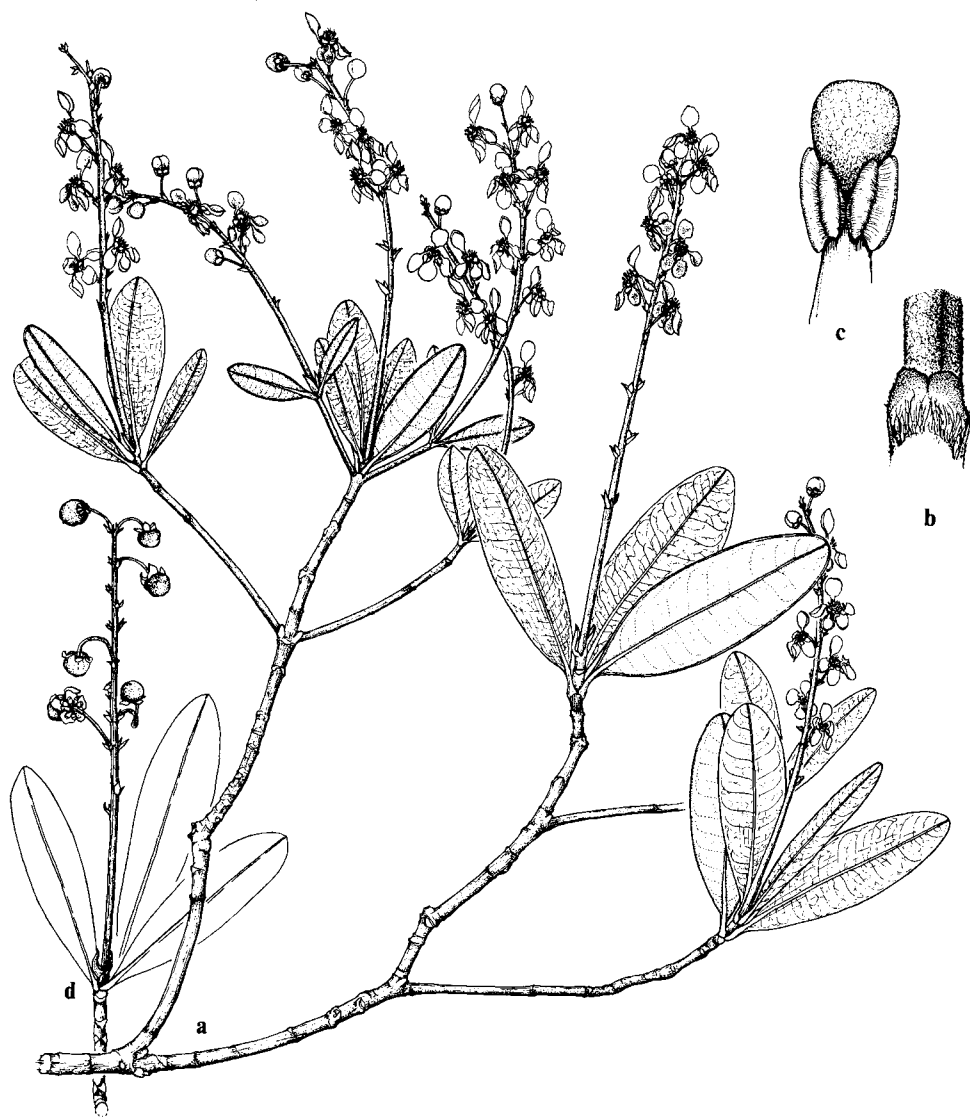


Fig 20. *Byrsonima bronweniana*. a) Flowering branch, $\times 0.5$; b) stipules, adaxial view, most hairs removed, $\times 5.5$; c) anther, $\times 10$; d) fruiting branch, $\times 0.5$. Drawn by Melissa Marshall, a-c from Maguire et al 34612A, d from Vareschi & Jaffe 8006.

Flora Colombiana, but that name is properly applied to a superficially similar species of *Blepharandra*, q v. There seems to be no name for this *Byrsonima*, so I am naming it for my friend and student, Dr. Bronwen Gates, whose revision of *Banisteriopsis* has brought order to a very muddled corner of the Malpighiaceae. *Byrsonima bronweniana* is in the group of species allied to *B. luetzelburgii* and *B. densa*. In that group it is notable for its glaucous, narrow, obtuse or rounded leaves with many fine veins, interrupted inflorescence, large bracts and bracteoles, decurved pedicels, and petals often persistent in fruit.

23. *Byrsonima bracteolaris* Bentham, London Jour. Bot. (Hooker) 7: 123. 1848.

Shrubs or small trees 2–4 m tall; stems initially sericeous, soon or eventually glabrate. Lamina of the larger leaves 5.5–9 cm long, 3–4.5 cm wide, elliptical or obovate, cuneate at the base, obtuse or rounded and sometimes apiculate or retuse at the apex, initially sparsely sericeous but soon quite glabrate, the margin yellow, 0.2–0.4 mm wide, revolute, the lateral veins and reticulum usually prominent below or on both sides; petiole 8–12(–15) mm long, loosely sericeous to glabrate; stipules 2–3 mm long, free, ovate, obtuse, abaxially sericeous to glabrate, adaxially glabrous except hirsute at the base. Inflorescence 5–10 cm long, sericeous or tomentose, the flowers borne 1 per bract; bracts 1.5–3.5 mm long (the lowest pair up to 6 mm long), 1.5–2.5 mm wide, triangular, loosely sericeous to nearly glabrous, spreading or reflexed, persistent past maturity of the fruit; peduncle none; bracteoles like the bracts but usually smaller. Pedicel 5–6 mm long, loosely sericeous or tomentose, circinate in bud, decurved in fruit and old flowers. Sepals all biglandular, 1.5 mm long beyond the glands, ca 2 mm wide, rounded at the apex, abaxially densely sericeous or appressed-tomentose, adaxially glabrous, appressed in anthesis, accrescent in fruit; glands 1.6–2 mm long, pink. Petals white, turning pink in age, glabrous, the outermost $\pm$ completely covering all others in bud. Filaments 2.6–2.8 mm long, abaxially glabrous, adaxially hirsute basally; anthers 1.4–1.7 mm long, glabrous, the locules 1.1–1.3 mm long, dorsiventrally flattened and bearing prominent membranous longitudinal wings 0.1–0.2 mm wide, the connective exceeding the locules by 0.2–0.5 mm, the extension globose, glandular, inserted slightly between the locules. Ovary ca 1 mm high, glabrous, all 3 locules fertile; styles ca 3 mm long, curved toward the anterior sepal. Fruit 5 mm in diameter, 6 mm high (dried), ovoid, glabrous, subtended by the accrescent, reddish calyx, the nut rugose.

Type. *Robt. Schomburgk*, "British Guiana," probably actually from Cerro Duida, Amazonas, Venezuela; cf discussion below (K).

Distribution. Cerros Duida and Sipapo. VENEZUELA. Amazonas: Cerro Sipapo, edge of savanna, Base Camp, 125 m, Jan flr, *Maguire & Politi 28287* (NY); Cerro Duida: Orinoco River, 30 km below La Urbana, 80 m, Mar flr, *Maguire & Maguire Jr 29069* (NY); open scrub, Caño Negro basin, 2000–2300 m, Nov imm flr/frt, *Maguire et al 29679* (MICH, NY, VEN); summit, along valley forest between Central Camp and Brocchinia Hills, 1675 m, Aug flr, *Steyermark 58112* (NY, VEN); summit, 1320–1440 m, Jan flr, *Tate 566, 595, & 740* (all NY).

As Sandwith has noted (1935, p 313), this species is similar to *Byrsonima concinna*. However, its leaves and internodes are initially sericeous while they are always glabrous in *B. concinna*, and the pedicels of fruits and old flowers are decurved, as in *B. laevis* and its close relatives and unlike *B. concinna*, *B. densa*, and their close relatives. Its leaves also have a wider yellow margin than is usual in *B. concinna*, its anthers have wider longitudinal wings, and its sepals are always densely sericeous or tomentose, a condition that does occur in *B. concinna* but only rarely.

I have not seen the type, a single specimen at Kew. Therefore, I cannot be sure I am applying this name correctly. However, if it does agree with the Duida plants in having vegetative vestiture and decurved pedicels in fruit, it was probably collected by Robert Schomburgk on Duida when he visited the Orinoco in 1839. He must have collected the type of *Diacidia vestita* (q v) in that vicinity, and

that collection was another of his unnumbered unicates. Note that Tate collected *Diacidia vestita* (his number 563) and *Byrsonima bracteolaris* (566) together on Duida. It seems quite possible that he was unknowingly following Robert Schomburgk's exact route and re-collecting the same populations.

If it should eventually seem necessary to unite these two species, I would strongly favor using the name *Byrsonima concinna*, of which the type is central to the variation of the assemblage, not *B. bracteolaris* with its very peripheral morphology and distribution. There is also the practical consideration of isotypes—*B. concinna* has several, *B. bracteolaris* has none.

24. *Byrsonima luetzelburgii* Steyermark, Fieldiana (Bot.) 28: 288. 1952.

Byrsonima cretacea Niedenzu, Repert. Spec. Nov. Regni Veg. 33: 71. 1933. non *B. cretacea* Gleason, 1931.

Trees 6–8 m tall; stems glabrous except short-hirsute in axils of stipules. Lamina of larger leaves 8–14 cm long, 4–7 cm wide, broadly elliptical, cuneate to truncate at the base, revolute at the margin, broadly obtuse or rounded and sometimes apiculate at the apex, very coriaceous, glabrous, glaucous or not above, the epidermis below concealed by a thick persistent glaucescence, the numerous parallel lateral veins and reticulum $\pm$ prominent above, obscure below; petiole 10–22 mm long, glabrous; stipules 1.5–3 mm long, broadly obtuse or rounded, free, abaxially glabrous, adaxially hirsute (?). Inflorescence 8–12 cm long, glabrous (? or soon glabrate), the flowers borne 1 per bract; bracts and bracteoles 1–1.5 mm long, 1.2–1.7 mm wide, obtuse or rounded, glabrous or bearing a few marginal hairs, persistent past maturity of the fruit, the bracteoles usually slightly larger than the bracts; peduncle none. Pedicel ca 8 mm long (in fruit), thinly sericeous to glabrate, circinate in bud, decurved and eventually twisted in fruit and old flowers. Sepals all biglandular, glabrous, reflexed, accrescent, and red in fruit. Petals “dilute rosea.” Anthers “glaberrimae obovovideae $\pm$ 2 mm longae, connectivo sursum incrassato loculos basi productos sursum divergentes vix vel usque $\frac{1}{2}$ mm superante” (Niedenzu). Ovary glabrous. Fruit 4.5–5.5 mm in diameter, 5–6 mm high, globose or ovoid, red, glabrous, the nut rugose.

Syntypes. *Luetzelburg* 22581, 22623, 22636: Casiquiare, Amazonas, Venezuela; *Luetzelburg* 22838: Esmeralda, Orinoco, Amazonas, Venezuela; *Luetzelburg* 22835, 23746: Jatica, Uaupés, Amazonas, Brazil; all collected in flower.

Distribution. Riverbanks and lowland savannas from the Alto Orinoco to the Uaupés. VENEZUELA. Amazonas: Savanna No. 3, Cerro Yapacana, Río Orinoco, Jan frt, *Maguire et al* 30593 (MICH, NY, VEN). BRAZIL. Amazonas: Entre Posto do Içana e Tunuí, May frt, *Black* 48-2821 (IAN).

I have seen none of the syntypes, and shall delay choice of a lectotype until I do. Neither of the collections I have seen has flowers, so I may be wrong in my assumption that the anther locules are dorsiventrally flattened and probably alate. This species is quite similar to *Byrsonima laevis*, from the same area, but it seems to be well marked by its large coriaceous leaves with thick glaucescence below and its small fruit. It is interesting and puzzling to note that whereas Luetzelburg collected the species six times in a single voyage, modern collectors have since found it only twice.

25. *Byrsonima laevis* Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 1: 34. 1901. Fig 16i.

Trees 6–10 m tall; stems glabrous except short-hirsute in axils of stipules. Lamina of the larger leaves 8.5–10.5(–13) cm long, 5–7 cm wide, broadly elliptical, cuneate or obtuse and then somewhat attenuate at the base, often revolute at the margin, obtuse or rounded and abruptly apiculate or retuse at the apex, coriaceous, glabrous, not glaucous below, not or slightly glaucous above, the lateral veins numerous, parallel, and prominulous on 1 or both sides; petiole (11–)15–22 mm long, glabrous; stipules 1–2 mm long, free, broadly rounded, abaxially glabrous, adaxially short-hirsute at base. Inflorescence 9–14 cm long, thinly sericeous with tightly appressed hairs to glabrate, the flowers borne 1 per bract; bracts and bracteoles 0.5–1 mm long, 0.7–1.4 mm wide, mostly wider than long, obtuse or broadly rounded, glabrous or bearing a few hairs, persistent past maturity of the fruit; peduncle none. Pedicel 4.5–6 mm long (–9 mm in fruit), slender, even in fruit only 0.5 mm in diameter, thinly sericeous to glabrate, circinate in bud, decurved and eventually twisted in fruit and old flowers. Sepals all biglandular, 1.2–1.5 mm long beyond the glands, 1.7–1.9 mm wide, obtuse or rounded, glabrous except ciliate on the margin, revolute in anthesis, accrescent in fruit; glands 1.2–2 mm long, pink. Petals white, glabrous, the outermost $\pm$ completely covering all others in bud. Filaments 1.8–2 mm long opposite the sepals, 2–2.5 mm long opposite the petals, abaxially glabrous, adaxially hirsute basally, connate at the base; anthers 1.6–1.8 mm long, glabrous, the locules 1.4 mm long opposite the petals, 1.6–1.7 mm long opposite the sepals, dorsiventrally flattened and bearing prominent, discolored, membranous wings 0.15–0.2 mm wide, the connective exceeding the locules by 0.1–0.3 mm, the extension rounded, glandular, and abaxially protuberant opposite the sepals. Ovary glabrous, all 3 locules fertile; styles ca 3 mm long. Fruit 12 mm in diameter (dried), globose, glabrous.

Type. *Spruce 3754* in 1854, “ad flum. Guainia v. Rio Negro supra ostium fluminis Casiquiari,” Amazonas, Venezuela, flr (isotype NY!).

