

MALPIGHIACEAE³

Introduction

The Malpighiaceae are represented in the flora of the Guayana Highland by about 160 species, of which about 100 are nearly or quite endemic to the area. These species are referable to 22 genera. Such a large number of species, relative to the size of the family (probably about 1250 species in 71 genera, according to my current estimate), in a rather small area makes the flora of Guayana one of the richest and most diverse assemblages of Malpighiaceae in the world. This

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paper is a treatment of the taxonomy of that assemblage and a few related Amazonian species. Subsequent papers will consider some of the phytogeographic and evolutionary questions growing out of this work.

The most recent monograph of the Malpighiaceae is Franz Niedenzu's monumental treatment in *Das Pflanzenreich* (1928). This work is better than one would gather from its critics, but the keys are sometimes difficult to use, and Niedenzu suffered from seeing a poor representation of many floras. He was never able to do fieldwork or visit herbaria in Paris, London, or the Western Hemisphere, so naturally he made some mistakes and omitted many rare or poorly collected species. José Cuatrecasas (1958) has given us an excellent modern treatment of the Malpighiaceae of Colombia, and the present paper plus my subsequent treatment of the Malpighiaceae for the Flora de Venezuela will extend the modern coverage to include most of South America north of the Amazon. However, new species are still being found regularly in that area, and it will surely be at least another generation, possibly two, before the flora of northern South America is known as well as most temperate and many subtropical floras are today.

I have defined "Guayana," for the purpose of this paper, as the area demarcated with the label "superposed Roraima sediments (approximate limits)" on Bassett Maguire's revised map of Guayana (1979); cf also this volume. In political terms, that includes the uplands of western Guyana; much of Bolívar, Venezuela, and adjacent parts of Roraima Territory, Brazil; all of Amazonas, Venezuela, and adjacent parts of Amazonas, Brazil; the drainage of the upper Rios Negro, Içana, and Uaupés in Brazil; and the drainage of the Río Vaupés in Amazonian Colombia. I have tried to include all Malpighiaceae found in this area, as a minimum. In addition, a few extra-Guayana species are included because they are likely to be found in Guayana eventually, or because they are closely related to species of Guayana and need to be distinguished from them. As it happens, the flora of the black waters of the entire Rio Negro is almost entirely covered by this paper, because most species present anywhere on the Rio Negro extend up to the area considered part of Guayana. Similarly, most of the state of Bolívar, Venezuela, will be covered by this paper, even the lowlands along the middle Orinoco. However, the flora of the area of San Félix and Upata is rather different and may well contain species not treated here.

The Malpighiaceae of Guayana include many species of lowland savannas and riversides and many more of the uplands, especially savannas, rocky slopes, and cumbre forests. Except for some of the riverine species, closest relatives of lowland species seem often to be upland species, suggesting that this flora is a rather coherent historical unit that really deserves the recognition accorded it by Maguire and other authors in this series. From the point of view of a specialist in the Malpighiaceae, this flora is especially noteworthy for the abundance of the genera I have recently grouped in the subfamily Byrsonimoideae (Anderson, 1978), genera 1 to 9 in the Taxonomy below. By any measure one could devise, this subfamily is far more abundant in Guayana and northern Amazonia than anywhere else (except for the genera *Galphimia* and *Byrsonima*). For reasons I shall discuss elsewhere, I consider the Byrsonimoideae to exhibit most of the ancestral characteristics of the family, and the genus *Diacidia*, which is endemic to Guayana, has the least specialized inflorescences found in the family. These facts lead me to suggest, with some hesitation, that the Malpighiaceae may have

originated and achieved their early diversity in northern South America, possibly on the Roraima Sandstone Formation of which the tepuís are a remnant. Subsequent migration to the north and south was followed by major new episodes of evolutionary radiation. Thus the mostly Mexican or Antillean genera *Malpighia*, *Galphimia*, and *Gaudichaudia* are absent from Guayana, as is the central Brazilian genus *Peixotoa*. The large genus *Banisteriopsis* (90 species) is poorly represented in Guayana (ten species) and very well represented in central Brazil. All of these non-Guayana groups are morphologically relatively advanced, as one would expect of groups resulting from secondary radiation. In a later paper I shall consider in detail the most likely time and place of the origin and diversification of the Malpighiaceae, including the problems inherent in attempting to address that question. For the present it seems safe to say that the Guayana Highland, if not the homeland of the Malpighiaceae, at least has served as a refugium where some rather primitive members of the family have survived.

Taxonomy is at best an inexact science, and taxonomy in the neotropics is still in a primitive stage. This paper is sure to suffer from errors and inadequacies, many of which will become evident as the flora becomes better known. However, in several cases I am already well aware that my treatment leaves much to be desired, and in most of these the source of the problem is not inadequate collection, but more likely extreme variability of the plants, or hybridization (current or former), or misinterpretation on my part. Following is a list of what I consider the species or complexes most in need of further, intensive study. I give it in the hope of encouraging energetic and ambitious students to direct their attention to these problems.

Blepharandra heteropetalal/intermedia/cachimbensis

Blepharandra hypoleuca

Byrsonima concinna

Byrsonima cuprea/punctulatal/leucophlebia

Heteropterys macradena

Mascagnia benthamiana

Stigmaphyllon hypoleucum

Taxonomy

MALPIGHIACEAE A. L. de Jussieu, Gen. Pl. 252. 1789.

Trees, shrubs, subshrubs, or lianas to hardly woody twining vines, always perennial. Vesture always of unicellular hairs, these usually medifixed or submedifixed, sometimes basifixed, rarely stellate. Leaves usually opposite and decussate, sometimes whorled, very rarely subopposite or alternate, often bearing large multicellular glands on the petiole or lamina or both; lamina simple, usually entire, rarely lobed, the margin never really toothed but sometimes pseudodentate or ciliate at the location of marginal glands; stipules usually present on, beside, or within the petiole, distinct or variously connate, sometimes very small or apparently absent. Flowers almost always perfect, subtly to strongly bilaterally symmetrical. Sepals 5, free or partially adnate to the receptacle, eglandular or, most often, the lateral 4 or all 5 bearing (1–)2 large multicellular abaxial glands. Petals 5, free, clawed, alternating with the sepals, imbricate with the posterior innermost and one of the anterior-lateral pair outermost, most often yellow, pink,

or white, sometimes other colors but very rarely blue, the posterior petal often different from the lateral 4. Stamens mostly 10, fewer by reduction in some genera, very rarely up to 15, the stamens alike or heteromorphic; anthers raised on filaments, usually dehiscent by longitudinal slits, rarely with apical or subapical pores or short slits. Gynoecium superior, usually comprising 3 free to connate carpels, occasionally 2, very rarely 4, all carpels usually fertile, each fertile carpel containing 1 pendent anatropous ovule; styles usually 1 per carpel, rarely connate or reduced in number. Fruit dehiscent or indehiscent, nutlike, drupaceous, or samaroid; seed without endosperm.

Type. *Malpighia* Linnaeus.

A few aspects of the morphology of Malpighiaceae require fuller discussion to enable the reader to successfully use the keys and descriptions that follow.

Vesture. With their peculiar hairs, Malpighiaceae achieve much variation in vesture, which is of great systematic importance. My use of terms generally follows that of Niedenzu, and attempts to be precise and consistent. The typical malpighiaceous hair is T-shaped or Y-shaped, with the basal part called the foot or stalk and the crosspiece the trabecula or branches. The variations in vesture depend on length and straightness of the foot and angle, length, and straightness of the trabecula. *Sericeous* is used when the trabecula is straight and $\pm$ sessile, producing a silky vesture. I use this term whenever the hairs are tightly appressed, even when they are sparse, so that the term refers more to the quality of the hairs than their abundance, which is denoted by qualifying adjectives as appropriate. *Velutinous* denotes erect, parallel hairs, usually Y-shaped but sometimes simple (i. e. basifixed, usually through suppression of one branch); again, density is indicated by modifiers. *Tomentose* is used when the hairs, usually the trabeculae, are twisted and non-parallel. These basic types of vesture often grade into each other, which is indicated by combinations like tomentose-sericeous.

Inflorescence. The ancestral inflorescence of the Malpighiaceae seems to have been a thyrses, a raceme of helicoid cymes (cincinni). This inflorescence is still well developed in most byrsonimoid genera, with the least condensation present in species of *Diacidia*, *Burdachia*, *Glandonia*, and several other genera. Each cincinnus is subtended by a *bract*. The axis of the cincinnus is called the *peduncle*, and it bears two *bracteoles* at or below its apex, which is a distinct joint. Beyond the joint the shoot terminates in the flower borne on a *pedicel*. One of the bracteoles subtends a secondary peduncle, which in turn bears two bracteoles, one sterile and one fertile, and a terminal flower. The fertile bracteole is always on the same side, hence the helicoid nature of the cyme. The history of the inflorescence in the family is one of successive and parallel episodes of reduction and condensation. First the cincinni were reduced to single flowers. This is now the commonest situation, where each apparent flower-unit (bract, peduncle with two bracteoles, and pedicel with flower) is actually a one-flowered cincinnus. These are grouped in pseudoracemes, corymbs, or umbels, and these may then be reduced (often to four flowers) and then borne themselves in racemes or panicles. Another common change is for the peduncle to be lost, so that the sessile pedicel is subtended just below the joint by the bract and both bracteoles. These units may then be variously grouped in second- and third-order inflorescences. In some evolutionary lines the clustering probably preceded the loss of the peduncle. See Figure 7 for a diagram of some of the commonest evolutionary

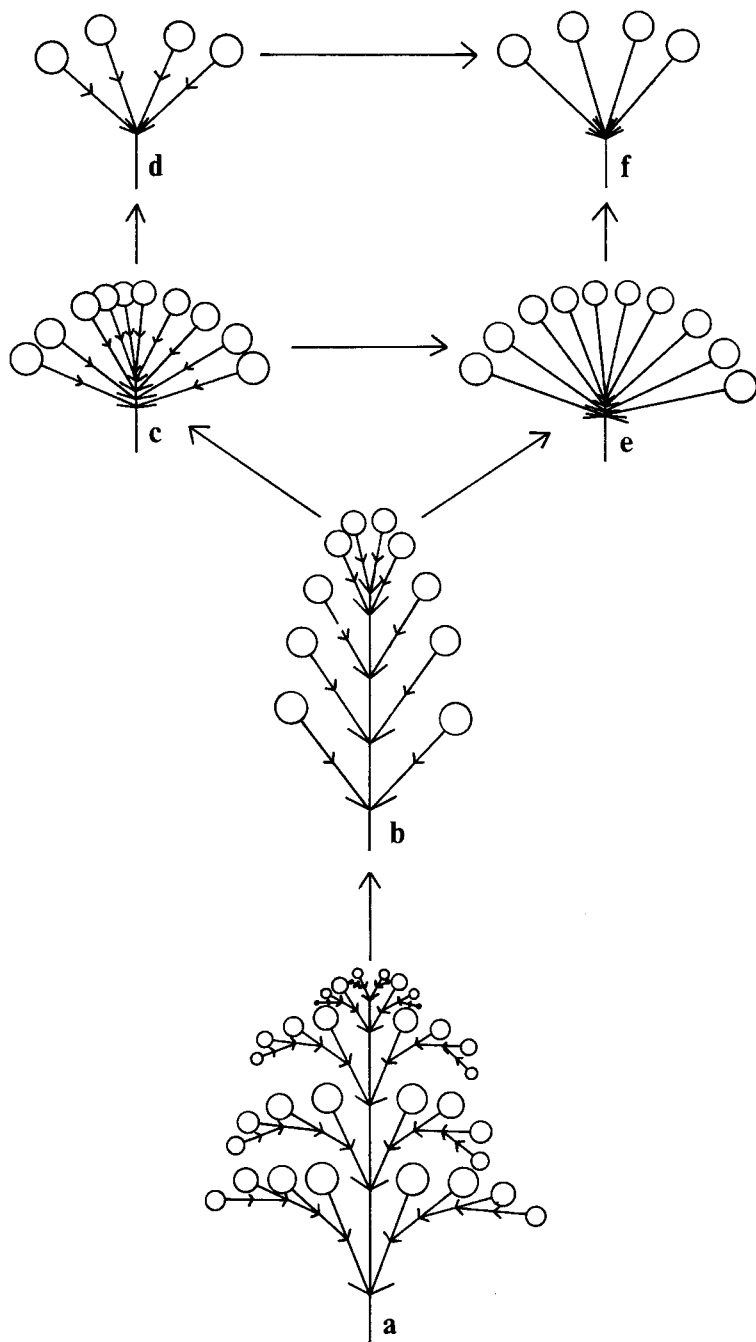


Fig 7. Evolutionary trends in the inflorescences of Malpighiaceae. a) Raceme of cincinni; b) pseudoraceme (raceme of 1-flowered cincinni); c) many-flowered corymb or umbel, peduncles retained; d) 4-flowered umbel, peduncles retained; e) many-flowered corymb or umbel, peduncles lost; f) 4-flowered umbel, peduncles lost.

trends. In my descriptions, if they are not modified, the terms *bract*, *peduncle*, *bracteole*, and *pedicel* refer only to the structures just described. This usage is consistent with Niedenzu's. Occasionally, in order to avoid ambiguity, I use the term *floriferous bract* or *floriferous peduncle*, which mean the same as bract or peduncle respectively. Other axes of the inflorescence are not normally denoted here by the term peduncle; if they are, such axes are clearly distinguished from the floriferous peduncle. Similarly, reduced leaves in the inflorescence that do not subtend a floriferous peduncle are never simply called bracts; they are distinguished by some modifier, such as "inflorescence bracts."

Floral symmetry. Flowers of Malpighiaceae are almost always bilaterally symmetrical, a fact ignored by many authors, particularly ones who have never seen the plants alive. The flowers, which are visited by bees, orient with the innermost petal (the "flag") erect and at the back of the flower from the bee's point of view. That petal is very often different in size, shape, color, stance, or other aspects from the other four petals. Across the flower is the odd sepal, which is often different from the other four, in many genera eglandular when they are biglandular. These two organs define a plane of symmetry and serve as reference points for the descriptions. The flag petal is posterior, the other four are the posterior-lateral pair and the anterior-lateral pair. The odd sepal is anterior, the others anterior-lateral and posterior-lateral. The stamens are denoted with respect to the sepal or petal to which they are nearest. When the stamens are heteromorphic, as they sometimes are in very elaborate ways, the androecium is symmetrical, so that each stamen has a twin across the flower except for the two on the plane of symmetry, which are usually unique. The carpels are called anterior or posterior; the commonest arrangement is for one carpel to be anterior, $\pm$ on the plane of symmetry, and the other two to be posterior, on each side of the plane of symmetry.

Measurements of mascagnioid samaras. Among the genera with schizocarpic, samaroid fruits, several have the largest wings lateral and the dorsal wing variously developed (*Mascagnia*, *Hiraea*, et al). In these groups I have followed Niedenzu's terminology for measurements of the wings, which is that for all three wings "width" denotes the distance from the nut to the farthest margin, while "height" is the maximum measurement at right angles to the width. In some cases these uses of the terms seem absurd, but the variation in the size and shape of these three wings is such that no set of terms, consistently applied, will seem appropriate in all cases.

Notes about the Keys to Genera

The keys below are constructed for the flora of Guayana, as defined above in the Introduction. While they will usually serve for other areas in northern South America, they do not attempt to deal with exceptional species that do not grow in Guayana. For example, almost every samara-bearing genus has one or more species with $\pm$ wingless fruits somewhere in its range, and such species will not necessarily key out here, nor will species of *Stigmaphyllon* with truncate styles, nor species of *Hiraea* with pedunculate flowers, etc. For explanation of some of the terms used, see the preceding discussion of morphology. For illustrations, see the plates for individual species. At least one species of every genus is illus-

trated, and most of the characters used in the following keys are shown in those plates.