Distribution. Known only from the type and the following two collections. VENEZUELA. Amazonas: A lo largo del camino entre Yavita y Pimichín, a 1 km de Yavita, suelo de arena blanca con selva, 125 m, Apr frt, *Steyermark & Bunting 102894* (NY, VEN). BRAZIL. Amazônas: Rio Uneiuxi, 300 km above mouth, caatinga forest on terra firme, Oct flr, *Prance et al 15589* (MICH, NY).

Another collection that is *Byrsonima laevis* or very close to it is *Silva & Brazão 60913*, wet caatinga forest, Serra Pirapucú, 1250 m, Jan flr, Amazônas, Brazil (MG, MICH, NY, US). It generally resembles the collections cited, but differs in having less parallel lateral veins and anthers with shorter locules and narrower wings. When the species is better known its range of variation will probably expand to accommodate this plant.

26. *Byrsonima amoena* Cuatrecasas, Webbia 13(2): 622. 1958.

Fig 16j.

Byrsonima ciliata Cuatrecasas, Webbia 13(2): 623. 1958. Type. *Schultes & Cabrera 19694*, Circasia, Río Vaupés, Vaupés, Colombia, 240 m, Nov flr (holotype US! isotype NY!).

Shrubs or small trees 1.5–6 m tall; stems glabrous except short-hirsute in axils of stipules. Lamina of the larger leaves 6–10.5 cm long, 3–5.7 cm wide, obovate

or occasionally elliptical, usually cuneate or obtuse at the base, usually rounded and often retuse or apiculate at the apex, rarely obtuse, glabrous, the margin yellowish and often slightly revolute, the lateral veins prominulous above; petiole (3–)5–10(–12) mm long, glabrous; stipules 1–2 mm long, free, rounded or obtuse, abaxially glabrous, adaxially short-hirsute at base. Inflorescence 6–15(–19) cm long, sericeous to glabrate, the flowers borne 1 per bract; bracts and bracteoles 0.5–1(–1.5) mm long, 0.9–1.6 mm wide, rounded or obtuse, glabrous except usually ciliate on the margin, persistent past maturity of the fruit; peduncle none. Pedicel 4–10 mm long, very slender, sericeous to glabrate, circinate in bud, decurved and eventually twisted in fruit and old flowers. Sepals all biglandular, 1–1.5 mm long beyond the glands, ca 1.5 mm wide, obtuse or rounded, glabrous except usually ciliate on the margin (very rarely sparsely sericeous abaxially in the center), reflexed in anthesis, accrescent in fruit; glands 1.4–2.6 mm long. Petals white, turning red in age, glabrous. Filaments 1.5–2 mm long, abaxially glabrous, adaxially hirsute at base; anthers 1–2 mm long, glabrous, the locules 0.8–1.9 mm long, dorsiventrally flattened and bearing membranous longitudinal wings ca 0.1 mm wide, the connective equalling the locules or exceeding them by 0.1–0.2 mm. Ovary glabrous, all 3 locules fertile; styles 2.5–3 mm long. Fruits 4–5.5 mm in diameter (dried), globose, glabrous, the nut rugose.

Type. *Cuatrecasas* 6966, Yuruparí, $\pm$ 350 km arriba de Mitú, Vaupés, Colombia, 220 m, Sep fl/frt (holotype US! isotype F!).

Distribution. In savannas on white sands in the drainage of the Ríos Negro and Vaupés. BRAZIL. Amazonas: Campina of Cacao Pirêra, Estr. para Manacapuru, A. B. Anderson 209 (NY); Manaus, Campina de Ponta Negra, *Ducke* 1746 (A, MG); Tauacuera, baixo Rio Negro, *Ducke* [MG 12195] (NY); Rio Cuieiras just below mouth of Rio Brancinho, *Prance et al* 14828 & 17718 (MICH, NY); Km 2 Estr. Terra Preta, branch of Manaus-Manacapuru 5 km from Cacao Pirêra, *Prance et al* 23486 (MICH); Manaus, Ponta Negra, *Rodrigues & Coelho* [INPA 8411] (MG). COLOMBIA. Vaupés: Río Vaupés, Cerro Circasia, *García-Barriga* 15043 (US); Río Cubiyú, *Humbert & Schultes* 27365 (US); Cerro Yapobodá, Río Kuduyarí, 450 m, *Schultes & Cabrera* 14217 (NY, US); Río Piraparaná, *Schultes & Cabrera* 17539 (US) & 17548 (NY, US); Cerro Kañendá, Río Kubiyú, 250 m, *Schultes & Cabrera* 18381 (NY, US); Mesa de Yambí, Río Karurú, 300 m, *Schultes & Cabrera* 19138 (US); Raudal de Yuruparí, Río Vaupés, *Schultes & Cabrera* 19743 (NY, US); Mitú & vicinity, *Schultes et al* 24282 (ECON), *Zaruchich* 1963, 2058, 2209 (all MICH). Amazonas: Araracuara Savannas, Río Caquetá, *Maguire et al* 44154 (COL, MICH, NY, US). VENEZUELA. Amazonas: Cuenca del Río Manapiare, entre el Cerro Morrocoy y la Serranía Colmena, 5°20'N, 66°10'W, elev 200–350 m, *Huber* 1204 (MICH).

Collected in flower (and rarely in fruit) from September to December, and once each in April and June.

27. *Byrsonima christianeae* Anderson, sp nov

Fig 16k, l & 21.

Arbor 12–25 m alta, ramis sericeis mox vel demum glabratis. Lamina foliorum majorum 18–30 cm longa, 7–15 cm lata, obovata, basi attenuata, margine plana vel paulo revoluta, apice rotundata vel late obtusa et brevissime acuminata vel acuminata, utrinque glabra (vero sparsim sericea permox glabrata), nervis late-

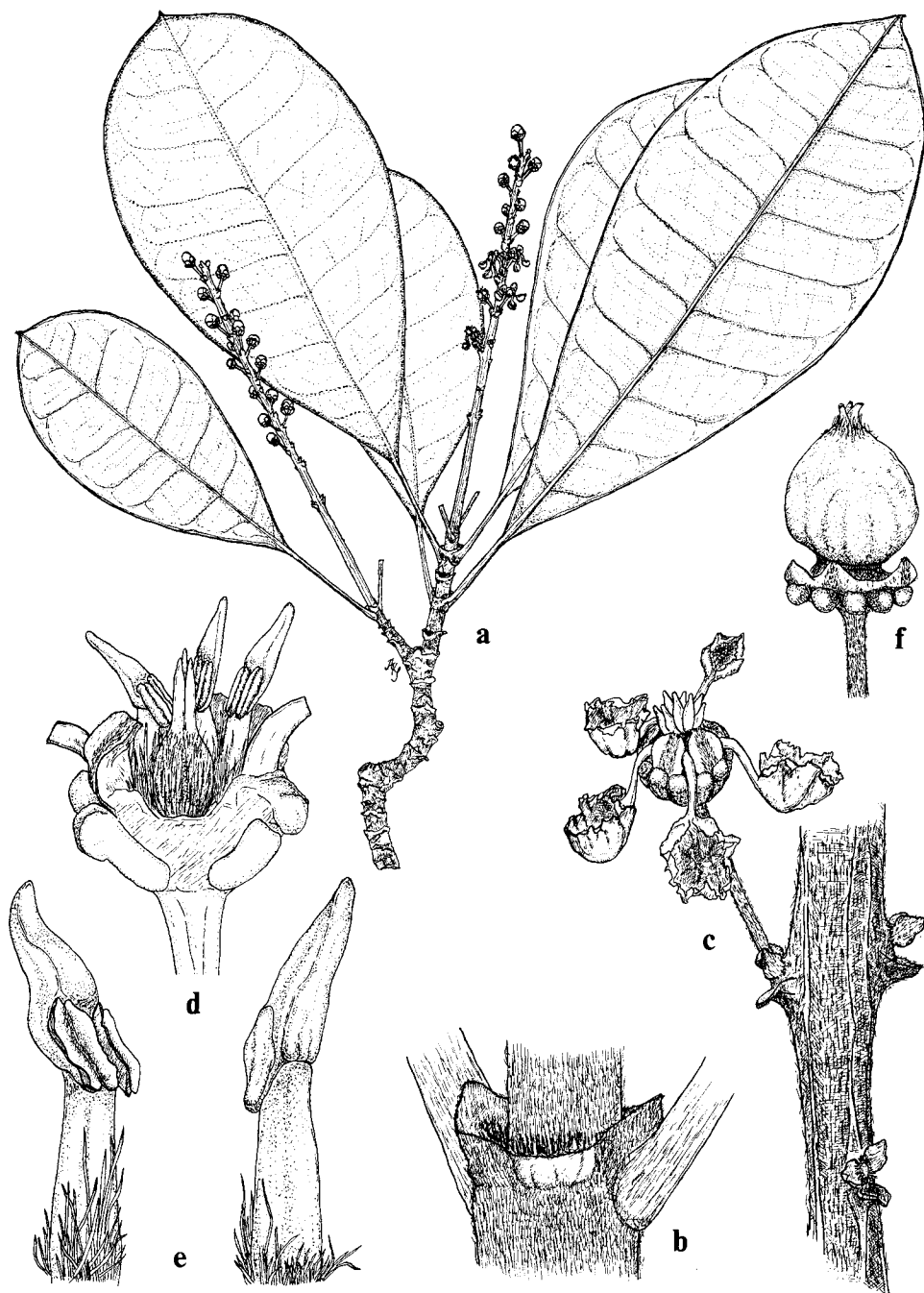


Fig 21. *Byrsonima christianeae*. a) Flowering branch, $\times 0.35$; b) stipules, $\times 5$; c) flower, $\times 3$; d) cutaway view of flower, showing gynoecium and 3 stamens, $\times 5.5$; e) stamens, $\times 14$; f) immature fruit, $\times 1.7$. Drawn by Annette Seidenschnur Mahler, a-e from the type, f from Forest Dept. 1004.

ralibus distantibus subtus prominentibus, supra prominulis; petiolus 20–35(–45) mm longus, sparsim sericeus mox glabratus; stipulae 3–5 mm longae, abaxialiter sericeae demum glabratae, adaxialiter distaliter sericeae proximaliter glabrae, omnino connatae vel raro apice liberae, pari late triangulari, apice acuto vel obtuso, paribus interpetiolariter usque 1 mm connatis. Inflorescentia (10–)13–25 cm longa, sericea vel tomentosa demum glabrata, floribus singulis vel saepius 2 (–3) fasciculatis (vero in cincinno sessili 2(–3)-floro portatis), bracteis 1–2 mm longis, 1.5–2 mm latis, rotundatis vel triangularibus, post maturitate fructus persistentibus, pedunculo nullo vel raro usque 0.5 mm longo, bracteolis 1–2.5 mm longis, 1.3–2.5 mm latis, persistentibus, plerumque longioribus quam bractea. Pedicellus 6–9(–12) mm longus, sericeus vel tomentosus, rectus vel paulo circumnatus in alabastro, rectus et crassior in fructu. Sepala glandulas 1.5–2.5 mm superantia, 2.5–3.5 mm lata, apice rotundata, in fructu non vel paulo accrescentia, appressa, abaxialiter sericea, adaxialiter glabra vel sparsim sericea, omnia biglandulifera, glandulis 2.5–4.5 mm longis, obovatis, compressis. Petala primum alba demum rubra, glabra vel abaxialiter in limbo paucipilifera, erosa. Filamenta 1–2.5 mm longa, libera, abaxialiter basi brevissime hirsuta, adaxialiter basi hirsuta; antherae glabrae, 2.1–4.2 mm longae, loculis non alatis, 0.5–1.8 mm longis, connectivo luteo, glanduloso, loculos 1.2–2.9 mm superanti, conoideo, recto vel paulo reflexo. Ovarium sericeum, sulcatum, carpellis omnibus fertilibus; styli 1.5–2.5 mm longi. Fructus sparsim sericeus vel glabratus, globosus, 17–20 mm diametro (siccus), “aurantiaco-luteus, carnosus, edulis.”

Type. *Tillett & Tillett 45583*, mixed evergreen forest, E arm of Karowtipu, Kako River, upper Mazaruni River basin, British Guiana [Guyana], elev ca 950 m, 1 Oct 1960 flr (holotype MICH, isotypes K, NY, US).

Distribution. Guyana and Amapá; to be expected also from forests at moderate elevations in Surinam and French Guiana. Paratypes: GUYANA. Mahdia R. Potaro R. 107 miles Bartica-Potaro Road, mixed forest on white sand, Jan frt, *Forest Dept. 1004* (NY); Dicymbe forest, Potaro River Gorge, May frt, *Maguire & Fanshawe 23535* (F, MO, NY, US); frequent, mixed-evergreen forest on and below talus from cliffs along NE side, Mt. Ayanganna, upper Mazaruni River basin, 750–900 m, Aug flr, *Tillett et al 45881* (K, MICH, NY, US). BRAZIL. Amapá: Missão do Serviço Florestal no T. Amapá, Sep frt, *Bastos 13* (IAN); heavily forested hills, Pôrto Terezinha, Rio Amapari, Serra do Navio, 70–300 m, Nov flr, *Cowan 38274* (MG, MICH, NY, US).

This species is named in honor of my wife, Christiane Eva Seidenschnur Anderson, astute student of Malpighiaceae and Compositae. It is similar to *Byrsonima incarnata*, but easily distinguished by the characters given in the key. The Cowan collection from Amapá has more, darker hairs on the inflorescence and longer bracts, bracteoles, pedicels, and anthers than the specimens from Guyana.

28. *Byrsonima incarnata* Sandwith, J. Arnold Arbor. 24: 221. 1943.

Tree 12–20 m tall, the stems densely sericeous to glabrate. Lamina of the larger leaves 12–25.5 cm long, 6.5–11 cm wide, obovate, cuneate or attenuate at the base, slightly revolute at the margin, usually abruptly short-acuminate at the apex, thinly sericeous to glabrate, the lateral veins prominent on both sides and interconnected by $\pm$ parallel tertiary veins; petiole 10–20(–23) mm long, sericeous

to eventually glabrate; stipules 4–7 mm long, nearly to quite connate, the pair triangular, acute, usually sulcate and sometimes bidentate at apex, abaxially densely sericeous to glabrate, adaxially glabrous. Inflorescence 12–18 cm long, loosely sericeous, the flowers borne 1 per bract, the bracts 4–5 mm long, 1.5–2 mm wide, deciduous before anthesis; peduncle none; bracteoles 2 mm long, 1.5–2 mm wide, deciduous before anthesis. Pedicel ca 5 mm long in flower, up to 10 mm long in fruit, velutinous, straight in bud, straight or decurved in fruit. Sepals 2 mm long beyond the glands, 2–2.5 mm wide, rounded at the apex, appressed, densely tomentose-sericeous on both sides, accrescent in fruit, eventually 5–6 mm long and wide and notably auriculate, the 10 glands 2–2.5 mm long, pink or red, obovate, compressed. Petals white or pale pink, glabrous. Filaments 2 mm long, abaxially bearing a few hairs, adaxially hirsute at the base; anthers glabrous, 1.9–2.4 mm long, the locules 1–1.3 mm long, linear, non-alate, acute at the apex, the connective fleshy, much enlarged, exceeding the locules by 0.9–1.4 mm, the extension often reflexed and tapered distally to a blunt point. Ovary densely sericeous, ovoid, the anterior locule sterile; styles 1.5 mm long. Fruit ca 12 mm in diameter (dried), globose with a short apical extension, “green” (blue and glaucous when dried), sericeous to glabrate with some hairs usually persistent at the apex, the flesh thick, the nut rugose.

Type. *Forest Dept.* 2737, Moraballi Creek, Essequibo River, British Guiana [Guyana], Oct flr (K?).

Distribution. Known only from the type and the following collections. GUY-ANA. Forest along Potaro River, ca 1 mile above Kaieteur Falls, 420 m, Feb frt, *Cowan & Soderstrom* 1757 (NY, US); Wallaba forest, 50 miles, Bartica–Potaro Road, Nov flr/imm frt, *Forest Dept.* 1436 (NY); Wallaba forest on white sand, 65 miles, Bartica–Potaro Road, Nov imm frt, *Forest Dept.* 2793 (NY, US); sandy Wallaba forest near 14th milepost, Bartica–Potaro Road, Aug bud, *Sandwith* 1145 (NY).

This seems to be primarily a lowland species. It is included in this treatment because of the one collection from the Kaieteur Plateau, and in order to facilitate its comparison with the similar *Byrsonima christianeae*.

29. *Byrsonima chalcophylla* Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 5: 57. 1914. Figs 16 & 22.

Shrubs or trees 2.5–12(–24) m tall; stems sericeous. Lamina of the larger leaves 5.5–12 cm long, 2.5–7 cm wide, elliptical or obovate, cuneate or obtuse at the base, revolute at the margin, acute to obtuse to abruptly acuminate or rounded and apiculate at the apex, sericeous to glabrate and often densely glaucous above, densely sericeous below with dark brown hairs, the vestiture persistent or thinning or belatedly abraded and sometimes canescent in age, the midrib prominent on both sides, the lateral veins 5–7(–8) on each side, prominent below, prominulous above; petiole 7–25 mm long, sericeous or eventually glabrate; stipules 3–5 mm long, triangular, $\frac{1}{2}$ – $\frac{3}{4}$ connate, the pair sulcate in the middle, abaxially sericeous, adaxially glabrous. Inflorescence (3–)5–13 cm long, loosely sericeous, the flowers borne 1 per bract; bracts (3–)4–6.5 mm long, 1–1.5 mm wide, narrowly triangular, straight, mostly deciduous before or during anthesis; peduncle usually none, up to 0.5 mm long in fruit; bracteoles like the bracts but shorter. Pedicel 4–7 mm

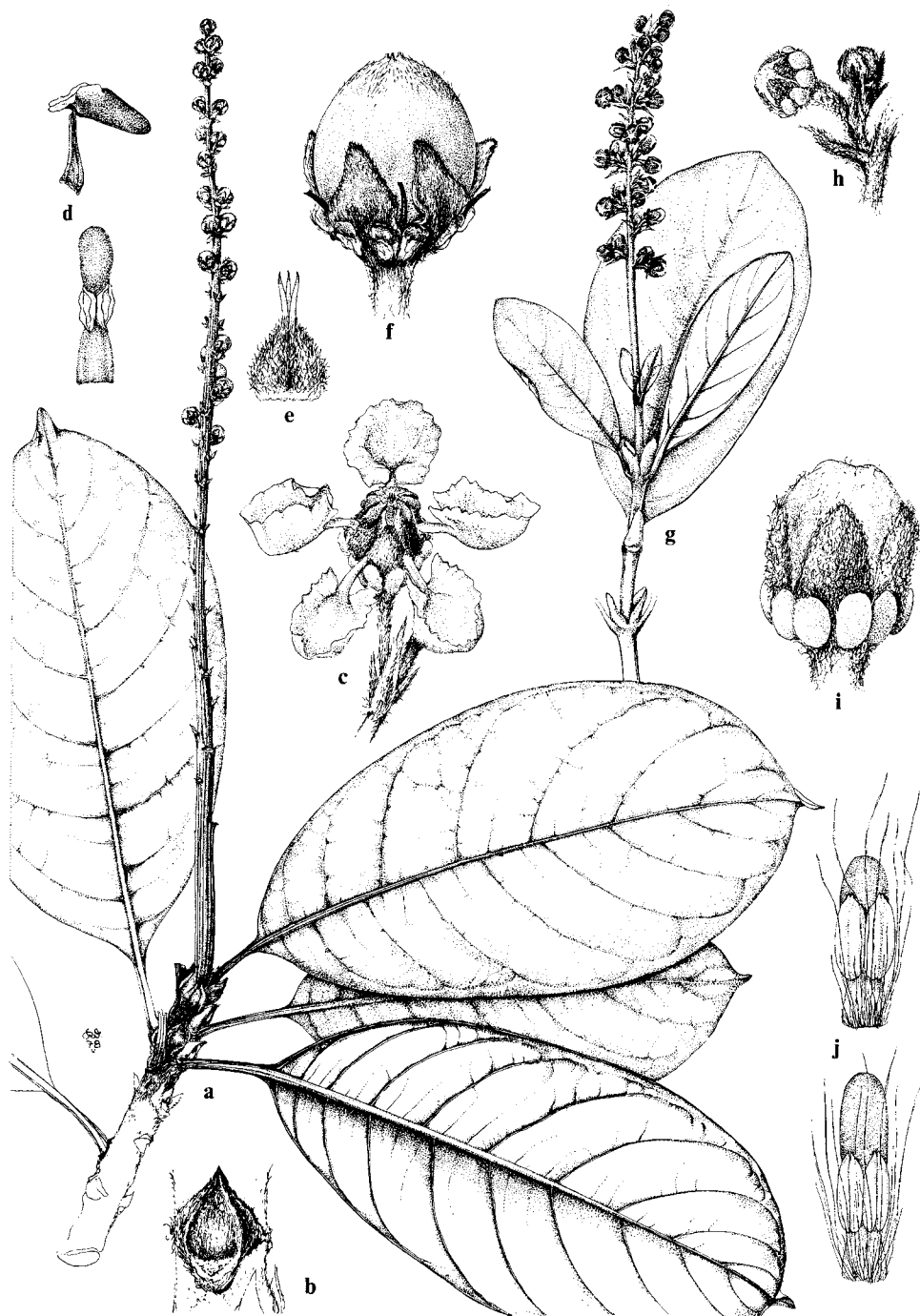


Fig 22. *Byrsonima macrostachya*, *B. chalcophylla*, and *B. tillettii*. a-b, *B. macrostachya*: a) Branch with inflorescence, $\times 0.5$; b) stipules (leaf removed), $\times 1.5$. c-f, *B. chalcophylla* var. *carraoana*: c) Flower, $\times 2.5$; d) stamens, $\times 5$; e) gynoecium, $\times 5$; f) fruit, $\times 2.5$. g-j, *B. tillettii*: g) Branch with

long (–10 mm in fruit), sericeous, straight in bud and fruit. Sepals all biglandular, 2–2.5 mm long and wide, triangular, acute or obtuse, sericeous or tomentose on both sides, more densely so abaxially, appressed in anthesis, accrescent in fruit, the glands 2.5–3 mm long, pink. Petals white with pink centers, glabrous. Filaments ca 2 mm long, abaxially glabrous, adaxially hirsute at base; anthers 1.5–2.9 mm long, glabrous, the locules 0.8–1.4 mm long, cylindrical, non-alate, acute and divergent at the apex, the connective exceeding the locules by 0.6–1.7 mm, the extension rounded and reflexed. Ovary 1.2–1.7 mm high, densely sericeous, with only 2 locules fertile; styles 1.2–1.5(–2) mm long, straight. Fruit “yellow-green,” 8–10 mm in diameter (dried), ovoid, sericeous to glabrate.

Type. *Ule* 8624, in unteren Walde, Roraima, Amazonas [Terr. Roraima, Brazil, or more likely Bolívar, Venezuela], Jan flr (holotype B, destroyed; fragments of holotype NY!).

Key to the Varieties of *Byrsonima chalcophylla*

1. Lamina with the hairs below so dense and persistent as to completely conceal the epidermis, even on older leaves; fruit densely and persistently sericeous. 29a. var *chalcophylla*.
1. Lamina sericeous below, but the hairs not so dense as to completely conceal the epidermis, especially on older leaves; fruit glabrescent, nearly or quite glabrate at maturity. 29b. var *carraoana*.

29a. *Byrsonima chalcophylla* var *chalcophylla*

Distribution. Known only from the following two collections. VENEZUELA. Bolívar: Ilu-tepuí, Gran Sabana, 1900 m, Mar flr/frt, *Maguire 33483* (MICH, NY, VEN); lower forests, Roraima, Jan flr, type, *Ule* 8624 (NY).

29b. *Byrsonima chalcophylla* var *carraoana* (Steyermark) Anderson, comb et stat nov Figs 16m & 22c–f.

Byrsonima carraoana Steyermark, Fieldiana Bot. 28(2): 287. 1952. Type. *Steyermark 60883*, Carrao-tepuí, Bolívar, Venezuela, 2470–2500 m, Dec flr/frt (holotype F! isotypes NY! VEN!).

Byrsonima bolivarana Steyermark, Fieldiana Bot. 28(2): 287. 1952. Type. *Steyermark 60272*, mesa between Ptari-tepuí and Sororopán-tepuí, Bolívar, Venezuela, 1615 m, Nov flr/frt (holotype F! isotypes NY! US!).

Distribution. Forests of eastern Bolívar and western Guyana. VENEZUELA. Bolívar: Km 133 S of El Dorado, 1300 m, forest near savanna, *Gentry et al 10563* (MICH); forested slopes, NW part of Abácapa-tepuí, Chimantá Massif, 1300 m, *Steyermark 75175* (NY); elfin forest, Apácará-tepuí, 2000 m, *Steyermark 75741* (NY); moist mossy recumbent forest, Auyan-tepuí, 1660 m, *Steyermark 93807* (NY, VEN); dwarf forest between Luepa and Cerro Venamo, 1200 m, *Steyermark & Nilsson 301* (VEN); rocky slopes of *zanjon* bordering Upper Falls of Río Tirica, Central Section, Chimantá Massif, 1950 m, *Steyermark & Wurdack 504* (MICH,

←

inflorescence, $\times 0.5$; h) cincinnus, $\times 2$; i) flower bud, $\times 5$; j) immature stamens from bud, upper opposite a petal, lower opposite a sepal, $\times 10$. Drawn by Karin Douthit, a–b from *Cowan & Wurdack 31363*, c–e from *Steyermark & Wurdack 504*, f from *Steyermark 93807*, g–j from *Tillett et al 45092*.

NY, VEN); bosque muscoso enano montañoso, Cerro Venamo, 1400–1450 m, *Steyermark et al 92501* (F, NY, VEN); selva enana en la altiplanicie del suelo arenoso blanco, drenaje de Río Cuyuní, Km 130–131 al sur de El Dorado, 1290–1300 m, *Steyermark et al 104521* (NY, VEN). GUYANA. Upper Mazaruni River basin, Mt. Ayanganna, low scrub, scrub, and low forest (8–10 m) on shoulder of E flank, above Thompson Camp, 1418–1525 m, *Tillett et al 45072* (K, MICH, NY, US).

Collected in flower and fruit most frequently from November to June.

30. *Byrsonima macrostachya* Anderson, sp nov

Fig 22a–b.

Arbor 20 m alta, trunco 35 cm diametro, ramis sericeis, foliis confertis. Lamina foliorum majorum 14–17 cm longa, 7.5–9 cm lata, elliptica vel obovata, basi obtusa, margine revoluta, apice abrupte acuminata vel rotundata et apiculata apiculo 3–6 mm longo, supra primum sericea demum glabrata et saepe glauca, subtus densissime et pertinaciter sericea, pilis primum rufis demum atrobrunneis vel canescentibus epidermidem omnino tegentibus, nervis lateralibus utrinque 8–11 subtus prominentibus supra prominulis; petiolus 20–28 mm longus, sericeus; stipulae 7–9 mm longae, triangularibus, ca $\frac{1}{2}$ connatae pari in medio sulcato, abaxialiter sericeae, adaxialiter glabrae praeter basim brevihirsutam. Inflorescentia (14–)25–26 cm longa, laxa sericea, floribus singulis, bracteis 2.5–4 mm longis, 0.8–1.5 mm latis, triangularibus vel anguste ellipticis, tomentosis, rectis, deciduis ante vel per anthesin, pedunculo nullo, bracteolis bracteis similaribus plerumque minoribus. Pedicellus alabastri 5–6 mm longus, tomentosus, non circinatus. Sepala omnia biglandulifera, in alabastro glandulas 2–2.5 mm superantia, 2.5–3 mm lata, utrinque dense tomentoso-sericea, apice obtusa vel rotundata, glandulis roseis, ca 2.5 mm longis. Petala rosea, glabra. Antherae glabrae, loculis cylindricis, non alatis, apice acutis, in alabastro 1–1.4 mm longis, connectivo globoso 0.8–1.3 mm superatis. Ovarium dense sericeum, tantum 2 loculis fertilibus; styli in alabastro 1.3 mm longi, recti. Fructus ignotus.

Type. *Cowan & Wurdack 31363*, valley head above camp and valley draining eastward through cumbre, Cerro Parú, Amazonas, Venezuela, 2000 m, 10 Feb 1951 imm flr (holotype MICH, isotypes NY, US, VEN).

This species is known only from the type, which is in bud. It is obviously closely related to *Byrsonima chalcophylla* of eastern Guayana, being distinguished by its larger leaves and stipules and much longer inflorescence, for which it is named.

31. *Byrsonima tillettii* Anderson, sp nov

Fig 22g–j.