Key to the Genera of Malpighiaceae in Guayana (for specimens with flowers)

1. Styles slender and subulate, the stigmas minute; shrubs or trees.
2. Leaves bearing large glands on the petiole or abaxial surface of the lamina; some bracteoles often bearing large apical or abaxial glands.
 3. Anthers with 2 dark longitudinal wings on the outer locules; carpels connate only along a narrow central axis, separating in fruit. 2. *Lophanthera*.
 3. Anthers unwinged; carpels broadly and persistently connate.
 4. Stipules connate intrapetiolarly, persistent; flower bud spherical; connective of the anther enlarged, greatly exceeding the apically rounded locules; filaments glabrous. 8. *Burdachia*.
 4. Stipules connate interpetiolarly, caducous, leaving a large interpetiolar scar; flower bud pyramidal; connective of the anther exceeded by extensions of the apically tapered locules; filaments densely hirsute. 9. *Glandonia*.
2. Leaves and bracteoles eglandular (except for tiny pellucid dots in the lamina and gland-tipped marginal teeth or cilia on bracts and bracteoles in some species).
 5. Inflorescence a tight umbellate fascicle, sessile or subsessile, axillary to leaves or bracts or leaf-scars on older stems; carpels distinct; petals abaxially sericeous, at least on claw. 1. *Pterandra*.
 5. Inflorescence an elongated terminal thyrse or pseudoraceme; carpels connate, at least in flower; petals glabrous or rarely bearing a few hairs.
 6. Anthers bearing on each side a line or cluster of vesicular outgrowths toward the apex; carpels separating in fruit. 4. *Verrucularia*.
 6. Anthers without vesicular outgrowths; carpels persistently connate, the fruit indehiscent.
 7. Anthers bearing few to many basifixed awns or hairs, the apical ones more or less stiff and directed slightly forward; petals of the open flower flat to somewhat concave; hairs on the leaves (if any) mostly basifixed.
 8. Petals white and/or pink, or 4 white and the posterior pale yellow; anthers with the apical hairs hardly or not at all different from other hairs on the stamen; stamens 10; ovary with all 3 locules fertile (except in some populations of *B. fimbriata*).⁴ 5. *Blepharandra*.
 8. Petals all yellow; anthers with 2(–4) stout apical awn-like hairs, these strongly differentiated from other hairs on the stamen, if any; stamens 6–10; ovary with only 2 locules developed and containing ovules, the third reduced and empty. 6. *Diacidia*.
 7. Anthers glabrous or bearing medifixed or sub-medifixed hairs, the apex without specially modified or directed hairs; lateral 4 petals concave or cup-shaped in open flower, especially the anterior 2; hairs on the leaves (if any) mostly medifixed or sub-medifixed or branched, rarely basifixed or sub-basifixed. 7. *Byrsonima*.
1. Styles stout and of uniform thickness or widened at the apex, the stigmas large; vines, shrubs, or trees.
 9. Styles with the stigma quite apical and without any sort of dorsal extension at the apex.
 10. Stipules large, 3–6 mm long, intrapetiolar and completely connate. 3. *Spachea*.

⁴ A few pink-flowered species of *Byrsonima* have anthers that mimic those of *Blepharandra*, from which they differ in having the stipules connate to form an intrapetiolar pair, the connective of the anthers much exceeding the fertile part of the locules, and the ovary sericeous at the apex.

10. Stipules small, up to 2 mm long, interpetiolar or borne on the base of the petiole, distinct.
11. Stipules borne on the base of the petiole; carpels 2 or 3, completely connate in the ovary, developing into an indehiscent, fleshy fruit; styles free or connate; trees or shrubs. 21. *Bunchosia*.
11. Stipules interpetiolar, sometimes apparently absent; carpels 3, centrally connate in the ovary, the fruit dry and schizocarpic; styles 3, free; vines or shrubs.
12. Calyx bearing 10 glands; bracteoles wider than the floriferous bract and often longer, often bearing marginal or abaxial glands. 19. *Tetrapteryx*.
12. Calyx bearing 8(-9) glands; bracteoles as large as the bract or smaller, eglandular.
13. Petals glabrous. 10. *Banisteriopsis*.
13. Petals abaxially sericeous.⁵
14. Petals, especially the lateral 4, very densely sericeous and dentate to lacinate; bracts and bracteoles triangular, closely investing base of pedicel. 10. *Banisteriopsis*.
14. Petals sparsely sericeous and long-fimbriate; bracts and bracteoles lingulate, spreading. 11. *Diplopteryx*.
9. Styles with the stigma internal, the apex dorsally rounded, truncate, or extended into a hook or flap.
15. Styles (2 or all 3) with an apical-dorsal extension laterally expanded into a horizontal or pendulous flap; 4 anthers opposite the lateral sepals with the locules much reduced, nearly or quite sterile. 12. *Stigmaphyllon*.
15. Styles rounded or truncate at the apex or with the apical-dorsal extension hook-like or pedaliform; all anthers fertile.
16. Bracteoles much larger than the bracts, globose-cymbiform, borne just below the flower, enclosing the bud until anthesis; pedicel none or up to 2 mm long in fruit, the peduncle well developed. 17. *Mezia*.
16. Bracteoles mostly similar to the bracts or smaller than them, larger in some species, not enclosing the bud, at least not throughout its enlargement; pedicel well developed relative to the peduncle.
17. Calyx with 1 large central gland on each of the 4 lateral sepals, the anterior sepal eglandular.
18. Petals (in ours) pink, the lateral 4 abaxially sparsely to densely sericeous; bracteoles large, 4 mm long or longer; flowers borne ultimately in 4-flowered umbels. 16. *Jubelina*.
18. Petals yellow, glabrous; bracteoles small, up to 2.5 mm long; flowers borne ultimately in elongated pseudoracemes. 20. *Lophopteryx*.
17. Calyx eglandular or with 2 glands on each of the 4 lateral sepals or on all 5 sepals.
19. Anthers with the connective extended up to 1 mm beyond the locules; petals abaxially densely sericeous; anther locules (in ours) densely pilose-sericeous. 22. *Dicella*.
19. Anthers with the connective hardly or not at all exceeding the locules; petals glabrous or variously hairy; anther locules hairy in a few species, otherwise glabrous.
20. Petals (at least the lateral 4) with a prominent abaxial wing; petals pink and/or white.
21. Flowers borne ultimately in a tight corymb or umbel

⁵ While this paper was in press, *Banisteriopsis krukoffii* Gates was found for the first time in Venezuela. It has the petals of a *Banisteriopsis* but the spreading bracts and bracteoles of a *Diplopteryx*.

- of 4–10 flowers; all petals smooth on the adaxial face.
13. *Heteropterys*.
21. Flowers borne ultimately in an elongated pseudoraceme; posterior petal (and the laterals in some) papillose on the adaxial face. 14. *Clonodia*.
20. Petals abaxially smooth or at most slightly carinate, mostly yellow, in a few species lilac, pink, white, bronze, maroon, or yellow turning red.
22. Pedicels sessile (i.e. floriferous peduncle not developed); flowers borne ultimately in umbels of 4–many flowers.
23. Stipules well-developed, usually elongated, epipetiolar, mostly borne at or above the middle of the petiole; inflorescences axillary. 18. *Hiraea*.
23. Stipules none or minute and borne at the base of the petiole; inflorescences terminal or axillary and terminal. 13. *Heteropterys*.
22. Pedicels pedunculate; flowers borne ultimately in umbels, corymbs, or pseudoracemes.
24. Petals concealed by the sepals during enlargement of the bud, until anthesis.
25. Carpels smooth-sided. 13. *Heteropterys*.
25. Carpels with lateral crests, developing into lateral wings in fruit. 15. *Mascagnia*.
24. Petals (at least the outermost) exposed during enlargement of the bud.
26. Petals abaxially densely sericeous. 15. *Mascagnia*.
26. Petals glabrous.
27. Flowers borne ultimately in elongated to congested pseudoracemes.
28. Bracteoles smaller than bracts; carpels with 1 crest on each side. 15. *Mascagnia*.
28. Bracteoles mostly larger than bracts; carpels with 2 (or more) crests on each side. 19. *Tetrapterys*.
27. Flowers borne ultimately in umbels of 4(–6) flowers.
29. Stipules none or borne on the base of the petiole; carpels smooth-sided. 13. *Heteropterys*.
29. Stipules interpetiolar, distinct or connate; carpels with lateral crests, developing into lateral wings in fruit. 19. *Tetrapterys*.

Key to the Genera of Malpighiaceae in Guayana (for specimens with fruits)

1. Fruit proper unwinged, the sepals sometimes accrescent or winglike in fruit; fruit schizocarpic or indehiscent.
 2. Fruit schizocarpic, the mericarps dry, or the carpels distinct even in flower.
 3. Leaves and bracteoles eglandular (except for tiny pellucid dots in the lamina of some species).

4. Inflorescence a tight umbellate fascicle, sessile or subsessile, axillary to leaves or bracts or leaf-scars on older stems; pedicels sessile. 1. *Pterandra*.
4. Inflorescence an unbranched, often corymbose, terminal thyrses or pseudoraceme comprising cincinni of 1-several flowers; pedicels pedunculate. 4. *Verrucularia*.
3. Leaves bearing large glands on the petiole or abaxial surface of the lamina; some bracteoles often bearing large apical or abaxial glands.
 5. Styles slender and subulate, the stigmas minute; anthers longitudinally winged. 2. *Lophanthera*.
 5. Styles stout, truncate or subpeltate at the apex; anthers unwinged. 3. *Spachea*.
2. Fruit indehiscent, dry or fleshy.
 6. Woody vines; sepals enlarged in fruit to form 5 wings 2-5.5 cm long subtending a nut 13-18 mm in diameter, the anterior sepal/wing eglandular. 22. *Dicella*.
 6. Shrubs or trees; sepals not or only slightly accrescent in fruit (except in *Diacidia* spp., with the nut up to 2.5 mm in diameter and all 5 sepals biglandular).
 7. Leaves and bracteoles eglandular (except for gland-tipped marginal teeth or cilia on bracts and bracteoles in some species).
 8. Fruit up to 2.5 mm in diameter, dry at maturity, the stone covered by a very thin, non-fleshy coat; hairs on the leaves (if any) mostly basifixed.
 9. Fruit with up to 3 fertile locules (only 2 in some populations of *B. fimbriata*); anthers with the apical hairs hardly or not at all different from other hairs on the stamen; sepals not or hardly accrescent in fruit. 5. *Blepharandra*.
 9. Fruit with only 2 locules; anthers with 2(-4) stout apical awn-like hairs, these strongly differentiated from other hairs on the stamen, if any; sepals accrescent in fruit in some species. 6. *Diacidia*.
 8. Fruit 4-15 mm or more in diameter, the stone covered by a fleshy exocarp; hairs on the leaves, if any, mostly medifixed or submedifixed or branched, rarely basifixed or sub-basifixed. 7. *Byrsonima*.
 7. Leaves bearing large glands on the petiole or abaxial surface of the lamina; some bracteoles often bearing large abaxial glands.
 10. Fruit without a soft fleshy exocarp, dry and corky or fibrous at maturity; inflorescence terminal, with each bract subtending a short cincinnus of 1-6 flowers; styles slender and subulate, free, the stigmas minute.
 11. Stipules connate intrapetiolarly, persistent; 1 cotyledon folded back, the other embracing it; filaments glabrous. 8. *Burdachia*.
 11. Stipules connate interpetiolarly, caducous, leaving a large interpetiolar scar; cotyledons straight and not folded, equal or one larger and slightly embracing the other; filaments densely hirsute. 9. *Glandonia*.
 10. Fruit with an edible fleshy yellow or red exocarp at maturity; inflorescence lateral, with each bract subtending 1 flower; styles stout, free or connate, with large subpeltate stigmas. 21. *Bunchosia*.
1. Fruit winged, the wings reduced in some species to winglets or dissected crests; fruit schizocarpic.
 12. Mericarps with neither the dorsal nor the lateral wing(s) clearly dominant, the wings short relative to the size of the nut, often dissected and irregular or rudimentary.
 13. Flowers borne ultimately in umbels or corymbs of 4(-8).
 14. Pedicels sessile. 11. *Diplopterys*.
 14. Pedicels pedunculate. 15. *Mascagnia*.
 13. Flowers borne in an elongated pseudoraceme. 14. *Clonodia*.

12. Mericarps samaroid, with either dorsal or lateral wings(s) well developed and dominant.
15. Samara with the dorsal wing dominant, the nut bearing on its sides only short winglets or crests or quite smooth.
16. Wing of the samara with the adaxial edge thickened, the veins diverging and branching from it toward the thinner abaxial edge.
17. Styles with the stigma quite apical and without any sort of dorsal extension at the apex. 10. *Banisteriopsis*.
17. Styles with an internal stigma and a prominent dorsal extension of the apex in the form of a hook or flap. 12. *Stigmaphyllon*.
16. Wing of the samara with the abaxial edge thickened, the veins diverging and branching from it toward the thinner adaxial edge. 13. *Heteropterys*.
15. Samara with the lateral wing(s) dominant, the dorsal wing smaller or reduced to a winglet or crest, occasionally absent.
18. Bracteoles much larger than the bracts, globose-cymbiform, borne just below the flower, enclosing the bud until anthesis; pedicel none or up to 2 mm long in fruit, the peduncle well developed, 7–25 mm long in fruit. 17. *Mezia*.
18. Bracteoles similar to the bracts or smaller than them, not enclosing the bud; pedicel well developed relative to the peduncle.
19. Calyx with 1 large central gland on each of the 4 lateral sepals, the anterior sepal eglandular.
20. Nut of the samara with the fertile locule accompanied on each side by a parallel sterile cavity developed during maturation; lateral wings of the samara directed sideways, semicircular or up to twice as long as wide; bracteoles large, 4 mm long or longer; flowers borne ultimately in 4-flowered umbels. 16. *Jubelina*.
20. Nut of the samara containing only the fertile locule; lateral wings of the samara directed forwards, 3 or more times as long as wide; bracteoles small, up to 2.5 mm long; flowers borne ultimately in elongated pseudoracemes. 20. *Lophopterys*.
19. Calyx eglandular or with 2 glands on each of the 4 lateral sepals or on all 5 sepals.
21. Samara with 1 continuous lateral wing or 2, 1 on each side.
22. Pedicels usually pedunculate, the peduncle rarely much reduced or absent; stipules interpetiolar or borne on the base of the petiole, very short; flowers usually borne in $\pm$ elongated pseudoracemes, these occasionally congested to form corymbs or umbels. 15. *Mascagnia*.
22. Pedicels sessile; stipules epipetiolar, most often borne well above the base of the petiole, often elongated; flowers borne in umbels of 4 or more. 18. *Hiraea*.
21. Samara with 4 discrete lateral wings, 2 on each side. 19. *Tetrapterys*.

1. *Pterandra* Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 72. 1832 [1833].

Shrubs or trees, the leaves often crowded at tips of branchlets, eglandular (except for tiny angular translucent dots often present in the lamina); stipules intra- and epipetiolar, basally to completely connate. Inflorescence reduced to fasciculate clusters in the axils of leaves or bracts or above leaf scars; pedicels sessile. Flowers apparently almost actinomorphic, very weakly or not at all circinate in bud. Sepals all eglandular or all biglandular. Petals $\pm$ alike, often persistent in fruit, abaxially sparsely to densely sericeous on claw and center of limb.

Stamens 10 in 2 whorls, the outer whorl opposite the petals and having longer filaments than the inner whorl; filaments distinct, flat, adaxially hirsute at the base; anthers alike, glabrous, 4-locular, the outer locules bearing introrse longitudinal wings; pollen tri- or tetracolporate. Receptacle with tufts of basifixed hairs inside sepals and petals and filaments. Ovary of 3 distinct uniovulate carpels borne on a flat or pyramidal torus; styles 3, attached ventrally or subapically, inbent in bud, persistent in fruit, subulate with minute apical stigmas. Fruit composed of 3 (or fewer due to abortion), dry, 1-seeded, indehiscent cocci with a papery exocarp and a moderately thick, corneous but not bony endocarp.

Type. *Pterandra pyroidea* Adr. Jussieu.

Pterandra comprises at present seven described species: Four in northern Amazonia and the Guayana Highland, one in the Planalto of south-central Brazil (*P. pyroidea* Adr. Juss.), one in southern Amazonia (*P. evansii* Cuatr.), and one on Isla Gorgona, Colombia (*P. ultramontana* Cuatr.). Several additional species will be described in the near future.

Key to the Species of *Pterandra* in Guayana

1. Shrubs or trees 2–10 m tall; fascicles of flowers borne in the axils of current leaves or above leaf scars 1 or 2 nodes below current leaves, probably all on stem of the current season; lamina of the largest leaves up to 9.5 cm long; bracts and bracteoles narrowly triangular; sepals slightly or not at all revolute.
 2. Leaves white or yellow below, bearing scattered, dark red or brown, short (up to ca 0.5 mm long), straight, sessile hairs; lateral veins of the lamina flush with the surface below or prominulous; anther wings 0.3–0.5 mm wide; carpels and cocci borne on a pyramidal torus. 1. *P. flavescens*.
 2. Leaves light green below, brown- or white-sericeous, the hairs up to 1.3 mm long, straight to somewhat serpentine, sessile or short-stalked; lateral veins of the lamina prominently raised below; anther wings 0.2 mm wide; carpels and cocci borne on a flat torus. 2. *P. sericea*.
1. Trees 15–25 m tall; fascicles of flowers borne on older parts of the stem 1 to many nodes below current leaves, probably stem from previous season or seasons; lamina of the largest leaves (5–)8–14 cm long; bracts and bracteoles broadly triangular; sepals strongly revolute.
 3. Pedicel 0.4–0.6 mm in diameter; leaves obtuse or very short-acuminate at the apex, the acumens up to 5 mm long; translucent dots in the lower epidermis of the leaf prominent; calyx glands pink; petals white. 3. *P. arborea*.
 3. Pedicel 1–1.2 mm in diameter; leaves longer-acuminate at the apex, the acumens 7–12 mm long; translucent dots in the lower epidermis obscure; calyx glands whitish-yellow; petals greenish-yellow. 4. *P. guianensis*.

1. *Pterandra flavescens* Maguire, Mem. New York Bot. Gard. 8: 128. 1953.

Shrubs or small trees 2–10 m tall; branchlets sericeous. Lamina of the larger leaves (3–)4–9.5 cm long, (1–)2–5 cm wide, elliptical or slightly obovate, cuneate at the base, obtuse or rounded and apiculate at the apex, white or yellow below, with angular glandular dots usually conspicuous in the surface below and sometimes above, sericeous on the midrib above and below and on lateral veins below and sometimes above, otherwise glabrate above and bearing scattered, dark red or brown, short, straight, sessile hairs below, with only the midrib prominently raised below, the 7–9 pairs of lateral veins prominulous or obscure, the reticulum prominulous above. Flowers borne in fascicles of 1–3 in axils of current leaves or above leaf scars 1 or 2 nodes below current leaves; bracts and bracteoles

similar, 1.5–2.5 mm long, 0.5–1 mm wide, narrowly triangular, sericeous, persistent in fruit; pedicels 12–26 mm long, loosely rufo-sericeous. Sepals 1.5–3 mm long beyond the glands, 1.5–2.5 mm wide, triangular, acute or obtuse at the apex, slightly or not at all revolute, sericeous abaxially, glabrous adaxially, often with translucent dots in the adaxial surface, bearing 10 glands, the glands lateral on sepals, 1.5–2 mm long, flat, elliptical or oblong, compressed or not. Petals pale yellow, loosely sericeous abaxially on claw and center of limb, hirsute adaxially on claw, at least at base; claw 1.5–2.5 mm long, 0.7–0.8 mm wide; limb 3.5–4.5 mm long, (3–)3.5–4.5 mm wide, round or spatulate, $\pm$ flat, erose, usually with translucent dots in center. Stamens with filaments 2–3 mm long; anthers 0.8–1 mm long, reflexed, mostly persistent in fruit, the wings dark red, 0.3–0.5 mm wide, slightly shorter than locules, often widest at base, the connective glandular, dark red and slightly extended at apex; pollen tricolporate. Ovary with carpels ca 1.5 mm high, borne on a pyramidal torus, hirsute; styles slightly subapical, 3–4 mm long, glabrous except at base. Cocci 4.5 mm high, spheroid, without a base of spongy tissue, pubescent.

Type. *Maguire & Politi 28104*, savanna along open banks of lower Caño Negro, 1500 m, Cerro Sipapo (Paráque), Amazonas, Venezuela, 25 Dec 1948 (holotype NY! isotypes US! VEN!).

Distribution. Known only from the type locality. VENEZUELA. Amazonas: Cerro Sipapo, Caño Negro, elev 1500 m: marshes, 15 Dec 1948, *Maguire & Politi 27692* (NY), *27692A* (NY); savanna, 25 Dec 1948, *Maguire & Politi 27946* (NY, VEN); type, q v.

2. *Pterandra sericea* Anderson, *Brittonia* 28: 407. 1976[1977].

Fig 8.

Shrubs or trees 2.5–10 m tall; branchlets sericeous to eventually glabrate. Lamina of the leaves 3–7 cm long, 1.5–3.5 cm wide, elliptic or slightly ovate or obovate, cuneate at the base, obtuse or acute or slightly acuminate and often apiculate at the apex, light green below and containing many angular translucent dots, glabrate above except sericeous on nerves and margin, brown- or white-sericeous below with the hairs sessile or short-stalked, straight or slightly serpentine and up to 1.3 mm long, the midrib and lateral nerves raised below; petiole 4–10 mm long, sericeous; stipules 2.5–3 mm long, sericeous abaxially, dark red-hirsute adaxially, quite connate or free at the apex. Flowers borne in fascicles of 3–6 in axils of current leaves; bracts and bracteoles similar, 1.5–2.5 mm long, up to 0.8 mm wide, narrowly triangular or linear. Pedicel 8–14 mm long, 0.8 mm in diameter, loosely sericeous. Sepals 3–3.5 mm long, 2.5–3 mm wide, triangular, obtuse to acute at the apex, densely sericeous abaxially, glabrous adaxially, all eglandular or all biglandular, the glands up to 2 mm long, flat, circular or elliptical, slightly detached, not compressed. Petals white or pale yellow, abaxially sericeous on claw and midrib, the claw 1–2 mm long, the limb 3–4.5 mm long, 2.5–3.5 mm wide, round or spatulate, flat or revolute, erose, with translucent dots in the center. Stamens with filaments 1.5–3 mm long; anthers 1 mm long, reflexed, deciduous, the wings uniformly ca 0.2 mm wide and red (?), the connective glandular and slightly broadened at the apex. Ovary with carpels borne on a flat torus, hirsute with basifixed hairs; styles basiventrifixed, 3–4 mm long. Immature cocci 3 mm high, compressed-ovoid with a swollen base, hirsute.

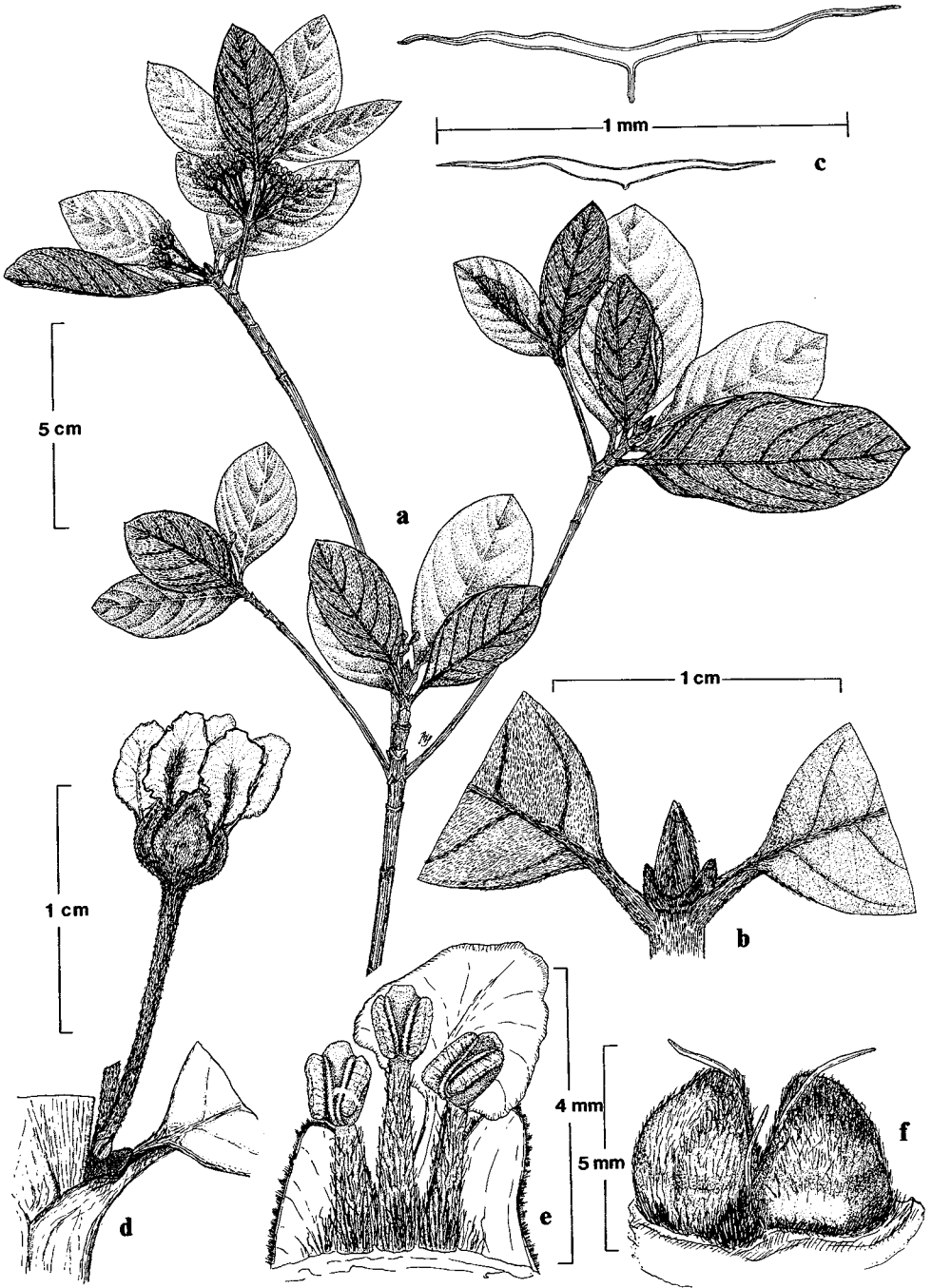


Fig 8. *Pterandra sericea*. a) Flowering branch; b) stipules and leaf-bases; c) hairs from abaxial surface of lamina; d) flower; e) three stamens opposite one petal and two sepals; f) immature fruit (one carpel aborted). a-d and f drawn from *Maguire 32715*, e from *Wurdack 34405* by Annette Seidenschneur Mahler.

Type. *Maguire 32715*, Upper Mazaruni River, Guyana, 9 Dec 1951, flr/imm frt (holotype MICH, isotypes K, NY, US).

Distribution. Western Guyana and eastern Bolívar, Venezuela. GUYANA. Type, q v. VENEZUELA. Bolívar: Chimantá Massif, by rapids of Río Apácará over igneous rock, western side of Apácará-tepuí, elev 415 m, Mar flr, *Steyermark 74677* (F, NY); Cerro Bolívar, elev 700–750 m, Feb flr, *Wurdack 34405* (F, MICH, NY, P, US, VEN).

3. *Pterandra arborea* Ducke, Arch. Jard. Bot. Rio de Janeiro 6: 40. 1933.

Trees 15–25 m tall; branchlets sericeous to eventually glabrate. Lamina of the larger leaves (5–)8–14 cm long, (3–)4–7 cm wide, broadly elliptic or obovate, cuneate at the base, obtuse at the apex or very abruptly short-acuminate, the acumen up to 5 mm long, thinly but persistently sericeous below, with many prominent angular translucent dots in the lower epidermis, loosely sericeous above but soon glabrate except on the veins; petiole 8–22(–28) mm long, sericeous; stipules 3–4 mm long, quite connate, abaxially sericeous at the base and distally glabrous, adaxially hirsute. Flowers borne in paired fascicles on old stems axillary to and slightly above leaf scars, each fascicle bearing 1–5 flowers at a time; bracts and bracteoles similar, 1–2 mm long and wide, triangular, abaxially sericeous, adaxially glabrous, deciduous. Pedicel (13–)15–24 mm long, 0.4–0.6 mm in diameter, sericeous. Sepals ca 3.5 mm long, linguiform, revolute, abaxially sericeous, adaxially glabrous, all biglandular, the glands pink, ca 1.5 mm long, flat, elliptical. Petals white, abaxially sericeous, adaxially hirsute at base of claw or glabrous, the claw 1–1.5 mm long, the limb 3.5–4.5 mm long, 2.5–3.5 mm wide, ovate or elliptical, flat, erose or subentire. Stamens with filaments 1.5–3 mm long; anthers 0.7–0.9 mm long, the connective not glandular or enlarged, the wings ca 0.3 mm wide. Ovary 1–1.5 mm high, borne on a pyramidal torus, tomentose; styles subapical, ca 4 mm long, glabrous except at base. Cocci 4–4.5 mm high, spheroid with a base of spongy tissue, tomentose.

Type. *Ducke*, unflooded forest, cachoeira, Rio Tarumã, near Manaus, Amazônia, Brazil, 3–8–1929 (holotype RB 23649! isotype US!).

Distribution. Itacoatiara to Manaus and northwest. BRAZIL. Amazônia: margem do ig. do Bindá, Manaus, *Coelho s n* [INPA 4009] (IAN, INPA); type, q v; Manaus-Itacoatiara Highway, Reserva Florestal Ducke, forest on terra firme, *Prance et al 2122* (MICH, NY); Manaus-Itacoatiara, *Rodrigues & Loureiro 7058* (INPA), *Rodrigues 7244 & 7577* (INPA); Rio Maturacá, catinga forest between Missão Salesiana and Serra Pirapucú, elev 400–800 m, *Silva & Brazão 60825* (MG, MICH, NY, US).

Collected in flower from July to September and in fruit from August to January.

Cowan 38123 (MG, MICH, NY, US) is this species or a very close relative. It was collected in Serra do Navio, Terr. Amapá, Rio Amapari, heavily forested hills, 70–300 m elev. More collections from Amapá, especially ones that note color of petals, should help to understand the variation in this species.

4. *Pterandra guianensis* Anderson, sp nov

Fig 9i–m.

Arbor usque 20 m alta, ramis sericeis, demum glabratiss. Folii lamina 9.5–14 cm longa, 3.5–6 cm lata, elliptica vel parum obovata, basi cuneata, margine paene

vel omnino plana, apice abrupte acuminata acumine 7–12 mm longo, supra atro-viridis et novella sericea mox glabrata praeter costam, subtus flavovirens et etiam adulta sericea pilis brevibus, sessilibus, rectis parallelisque, ca 0.5 mm longis, costa et utrinque 7–9 nervis lateralibus supra planis, subtus prominentibus, reticulo utrinque prominenti, subtus punctis obscuris translucidis angulatisque instructa; petiolus 9–15 mm longus, sericeus; stipulae 3.5–4 mm longae, triangulares, plane connatae vel sulcatae apiceque liberae, abaxialiter glabrae vel basi sericeae, adaxialiter hirsutae. Fasciculi binati florum 2–4 foliis delapsis axillares, bracteis bracteolisque similaribus, 1–1.5 mm longis latisque, triangularibus, abaxialiter sericeis, adaxialiter glabris, persistentibus vel demum deciduis. Pedicellus 11–16 mm longus, 1–1.2 mm diametro, sericeus. Sepala ca 3.5 mm longa, lingulata, revoluta, abaxialiter sericea, adaxialiter glabra, omnia biglandulifera, glandulis albo-flavidis, usque 2 mm longis, planis, ellipticis. Petala viridi-flava, abaxialiter sericea, ungue 1–1.5 mm longo, limbo 3–4 mm longo, 2.5–3 mm lato, ovato vel elliptico. Stamina filamenta 1.5–2.5 mm longa; antherae ca 0.8 mm longae, connectivo apice truncato vel minute apiculato, alis 0.2–0.3 mm latis. Ovarium ca 1.5 mm altum, tomentosum pilis $\pm$ medifixis; styli ca 3.5 mm longi, praeter basim hirsutam glabri. Fructus tomentosus, coccis immaturis ca 3 mm altis latisque, in toro pyramidalis portatis.

Type. *Tillett, Tillett & Boyan 45011*, mixed evergreen forest, on laterite, below talus of cliffs along NE side, elev below 762 m, Mt. Ayanganna, upper Mazaruni River basin, British Guiana [Guyana], 3 Aug 1960 flr/imm frt (holotype MICH, isotypes K, NY, US).

Distribution. Known only from the type.

This species is closely related to *P. arborea*, but it differs in its long-acuminate leaves with obscure translucent dots in the epidermis, its stout pedicels, and its greenish-yellow petals.

2. *Lophanthera* Adr. Jussieu, Ann. Sci. Nat. 2^o Sér. Bot. 13: 328. 1840.

Shrubs or trees, the stems often containing white latex, the leaves bearing glands on the petiole or lamina or both; stipules intra- and slightly epipetiolar, $\frac{2}{3}$ to completely connate. Inflorescence terminal (rarely axillary in *L. spruceana*), a thyse composed of few-flowered cincinni or dichasia or a pseudoraceme, the bracts and bracteoles persistent, 1 or both bracteoles usually bearing a large gland. Petals entire or at most minutely denticulate, deciduous, the posterior petal moderately to strongly differentiated from the other 4. Stamens 10, $\pm$ in 1 whorl, the filaments distinct or slightly connate basally, glabrous, those opposite the sepals longer than those opposite the petals; anthers alike, glabrous, deciduous, 4-locular, the outer locules bearing dark longitudinal wings, the connective shorter than the locules; pollen tricolporate. Receptacle glabrous or with a row of short, basifixed hairs between filaments and ovary. Ovary of 3 uniovulate carpels, the carpels laterally somewhat to quite free but connate along a narrow to broad central axis; styles 3, apical or subapical, inbent in bud, subulate with minute apical stigmas, glabrous, often persistent in fruit. Fruit schizocarpic, breaking apart into 3 (or fewer due to abortion) dry, unwinged, 1-seeded cocci, the mericarps indehiscent or slightly dehiscent along the keel but not enough so to release the spheroid seed.

Type. *Lophanthera longifolia* (H.B.K.) Grisebach.

Lophanthera is a lowland genus of four species, three of which occur in or near Guayana.

Key to the Species of *Lophanthera*

1. Stipules up to 3 mm long; inflorescence erect, shorter than the subtending leaves; one bracteole bearing a large sessile gland covering much of its abaxial surface; petals white or pink. 1. *L. spruceana*.
1. Stipules 5–12 mm long; inflorescence more or less pendulous, often longer than the subtending leaves; one or both bracteoles usually bearing an apical, often stalked gland; petals yellow.
 2. Glands of the calyx 1–4, borne on 1–3 adjacent posterior sepals; ovary and fruit densely pilose. 2. *L. pendula*.
 2. Glands of the calyx usually 10 (often connate in pairs), symmetrically distributed on all 5 sepals; ovary and fruit glabrous.
 3. Primary peduncle of the cincinni (from bract to joint of first flower) 2.5–8.5 mm long; anthers 2–2.5 mm long, with wings ca 0.5 mm wide; cocci 7–9 mm long, the proximal half filled with aerenchyma. 3. *L. longifolia*.
 3. Primary peduncle 9–20 mm long; anthers 0.8–1.0 mm long, with wings 0.1–0.2 mm wide; cocci ca 5 mm long, containing only the seed, no aerenchyma. 4. *L. lactescens*.