Frutex usque 2.5 m altus, ramis rubro-sericeis demum glabratiss. Lamina foliorum majorum 9–11 cm longa, 4.5–6 cm lata, elliptica vel obovata, basi cuneata, margine parum revoluta, apice obtusa vel rotundata, coriacea, supra primum appresso-tomentosa demum glabrata, subtus pertinaciter patulo-sericea, pilis rubris demum canescentibus, sessilibus, rectis vel leviter tortis, $\pm$ parallelis, usque 1 mm longis, abundantibus sed epidermidem non omnino tegentibus, costa et 8–10 nervis lateralibus supra prominulis subtus prominentibus, venis tertiariis inter se subparallelis; petiolus 7–10 mm longus, sericeus demum glabratus; stipulae

10–11 mm longae, abaxialiter sericeae demum glabratae, adaxialiter glabrae, omnino connatae, pari linguiformi apice rotundato. Inflorescentia ca 10 cm longa (immatura), rufotomentosa, cincinnis lateralibus 1–2(–3?)-floris, bracteis 5–7 mm longis, 2 mm latis (basalibus usque 10 mm × 4 mm), anguste triangularibus, patulis, abaxialiter appresso-tomentosis, adaxialiter glabris vel apice tomentosis, pedunculo florifero primario 2–3 mm longo, tomentoso, bracteolis bracteis similaribus, tantum 4–4.5 mm longis. Pedicellus tomentosus, in alabastro circinatus. Flores tantum in alabastro cogniti. Sepala glandulas 2.5–3 mm superantia, 2.5 mm lata, ovata, apice obtusa, appressa, abaxialiter dense tomentosa, adaxialiter sparsim tomentosa, omnia biglandulifera, glandulis albis, glabris. Petala alba? (vel forsitan rosea), limbo abaxialiter rubro-piloso, margine integro vel denticulato, ungue (in alabastro) adaxialiter piloso. Filamenta abaxialiter glabra, adaxialiter praecipue basi hirsuta, pilis rubris, basifixis, usque 2.5 mm longis; antherae glabrae, subaequales, loculis linearibus, non alatis, apice mucronulatis, longe superatis connectivo crasso glandulosoque, connectivo antherarum petalis oppositarum obtuso, sepalis oppositarum majore globosoque. Ovarium glabrum, carpello antico sterili. Fructus ignotus.

Type. *Tillett, Tillett & Boyan 45092*, frequent, dense scrub and low forest (8–10 m) on shoulder of E flank, above Thompson Camp, 1418–1585 m, Mt. Ayan-ganna, Upper Mazaruni Basin, British Guiana [Guyana], 11 Aug 1960 (holotype MICH, isotype NY).

This species is known only from the type, which is only in bud, but nevertheless seems to be quite distinct from all described species. It is distinguished by its short petioles, large, rounded stipules, persistently sericeous leaves, long bracts and bracteoles, pedunculate flowers, pilose petals, glabrous anthers with much enlarged connective and apically mucronate locules, and glabrous ovary with the anterior locule sterile. The collectors of the type did not describe the color of the petals, but did say that the calyx glands were white; that, plus the fact that the other species of *Byrsonima* with similar anthers all have white or pink petals, makes me confident that *B. tillettii* will also prove to have white or pink petals. The epithet honors Stephen L. Tillett, one of the collectors of the type and student of Venezuelan botany.

32. *Byrsonima wurdackii* Anderson, sp nov

Fig 23.

Arbor 6 m alta, ramis sericeis mox glabratiss. Lamina foliorum majorum 9.5–15 cm longa, 5–8 cm lata, obovata vel elliptica, basi cuneata, margine ± plana, apice obtusa vel rotundata et breviter acuminata vel apiculata, sparsim sericea mox glabrata, supra vel utrinque glauca, nervis lateralibus utrinque 5–9, subtus prominulis, supra prominentibus (et saepe venis tertiariis scalariformibus); petiolus 16–25 mm longus, sericeus vel glabratus; stipulae 1.7–3.5 mm longae, abaxialiter sericeae vel glabratae, adaxialiter glabrae praeter basim hirsutam, connatae vel apice liberae, pari late triangulari, sulcato, apice acuto. Inflorescentia 16–24 cm longa, sparsim sericea, floribus raro singulis plerumque 2–3(–4) fasciculatis (vero in cincinnis sessilibus vel subsessilibus 2–3(–4)-floris), bracteis caducis non visis, pedunculo nullo, bracteolis 0.8–1.5 mm longis, 0.4–0.8 mm latis, lingulatis, caducis, tantum 2 visis. Pedicellus 5–7 mm longus (usque 10 mm in fructu), sericeus vel glabrescens, rectus in alabastro, decurvatus in fructu, gracilis, etiam in fructu

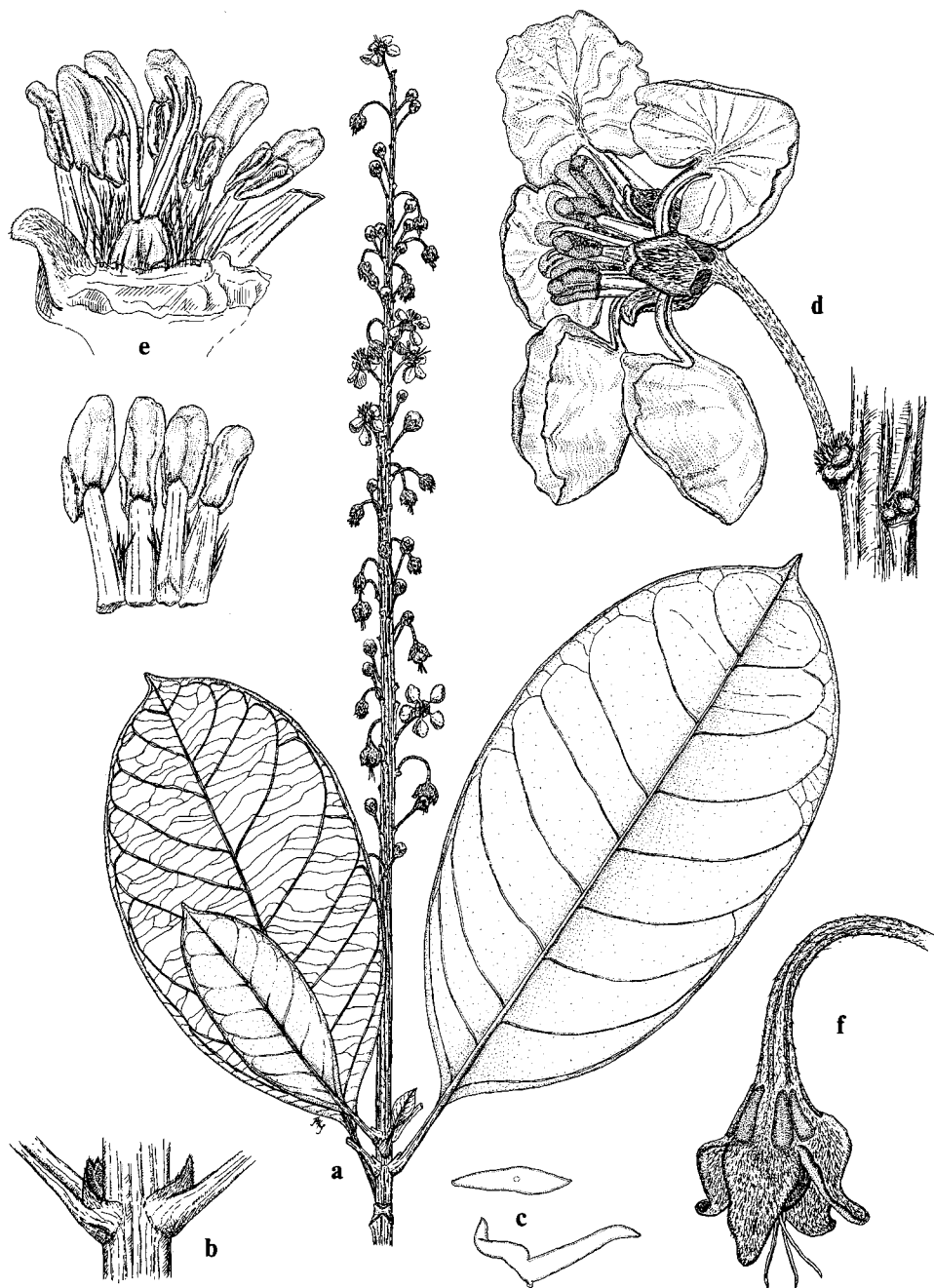


Fig 23. *Byrsonima wurdackii*. a) Flowering branch, $\times 0.6$; b) stipules, $\times 3.6$; c) hairs, upper from abaxial surface of lamina, lower from pedicel, $\times 170$; d) flower, $\times 5$; e) androecium and gynoecium, claw of posterior petal shown for orientation, lower 4 stamens removed from flower above, $\times 7.2$; f) immature fruit within accrescent calyx, $\times 4$. Drawn from the type by Annette Seidenschnur Mahler.

tantum ca 0.6 mm diametro basi, usque 1.3 mm apice (siccus). Sepala 1.5–2.3 mm longa, 2–2.3 mm lata, apice obtusa et plerumque revoluta per anthesin, in fructu accrescentia et auriculata, utrinque sparsim sericea, eglandulosa vel glandulis rudimentariis, immersis, usque 1.5 mm longis. Petala alba demum subrosea, glabra, erosa. Filamenta 1.5–2 mm longa, libera, abaxialiter glabra, adaxialiter basi hirsuta; antherae glabrae, 1.6–2.7 mm longae, loculis 0.6–1.2 mm longis, non alatis, apice liberis et divergentibus, connectivo glanduloso, loculos 0.8–1.6 mm superanti, erecto, apice rotundato. Ovarium glabrum, ca 1 mm altum, ovoideum, carpello antico sterili; styli 2.2–2.5 mm longi, in alabastro versus sepalum anticum flexi. Fructus glaber, globosus, ca 6–7 mm diametro (siccus), nux paulo rugosa.

Type. *Maguire & Wurdack 36406*, sabanita 1 km E of Maroa, Río Guainía, Amazonas, Venezuela, 130 m, 25 Nov 1953 flr (holotype MICH, isotypes NY, US, VEN).

Paratypes. VENEZUELA. Amazonas: San Carlos, Río Negro, Dec frt, *Schultes & López 9370* (F, GH, US). BRAZIL. Amazônia: Igarapé Jurupary, afl. do baixo Uaupés, catinga, Sep flr, *Ducke* [RB 35611] (MICH, RB).

Byrsonima wurdackii is named for John J. Wurdack, student of Melastomataceae and Polygalaceae and veteran collector of the plants of Guayana. It is notable for the veins more prominent above than below, the long inflorescence, the very early caducous bracts and bracteoles, the flowers occurring in clusters (very reduced cincinni), the calyx glands rudimentary or apparently absent, the large connective of the anthers, and the small pendent fruit within the enlarged calyx.

There is a specimen of this species at IAN with a label that says "R. E. Schultes 9374." It is supposed to be from Amazonas, Brazil. Dr. Schultes tells me that this is an error, and that this is probably a duplicate of his 9370 from San Carlos, Venezuela.

33. *Byrsonima frondosa* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 334. 1840.

Small trees; stems sericeous to glabrate. Lamina of the larger leaves 8–12 cm long, 4–5 cm wide, obovate, attenuate or cuneate at the base, abruptly acuminate at the apex, initially sericeous (?) but glabrate at maturity, with 9–12 pairs of lateral veins prominulous on both sides, the tertiary veins scalariform; petiole 10–15 mm long, very sparsely sericeous to glabrate; stipules 2–3 mm long, completely connate, the pair triangular, acute or obtuse, abaxially sericeous, adaxially hirsute at base. Inflorescence 6–10 cm long, sericeous, the flowers borne 1–2 per bract; bracts and bracteoles 1.7–2.3 mm long, ca 0.8 mm wide, lingulate, caducous before anthesis; peduncle none. Pedicel 3–3.5 mm long, loosely sericeous, somewhat circinate in bud. Sepals all biglandular, 1.5 mm long beyond the glands, 1.7 mm wide, triangular, obtuse, densely sericeous on both sides or glabrescent near the margin, appressed in anthesis; glands ca 2 mm long. Petals "avermelhadas" (white turning red? pink turning red?), glabrous. Filaments 1.5 mm long, abaxially glabrous, adaxially hirsute at base; anthers 2–2.5 mm long, glabrous, the locules 0.8–1.2 mm long, cylindrical, non-alate, slightly divergent at the apex, the massive connective exceeding the locules by 1–1.5 mm, rounded, straight or reflexed. Ovary ca 1 mm high, glabrous, sulcate, with the anterior carpel sterile; styles 1.5 mm long, straight. Fruit unknown.

Type. *Martius*, Coari, Amazônia, Brazil, Nov flr (M, P).

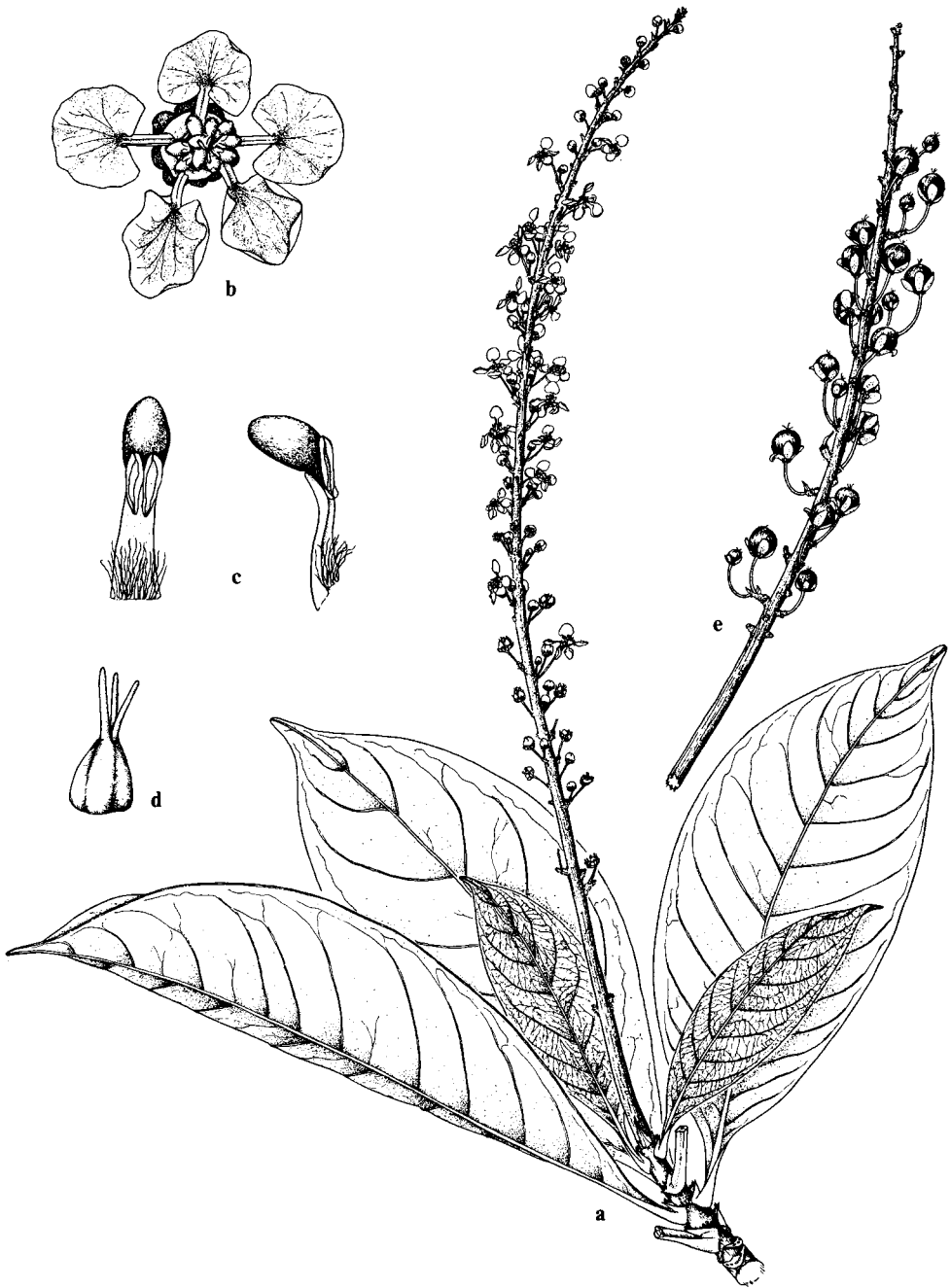


Fig 24. *Byrsonima cowanii*. a) Flowering branch, $\times 0.45$; b) flower, $\times 2.5$; c) stamens, $\times 8$; d) gynoecium, $\times 6.5$; e) infructescence, $\times 0.5$. Drawn by Melissa Marshall, a-d from the type, e from Maguire & Politi 28728.

Distribution. Known only from the type and the following recent collection. BRAZIL. Amazônas: Caatinga alta, Taraquá, Rio Uaupés, Nov fir, Pires 1107 (IAN, NY).

34. *Byrsonima cowanii* Anderson, sp nov

Fig 24.

Frutex vel arbor 2–12 m alta, ramis sericeis mox glabratiss, internodiis saepe brevissimis. Lamina foliorum majorum 15–25 cm longa, 7–13 cm lata, obovata, basi cuneata, margine paulo revoluta, apice breviacuminata, sparsim sericea mox glabrata, nervis lateralibus utrinque 8–11, utrinque $\pm$ aequaliter prominentibus, multis venis tertiariis scalariformibus prominulis interconnexis; petiolus 11–21 mm longus, sericeus mox glabratus; stipulae 4–7.5 mm longae, utrinque sericeae vel glabratae, late triangulares, amplexicaules, $\frac{1}{2}$ – $\frac{4}{5}$ connatae, acutae, pari sulcato. Inflorescentia 17–35 cm longa, sericea vel demum glabrescens, floribus in cincinnis condensatissimis (1)–2–4-floris, bracteis (4)–5–6 mm longis, 1–1.6 mm latis, anguste triangularibus, sparsim sericeis, rectis vel apice paulo reflexis, per anthesin deciduis, pedunculo nullo, bracteolis 1–3.5 mm longis, 0.5–3 mm latis, triangularibus, per anthesin deciduis. Pedicellus 6–8 mm longus, usque 12 mm in fructu, sericeus vel glabrescens, rectus in alabastro, rectus vel ascendens in fructu, ca 1.5 mm diametro in fructu. Sepala glandulas ca 1.5 mm superantia, 1.7–2.2 mm lata, triangularia, apice obtusa vel rotundata, appressa, in fructu elongata (fere linguiformia) et basi parum auriculata, utrinque sericea vel sparsim sericea, omnia biglandulifera, glandulis 2.5–3.5 mm longis, obovatis, compressis, apice revolutis. Petala “rosea” (primum alba demum rosea?), glabra, subintegra. Filamenta ca 2 mm longa, basi connata, abaxialiter glabra, adaxialiter in dimidio proximali hirsuta, pilis rubris et basifixis; antherae glabrae, 1.8–2.3 mm longae, loculis non alatis, (0.6)–0.8–1 mm longis, apice acutis sed non liberis, connectivo luteo, glanduloso, loculos 0.8–1.5 mm superanti, $\pm$ reflexo, apice rotundato vel obtuso. Ovarium glabrum, 1–1.5 mm altum, conicum, sulcatum, carpellis omnibus fertilibus; styli ca 1.5 mm longi, recti. Fructus glaber, globosus, 8–10 mm diametro (siccus), atrocyaneus (siccus), nux rugosa.

Type. *Wurdack & Adderley 43745*, laja, Caño Cupavén, Río Orinoco, opposite mouth of Río Atabapo, Amazonas, Venezuela, 125–150 m, 4 Aug 1959 flr/frt (holotype MICH, isotypes NY, US, VEN).

Paratypes. VENEZUELA. Amazonas: Formación arbustiva sobre la laja Cabezón al margen del río Cabezón, cerca de su desembocadura en el río Atabapo, 2–3 km S de El Merey, Sep flr, *Foldats 3882* (NY, VEN); banks of Cuao River, above Cuao Creek, 125 m, Nov flr, *Maguire & Politi 27399* (MICH, NY, US, VEN); mixed montane forest, trail from Base Camp, Cerro Sipapo (Paráque), 125 m, Jan flr/frt, *Maguire & Politi 28601* (MICH, NY, US, VEN); mixed montane woodland, vic. Intermediate Camp, Cerro Sipapo, 600 m, Feb frt, *Maguire & Politi 28728* (MICH, NY, VEN).

This species is named in honor of Richard S. Cowan, student of Leguminosae and collector of many fine specimens in Guayana. It is especially notable for the very condensed cincinni with large, deciduous bracts and bracteoles and the straight or ascending pedicels.

35. *Byrsonima pachypoda* Anderson, sp nov

Figs 16n & 25.

Frutex 2–4 m altus vel arbor 8 m alta, internodiis brevibus glabris praeter axillas hirsutas stipularum. Folia apice ramorum conferta; laminafoliorum majorum 6–14.5 cm longa, 3–8.3 cm lata, obovata, basi gradatim angustata, interdum rotundata, margine revoluta, apice late obtusa vel rotundata et interdum brevissime apiculata, coriacea, glaberrima, interdum leviter glauca, nervis lateralibus ob-

scuris vel prominulis; petiolus 3–5(–7) mm longus, crassissimus, glaberrimus; stipulae 3–6 mm longae, triangulares vel ovatae, apice acutae vel obtusae, intrapetiolariter inter se distinctae, interpetiolariter breviter connatae, abaxialiter glabrae, adaxialiter dense ferrugineo-hirsutae. Inflorescentia 5–10 cm longa, sparsim sericea vel subtomentosa mox glabrescens, floribus singulis, bracteis 2.5–3 mm longis, 2–3 mm latis, ovatis apice acutis, sparsim sericeis vel glabris, post maturitate fructus persistentibus, pedunculo nullo, bracteolis bracteis similaribus, saepe paulo brevioribus et plerumque angustioribus. Pedicellus ruber, 8–22 mm longus, distaliter dilatatus apice 2–3 mm diametro (siccus), tomentosus vel subsericeus demum glabrescens, rectus in alabastro et fructu. Sepala rubra, glandulas 2 mm superantia, 2–3 mm lata, late ovata, in fructu paulo accrescentia et crassiora, apice obtusa vel rotundata, appressa, abaxialiter glabra praeter basim paucipiliferam, adaxialiter glabra, omnia biglandulifera, glandulis 1.5–3 mm longis, obovatis, rubris demum denigrantibus. Petala alba aetate rosea, glabra, 4 lateralia patentia vel reflexa ungue 2.5–3.5 mm longo, limbo 3.5–4 mm longo, 5–6 mm lato, cordato, margine sinuato subintegro; petalum posticum erectum, ungue 2.5–3 mm longo crassioreque, limbo 3–3.5 mm longo, 5 mm lato, corrugato. Filamenta 2.3–2.6 mm longa, abaxialiter glabra vel sparsim tomentosa, adaxialiter basi hirsuta; antherae glabrae, 1.6–2.2 mm longae, subaequales, loculis linearibus, non alatis, apice non liberis, connectivo tumido non vel brevissime (usque 0.1 mm) superatis. Ovarium conicum, 1.5 mm altum, glabrum, carpello antico sterili (semper?); styli 2.5 mm longi, omnes vel posteriores versus sepalum anticum flexi. Fructus glaber, globosus vel ovoideus, ca 8 mm diametro, primum ruber demum ater, carne tenui, nuce rugosa.

Type. *Tillett, Tillett & Boyan 45073*, frequent, low scrub and forest (8–10 m) on shoulder of E flank, above Thompson Camp, Mt. Ayanganna, upper Mazaruni River basin, British Guiana [Guyana], 1418–1585 m, 10–11 Aug 1960 flr/frt (holotype MICH, isotypes K, NY, US).

Distribution. Mountains of western Guyana and eastern Bolívar. Paratypes: VENEZUELA. Bolívar, Ilu-tepuí, March: occasional in low *Clusia-Oedematopus*-*Magnolia* woodland, ridge E of Mesa Grande, 1650 m, flr, *Maguire 33321* (NY); Mesa Ridge, frequent, 1900 m, *Maguire 33377* flr (NY) & *33396* flr/frt (NY, VEN).

Byrsonima pachypoda is named for its straight, red, enlarged pedicels. It is one of the few species in the genus to have white/pink petals and the connective not or hardly exceeding the locules of the anther. It is also notable for its glabrous, brittle, subsessile leaves crowded at the tips of the branches, and for the free stipules abaxially glabrous and adaxially densely hirsute.

36. *Byrsonima steyermarkii* Anderson, sp nov

Fig 26.

Arbor 6–7 m alta, ramis vegetativis glabris praeter axillas brevihirsutas stipularum. Lamina foliorum majorum 6.5–12.2 cm longa, 4.5–7 cm lata, obovata, basi rotundata vel paulo cordata, margine revoluta, apice late obtusa vel rotundata et plerumque apiculata, coriacea, utrinque glabra, nervis lateralibus utrinque 6–9, obscuris vel prominulis; petiolus 3–5 mm longus, glaber; stipulae 3–5 mm longae, liberae, ovatae, abaxialiter glabrae, adaxialiter basi hirsutae. Inflorescentia 2.5–10.5 cm longa, laxa sericea vel tomentosa, floribus singulis, bracteis bracteolisque

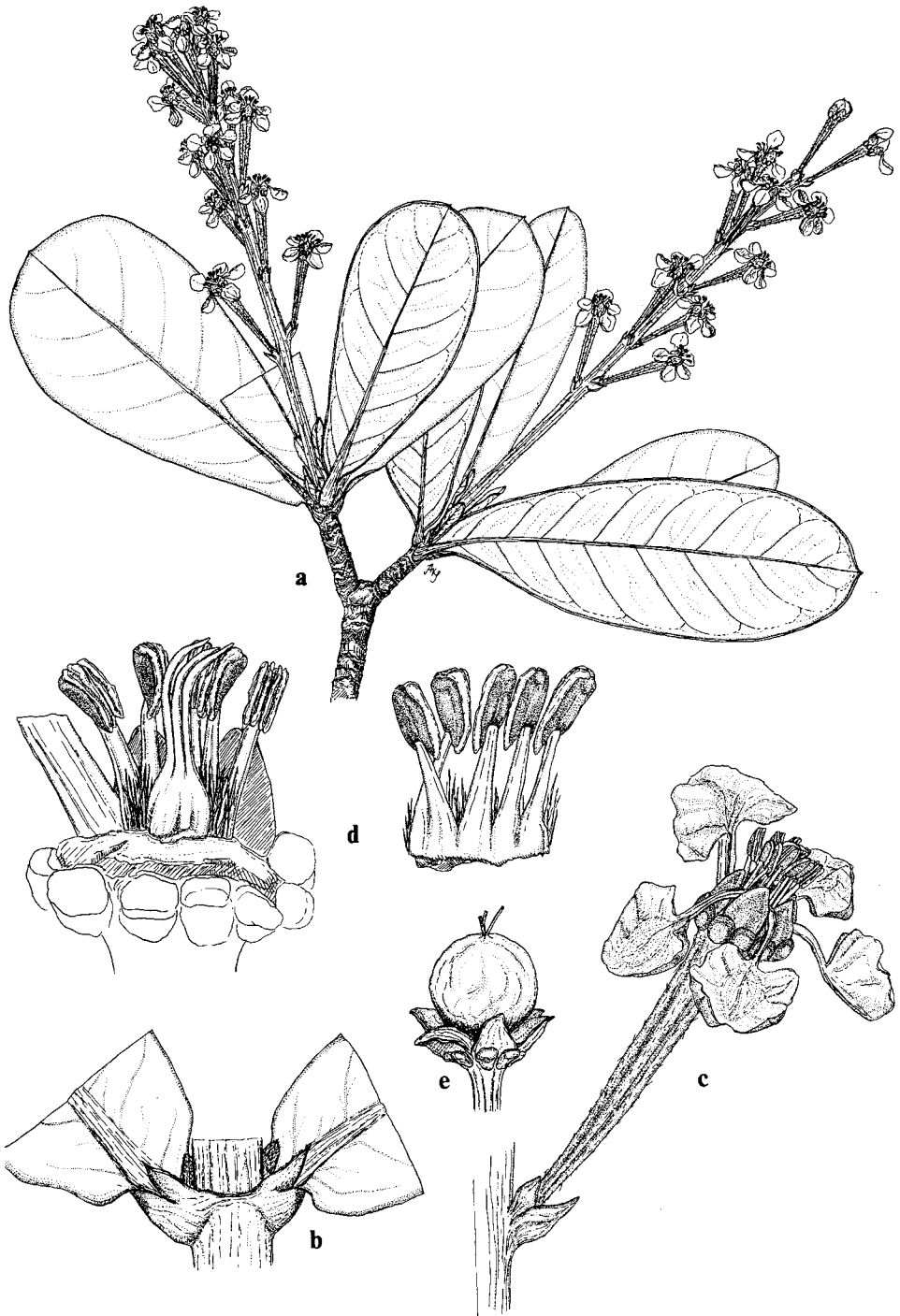


Fig 25. *Byrsonima pachypoda*. a) Flowering branch, $\times$ ca 0.8; b) leaf-bases and stipules, $\times$ 3.6; c) flower, $\times$ 3.6; d) androecium and gynoecium, with claw of psoterior petal shown on left for orientation, the 5 separate stamens (right) removed from same flower, $\times$ 6; e) fruit, $\times$ 3. Drawn from *Maguire 33396* by Annette Seidenschur Mahler.