1. *Lophanthera spruceana* Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 5: 30. 1914.

Shrubs or small trees to 6 m tall; stems sericeous to glabrate, the hairs short, straight, sessile, reddish-brown. Lamina of the larger leaves 15–22 cm long, 5–10 cm wide, elliptical or slightly ovate or obovate, obtuse or attenuate at the base, revolute at the margin, abruptly short-acuminate at the apex, glabrate above, very sparsely but persistently sericeous below, usually bearing 2 large impressed glands below at the base and several small glands in a row on each side; petiole 5–12 mm long, eglandular, sericeous to glabrate; stipules 1.5–3 mm long, connate, obtuse or rounded at the apex, abaxially sericeous. Inflorescence terminal or rarely axillary, simple, binate, or ternate, each axis 5–15 cm long, with a pair of sterile, much-reduced leaves 1–15 mm above the base, erect, reddish-brown-sericeous, a thyrse composed of ascending 1–5-flowered cincinni 1–2.5 cm long; bracts 1–2 mm long, triangular, sericeous, eglandular; primary peduncle (from base to joint of first flower) 4–8(–11) mm long, bearing at its apex 2 bracteoles similar to the bract, one of these bearing a large round gland over most of the abaxial surface, the other, eglandular bracteole usually fertile (i.e. subtending a lateral branch). Pedicel 4–6 mm long, sericeous. Sepals extending 1–2 mm beyond the glands, obtuse or rounded at the apex, sericeous to glabrate abaxially, ciliate on the margin, glabrous adaxially, all biglandular or very rarely 1 of the anterior-lateral sepals eglandular, the glands circular or obovate, 0.8–1.5 mm long, often so compressed as to appear confluent in open flowers. Petals white or pink, 4–6 mm long, dorsally smooth or slightly carinate at base of limb, glabrous, the posterior petal with a much longer and thicker claw than the others. Stamens with the filaments 1.5–2 mm long, the anthers 1.5–2 mm long, the wings 0.3–0.6 mm wide, widest distally and exceeding the locules. Ovary ca 1 mm high, densely sericeous; styles 2–2.5 mm long, slightly incurved at the apex or straight, apical. Cocci separating from each other along a broad zone of contact and leaving a plane base, 8–10 mm long, 5–6 mm wide, thinly sericeous, irregularly ovoid, containing the seed in a globose distal chamber above a broad, empty or aerenchymatous base ca 2–3 mm high.

Type. *Spruce 2518/2632*, prope Panuré ad Rio Uaupés, Amazonas, Brazil, Oct 1852–Jan 1853 flr/frt (isotypes CP, NY!).

Distribution. BRAZIL. Amazonas, Rio Uaupés: caatinga, Rio Tikie at Iripipy, May flr, *Fróes 12548/242* (A); caatinga, Panuré, *Pires 1052*, Nov flr, (IAN), *1070* (IAN), *1080*, Nov flr/frt, (IAN, NY), *Pires & Silva 7950*, Jun flr/frt, (IAN, UB); solo úmido arenoso, Vila Iauareté, May flr, *Ribeiro 995* (MICH); Ipanoré, Nov flr, *Schultes & Pires 9090* (GH, US); type, q v.

2. *Lophanthera pendula* Ducke, Tropical Woods 50: 34. 1937.

Shrubs or small trees, the stems sericeous to glabrate and eventually lenticellate. Lamina of the larger leaves 14–23 cm long, 5.5–10.5 cm wide, elliptic or broadly elliptic, cuneate or slightly decurrent at the base, usually abruptly short-acuminate at the apex with the acumen ca 5 mm long, glabrate except loosely sericeous on the midrib, especially below, and on the margins, bearing small impressed glands below near the base and often distally in a row on each side; petiole 2–2.7 cm long, loosely sericeous to glabrate, eglandular or rarely bearing 1–2 glands near the apex on decurrent laminar tissue; stipules 5–8 mm long, abaxially sericeous, adaxially nearly or quite glabrous, the pair triangular, 2-ribbed, quite connate or free at the apex. Inflorescence 25–65 cm long, with a pair of sterile, much-reduced leaves 3–6 cm above the base, $\pm$ pendulous, an open pseudoraceme of 1-flowered cymules, with often 1 cm or more between pairs or groups of flowers, tomentose with basifixed or medifixed hairs; bracts 2–3 mm long, triangular, tomentose, eglandular or with marginal glandular spots; peduncle 2–5 mm long, bearing at the apex 2 minute reduced bracteoles and well below the apex 2 larger bracteoles 1–2 mm long, often with marginal glandular spots, 1 bracteole terminating in a large stalked gland. Pedicel 6–9 mm long, pilose. Sepals 2–3 mm long, triangular, acute at the apex, flat, appressed-pilose on both sides, bearing 1–4 glands on 1–3 adjacent posterior sepals, the glands 1–1.3 mm long, flat, circular. Petals yellow, 4–5 mm long, cucullate, dorsally alulate or carinate, glabrous, the posterior petal with a larger, more spreading limb. Stamens with the filaments 2–3 mm long, the anthers 1.5 mm long, the wings ca 0.3 mm wide, widest distally. Ovary ca 1.5 mm high, densely pilose with mostly basifixed hairs; styles ca 4 mm long, persistently bent. Cocci separating from a short pyramidal axis, ca 6 mm long, 4–5 mm wide, pilose, laterally compressed, with a flattened arching dorsal keel, containing only the seed (no aerenchyma).

Type. *Ducke* [RB 29041], Rio Curicuriary afl. Rio Negro super., ad ripas inundatas, Amazonas, Brazil, 4–X–1935 flr/frt (holotype RB! isotypes NY! US!).

Distribution. Upper Rio Negro and its tributaries. BRAZIL. Amazonas: Rio Curicuriary, 23 Dec 1931 frt, *Ducke* [RB 24164] (RB), type, q v; Igarapé Caburí, igapó, Sep frt, *Fróes 28746* (IAN); Tapuruquara, mata da ilha, Apr frt, *Pires 250* (IAN, NY, US); San Felipe and vicinity, below mouth of Rio Içana, Jan frt, *Schultes & López 9600* (GH, IAN, US) & *9601* (US).

3. *Lophanthera longifolia* (Humboldt, Bonpland & Kunth) Grisebach in Martius, Fl. Bras. 12(1): 25. 1858. Fig 9a–h.

Galphimia longifolia Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 173 (4° ed.). 1821 [1822].

Lophanthera kunthiana Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 329. 1840 [nom superfl].

Shrubs or small trees 1–6(–10) m tall, the branchlets loosely sericeous, often containing some white latex. Lamina of the leaves 12–30 cm long, 4–10 cm wide, obovate, gradually narrowed at the base, acute or short-acuminate at the apex, glabrate above or sparsely sericeous on the midrib, thinly sericeous below, at least on the veins, usually bearing few to many small impressed glands below near the midrib or distant from it; petiole (1–)1.4–3 cm long, $\pm$ persistently sericeous, usually bearing 2(–4) flat glands above near the middle; stipules (6–)7–10 mm long, narrowly triangular, quite connate or bidentate at the apex, abaxially sericeous to glabrate, adaxially glabrous. Inflorescence 12–35 cm long, with a pair of usually sterile, much-reduced leaves about midway between the base and the first cincinni, usually pendulous, loosely sericeous or tomentose, a thyrse composed of 15–70 horizontal or reflexed, 1–4-flowered cincinni; bracts 2–4 mm long, triangular, abaxially loosely sericeous, eglandular; primary peduncle (from base to joint of first flower) 2.5–8.5 mm long, bearing 0.5–1.5 mm below its apex 2 triangular bracteoles, one of these terminating in a sessile or stalked gland, the other, eglandular bracteole subtending a lateral branch. Pedicel (3–)5–8 mm long, loosely sericeous. Sepals extending 2–2.5 mm beyond the glands, triangular, acute at the apex, flat, thinly sericeous distally to glabrate on both sides, all biglandular, the glands 1–2 mm long, obovate, strongly lateral, neighboring glands of adjacent sepals often $\pm$ connate. Petals yellow, 5–8 mm long, dorsally carinate and somewhat cucullate, glabrous. Stamens with the filaments 1.5–3 mm long, the anthers 2–2.5 mm long, the wing 0.5 mm wide, widest distally and exceeding the locules. Ovary 1.5–2 mm high, glabrous; styles 3.5–4.5 mm long, apical or slightly sub-apical. Cocci separating from a pyramidal axis, 7–9 mm long, 3–4 mm wide, glabrous, sub-cylindrical, the proximal half filled with aerenchyma, the distal half bearing the seed and carinate.

Type. *Humboldt & Bonpland*, locis umbrosis, ad ripam fluminis Cassiquiare (Misiones del Orinoco), Amazonas, Venezuela (P).

Distribution. Along the Alto Río Orinoco, Casiquiare, and Río Negro in Amazonas, Venezuela; widespread along rivers in Amazônia, Brazil; and occasional in Rondônia and Pará. Representative collections: VENEZUELA. Amazonas: Orinoco, Isla del Ratón, *Breteler* 4718 (US, VEN, WAG); La Esmeralda, *Fariñas et al* 295 (VEN); São José do Casiquiare, *Fróes* 21500 (NY, US); Río Orinoco between San Fernando de Atabapo and Tamatama, *Level* L-25 (F, MICH, NY, VEN); Danta Falls, Cuao River, *Maguire & Politi* 27321 (NY, VEN); W of Santa Barbara, *Maguire et al* 32077 (NY, VEN); Río Casiquiare 4 hours below origin, *Maguire et al* 36604 (MICH, NY, US, VEN); Caño Cupueni at mouth of Río Atabapo, *Maguire et al* 37683 (NY, VEN); San Carlos de Río Negro, *Ll. Williams* 14563 & 14721 (US, VEN); El Cucuy, Río Negro, *Ll. Williams* 14716 (US, VEN); Alto Orinoco, Esmeralda, *Ll. Williams* 15314 (VEN), 15361 (NY, US, VEN), 15414 (US, VEN). BRAZIL. Amazônia: Rio Jamundá [Nhamundá], Aminará-Assú, *Black & Ledoux* 50–10865 (IAN); Borba, Rio Madeira, *Ducke* 76 (NY); Faro, *Ducke* [MG 3719 & 6921] (MG); Manaus, *Fróes* 20846 (NY); Sucurijú, Rio Urubú, *Fróes* 25430 (IAN); Barcelos, Rio Negro, *Fróes* 28439 (IAN); Rio Canumã, Rio Madeira, *Fróes* 33748 (IAN); near Tres Casas, mun. Humaitá, *Krukoff* 6269 (NY); Itacoatiara-Manaus, *Oliveira* 2948 (IAN); Rio Juruá, mata da várzea, *Pena* 573 (MICH); Maués, *Pires* 80 (IAN, NY); Tefé, *Pires* 1413 (IAN); Rio Negro between mouth of Rio Caures and Barcelos, *Prance et al* 15136

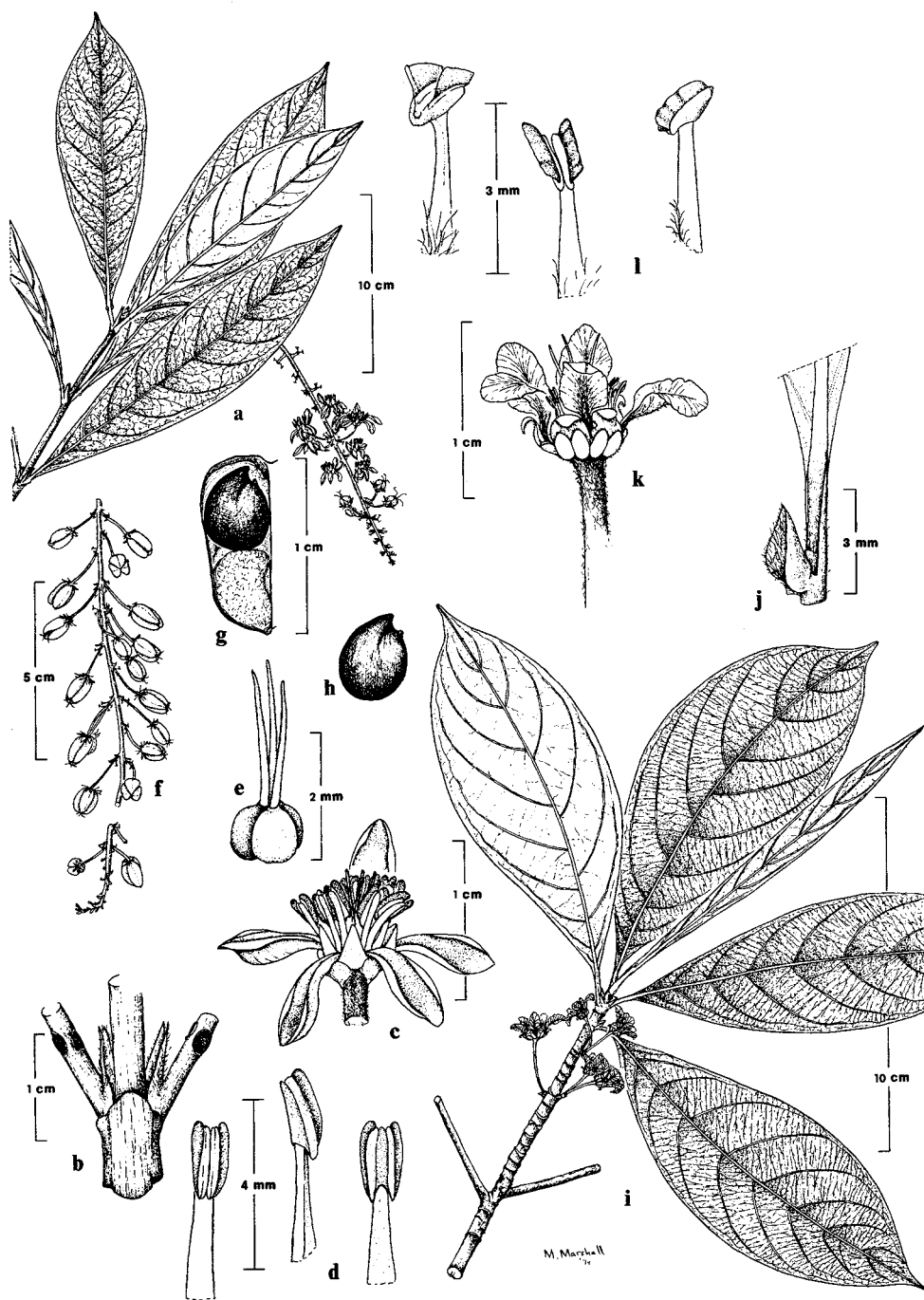


Fig 9. *Lophanthera longifolia* and *Pterandra guianensis*. a–h, *L. longifolia*: a) Flowering branch; b) stipules and petioles; c) flower; d) stamens, left to right adaxial, lateral, and abaxial views; e) gynoeceum; f) infructescence; g) seed in locule with proximal aerenchyma; h) seed. i–m, *P. guianensis*: i) flowering branch; j) connate stipules; k) flower; l) stamens, left and center adaxial views, right abaxial view. Drawn by Melissa Marshall, a–e from Breteler 4718, f–h from Maguire et al 32077, i–m from Tillett et al 45011.

(MICH, NY, U, US); Rio Uatumã, mun. Parintins, *Rodrigues* 259 (IAN); Rio Negro, Muyrapenima [Mirapinima], *Tate* 53 (NY, US). Pará: São Miguel do Guamá, Rio Guamá, *Dardano & Black* 48–3139 (IAN); Rio Trombetas, acima de Oriximiná, *Ducke* [MG 7893] (MG); Rio Cuminá, *Ducke* [MG 7963] (MG); Rio Tocantins, região de Tucuruí, *Oliveira* 1203 (IAN); Monte Dourado, Rio Jarí, *Silva* 982 & 1112 (NY). Terr. Rondônia: Pôrto Velho, *Baldwin* 3151 (IAN) & *Black & Cordeiro* 52–14509 (IAN); source of Jatuaraha River, Machado River region, *Krukoff* 1546 (NY).

Collected in flower and fruit in almost all months, most frequently from November to March.

Lophanthera longifolia is usually collected along rivers. Its fruit appears to be well adapted to dispersal by water, in that half the volume of each coccus is filled with aerenchyma.

4. *Lophanthera lactescens* Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 103. 1925.