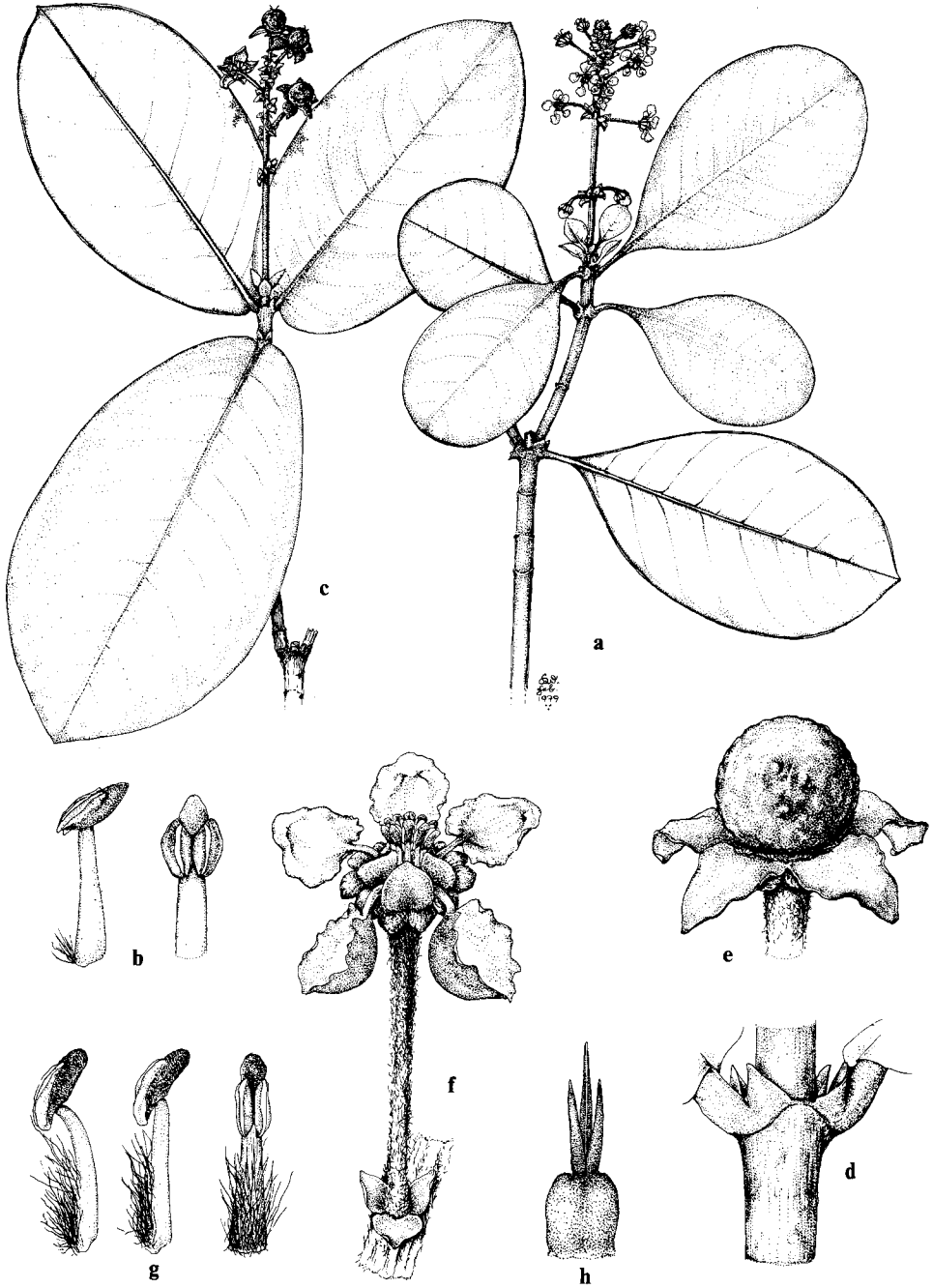


Fig 26. *Byrsonima rubrobracteata* and *B. steyermarkii*. a-b, *B. rubrobracteata*: a) Flowering branch, $\times 0.5$; b) stamens, $\times 7.5$. c-h, *B. steyermarkii*: c) Fruiting branch, $\times 0.5$; d) stipules, $\times 2.5$; e) fruit, $\times 3$; f) flower, $\times 3.5$; g) stamens, left opposite petal, middle opposite sepal, $\times 7.5$; h) gynoecium, $\times 7.5$. Drawn by Karin Douthit, a-b from Tillett et al 45128, c-e from Cowan & Wurdack 31344, f-h from Steyermark 97979.

1.5–2.5 mm longis latisque, ovatis vel rotundatis, glabris vel margine ciliatis, post maturitate fructus persistentibus, pedunculo nullo. Pedicellus 8–12 mm longus, 1 mm diametro (usque 1.5 mm in fructu), laxe sericeus vel tomentosus, in alabastro circinatus, in fructu rectus. Sepala omnia biglandulifera, glandulas 2 mm superantia, 2 mm lata, rotundata, abaxialiter basi brevihirsuta distaliter glabra, margine ciliata, adaxialiter glabra, per anthesin appressa, in fructu accrescentia et rubescentia, glandulis 2.5 mm longis. Petala alba, glabra, 4 lateralibus ungue 2 mm longo, limbo 3–5 mm longo latoque; petalum posticum ungue 2.5 mm longo, limbo 3 mm longo latoque. Filamenta 2.2–2.5 mm longa, recta vel paulo curvata, abaxialiter glabra, adaxialiter hirsuta in dimidio proximali; antherae 1.4–1.6 mm longae, glabrae, loculis 1–1.3 mm longis, cylindricis, non alatis, apice acutis, connectivo 0.3–0.5 mm superatis. Ovarium 1.2 mm altum, glabrum, sulcatum, loculis omnibus fertilibus; styli inaequales (semper?), anticus et 1 posticus 1.5 mm longi, alter posticus 2.1 mm longus. Fructus 5–7.5 mm diametro (siccus), viridis (immaturus?), glaber, globosus, sepalis accrescentibus revolutis rubescentibus subtentus, nuce rugosa.

Type. *Steyermark* 97979, Cerro Jáua, Bolívar, Venezuela, 1922–2100 m, 22–27 Mar 1967 flr (holotype VEN, isotype NY).

Distribution. Known only from the type and the following paratype. VENEZUELA. Amazonas: Cerro Parú, cumbre, Río Ventuari, 2000 m, Feb frt, *Cowan & Wurdack* 31344 (MICH, NY, VEN).

This species, named in honor of Julian A. Steyermark, is notable for the short petiole, rather large, coriaceous, revolute lamina with a rounded or cordate base, large stipules, and non-alate anther locules. Because of the persistent bracts and bracteoles and erect pedicel in fruit it is similar and probably rather closely related to *Byrsonima concinna*.

37. *Byrsonima kariniana* Anderson, sp nov

Fig 27.

Frutex usque 4 m altus, internodiis vegetativis glabris (vero sericeis permox glabratibus), nodis in axillis stipularum hirsutis pilis atrorubris basifixisque demum glabratibus. Lamina foliorum majorum 6.5–10.7 cm longa, 3–5.5 cm lata, elliptica, basi cuneata, margine revoluta, apice rotundata, obtusa, vel brevissime acuminata, coriacea, utrinque glabra (vero sericea permox glabrata), supra vel utrinque glauca, nervis lateralibus utrinque costae 7–10, subtus prominulis supra obscuris vel rarius prominulis; petiolus 12–19 mm longus, sericeus permox glabratus; stipulae 3.4–5 mm longae, late triangulares, $\frac{1}{2}$ – $\frac{4}{5}$ connatae, pari medio sulcato, abaxialiter sericeae mox glabratae, adaxialiter glabrae. Inflorescentia 6–13 cm longa, tomentosa demum glabrescens, floribus singulis, bracteis 2.5–7 mm longis, 2–4 mm latis, e basi ad apicem inflorescentiae deminuentibus, ovatis vel lanceolatis, patentibus, rectis vel rarius apice paulo revolutis, sericeis demum glabratibus, post maturitate fructus persistentibus, pedunculo nullo, bracteolis bracteis similaribus, tantum 2–3 mm longis latisque, late ovatis. Pedicellus 2.5–6 mm longus, 1.2–2 mm diametro, tomentosus pilis atrobrunneis, demum glabratus, rectus in alabastro, rectus (vel paulo decurvatus?) in fructu. Sepala glandulas 2.2–2.5 mm superantia, 2.5 mm lata, late triangularia, in fructu accrescentia et auriculata, apice obtusa vel rotundata, appressa, abaxialiter dense sericea demum glabrata, adaxialiter glabra vel sparsim tomentosa, omnia biglandulifera, glandulis 1.8–2.3

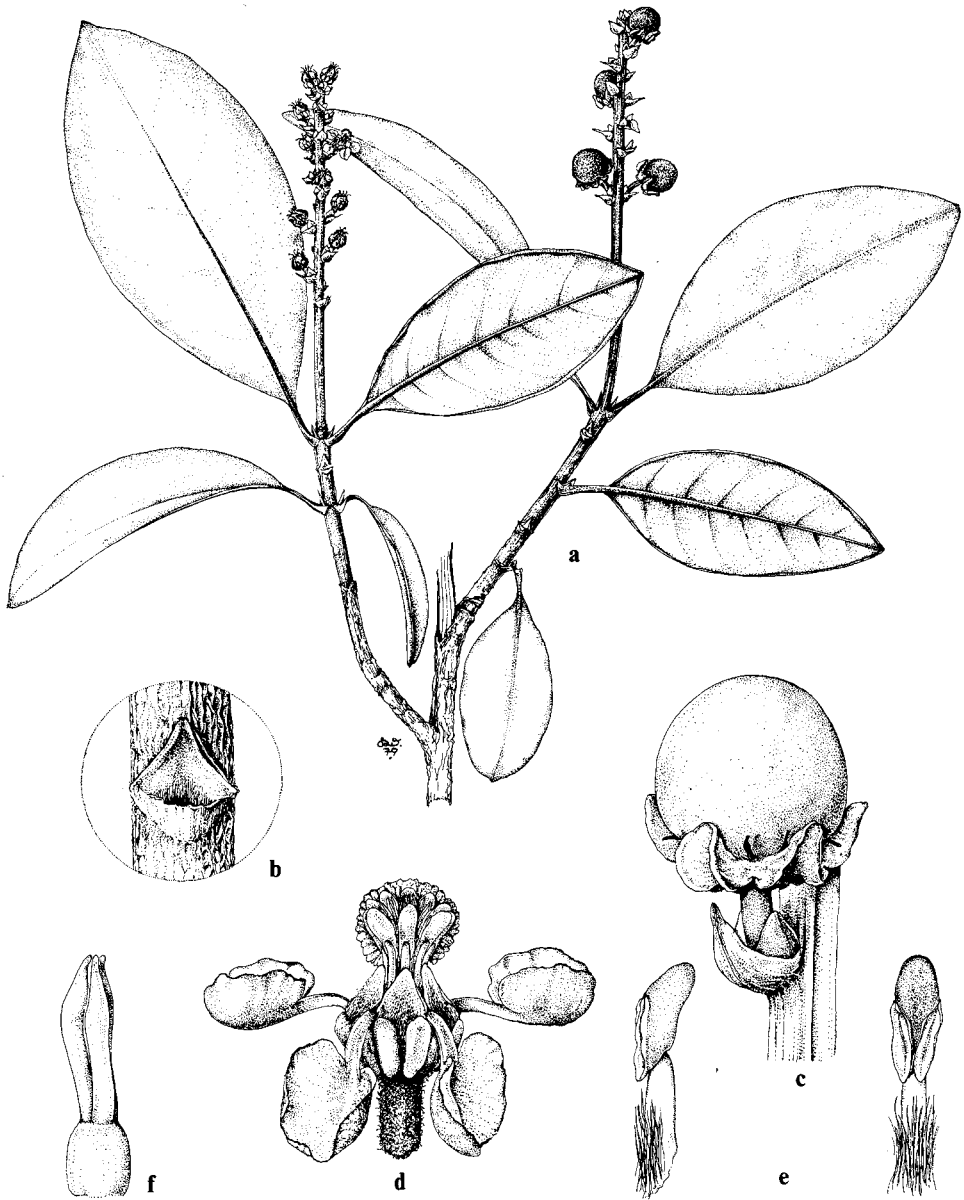


Fig 27. *Byrsonima kariniana*. a) Flowering and fruiting branches, $\times 0.5$; b) stipules, $\times 2.5$; c) fruit, $\times 2.5$; d) flower (including entire pedicel), $\times 3.5$; e) stamens, $\times 7.5$; f) gynoecium, $\times 7.5$. Drawn by Karin Douthit, a–c from Maguire & Politi 28021, d–f from Maguire & Politi 28139.

mm longis (–3 mm in fructu), anguste obovatis, compressis, apice paulo revolutis, basi interdum decurrentibus. Petala “rosea” (primum alba demum rosea?), glabra, erosa. Filamenta ca 3 mm longa, fere libera, abaxialiter glabra, adaxialiter in dimidio proximali hirsuta, pilis rubris et basifixis; antherae glabrae, 1.9–2.5 (–3) mm longae, subaequales, loculis linearibus, non alatis, 1.2–1.5 mm longis, apice acutis et breviter liberis, connectivo carnoso sulcato 0.7–1(–1.5) mm su-

peratis. Ovarium glabrum, carpello antico sterili; styli 2.5 mm longi (–3.2 mm in fructu) in alabastro versus sepalum anticum flexi. Fructus glaber, globosus, ca 10 mm diametro, atrocyaneus (?), glaucus, carne crassa, nuce ca 7 mm diametro, laevi vel paulo rugosa.