Trees to 15 m tall; stems lactiferous, very finely sericeous, soon glabrate and coarsely lenticellate. Lamina of the larger leaves (12–)15–24 cm long, (5–)9–12 cm wide, obovate, decurrent at the base, rounded or obtuse or apiculate at the apex, glabrate except for very fine subappressed hairs on the midrib, usually bearing several small impressed glands below in a row on each side; petiole 1.5–2.5 cm long, finely sericeous to glabrate, eglandular or bearing 2 large flat glands above in the middle; stipules 8–12 mm long, abaxially gray-sericeous, adaxially very sparsely sericeous, the pair triangular, 2-ribbed, quite connate or free at the apex. Inflorescence 30–40 cm long or longer, with a pair of sterile, much-reduced leaves 1–3 cm above the base, pendulous, gray-sericeous to reddish-subvelutinous, a thyrse composed of many crowded, horizontal or reflexed, 1–3-flowered dichasia or cincinni 2–4 cm long; bracts 1.5–3 mm long, narrowly triangular, loosely sericeous, eglandular; primary peduncle (from base to joint of first flower) 9–20 mm long, bearing at its apex 2 minute bracteoles (hardly more than swellings in some) and well below the apex 2 large triangular bracteoles, one or both of these usually terminating in a large stalked gland, one or both often fertile (i.e. subtending lateral flowers). Pedicel 4–7 mm long, sparsely velutinous. Sepals extending 1–2 mm beyond the glands, triangular, acute at the apex, flat, appressed-tomentose on both sides especially distally, all biglandular, the glands 2–2.5 mm long, obovate, laterally compressed, somewhat decurrent, neighboring glands of adjacent sepals sometimes partially to completely connate. Petals yellow, 5–7 mm long, dorsally carinate, pilose on the margin. Stamens with the filaments 2–2.5 mm long, the anthers 0.8–1 mm long, the wings 0.1–0.2 mm wide, widest distally. Ovary ca 1.3 mm high, glabrous; styles ca 2.3 mm long, incurved at the apex or straightening, subapical. Cocci separating from a very short pyramidal base, ca 5 mm long and 3.5 mm wide, glabrous, obovoid, containing only the seed (no aerenchyma). Chromosome number: $n = 6$ (voucher: *Anderson 11665*, MICH).

Type. *Ducke* [RB 17698], silva non inundata, Bella Vista, Rio Tapajós, Pará, Brazil, 31–V–1923 fl/frt (holotype RB!).

Distribution. This very rare species is known in the wild only from the lower Rio Tapajós, where Ducke found it and where collectors from IAN have recently

re-collected it. However, Ducke brought it into cultivation in Rio de Janeiro, where it has proved to be an attractive street tree capable of withstanding pollution, neglect, and the other rigors of urban life. The above description was based on specimens from cultivated trees; the vouchers are *Anderson 11665*, *Gates s n*, and *Occhioni 3563*, all at MICH.

Two aspects of this plant's morphology are particularly noteworthy. One is the inflorescence, in which the cymules are often dichasia (i.e. both bracteoles subtend lateral branches). Most byrsonimoids with several-flowered cymules have cincinni instead of dichasia, but I have long thought that both bracteoles might have been fertile in an ancestor, and the fact that this species has dichasia shows at least that both bracteoles can be fertile. The other point of interest is that the anther wings in this species are narrow and rather similar to the "verrucae" of *Verrucularia*, which suggests the homology of the outgrowths on the anthers in the two genera and supports a close relationship of the genera that can be inferred from other characters.

This species is also of interest for its chromosome number ($n = 6$). This is the lowest number known for the Malpighiaceae. It is almost certainly the base number for the subfamily Byrsonimoideae (Anderson, 1978), and may well be the base number for the family. (The other likely base number is five, since many non-byrsonimoids have chromosome numbers based on ten pairs. No count of five pairs is known, and it may be that a number of ten, derived by aneuploidy from twelve, is basic to the non-byrsonimoids.) The chromosomes of *Lophanthera lactescens* are unusually fat for this family.

3. *Spachea* Adr. Jussieu in Delessert, Icon. Sel. 3: 19, tab. 31. 1837 [1838].

Meckelia (Adr. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 25. 1858.

Shrubs or trees, the stems sometimes containing white latex, the leaves bearing glands on the lamina; stipules large, intra- and epipetiolar, connate. Inflorescence terminal, a raceme of short 1-several-flowered cincinni, the bracts and bracteoles persistent, 1 bracteole often bearing a large gland. Petals pink or white. Stamens 10, the anthers alike, glabrous, unwinged, the connective shorter than the locules. Carpels 2 or 3, connate along a central axis, each fertile and bearing a stout, untapered style with the broad apical stigma often becoming subpeltate or bilobed in anthesis. Fruit schizocarpic, breaking apart into 2-3 (or fewer due to abortion) dry, unwinged, smooth, indehiscent, 1-seeded cocci bearing the persistent styles.

Plants apparently gynodioecious, the pistillate flowers bearing flat, unopened anthers with aborted pollen, the perfect flowers bearing large polleniferous anthers and a small ovary with ovules.

Type. *Spachea elegans* (G. F. W. Meyer) Adr. Jussieu.

Spachea comprises approximately six species in northern South America, Central America, and the West Indies. It is not known to occur in the sandstone uplands of the Guayana Highland proper, but *S. elegans* grows in the lowlands north, east, and south of there. It is included here as an aid to identification of plants of the general region.

Most Malpighiaceae have monotonously bisexual flowers, so it was a great surprise to discover that *Spachea* does not. Some plants are functionally pistillate, while the flowers on plants that produce pollen are morphologically perfect

but perhaps functionally staminate, i.e. they do bear ovule-containing carpels, but I suspect that those carpels do not set seed, since I have found no enlarging fruits on old inflorescences of those plants. These observations are based only on material of *S. elegans* and *S. tricarpa*; it will be interesting to see whether species from Colombia and Central America have similar gynodioecy or functional dioecy.

Spachea elegans (G. F. W. Meyer) Adr. Jussieu in Delessert, Icon. Sel. 3: 19, tab. 31. 1837 [1838]. Fig 10.

Malpighia elegans G. F. W. Meyer, Prim. Fl. Esseq. 178. 1818.

Byrsonima elegans (G. F. W. Meyer) de Candolle, Prodr. 1: 580. 1824.

Trees 4–15 m tall, the stems loosely sericeous to subvelutinous, soon glabrate. Lamina of the larger leaves 7–12(–14) cm long, 3–6 cm wide, elliptical or slightly obovate, cuneate or rounded at the base, often revolute at the margin, usually short-acuminate at the apex, tomentose to soon glabrate above, sparsely reddish-tomentose or subsericeous below at least on the midrib, usually bearing 2–4 impressed glands below near the base and often several glands distally; petiole 7–10 mm long, tomentose or sericeous, eglandular; stipules 3–6 mm long, abaxially sericeous, adaxially glabrous, quite connate. Inflorescence a terminal pseudoraceme of 1-flowered cincinni, 5–20 cm long, tomentose throughout; cincinni horizontal or reflexed; peduncle 1–4 mm long, twisted and apparently bearing the bract on its upper side; bracts and bracteoles 0.5–1.5 mm long, ovate or rotund, both bracteoles borne well below the joint, some plants with 1 bracteole terminating in a $\pm$ stalked gland. Pedicel 4–6 mm long, tomentose to glabrate in fruit. Sepals 2–3 mm long, ca 1.5 mm wide, broadly rounded at the apex, thinly sericeous on both sides and ciliate around the margin, bearing 8–9 glands 2–3 mm long. Petals pink, glabrous or with a few hairs at base of claw, subequal, the claw 1.5–2.5 mm long, the limb 2.5–3.5 mm long, 1.5–2.5 mm wide, obovate, minutely fimbriate with short unicellular processes, persistent in fruit. Filaments free, bearing a few basal hairs, 1.5–2 mm long in “pistillate” flowers, ca 3 mm long in “perfect” flowers; anthers ca 1 mm long and unopened in “pistillate” flowers, 1.1–1.3 mm long and releasing abundant pollen in “perfect” flowers. Receptacle bearing long hairs between stamens and ovary. Carpels 2(–3), glabrous or bearing a few hairs, 1–2 mm high; styles 2(–3), 2–2.5 mm long, glabrous, divergent to eventually recurved, the reniform or bilobed stigmas 0.5–0.8 mm wide. Fruit of 2(–3) glabrous cocci 4.5–6 mm long, 3–4 mm wide, dorsiventrally slightly flattened, spheroid, ellipsoid, or slightly obovoid, bearing a smooth scar 1.5–2.0 mm wide over much of the length of the ventral face; torus almost flat, bearing a short ridge between the cocci.

Type. *Rodschied*, in litore insulae Arowabisch, Essequibo River, Guyana (GOET).

Distribution. Reported from Trinidad, southeastern Venezuela, Guyana, Surinam, French Guiana, and Terr. Roraima, Brazil. VENEZUELA. Delta Amacuro: Río Amacuro, Sierra Imataca, falls at San Victor, elev 65–80 m, ♀, Oct frt, *Steyermark* 87154 (MICH, NY). Bolívar: Pto. Ordaz-San Félix, *Aristeguieta* 5297, ♀, Apr flr (VEN) & 5838 (MY, NY, VEN); San Félix, elev 30–40 m, ♀, Dec flr/imm frt, *Bernardi* 7798 (VEN). GUYANA. Upper Rupununi River, near

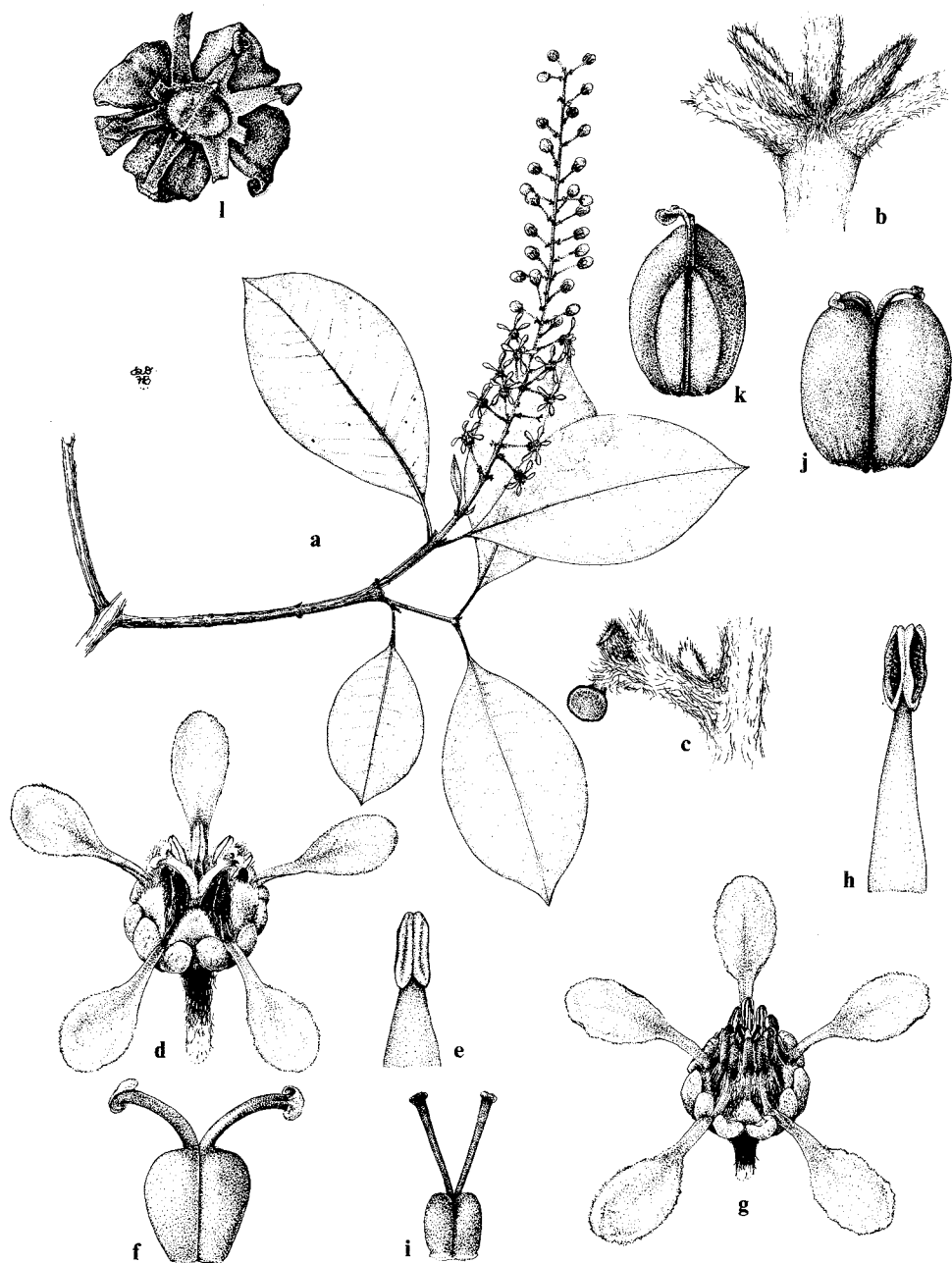


Fig 10. *Spachea elegans*. a) Flowering branch, $\times 0.5$; b) stipules, $\times 5$; c) bract, peduncle, and bracteoles, $\times 5$; d-f) flower, stamen, and gynoecium of functionally pistillate plant, d $\times 4$, e $\times 10$, f $\times 7.5$; g-i) flower, stamen, and gynoecium of perfect or functionally staminate plant, g $\times 4$, h $\times 10$, i $\times 7.5$; j) intact fruit, $\times 5$; k) coccus, ventral face, $\times 5$; l) torus in old flower, $\times 3$. Drawn by Karin Douthit, a-f from Aristeguieta 5297, g-i from Pires *et al* 14.413, j-l from Steyermark 87154.

Dadanawa, ♀, *De La Cruz* 1492 (NY); Puruni River, ♂, *Forest Dept.* 7724 (NY); Barima River, ♀, *Jenman* 7127 (NY); Rupununi River basin, near mouth of Charwair Creek, ♀, *Smith* 2352 (NY). BRAZIL. Terr. Roraima: Caracarái, ♂, Apr flr, *Pires et al* 14334 (MICH); R. Ajarani, ♀, *Pires et al* 14413 (MICH); R. Anauá, ♀, *Pires et al* 14501 (MICH).

4. *Verrucularia* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 327. 1840.

Shrubs, the leaves eglandular, the stipules intrapetiolar and free or slightly connate. Inflorescence an unbranched, often corymbose, terminal thyse or pseudoraceme composed of 1–several-flowered cincinni, the bracts and bracteoles eglandular and persistent. Sepals all biglandular, the neighboring glands of adjacent sepals sometimes connate. Petals yellow, the posterior relatively little differentiated except for a thicker claw. Stamens 10, the filaments glabrous, those opposite the sepals longer than those opposite the petals, the anthers alike, glabrous, deciduous, 4-locular, each of the outer locules bearing a line or cluster of vesicular outgrowths toward the apex. Receptacle glabrous. Ovary of 3 connate uniovulate carpels; styles 3, glabrous, subulate with minute apical stigmas, inbent at the apex in bud. Fruit schizocarpic, breaking apart into 3 (or fewer due to abortion), dry, 1-seeded cocci, the cocci dorsally loculicidal (in nature?) but not enough so to release the seed.

Type. *Verrucularia glaucophylla* Adr. Jussieu.

Verrucularia is closely related to *Galphimia*, and they have a similar schizocarpic fruit. The mericarps seem to be dehiscent along the dorsal suture, but in both groups it is difficult to say whether they are actually dehiscent before separating in nature, or split open on herbarium specimens in response to being pressed and dried.

Verrucularia comprises two species, the type and the new one described below.

***Verrucularia piresii* Anderson, sp nov**

Figs 11 & 12.

Frutex? ("arbor") 50 cm altus, ramulis sericeis. Lamina foliorum majorum 4–5.5 cm longa, 1.5–2.5 cm lata, elliptica, basi attenuata, margine revoluta, apice acuta, supra glabrata, subtus glabrata vel pilis perpaucis persistentibus praecipue costa obsita, nervis lateralibus numerosis tenuibus supra prominulis (in sicco), subtus obscuris, epidermide abaxiali olivacea, minute papillosa et stomatibus (?) translucetibus instructa; petiolus (8–)10–13 mm longus, sericeus vel demum subglabratus; stipulae 1.5–2 mm longae, triangulares, apice obtusae, ± liberae, abaxialiter sericeae, adaxialiter glabrae. Inflorescentia usque 6 cm longa, sericea, cincinnis 1–2-floris, bracteis 2.5–4.5 mm longis, linearibus, denticulatis, glabris vel basi paucipiliferis, pedunculo primario 4–8 mm longo sub apice bibracteolato, bracteolis bracteis similibus sed brevioribus. Pedicellus 6–8 mm longus, sericeus vel glabrescens. Sepala glandulas 0.8–1.5 mm longas obovatas decurrentes 2–2.5 mm superantia, ca 1.3 mm lata, apice rotundata, plana, glabra, integra vel irregulariter denticulata. Petala glabra, ungue 2–3 mm longo, limbo 4–5 mm longo, plano vel carinato, denticulato. Stamina filamentis 2.7–4 mm longis, 1 mm connatis, antheris 1–1.2 mm longis, verruculis usque 0.3 mm latis, dissectis, per $\frac{2}{3}$ longitudinem loculorum extensis. Ovarium sphaeroideum, 1.5 mm altum, proximaliter minute sericeum distaliter glabrum, stylis 3.5 mm longis. Fructus ignotus.

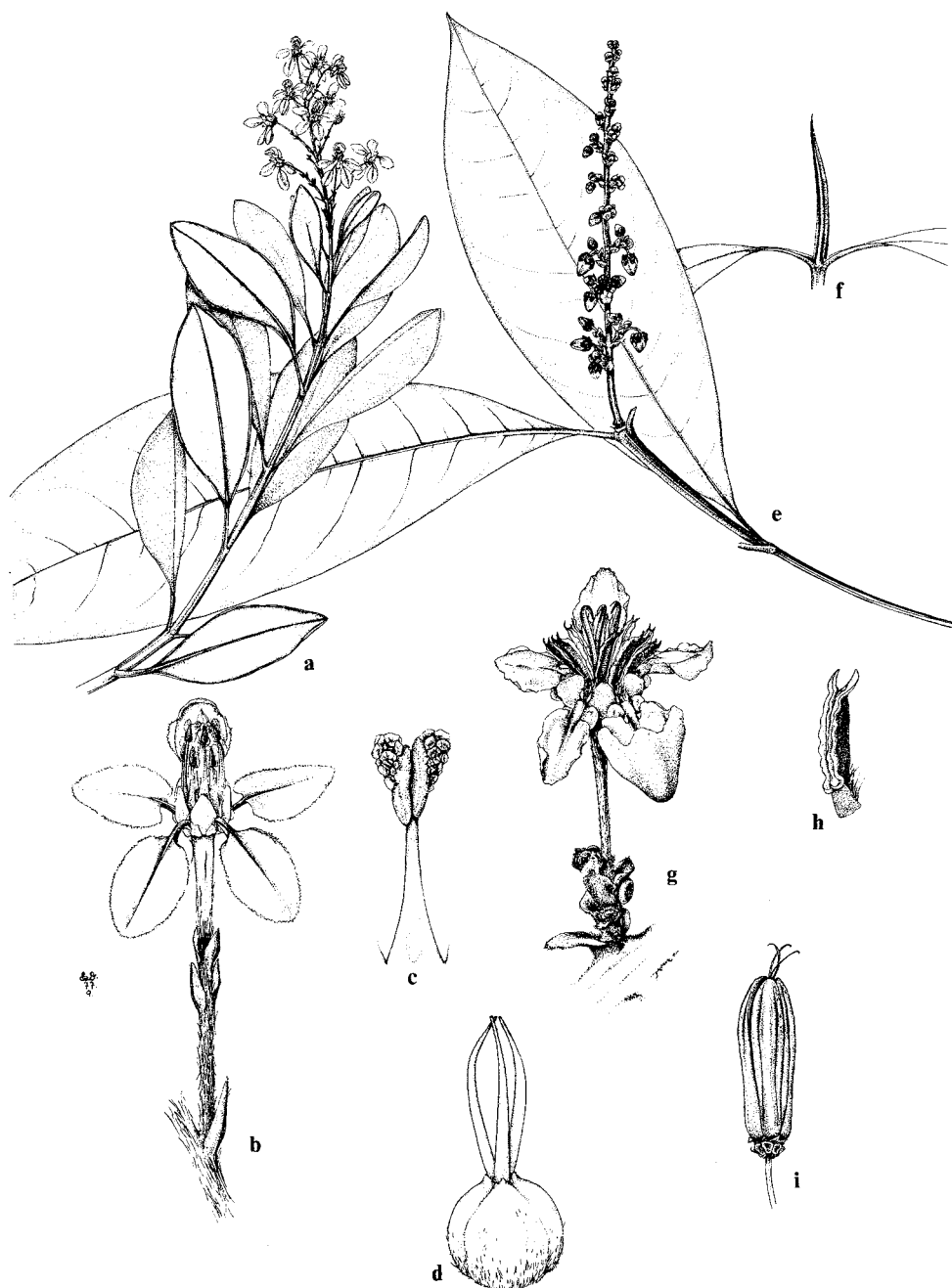


Fig 11. *Verrucularia piresii* and *Glandonia prancei*. a-d, *Verrucularia piresii*: a) Flowering branch, $\times 0.5$; b) flower, $\times 2.5$; c) stamen, $\times 10$; d) gynoecium, $\times 7.5$. e-i, *Glandonia prancei*: e) Flowering branch, $\times 0.5$; f) stipules, $\times 1$; g) flower, $\times 2.5$; h) stamen, $\times 5$; i) fruit, $\times 1$. Drawn by Karin Douthit, a-d from Pires 15040, e-f from Prance et al 8058, g-h from Prance et al 3363, i from Prance et al 20557.

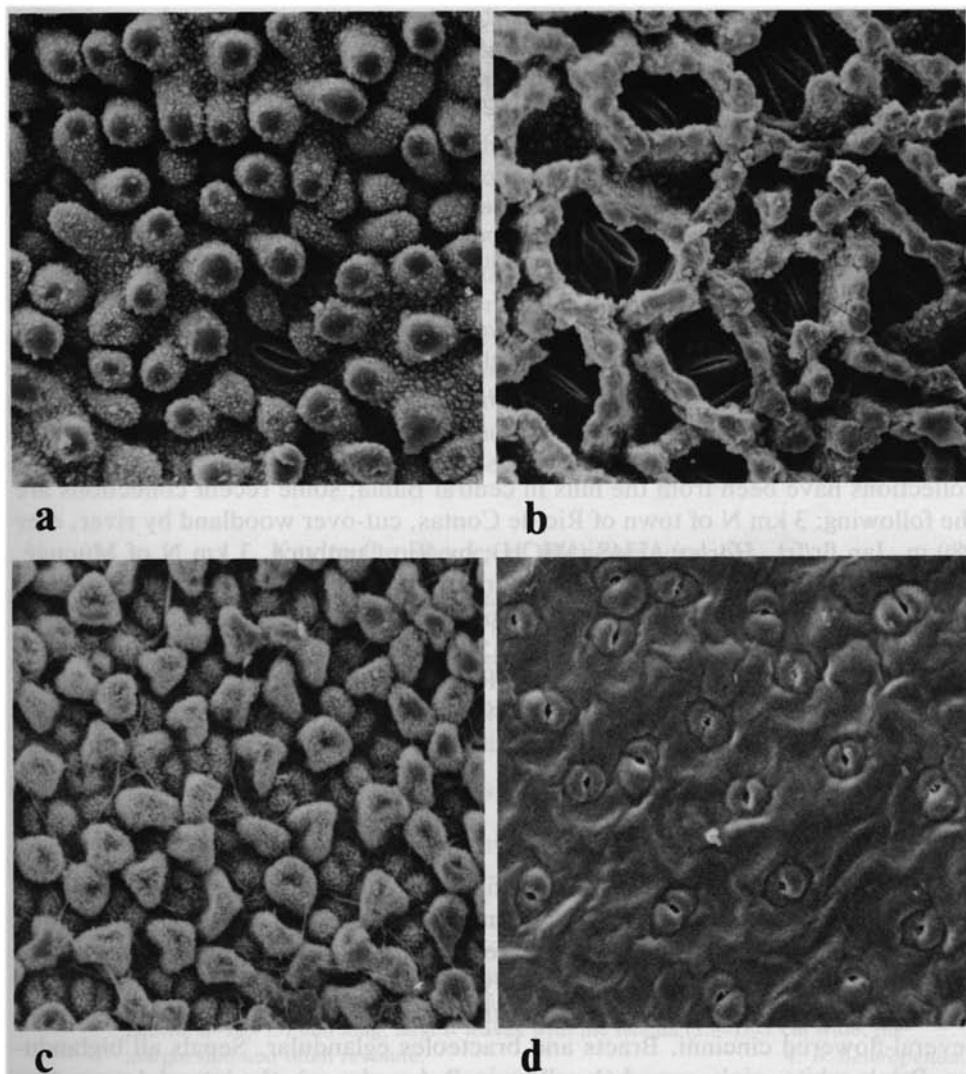


Fig 12. Lower epidermis of *Verrucularia* and *Glandonia*. SEM micrographs. a) *V. piresii*, $\times 250$, Pires 15040; b) *V. glaucophylla*, $\times 250$, Harley 15348; c) *G. williamsii*, $\times 375$, Maguire et al 36493; d) *G. macrocarpa*, $\times 375$, Ducke 63.

Type. Pires 15040, Serra Aracá, elev 1000 m, Amazonas, Brazil, 10 Feb 1975 (holotype IAN 145476, isotype MICH).

This most interesting species is known only from the type, collected by João Murça Pires, for whom the species is named. Prance (1976) states that the Serra Aracá is about 1°N , 63°W . That is an astonishing disjunction from central Bahia where *Verrucularia glaucophylla* grows. The two species must have been separated for a very long time, but there has been only slight morphological divergence. They can be distinguished on the following bases; further collections of *V. piresii* may reveal more differences.

Key to the Species of *Verrucularia*

1. Leaves acute at the apex, olive-green below, the epidermis minutely but densely and evenly papillose (Fig 12a); petiole (8-)10-13 mm long; petals glabrous; anthers 1-1.2 mm long, bearing 1-3 distinct outgrowths on each side; ovary proximally sericeous, distally glabrous. *V. piresii*.
1. Leaves broadly rounded and often apiculate or emarginate at the apex, whitish below, the epidermis bearing a reticulate pattern of raised white cells forming crypts surrounding sunken stomates⁶ (Fig 12b); petiole 2-6 mm long; petals often bearing at least a few hairs on the claw and midrib; anthers ca 0.7 mm long, bearing undivided apical outgrowths; ovary uniformly spreading-sericeous to pilose. *V. glaucophylla*.

In addition to these differences, *V. glaucophylla* has more persistent hairs on its leaves than *V. piresii*, and its calyx glands are larger and less decurrent.

Verrucularia glaucophylla Adr. Jussieu was published in the "Malpighiacearum synopsis," Ann. Sci. Nat. 2° Sér. Bot. 13: 327. 1840. Its type is *Martius* 1921 (M) from the Serra da Villa do Rio de Contas, Bahia, Brazil. All subsequent collections have been from the hills in central Bahia; some recent collections are the following: 3 km N of town of Rio de Contas, cut-over woodland by river, elev 980 m, Jan flr/frt, *Harley* 15348 (MICH); by Rio Cumbuca, 3 km N of Mucugé, Serra do Sincorá, conglomerate sandstone rock, elev 850 m, Feb flr/frt, *Harley* 16027 (K); S of Andaraí near Xique-Xique, Serra do Sincorá, Feb flr/frt, *Harley* 18671 (MICH); Rio do Ferro Doido, 19.5 km SE of Morro do Chapéu, Mar flr/frt, *Harley* 19193 (MICH); S of Vila do Rio de Contas, Mar flr/frt, *Harley* 20076 (MICH); Rio Agreste, *Hatschbach* 39692, and Rio Ferro Doido, *Hatschbach* 39705 (both MICH); Rio Ferro Doido, sand on sandstone, elev 1100 m, Feb flr, *Irwin et al* 32437 (MICH).

5. *Blepharandra* Grisebach, *Linnaea* 22: 7. 1849.

Trees or shrubs, the hairs often basifixed or sub-basifixed, the leaves eglandular, the lamina with many (12-20 or more) fine, parallel lateral veins on each side interconnected by a fine, elaborate reticulum, the stipules intra- and epipetio- lar, free from each other but often basally connate with opposite stipules to form an interpetiolar sheath. Inflorescence a thyrses or pseudoraceme composed of 1-several-flowered cincinni. Bracts and bracteoles eglandular. Sepals all biglandular. Petals white, pink, or red (1 yellow in *B. hypoleuca*), the lateral 4 spreading to reflexed, the posterior erect or spreading. Stamens 10, all fertile, the filaments free, flat, hirsute with straight basifixed hairs, the anthers alike, with 2 linear locules bearing at least apical tufts of basifixed hairs and often hirsute on the sides as well. Receptacle bearing long basifixed hairs inside or all around the stamens. Ovary of 3 quite connate carpels, 1 ± anterior and 2 ± posterior, spheroid or conoid, glabrous; styles 3, imbricate in bud, subulate with minute apical stigmas, glabrous, deciduous in fruit. Fruit a tiny, spheroid or ovoid, 3-angled, dry, indehiscent, nut-like capsule with a bony and often rugose endocarp, glabrous. Embryo with the cotyledons folded (mature seeds not seen).

Type. *Blepharandra hypoleuca* (Benth) Grisebach.

⁶ Plants from the Chapada da Diamantina near Morro do Chapéu in Bahia may have the crypts poorly developed or absent, so that the epidermis below is more or less smooth and not white; in other respects they agree well with other collections of *V. glaucophylla*.

Blepharandra comprises six species, divided here into two geographically and ecologically disjunct sections. Section *Blepharandra* occurs in Guyana and southern Venezuela, while section *Callyntranthele* is found only in Amazonas, Venezuela, and Amazonian Brazil. Where the sections meet, at Cerro Duida, the plants of section *Blepharandra* grow high on the slopes of the tepuí, at elevations of 1400 m or more, while those of section *Callyntranthele* are from lowland savannas at elevations of 400 m or less.

Blepharandra is clearly very closely related to *Diacidia*, a fact that has been overlooked by previous workers (Nieden zu put them in different tribes). Basifixed hairs, exfoliating glaucescence, and lacerate sepals are all present in both genera and otherwise rare in the Malpighiaceae. Accrescent sepals are the rule in *Diacidia* and are found also in *Blepharandra* section *Blepharandra*; they occur sporadically elsewhere in the family, including some species of *Byrsonima*. Stiff awn-like hairs at the apex of the anther are found only in *Blepharandra* and *Diacidia*, and the tiny, dry, indehiscent fruit of these two genera is peculiar to them.

Key to the Species of *Blepharandra*

1. Stipules acute or acuminate at the apex, deciduous before the leaves. Section *Blepharandra*.
 2. Sepals, most bracteoles, and some bracts bearing gland-tipped marginal processes 1–2 mm long; leaves light green below, not glaucous; leaves, vegetative internodes, and abaxial surface of the stipules glabrous. 1. *B. fimbriata*.
 2. Sepals, bracteoles, and bracts entire or denticulate; leaves white- or yellowish-glaucous below; petioles, internodes, and abaxial surface of the stipules densely hairy, leaf blades densely hairy to glabrate below. 2. *B. hypoleuca*.
1. Stipules rounded at the apex, persistent on the leaf-base. Section *Callyntranthele*.
 3. Lamina cuneate or truncate at the base.
 4. Petals all pink, turning white in age; sepals glabrous adaxially or sparsely sericeous near the margin, sericeous abaxially; free lobes of the stipules 2.5–4 mm long; pubescence of the inflorescence light to dark brown; pedicel 5–6(–7) mm long; largest leaves with the lamina 1.5–3 cm wide, the margin thick and non-revolute. 3. *B. angustifolia*.
 4. Lateral 4 petals white, the posterior pink; sepals densely sericeous on both sides; free lobes of the stipules 4–7 mm long; pubescence of the inflorescence white; pedicel 8–10(–13) mm long; largest leaves with the lamina (2.5–)3–7 cm wide, the margin thin and often revolute. 4. *B. heteropetala*.
 3. Lamina cordate at the base.
 5. Lateral 4 petals white, the posterior pink; sepals entire or bearing 1–several short, obscure processes; hairs at apex of anther 1–1.2 mm long. 5. *B. intermedia*.
 5. Petals all pink, the posterior darker, all turning white in age; sepals lacerate into many cilia; hairs at apex of anther up to 0.6 mm long. 6. *B. cachimbensis*.

Section *Blepharandra*

1. *Blepharandra fimbriata* B. MacBryde, Canad. J. Bot. 52: 2437. 1974. Fig 13.