Type. *Maguire & Politi 28021*, summit, North Peak (IV), Cerro Sipapo (Paráque), 2000 m, Amazonas, Venezuela, 30 Dec 1948 flr/frt (holotype NY, isotypes MICH, VEN).

Distribution. Known only from the type locality. Paratypes: VENEZUELA. Amazonas, Cerro Sipapo, Dec–Jan: Forest near summit, Peak I, 5600 ft, frt, *Maguire & Politi 27626* (NY); SE slope, savanna, Peak I, 5000–6000 ft, flr/imm frt, *Maguire & Politi 27647* (NY); dissected terraces and low slopes, Peak IV, flr, *Maguire & Politi 28139* (NY, VEN); Caño Profundo, vic. Caño Negro, 4800 ft, imm frt, *Maguire & Politi 28273* (NY, VEN).

This species is rather similar to the eastern species *Byrsonima chalcophylla*, but it is easily distinguished by its glabrous leaves, persistent bracts and bracteoles, and glabrous ovary and fruit. It is also notable for its short, stout, straight pedicel. The epithet honors Mrs. Karin Douthit, the incredibly talented and patient artist who has illustrated this and many other species of neotropical vascular plants.

38. *Byrsonima coniophylla* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 335. 1840. Figs 16o & 28.

Small trees 2–8 m tall, sometimes shrubby, rarely less than 1 m tall; stems sericeous or tomentose to eventually glabrescent, the hairs turning from brown to gray. Lamina of the larger leaves 8–12(–15.5) cm long, 3–4.7(–5.2) cm wide, narrowly ovate or elliptical, cuneate or truncate at the base, mostly obtuse or slightly acuminate at the apex, rarely acute, usually glaucous below and sometimes glaucous above, thinly sericeous on both sides at first, glabrate at maturity or with some hairs persistent on the midrib, the numerous fine parallel lateral veins and reticulum prominulous above or on both sides; petiole 10–16(–23) mm long, sericeous or tomentose to glabrate; stipules 2.5–4(–5) mm long, ovate or triangular, free to nearly connate, abaxially sericeous, adaxially densely hirsute. Inflorescence 5–17 cm long, sericeous or tomentose, the flowers borne 1 per bract; bracts 2.5–4 mm long, 1–2 mm wide, narrowly triangular or lingulate, sparsely tomentose, especially on the margin, persistent past maturity of the fruit; peduncle none; bracteoles like the bracts but smaller. Pedicel 7–14 mm long, sericeous or tomentose, slightly circinate in bud, straight or slightly nodding in fruit. Sepals all biglandular, 1.5–3 mm long beyond the glands, 1.5–2.5 mm wide, ovate or distally lingulate, glabrous or ciliate on the margin and rarely bearing scattered hairs abaxially, reflexed in anthesis, accrescent and often turning red in fruit; glands 1.2–2.2 mm long, red, sometimes decurrent. Petals white, turning red in age, glabrous. Filaments 2–3 mm long, abaxially glabrous, adaxially hirsute at base; anthers 1.8–3.1 mm long, glabrous, the locules 1.8–3.1 mm long, linear, non-alate, often slightly detached at the apex, the connective shorter than the locules, equalling them, or exceeding them by up to 0.3 mm. Ovary glabrous, 0.8–1.2 mm high, sulcate, with all 3 locules fertile; styles 3.3–5 mm long. Fruit red or black, 4–5 mm in diameter (dried), depressed-globose, glabrous, the nut rugose.



Fig 28. *Byrsonima coniophylla*. a) Flowering and fruiting branches, $\times 0.5$; b) stipules, $\times 3$; c) flower, $\times 3$; d) stamens, $\times 7.5$; e) gynoecium, $\times 10$; f) fruit, $\times 5$. Drawn by Karin Douthit from Maguire et al 36648.

Type. “*Brasilia borealis*” (holotype P, Field Mus. Neg. 35556).

Distribution. Sandy savannas from the Alto Orinoco south to the middle Río Negro. VENEZUELA. Amazonas: Río Casiquiare, Laguna Baciba, *Fariñas et al* 665 & 666 (NY, VEN); 2 km N de El Merey, margen del Río Atabapo, *Foldats* 3873 (NY); Caño Guazuriapana, Río Atabapo near San Fernando, 150 m, *Level L-99* (MICH, NY, VEN); NW base of Cerro Yapacana, 150 m, *Maguire & Wurdack* 34540 (MICH, NY, VEN); Sabana El Venado, on left bank of Caño Pimichin above Puerto Pimichin, Río Guainía, 140 m, *Maguire & Wurdack* 35645 & 36362 (NY); 50–60 km above mouth of Río Pacimoni, *Maguire et al* 36648 (MICH, NY, US, VEN), 36678 (MICH, NY, VEN), 41671 (MICH, NY, VEN); Sabana El Venado, above Pimichin, *Maguire et al* 41822 (NY); Río Atabapo, San Fernando, *Medina* 545 (VEN); Río Casiquiare, arriba de Solano, 100 m, *Steyermark & Bunting* 102443 (NY, VEN); Caño Monomi, Casiquiare, *Vareschi* 7786 p p & 7786a (both VEN); Río Atabapo, cerca Isla el Zapo, *Vareschi & Jaffe* 8007 & 8008 (VEN). COLOMBIA. Vaupés: Puerto Inírida, Río Inírida, *García-Barriga* 20846 (GH); Puerto Huesito, sabanas del Alto de la Cruz, *García-Barriga* 20889 (GH); 1 km W of Cacagual (Piedra Cacaguati), *Maguire et al* 36284 (NY); Cacagual Savanna, Río Atabapo between San Fernando and Caño Temi, *Maguire et al* 41433 (MICH, NY, US, VEN). BRAZIL. Amazonas: R. Curicuriari, *Ducke* [RB 35608] (RB); Río Negro, Enuixy, lago do Dondona, *Fróes* 22350 (IAN, UB); Río Uneiuxi, 35 km above mouth, Campina do Dodono, *Prance et al* 15440 (INPA, MICH, NY); Río Uneiuxi, 200–300 km above mouth, *Prance et al* 15536 (INPA, MICH, NY); Río Uneiuxi, 5 km above mouth, *Prance et al* 16171 (MICH, NY); Ilha Xibarú, above Barcellos, *Schultes & López* 8893 (GH, IAN). Terr. Roraima: R. Xeriuini, *Pires et al* 13940 (IAN), 13986 (MICH), 14020 (MICH).

Collected in flower and fruit in most months.

Plants from near the Río Atabapo sometimes have atypically small leaves. This condition occurs in small plants, 0.7 m tall or shorter, which suggests that the small leaves are a phenotypic phenomenon of no taxonomic significance. The extreme of this is seen in *García-Barriga* 20889, which has very small, narrow leaves but floral characters of this species.

39. *Byrsonima eugeniifolia* Sandwith, Kew Bull. 1935: 315. 1935.

Shrubs or small trees 1–7.5 m tall; stems tightly sericeous to eventually glabrate. Lamina of the larger leaves 4–7(–8) cm long, 1.8–2.6(–3) cm wide, elliptical or slightly ovate, attenuate or cuneate at the base, usually short-acuminate at the apex, sometimes acute, not or only thinly glaucous below or above, initially sparsely sericeous, glabrate at maturity or sparsely sericeous below on the midrib, the many fine parallel lateral veins not or hardly distinguishable from the reticulum, obscure or prominulous on one or both sides; petiole 6–8(–10) mm long, sericeous to glabrate; stipules 1.8–2.8 mm long, acute or obtuse, free to nearly connate, the pair sulcate in the middle, abaxially sericeous, adaxially hirsute. Inflorescence 2–8 cm long, loosely sericeous, the flowers borne 1–2 per bract; bracts 1.5–2.7(–3.5) mm long, 1–2 mm wide, triangular, often red, persistent past maturity of the fruit; peduncle 0(–1) mm long; bracteoles like the bracts but smaller. Pedicel 6–8 mm long, loosely sericeous or tomentose, straight or slightly circinate in bud, straight or slightly nodding in fruit. Sepals all biglandular, 2–2.7

mm long beyond the glands, 1.8–2.7 mm wide, usually red or turning red in fruit, rounded at the apex, revolute in anthesis, abaxially usually thinly sericeous or tomentose, especially in the center, ciliate on the margin, adaxially sparsely tomentose, accrescent in fruit; glands 1.5–2.8 mm long, often pink, sometimes decurrent. Petals white, turning pink and then red in age, glabrous. Filaments 2.3–2.7 mm long, connate up to 1 mm, abaxially glabrous, adaxially sparsely hirsute at base; anthers 1.9–2.7 mm long, glabrous, the locules 1.7–2.7 mm long, linear, non-alate, sometimes detached at the apex, the connective equalling the locules or exceeding them by up to 0.3 mm. Ovary ca 1 mm high, glabrous, sulcate, with all 3 locules fertile; styles 3.5–4.4 mm long. Fruit 3–4 mm in diameter (dried), purplish red, glabrous, ovoid to depressed-globose, subtended by the accrescent, red or purplish calyx, the nut rugose.

Type. *Forest Dept.* 2387, Captain Creek, Mahaicony River, Demerara Co., British Guiana [Guyana] (holotype K).

Distribution. Sandy savannas from Guyana south and west to Roraima Territory. GUYANA. Kaieteur Plateau vic. Kaieteur Falls, 420 m, *Cowan & Soderstrom* 1871 & 1947 (NY); Rupununi Savanna, *Goodland* 908 (US); vic. St. Cuthbert's Mission, 50 km S to SSE of Georgetown, *Mori et al* 8030 & *Mori & Bolten* 8289 (both MICH); Kaieteur Savanna, *Sandwith* 1297 (NY). SURINAM. Distr. Saramacca, Kappul savanna, ped. austr. mont. Tafelberg, *Kramer & Hekking* 2902 (NY). BRAZIL. Pará: Rio Parú de Oeste, 2°20'N, 55°45'W, *Cavalcante* 2510 & 2558 (MG, NY); R. Marapí, afl. do R. Parú, *Ribeiro* 411 (MICH); Porteira, Rio Trombetas, *Ribeiro* 459 (MICH); campos de Marapí, *Rosa* 58 (MICH). Terr. Roraima: Bôa Vista-Caracarái, *Black* 51–13448 (IAN); Rio Cantá, *Black* 51–13929 (IAN); Anana savanna, *Boyan* 188 (INPA); 20 km E of Caracarái, *Pires & Leite* 14844 (IAN); R. Univini, *Pires et al* 14187 (MICH), 14191 (IAN), 14226 (MICH); R. Anauá, *Pires et al* 14486 (MICH).

Collected in flower and fruit in most months.

This species is similar and closely related to *Byrsonima coniophylla*. Their ranges seem to overlap only in southwestern Roraima Territory. There, in the region of Rio Xeriuini-Rio Univini, both species were collected by Pires et al, as well as one plant (*Pires et al* 14228) that combines the characters of the two and is probably a hybrid. These two species are a good example of a recurrent situation, in which related but distinguishable taxa from eastern and western Amazonia meet in southern Roraima and Amazonas north of Manaus. Sometimes there is minimal integradation, as in this case. In other cases, there seems to have been extensive hybridization and back-crossing, as in the *B. punctulata* complex. The pattern suggests to me that these species diverged from a common ancestor at a time when they were effectively isolated, and subsequently they have come back into contact. Since *B. coniophylla* and *B. eugeniifolia* are species of sandy savannas, perhaps they diverged in a wetter period when higher rivers and denser forests in Brazil isolated the savannas of the upper Orinoco from the savannas of Guyana.

40. *Byrsonima nitidissima* Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 152 (4° ed.), tab. 448. 1821 [1822]. Fig 16p.

Shrubs or trees 2–5(–10) m tall, the stems loosely sericeous or subvelutinous to glabrate. Lamina of the larger leaves 3.5–8.5 cm long, 2–4.5 cm wide, elliptical

or obovate or occasionally somewhat ovate, rounded or sometimes cuneate at the base, flat or slightly revolute at the margin, rounded or broadly obtuse at the apex, sericeous or tomentose above to usually glabrate at maturity, often with some hairs persistent on the midrib, dark and shining above when dried, sericeous to velutinous below, the sessile hairs with the arms appressed to erect, sometimes glabrescent but never completely glabrate in age, the lateral veins 5–8 on each side, prominent and often yellowish below, the reticulum often prominulous above; petiole 2–6 mm long, sericeous to velutinous, sometimes glabrescent; stipules 2–5 mm long, usually completely and smoothly connate, very rarely sulcate in the middle and free at the apex, the pair triangular, acute (rarely obtuse or rounded) at the apex, abaxially sericeous to glabrate, adaxially glabrous. Inflorescence 4–14 cm long, tomentose, a simple pseudoraceme or the flowers often 2 per bract but both sessile; bracts 1.5–3 mm long, 1.5–2 mm wide, triangular, sericeous to glabrate, persistent to maturity of the fruit and after; peduncle none; bracteoles like the bracts but slightly smaller, especially narrower. Pedicel 3–6 mm long, slender (ca 0.5 mm in diameter), sericeous to velutinous, straight in bud, decurved in fruit. Sepals abaxially sericeous, adaxially sparsely sericeous, strongly revolute, accrescent and turning red in fruit, all biglandular, the glands 1.5–3 mm long, obovate, compressed in flower, separated in fruit due to stretching of the receptacle and calyx. Petals white or pinkish, at least the claws, glabrous, subentire, the margin undulate or slightly erose. Filaments 1.5–2.5 mm long, $\pm$ equal, quite distinct, adaxially bearded, especially on the proximal half, with long, kinky, twisted, ferruginous hairs; anthers glabrous, the locules cylindrical, 1.4–1.8 mm long, equalled or slightly exceeded at the apex by the connective, by up to 0.2 mm. Ovary 0.7–1 mm high above the receptacle, conical, glabrous, all 3 locules fertile; styles 2.5–3.3 mm long. Fruit glabrous, 4–4.5 mm in diameter, 3.5 mm high, broadly ovoid, green (immature) and displayed in the accrescent red calyx, developing half immersed in the enlarged, disc-like receptacle, popping out at maturity, the proximal half then enclosed in a white, fleshy, oily mesocarp, the distal half with very little flesh; nut 3-angled, rugose, 3-loculed, containing 3 seeds or fewer due to abortion.

Type. *Humboldt & Bonpland*, Isla Panumana inter Atures et Carichana, Misiones del Orinoco, Amazonas, Venezuela (P).