Weak shrub, prostrate to erect, up to 2 m high; vegetative stems terete, glabrous except for tufts of ferrugineous hairs at the nodes. Lamina of the larger leaves 3.5–8 cm long, 1.7–3.8 cm wide, elliptical, cuneate, truncate, or subcordate at the base, obtuse or rounded and sometimes apiculate at the apex, glabrous on both sides, dark green above, light green but not glaucous below, coriaceous, the margin red and thickened, flat or usually revolute, the veins and reticulum visible

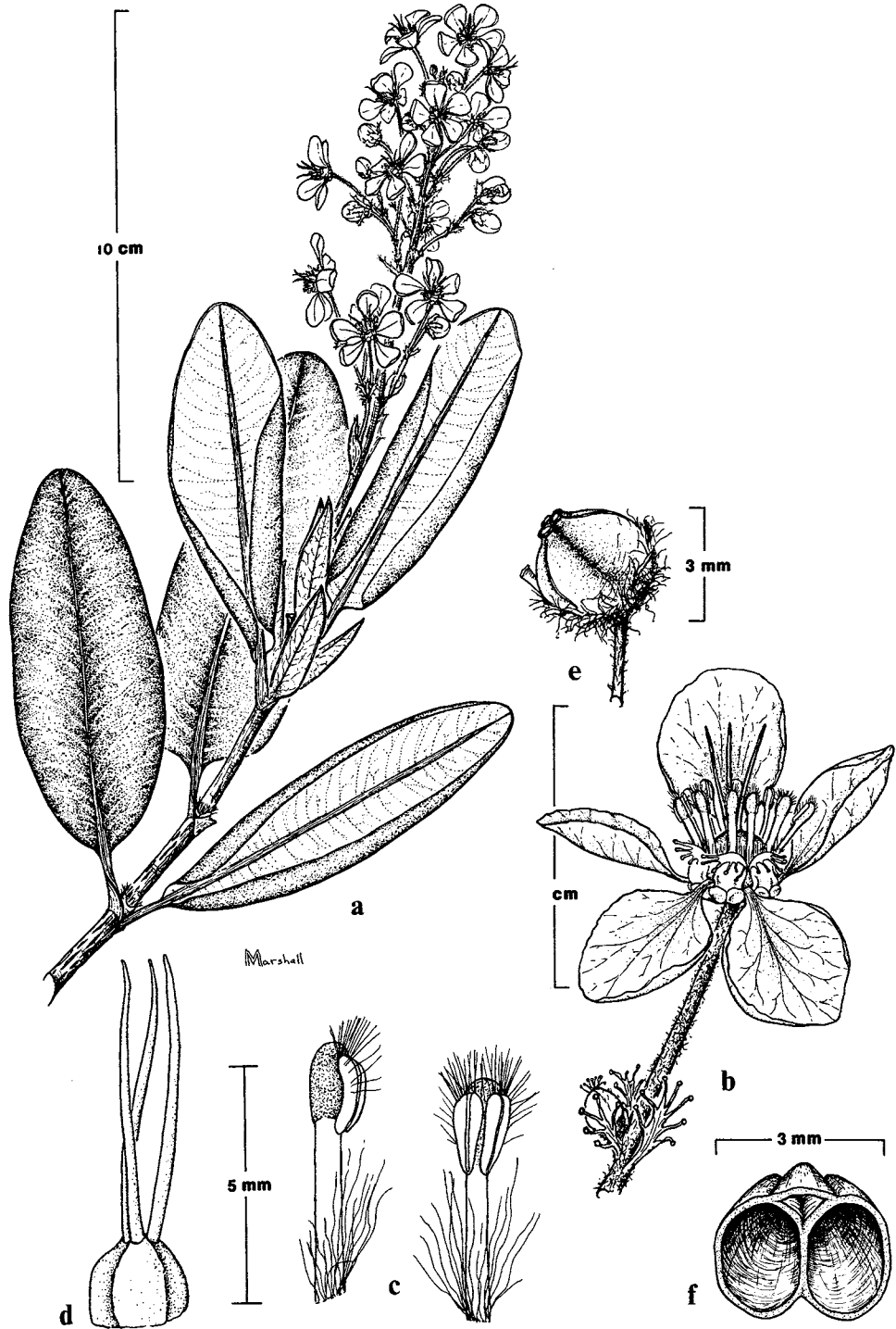


Fig 13. *Blepharandra fimbriata*. a) Flowering branch; b) flower; c) stamens, lateral view (left) and adaxial view (right); d) gynoecium; e) fruit; f) fruit in cross section, seeds removed, showing two locules fertile and one sterile. Drawn from *Maguire 33002* by Melissa Marshall.

or prominulous on both sides; petiole 5–15 mm long, glabrous, often dark red, the bases of opposite petioles briefly connate; stipules foliaceous, 11–30 mm long, 4–7 mm wide, ovate or elliptical, often asymmetrical, acute or acuminate at the apex, free, deciduous well before the leaves, the veins prominent on both sides, abaxially glabrous, adaxially tomentose especially at the margins and bearing a tuft of basifixed ferrugineous hairs at the base. Inflorescence a terminal thyrse 10–14 cm long, the axis dark red or purplish and villous to proximally glabrate; bracts 4–10 mm long, 2–4 mm wide, triangular or lanceolate, flat, entire or bearing few to many gland-tipped marginal processes 1–2 mm long, glabrous or ciliate on the margin, persistent or belatedly deciduous; cincinni 1–4-flowered, the primary peduncle 5–13 mm long, villous; bracteoles like the bracts but smaller. Pedicel 5–14 mm long, sparsely to densely villous. Calyx with glands ca 1.5 mm long and slightly detached at the apex, the sepal lobes often red, triangular, 3–4 mm long, 1.5–2 mm wide, bearing 2–10 gland-tipped marginal processes ca 1 mm long, revolute, glabrous or tomentose on the margins and above the glands, slightly accrescent in fruit (up to 7 mm long and 3 mm wide). Petals white, glabrous, flat or somewhat concave, erose or denticulate, the lateral 4 with the claw 1.5–2 mm long and the limb 5.5–6.5 mm long and wide, subcircular, the posterior petal with the claw 2–2.5 mm long and the limb 6.5–7.5 mm long and wide, subcircular or obovate. Filaments 3–4 mm long, bearing many straight basifixed hairs at the base and few to none distally; anthers 1–1.5 mm long, each locule bearing many straight basifixed hairs in a tuft over the apex and usually in a row down the outer side and often barbate at the base, the connective slightly exceeding the locules at the apex. Pollen slightly prolate, tricolporate, the colpi short, the ora elliptical, oriented at 90° to the colpi and almost as long as them. Ovary 1.3 mm high, with all 3 carpels fertile or the anterior empty and smaller; styles 5–6.5 mm long, often reddish. Fruit 3.5 mm high, 3.5 mm in diameter.

Type. *Cardona 944*, Cerro Guaiquinima, Alto Paragua, Bolívar, Venezuela, elev 1740 m, Oct 1943 (holotype US! isotype VEN!).

Distribution. Known only from Cerro Guaiquinima in Venezuela and the Ayanganna Plateau in Guyana. GUYANA. Upper Mazaruni River basin, Ayanganna Plateau, scrub on W side of Haieka River, 1–2 mi E of Chinowieng Village, elev 740 m, *Tillett et al 45266* (K, MICH, NY, US). VENEZUELA. Bolívar, Cerro Guaiquinima, Alto Paragua: type, q v; elev 1700 m, *Cardona 1107* (VEN); open scrub savanna, cumbre, elev 1800 m, *Maguire 32729* (MICH, NY, US, VEN); North Valley, elev 1600–1700 m, *Maguire 32955* (NY); slopes, ridges and quebradas in valley below SE escarpment, elev 1600–1700 m, *Maguire 33002* (NY, VEN); Salto del Río Szczerbanari (Río Carapo), 5°44'4"N, 63°41'8"W, elev 750 m, *Steyermark et al 113125* (MICH).

Collected in flower and fruit from August to January.

2. *Blepharandra hypoleuca* (Benth) Grisebach, *Linnaea* 22: 7. 1849.

Coleostachys hypoleuca Benth, London Jour. Bot. (Hooker) 7: 125. 1848.

Byrsonima cretacea Gleason, Bull. Torr. Bot. Club 58: 378. 1931. Type. *Tate 533*, Cerro Duida, elev 4800 ft, Amazonas, Venezuela (holotype NY!).

Blepharandra cretacea (Gleason) Steyermark, Fieldiana (Bot.) 28(2): 280. 1952.

Blepharandra cretacea var *composita* Steyermark, Fieldiana (Bot.) 28(2): 281. 1952. Type. *Steyermark 58191*, Cerro Duida, elev 1700–1980 m, Amazonas, Venezuela (holotype F, isotype NY!).

Blepharandra ptariana Steyermark, Fieldiana (Bot.) 28(2): 282. 1952. Type. Steyermark 60310, savanna between Santa Teresita de Kavanayén and base of Ptari-tepuí, elev 1220 m, Bolívar, Venezuela (holotype F, isotype NY!).

Shrubs or small trees 1–8 m tall; vegetative stems loosely sericeous, eventually glabrate. Lamina of the larger leaves 4.5–15.5 cm long, 3–9.5 cm wide, elliptical or ovate, truncate to deeply cordate at the base, slightly revolute at the margin, obtuse or rounded at the apex, coriaceous, green and glabrous above, glaucous and tomentose or sericeous to glabrate below, the glaucescence white and flaky or yellowish and granular, the hairs light brown to dark reddish-brown, usually a mixture of long straight reflexed hairs and short twisted hairs, the vesture varying greatly in abundance and persistence; petiole 2–14(–18) mm long, sericeous or tomentose to glabrate; stipules 5–17(–22) mm long, 3–9 mm wide, ovate or triangular, slightly asymmetrical, acuminate at the apex, free, deciduous before the leaves, often with a prominent midrib, tomentose on both sides and ferrugineous-hirsute adaxially. Inflorescence a terminal, simple or rarely ternate thyrses or pseudoraceme 5–20 cm long, densely and persistently villous or velutinous, the hairs light to dark brown; bracts 5–11 mm long, 2–3 mm wide, narrowly triangular, flat or navicular, entire or denticulate, abaxially villous or sericeous, adaxially glabrous, caducous; cincinni (1–)2–5-flowered, the primary peduncle (0–)2–12 mm long, villous or velutinous; bracteoles 2–7 mm long, 0.5–3 mm wide, linear to ovate, flat or slightly concave, entire or denticulate, abaxially villous to subglabrous and ciliate at the margin, adaxially usually glabrous, caducous or variably persistent. Pedicel 5–10(–16) mm long, villous or velutinous. Calyx with the glands 1–2 mm long, green or pink, circular or elliptical or obovate, often free at the apex, rarely rudimentary, the sepal lobes 2.5–4.5 mm long, 1.5–3 mm wide, triangular, revolute, entire or denticulate, abaxially tomentose or villous, adaxially glabrous or proximally tomentose, slightly accrescent in fruit (up to 5 mm long). Petals glabrous or with a few hairs at base of claw, erose or denticulate, the lateral 4 white, with the claw 1.5–2.5 mm long and the limb 3.5–5(–7) mm long and 4–5.5(–7) mm wide, subcircular, flat or concave, the posterior petal yellow or white, with the claw 2–3 mm long and the limb 4–5.5(–7.5) mm long and 4.5–6(–7.5) mm wide, concave or galeiform. Filaments 2–4 mm long, densely hirsute, especially at the base; anthers 1.3–2.5 mm long, each locule bearing many (rarely few) basifixed hairs (0.5–)0.7–1 mm long in a row over the apex and usually down the outer side, the connective slightly to prominently exceeding the locules at the apex. Ovary 1–1.5 mm high and wide, with all 3 carpels fertile; styles 4–7 mm long. Fruit 2.5–3.5 mm high and wide, contracted at the base.

Type. *Rob. Schomburgk II 677/Rich. Schomburgk 1043*, Roraima, Bolívar, Venezuela ["Guiana angl."] (holotype K; fragment of isotype NY!).

Distribution. Eastern Guyana, Bolívar, Venezuela, and Cerro Duida. GUYANA. Chinoweng, Wandabu Mountain, *Forest Dept. 7842* (NY); Krabu Savanna, on rocks in open, *Forest Dept. 7980* (NY); upper Mazaruni River, Imbaimadai Savannas, in shallow sand on sandstone, elev 550 m, *Maguire 32191* (K, MICH, NY); Pakaraima Mts, Kamarang River–Wenamu Trail, Samwarakna-Tipu, elev 1100 m, *Maguire & Fanshawe 32485* (K, MICH, NY, US), elev 3350 ft, *Maguire & Fanshawe 32561* (K, NY); Kamarang River Crossing, Kamarang Head, elev 2700 ft, *Maguire 33268* (NY); upper Mazaruni River basin, Merume Mts, open rocky places along trail from Partang Rapids to first falls of Partang River, elev

460–550 m, *Maguire et al* 43886 (K, MICH, NY) and 43887 (K, MICH, NY); upper Mazaruni River, Membaru Creek, *Pinkus* 28 (GH, NY) and *Pinkus* 211 (NY); upper Mazaruni River basin, Kamarang River, top of Eboropu escarpment, elev 910 m, *Tillett & Tillett* 45675 (K, MICH, NY, US), Utschi River above Falls, elev 830 m, *Tillett & Tillett* 45845 (K, MICH, NY, US). VENEZUELA. Bolívar: Auyantepuí, *Cardona* 237 (VEN); Cerro Aprada, Caroni, elev 900 m, *Cardona* 1987 (NY, VEN); Río Surukun, Caroni, Perai-tepuí, elev 900 m, *Cardona* 2099 (NY, VEN); Caroni, Cerro Acopán, elev 1800 m, *Cardona* 2286 (VEN), elev 2100 m, *Cardona* 2287 (VEN); Auyantepuí, elev 2100 m, *Cardona* 2662 (NY, VEN); Auyantepuí, elev 1800–2000 m, *Foldats* 2602 (NY, VEN); Salto Angel, *Foldats* 7195 (VEN); Kavanayen, *Lasser* 1807 (NY, VEN); Río Paragua, Cerro Guaikinima, North Valley, elev 1600–1700 m, *Maguire* 32981 (MICH, NY, VEN), *Maguire* 33042 (MICH, NY, US, VEN); Gran Sabana, Ilu-tepuí, Mesa Grande, elev 1600 m, *Maguire* 33354 (NY, VEN); Sororopan-tepuí, north-facing slope, *Maguire & Wurdack* 33920 (MICH, NY, VEN); type, q v; Ptari-tepuí, rocky open portion of plateau on southeast-facing slopes, elev 1600 m, *Steyermark* 59623 (NY, VEN); Chimantá Massif, Apácará-tepuí, elev 2000 m, *Steyermark* 75697 (NY); Auyan-tepuí, dry granite hills, elev 1800 m, *Steyermark* 93587 (VEN); Auyan-tepuí, elev 1850 m, *Steyermark* 93660 (NY, VEN); Cerro Jaua, elev 1922–2100 m, *Steyermark* 97908 (NY, VEN); Sierra Pakaraima, Cabeceras del Río Paragua (Aguapira), elev 1400 m, *Steyermark* 107340 (NY); Meseta del Jaua, Cerro Sarisariñama, elev 1410 m, *Steyermark et al* 108862 (NY); Meseta del Jaua, Cerro Jaua, elev 1750–1800 m, *Steyermark et al* 109320 (NY); savanna of Río Uarama below Uarama-tepuí, NE of Luepa, elev 1220 m, *Steyermark & Nilsson* 632 (NY, VEN); savanna and stream margin along caño E of high part of Torono-tepuí, elev 1975 m, *Steyermark & Wurdack* 982 (MICH, NY, US, VEN); top of slope between Caño Mojado and Río Torono, at extreme N end of Torono-tepuí, elev 2152 m, *Steyermark & Wurdack* 1052 (NY, VEN); Río Carun, Alto Paragua, *Tamayo* 2469 (VEN); Auyan-tepuí, *Tate* 1174 (NY, VEN). Amazonas, Cerro Duida: elev 2100 m, *Fariñas et al* 284 (VEN), 352 (VEN), 531 (NY), 547 (VEN); Culebra Creek, elev 1600 m, *Maguire & Maguire* 29088 (MICH, NY, VEN); Culebra Creek just above Culebra Falls, elev 1400 m, *Maguire et al* 29742 (MICH, NY, US, VEN); elev 1675 m, *Steyermark* 58126 (NY).

Collected in flower and fruit in all months.

This exceedingly variable species defies my best efforts to divide it into natural and useful taxa. An extensive series of collections has been studied, and as often happens with polymorphic species, the more collections one studies the harder it becomes to find groups of correlated characters. It is possible to divide the species on the basis of any of several arbitrarily selected characters, but the membership of the subdivisions keeps changing with the character selected. For this reason I have decided to reject the taxonomy of MacBryde (1970, p 46 et seq) and recognize only *B. hypoleuca*. Study of MacBryde's key (p 46) will illustrate the difficulties. *Blepharandra cretacea* has the leaves not truly sessile, but with petioles only about 2–3 mm long and obscured by the cordate leaf base. Many collections of otherwise typical *B. hypoleuca*, from various parts of the range, have the petioles 3–5 mm long. The next character, whether or not the leaf bases are “amplexicaul,” is not really a separate character from the first. In plants with cordate leaf bases (a common condition in *B. hypoleuca*) the base

will be more or less "amplexicaul" depending on how short the petiole is. Leaf size is not a good basis for the separation, because small-leaved plants of *B. hypoleuca* are common. One can, without difficulty, find plants of *B. hypoleuca* with veins just as prominent as in *B. cretacea*. Number of hairs on the filament and anther is highly variable, with *B. cretacea* representing one end of a continuous series; the type of *B. cretacea* has more than 10 hairs per theca, and many collections of *B. hypoleuca* are intermediate between the "many" and "few" condition. Lest it be felt that the combination of these characters will still support *B. cretacea*, in spite of their individual weakness, I would point to the collections of *B. hypoleuca* from Auyan-tepuí. These collections are Cardona 237 and 2662, Foldats 2602 and 7195, Steyermark 93587 and 93660, and Tate 1174. In general these collections strongly resemble the collections from Cerro Duida that MacBryde calls *B. cretacea*. Most of the Auyan collections have been identified as *B. cretacea* by Gleason or Steyermark, but according to MacBryde's definition they have to be called *B. hypoleuca*. This is because he has chosen to place greatest emphasis on the length of the petiole and the number of hairs on the anther (the Auyan material has fewer anther hairs than usual for *B. hypoleuca*, but more than the Duida specimens). Thus one chooses a character to emphasize and ends up with *B. cretacea* sensu MacBryde or *B. cretacea* sensu Gleason and Steyermark. Neither seems to me to warrant recognition.

In such a variable species, some discussion of the nature and distribution of the more significant variation is necessary.

1. Leaf base. Every intermediate between truncate to deeply cordate can be found, with much variation even on the same plant. There is little geographical pattern, but the truncate leaf base is perhaps commoner in Guyana and easternmost Venezuela.

2. Leaf and bracteole vestiture. With a few exceptions, the leaves on plants from Guyana have few hairs to begin with, and these are soon lost. In most western populations the leaves tend to be and remain more densely hairy. This same general trend holds for bracteoles.