Distribution. Scrub forests on or beside crystalline “lajas” near the Alto Orinoco between Parguaza and Sanariapo. VENEZUELA. Bolívar: Parguaza, *Velez* 2446 (US). Amazonas: 10 km S of Puerto Ayacucho, *Foldats* 3583 (NY, VEN); 30–34 km S of Pto Ayacucho, 150 m, *Gentry & Berry* 14536 (MICH); 30 km N of Pto Ayacucho, *Gentry & Berry* 14719 (MICH); Pto Ayacucho, 100 m, *Holt & Blake* 776 (NY, US); Pto Ayacucho, *Maguire et al* 36069 (MICH, NY, US, VEN) & 36185 (MICH, NY, US, VEN); Sanariapo, 100 m, *Maguire et al* 36201 (MICH, NY, US, VEN); near Maypures, *Spruce* 3638 (NY); Sanariapo, *Steyermark* 58462 (NY); 35 km S of Pto Ayacucho, *Steyermark & Huber* 113863 (MICH); Pto Ayacucho, *Wessels Boer* 1901 (MICH), *Williams* 13036 (US, VEN), 13153 (US, VEN), & 15878 (MICH, MO, US, VEN). COLOMBIA. Vichada: Río Orinoco, Puerto Carreño, *Cuatrecasas* 4058 (US).

Collected in flower and fruit from April to June and September to November.

Byrsonima nitidissima is notable for the tangled hairs of the filaments; these hairs are $\pm$ straight in most species of the genus. The fruit is unique, developing

immersed in a disc-like receptacle. It is not rare for the ovary of other species to be slightly immersed, but as the fruit enlarges it usually becomes quite superior.

41. *Byrsonima cuprea* Grisebach in Martius, Fl. Bras. 12(1): 19. 1858.

Small trees 5–7(–10) m tall; stems densely velutinous or appressed-velutinous. Lamina of the larger leaves 8–16 cm long, 4–8 cm wide, ovate or occasionally elliptical or obovate, obtuse or rounded at the base, revolute at the margin, acute or obtuse or rarely rounded at the apex, usually glaucous below, glabrate above at maturity except tomentose at base on costa and margin, persistently and usually densely velutinous below, the hairs on tissue between the veins erect, $\pm$ straight, basifixed, the hairs on the veins denser, twisted, sub-basifixed, with 8–17 pairs of principal lateral veins arching and anastomosing within the margin, very prominent below, usually sunken above; petiole 11–20 mm long, densely tomentose or velutinous, often glabrescent in age; stipules 5–9 mm long, free, ovate and long-acuminate, densely hairy on both sides, abaxially glabrescent in age. Inflorescence 8–17 cm long, densely tomentose, rarely glabrescent in age, the flowers borne singly or in condensed cincinni of 2–3; bracts 1.5–2.5(–3.5) mm long, 1.5–2(–3) mm wide, triangular, tomentose, persistent past maturity of the fruit; peduncle 0.2 mm long; bracteoles like the bracts or smaller. Pedicel 3–7 mm long, densely tomentose, circinate in bud, decurved in fruit. Sepals all bi-glandular, 2 mm long beyond the glands, 2 mm wide, triangular, obtuse, abaxially densely tomentose, adaxially tomentose distally, appressed in anthesis; glands 2–2.5 mm long. Petals white, turning pink or red in age, glabrous, the lateral 4 with the claw 2 mm long, the limb 3.5–4.5 mm long, 4–5 mm wide; posterior petal with the claw 2.5 mm long, the limb 3–3.5 mm long, 4–4.5 mm wide. Filaments 2–3 mm long, abaxially glabrous, adaxially hirsute at base with short, straight hairs; anthers 1.5–2.3 mm long, glabrous, the locules 1–1.6 mm long, linear, tapered but not detached at the apex, the connective clavate, exceeding the locules by 0.5–0.9 mm. Ovary ca 1 mm high, glabrous, conical, sulcate, with all 3 locules fertile; styles 2–2.3 mm long. Fruit 5–6 mm in diameter (dried), red, ovoid or globose, glabrous, the nut rugose.

Type. *Spruce 2073* (cited erroneously as 2973 in protologue), Rio Negro between Barcellos and São Gabriel, Amazonas, Brazil, Dec frt (holotype GOET? isotypes F! GH! MG!).

Distribution. Alto Orinoco to Alto Rio Negro. VENEZUELA. Amazonas: Río Sipapo by Lorenzo Garcés, Dec frt, *Maguire & Politi 27851* (NY, VEN); sabanita, base of Cerro Moriche, Río Ventuari, Jan frt, *Maguire et al 30833* (NY, VEN); river edge, laja 50 km above mouth of Río Pacimoni, 100–140 m, Nov frt, *Maguire et al 36656* (MICH, NY, US, VEN); riverine forest near Laja Catipan, Ríos Pacimoni-Yatua, Feb frt, *Maguire et al 37550* (NY); flumina Casiquiari, Vasiva, et Pacimoni, *Spruce 3332* (GH, MG, NY); Río Casiquiare, arriba de Solano, 100 m, Apr flr, *Steyermark & Bunting 102445* (NY, VEN). BRAZIL. Amazonas: Río Curicuriari, above Cachoeira do Cajú, Oct flr, *Ducke* [RB 25231] (INPA); Içana, Poço Aiary, Nov flr, *Fróes 21385* (IAN, NY, US).

This species is hardly different (except in vesture) from the large-leaved populations of *Byrsonima punctulata* found in the area of San Fernando de Atabapo. Their close relationship seems assured, and since *B. punctulata* grades into or hybridizes with *B. leucophlebia* in the area of Manaus the three form a complex

of almost continuous variation that is divided into species only with some arbitrariness.

42. *Byrsonima punctulata* Adr. Jussieu, Ann. Sci. Nat. 2^o Sér. Bot. 13: 335. 1840.

Byrsonima barkleyana Cuatrecasas, Webbia 13(2): 620. 1958. Type. *Araque Molina & Barkley 18V138*, Río Orinoco, San Fernando, Amazonas, Venezuela, Nov fr (holotype US!).

Small trees 2.5–9 m tall; stems densely tomentose or velutinous, eventually glabrescent. Lamina of the larger leaves 8.5–14.5 cm long, 4–8 cm wide, ovate or elliptical, obtuse or rounded at the base, revolute at the margin, obtuse or acute at the apex, sometimes rounded or slightly acuminate, glaucous or not below or above, glabrate above at maturity except often tomentose at base of costa and on margin, sparsely tomentose to glabrate below between the veins, densely tomentose on the principal veins, most densely so on the midrib, to glabrate, often black-punctate below (fungal fruiting bodies?), with 8–12 pairs of principal lateral veins arching and anastomosing within the margin, prominent below, flush or sunken above, the reticulum usually $\pm$ concolorous with the areolar tissue; petiole 10–19 mm long, densely tomentose, often glabrescent in age; stipules 3.5–7(–8) mm long, free, triangular or ovate and often acuminate, densely hairy on both sides, abaxially glabrescent in age. Inflorescence 9–18 cm long, densely tomentose, the flowers borne singly or in condensed cincinni of 2–3; bracts 1.5–3 mm long and wide, triangular or ovate, tomentose, persistent past maturity of the fruit; peduncle 0–2 mm long; bracteoles like the bracts or smaller. Pedicel 2.5–5(–6) mm long, densely tomentose, circinate in bud, usually decurved in fruit. Sepals all biglandular, 2–2.5 mm long beyond the glands, 2–2.5 mm wide, triangular, obtuse, abaxially densely tomentose, adaxially tomentose distally, appressed in anthesis, reddening and somewhat accrescent in fruit; glands 2–3.5 mm long, red, sometimes decurrent. Petals white, turning pink and then red in age, glabrous. Filaments 2–3 mm long, abaxially glabrous, adaxially sparsely hirsute at base with short, straight hairs; anthers 1.4–2.5 mm long, glabrous, the locules 0.9–1.5 mm long, linear, tapered but not detached at the apex, the connective clavate, exceeding the locules by (0.3–)0.4–1 mm. Ovary 1–1.3 mm high, glabrous, conical or ovoid, sulcate, with all 3 locules fertile; styles 2–2.5 mm long. Fruit (dried) 4–6 mm in diameter, red or eventually blue, glabrous, ovoid or globose, subtended by the red calyx, the nut rugose.

Type. “*Brasilia borealis*” (P).

Distribution. Upper Orinoco and Vaupés to Manaus. VENEZUELA. Amazonas: Caño Cupueni, opposite mouth of Río Atabapo, 120–130 m, *Maguire et al 36217* (MICH, NY, US, VEN) & *37698* (MICH, NY, US, VEN); San Fernando de Atabapo, 124 m, *Williams 13829* (F) & *13839a* (F, VEN). COLOMBIA. Vaupés: along Río Vaupés about 1 km below Urania, *Zarucchi 2235* (MICH). BRAZIL. Amazonas: Rio Cuieiras, 50 km upstream, *Campbell et al P21837* (MICH); Rio Preto, *Fróes 22736* (IAN, UB) & *22882* (IAN); Rio Urubú, *Fróes 25322* (IAN); Bôa Vista, Rio Aracá, *Fróes & Addison 29064* (IAN); Rio Tarumã, *Gentry & Ramos 12895* (MICH); R. Negro, *Pena 446* (MICH); Rio Cuieiras and R. Brancinho, *Prance et al 14882* (MICH, NY), *17868* (MICH), *18022* (MICH). Terr. Roraima: R. Xeriuiini, *Pires et al 13967* (MICH); R. Catrimani, Igarapé Camogi, *Pires et al 14058* (MICH); Rio [Agua Bôa do] Univini, *Pires et al 14173* (IAN).

Morphologically and geographically this species fills in the gap between *Byrsonima cuprea* and *B. leucophlebia*. It seems to have no characteristics peculiar to it, except for the black dots, probably fungal in origin, often present on the lamina below. In the area of Manaus *B. punctulata* and *B. leucophlebia* seem to hybridize, with the following collections intermediate; I am calling these *B. punctulata* sens lat: Tarumã-miry, campina, Dec flr, *Ducke* [MG 12420] (MG); Rio Tarumã, igapó, Aug flr, *Fróes 25043* (IAN); Rio Urubú, prox. cach. Lindoia, Dec frt, *Rodrigues 299* (IAN, MG); Rio Cuieiras, igarapé Cachoeira, Nov frt, *Rodrigues & Coelho 4875* (MG).

Collected in flower and fruit from September to April.

43. *Byrsonima leucophlebia* Grisebach in Martius, Fl. Bras. 12(1): 15. 1858.

Shrubs or small trees 2–5(–8) m tall; stems densely sericeous or tomentose, eventually glabrescent. Lamina of the larger leaves 5–9(–10.5) cm long, 3–4.5 (–5) cm wide, ovate or elliptical, obtuse or rounded at the base, usually not or hardly revolute at the margin, obtuse or rounded at the apex, rarely acute or slightly acuminate, glaucous or not below or above, sparsely tomentose or glabrate on both sides at maturity except usually persistently tomentose on the midrib, with 7–12 pairs of principal lateral veins prominulous below and flush above, the fine reticulum visible (in dried leaves) below or, usually, on both sides as a white mesh against darker areoles; petiole 5–11 mm long, densely tomentose, often glabrescent in age; stipules 1.5–2.5(–3) mm long, free, triangular, acute or obtuse, densely hairy on both sides, abaxially glabrescent in age. Inflorescence 5–10(–12.5) cm long, densely tomentose, the flowers borne singly or in condensed cincinni of 2–3; bracts 1–2 mm long, 1.5–2.5 mm wide, triangular or ovate or rounded, tomentose, persistent past maturity of the fruit; peduncle 0–2 mm long; bracteoles like the bracts or smaller. Pedicel 2.5–7.5 mm long, densely tomentose, circinate in bud, usually decurved in fruit. Sepals all biglandular, 1.5–2 mm long beyond the glands, 1.5–2 mm wide, triangular, obtuse or rounded at the apex, abaxially densely tomentose, adaxially tomentose distally, appressed in anthesis, somewhat accrescent in fruit; glands 2–3 mm long, red, sometimes decurrent. Petals white, turning pink or red in age, glabrous. Filaments 2–2.5 mm long, abaxially glabrous, adaxially sparsely hirsute at base with short, straight hairs; anthers 1.4–2.2 mm long, glabrous, the locules 1.1–1.6 mm long, linear, tapered but not detached at the apex, the connective clavate, exceeding the locules by 0.3–0.7 mm. Ovary ca 1 mm high, glabrous, ovoid, with all 3 locules fertile; styles 2–2.3 mm long. Fruit (dried) 4–5 mm in diameter, red or eventually black, glabrous, ovoid, the nut rugose.

Type. *Spruce 764* in 1850, Santarém, Pará, Brazil, Aug flr (holotype GOET?, isotypes F! MG! NY!).

Distribution. Central and eastern Amazonia, north into Bolívar. VENEZUELA. Bolívar: Canaima, 300 m, *Agostini 260* (MY, NY, VEN); near Laguna of Canaima, *Hertel et al 15212* (VEN); Angel Falls, *Kunhardt 18* (NY); Río Carrao, Canaima, *Trujillo 6082* (MY); Canaima, 400 m, *Steyermark 106378* (NY); Canaima, *Tejera & Braun 11* (VEN). BRAZIL. Pará: Belterra, Lago Jururucuí, *Black 47–1769* (IAN); Rio Jamundá, *Ducke* [MG 3737 & 11793] (both MG); Faro, praia do lago, *Ducke* [MG 6903 & 8473] (both MG); Santarém, *Ducke* [MG 10840] (MG); campos do Mariapixy, *Ducke* [MG 11970] (MG); Lago Preto de Juruti,

Oliveira 43 (IAN); Rio Arapiuns, *Pires & Silva 4357* (IAN); Rio Capim, *N. T. Silva 459* (IAN, UB). Maranhão: Rio Gurupí, *Fróes 34541* (IAN). Amazonas: Rio Urubú, São Francisco, *Fróes 25504* (IAN, UB); Rio Madeira, Rio Canumã, *Fróes 33742* (IAN); Maués, *Pires 89* (IAN); Km 55, Humaitá-Lábrea, between Rio Ipixuna and Itaparana, campina, *Prance et al 3311* (MICH, NY); Km 201, Manaus-Itacoatiara, banks of Rio Urubú, *Prance et al 3690* (MICH, NY); Maués, beach, *N. T. Silva 4494* (MICH). Terr. Rondônia: 2–4 km E of Abunã, savanna island, *Prance et al 8595* (MICH, NY).

Collected in flower and fruit in all months, most commonly from June to November.

See discussion under *Byrsonima punctulata*.