3. Leaf size. Plants with very large and very small leaves have been collected throughout the range of the species, from the Upper Mazaruni River to Cerro Duida. Plants from higher on mountains and in more open vegetation seem often to have smaller, more appressed leaves, but the inconsistency of data on labels makes it hard to assess the significance of this tendency.

4. Inflorescence. Plants with large, many-flowered inflorescences have them "compound," i.e. each cincinnus consists of several flowers. Plants with tighter, fewer-flowered inflorescences have a reduction in the number of flowers per cincinnus, culminating in the pseudoraceme of some plants from Cerro Duida.

5. Stamen hairs. Most collections have many long, stiff, basifixed hairs on the filament and anther, especially at the apex of the anther. However, plants with relatively few shorter hairs on the anther have been collected on Auyan-tepuí, on the Chimantá Massif, and on Cerro Duida.

In addition to these characters, other interesting but apparently trivial variations occur. The sepals are nearly eglandular in Foldats 2602, and that plant also has the connective of the anther extended well beyond the locules, which condition occurs sporadically elsewhere to varying degrees. The stipules are more

belatedly deciduous in plants from Cerro Duida than is usual. *Steyermark & Wurdack 1052*, from Torono-tepuí, is notable for the size of its petals and their red claws, and the density and dark color of the tomentum in the inflorescence.

The variation in this species seems best interpreted as a combination of geographical clines, such as are found in many species and can be identified in herbarium material, and probably ecological variation and differentiation. The latter needs to be studied in the field, where careful analysis of the habitats and associated vegetation may yield an understanding of some of the diversity.

Section *Callyntranthele* (Niedenzu) Anderson, comb et stat nov

Callyntranthele Niedenzu, Ind. lect. Lyc. Brunsb. p. aest. 1897: 4. 1897.

Byrsonima series *Callyntranthele* (Niedenzu) Niedenzu, Arb. Bot. Inst. Ak. Braunsb. 5: 57. 1914.

Type. *Blepharandra angustifolia* (Humboldt, Bonpland & Kunth) Anderson.

3. *Blepharandra angustifolia* (Humboldt, Bonpland & Kunth) Anderson, comb nov

Byrsonima angustifolia Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 153 (4^e ed.), tab. 449. 1821 [1822].

Malpighia pruinosa Sprengel, Syst. 2: 384. 1825, nom superfl.

Callyntranthele angustifolia (Humboldt, Bonpland & Kunth) Niedenzu in Engler & Prantl, Nat. Pflanzenfam. Nachtr. zu III(4): 206. 1897.

Much-branched shrubs or small trees 1–6 m tall; stems terete, originally sericeous (always?), very soon glabrate. Lamina of the larger leaves 4.5–7.5(–8.5) cm long, 1.5–3 cm wide, elliptical or rectangular or narrowly obovate, cuneate to truncate at the base, obtuse to truncate and often slightly emarginate at the apex, coriaceous, flat, the margin white, thickened and not revolute, originally ciliate on the margin and tomentose at base of midrib above but very soon quite glabrate, densely areolate above, glaucous below, the glaucescence exfoliating to expose a prominulous reticulum; petiole 7–11(–18) mm long, often narrowly winged distally, glabrous; stipules persistent on the petiole, connate with adjacent stipules of the opposite leaf to form an interpetiolar sheath 2.5–4 mm long, the free lobes 2.5–4 mm long, rounded at the apex, abaxially glabrous, adaxially densely ferrugineous-hirsute. Inflorescence 5–12 cm long, terminal or axillary, a simple or ternate thyse, the axis ferrugineous-sericeous to velutinous; bracts 2.5–7.5 mm long, ovate, concave, obtuse or rounded at the apex, abaxially sericeous, adaxially glabrous, deciduous before anthesis; cincinni (2–)3–6(–9)-flowered, the primary peduncle 1–3(–5) mm long, velutinous; bracteoles like the bracts but smaller. Pedicel 5–6(–7) mm long, velutinous, circinate in bud. Calyx with the glands (0.7–)1–1.5 mm long, the sepal lobes 2–3 mm long, 1.5–2.5 mm wide, entire, rounded at the apex, flat (not revolute), abaxially sericeous, adaxially glabrous or sparsely sericeous near the margin. Petals pink, turning white with age, glabrous or bearing a few hairs on the claw, the lateral 4 with the claw 1.5–2.5 mm long and the limb 3–4 mm long and wide, cordate, flat or concave, entire or denticulate, the posterior petal with the claw 2.5–3.5 mm long, the limb 3.5–5 mm long and 4–6 mm wide, subcircular, concave or galeiform, dentate. Filaments 2–3 mm long, bearing many straight basifixed hairs, these especially dense at the base; anthers 1–1.2 mm long, the locules clothed in many straight basifixed

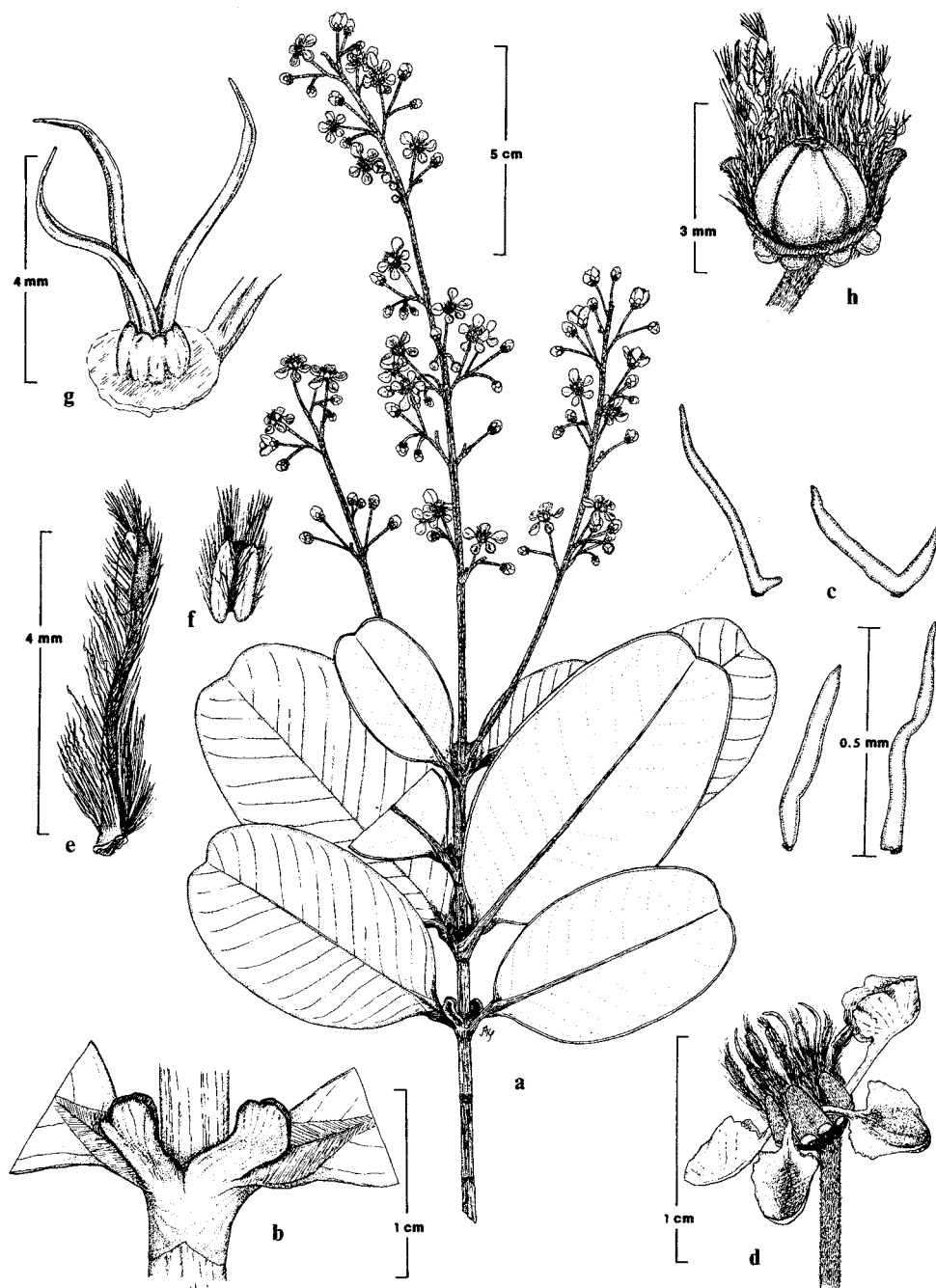


Fig 14. *Blepharandra heteropetala*. a) Flowering branch; b) stipules; c) hairs from inflorescence; d) flower; e) stamen, side view; f) anther, adaxial view; g) gynoeceium, with base of posterior petal for orientation; h) fruit. a-g drawn from Wurdack & Adderley 42704, h from Wurdack & Adderley 43672 by Annette Seidenschnur Mahler.

hairs, especially at the apex, the connective dark red or black, slightly exceeding the locules at the apex. Ovary 1.5 mm high, with all 3 carpels uniovulate; styles 4.5–5 mm long. Fruit 2.5–3 mm high, 3 mm in diameter, the seeds 3 (or fewer due to abortion).

Type. *Humboldt & Bonpland*, “juxta confluentem fluminis Atabapi et Orinoci,” probably Amazonas, Venezuela (holotype P).

Distribution. Savannas between the Alto Río Orinoco and the Alto Río Negro. VENEZUELA. Amazonas: Santa Cruz, margin of Río Atabapo, near mouth of Río Atacavi, *Foldats 3658* (NY, VEN); Cerro Yapacana, Río Orinoco, dominant shrub of savanna, gold mine trail, elev 125 m, *Maguire et al 30779* (NY, VEN); Yapacana caño laguna, NW base of Cerro Yapacana, elev 125 m, *Maguire & Wurdack 34480* (MICH, NY, US, VEN) and *Maguire & Maguire 34501* (MICH, NY, US, VEN); Pacimoni savanna, on right bank of Río Pacimoni 50 km above mouth, elev 100–140 m, *Maguire et al 37576* (MICH, NY, VEN); Yapacana savannas, NW base of Cerro Yapacana, *Maguire et al 41484* (MICH, NY, VEN); above junction of Caño Cotua with Río Orinoco, SW of Cerro Yapacana, elev 100 m, *Steyermark & Bunting 103000* (NY, VEN); Caño Manomi/Casiquiare, *Vareschi 7786* p.p. (VEN). BRAZIL. Amazonas: Rio Curicuriary, alto Rio Negro, catinga na margem rochosa da cachoeira do Cajú, *Ducke s n* [RB 25233] (RB); Igarapé Toury, afl. do Rio Negro, beira da caatinga, ao longo da margem do rio, *Fróes 27897* (IAN).

Collected in flower from August to April.

The species treated by Cuatrecasas as *Byrsonima angustifolia* is actually an undescribed species of *Byrsonima*, which is described below as *Byrsonima bronweniana*.

4. *Blepharandra heteropetala* Anderson, sp nov

Fig 14.

Frutex vel arbor 2–7 m alta, ramis vegetativis glabris (ab initio?), cicatricibus prominentibus. Foliorum majorum lamina 6–10 cm longa, (2.5–)3–7 cm lata, elliptica vel ovata, basi cuneata vel truncata, margine revoluta, apice emarginata, reticulo utrinque prominulo vel obscuro, subtus nunc glauca glaucidine tenui non exfoliata, nunc eglauca; petiolus (6–)8–12 mm longus, 3–5 mm proximalibus in vagina cum stipulis connatis, distaliter alatus; stipulae epipetiolares, in petiolo persistentes, cum stipulis oppositis in vagina interpetiolari 3–5 mm longa connatae, lobis liberis 4–7 mm longis, apice rotundatis, abaxialiter glabris, adaxialiter basi hirsutis apice glabris. Inflorescentia 7–20 cm longa, terminalis vel axillaris, simplex vel saepius ternata vel biternata, thyrsoformis, albovelutina, bracteis 2.5–5 mm longis, 1.5–2 mm latis, ovatis, concavis, abaxialiter subsericeis vel glabris, adaxialiter glabris, caducis, cincinnis 2–6-floriferis, velutinis, pedunculo primario 1–3 mm longo, bracteolis bracteis similibus sed minoribus et abaxialiter sericeis. Pedicellus 8–11 (in fructu 13) mm longus, velutinus pilis 0.3 mm longis, in alabastro circinatus. Sepalorum glandes 1.3–2 mm longae, obovatae, lobi (1.5–)2–3 mm longi, (1–)1.4–2 mm lati, triangulares, apice acuti vel obtusi vel rotundati, plani vel apice paulo revoluti, integri (vel obscure denticulati), utrinque laxe sericei. Petala glabra vel ungue paucipilifero; petala 4 lateralibus alba, ungue 1–1.5 mm longo, limbo 3–4 mm longo, 2.5–4 mm lato, ovato, margine denticulato, paulo concavo; petalum posticum roseum, ungue 3–4 mm longo, 1 mm diametro, limbo

3.5–4.5 mm longo, 5–6 mm lato, galeiformi, margine denticulato. Filamenta 1.5–4 mm longa, utrinque densissime pilosa, pilis longissimis, tenuibus, basifixis; antherae 1–1.7 mm longae, connectivo atrorubro loculos aequanti vel paulo superanti, loculis pilosis pilis basifixis apice persistentibus rectis 1–1.2 mm longis; pollen tricolporatum. Ovarium conoideum vel sphaeroideum, 1–1.2 mm altum, 1.3–1.5 mm diametro, triloculare, loculis omnibus uniovulatis; styli 5–6 mm longi, patulo-ascendentes. Fructus 2 mm altus, 2.5 mm diametro, subsphaeroideus. Semina 3 vel abortu 2 vel 1, matura ignota.

Type. *Wurdack & Adderley 42704*, Sabanita Morocoto, right bank of Río Orinoco, 8 km below mouth of Río Atabapo, Amazonas, Venezuela, elev 125–150 m, 30 May 1959 (holotype MICH, isotypes NY, US, VEN).

Distribution. Savannas of the Alto Río Orinoco to campinas east and north of Manaus. VENEZUELA. Amazonas: Sabana de Morocoto, W of Cerro Morocoto, Río Orinoco below San Fernando de Atabapo, elev 150 m, *Level L-7* (MICH, NY, US, VEN); type, q v; Cerro Cariche, near left bank of Río Orinoco, half-way between Tama-Tama and San Antonio, elev 350 m, *Wurdack & Adderley 43672* (MICH, NY, US, VEN). BRAZIL. Amazonas: Manaus-Caracarái Road, Km 140, white sandstone, *Berg et al P18162* (INPA, MICH) & Km 130, scrub forest on sandstone, *Berg et al P19507* (INPA, MICH); Rio Urubú, Maracaran, terrenos secos, altos e arenosos, *Fróes 25113* (IAN, US); Rio Urubú, *Fróes 25260* (IAN); Rio Aracá, sub-afl. do Rio Negro, solo arenoso, *Fróes & Addison 29280* (IAN, UB); Manaus-Caracarái, Km 130, Igarapé Lages, disturbed campina, *Nelson & Lima P21058* (INPA, MICH); Rio Urubú, Ig. Cachoerinha, *N. Pereira [MG 30278 & 30279]* (MG); Campina da Lage, com blocos de arenito, Igarapé de Lage, *Pires & Leite 14536* (IAN); Manaus-Caracarái Road, Km 130, Igarapé Lages, campina amongst sandstone rocks, *Prance 21031* (INPA, MICH); Manaus, Km 200 [near Rio Urubú], campina arenosa, *Rodrigues 7260* (INPA); low forest near Igarapé Lages, Km 130, *Steward et al P20250* (INPA, MICH).

Collected in flower in almost all months, most commonly from May to September.

Recently collectors have found in southern Amazonas a *Blepharandra* that is similar to *B. heteropetala* in stature and leaf-shape, but its leaves are smaller than usual and the flowers are reported to be white, with no mention made of the pink flag petal for which the species is named. Perhaps these populations represent *B. heteropetala* with some introgression from the southern species, *B. cachimbensis*, or perhaps they deserve recognition as yet another species in this complex. The collections are INPA 60468 from the Municipio de Lábrea and INPA 60667, 60670, and 60696 from Nova Prainha.

5. *Blepharandra intermedia* Anderson, sp nov

Fig 18a–f.

Frutex usque 2 m altus, ramis vegetativis glabris. Folia appressa; lamina foliorum majorum 4–7 cm longa, 2.5–4.2 cm lata, elliptica vel oblona, basi cordata, margine plana vel revoluta, apice rotundata et emarginata, coriacea, glabra, reticulo obscuro vel utrinque prominulo; petiolus 5–7 mm longus, glaber; stipulae 5–7 mm longae, 2–3 mm proximalibus in vagina cum petiolo et stipulis oppositis coalitis, 3–4 mm distalibus liberis rotundatis, abaxialiter glabrae, adaxialiter hirsutae in dimidio proximali. Inflorescentia 6–15 cm longa, terminalis, thyriformis, simplex vel ternata, albo- vel brunneo-velutina, cincinnis 2–3-floris, bracteis brac-

teolisque caducis, bracteis 2–4 mm longis, oblongis, margine ciliatis aliter glabris, bracteolis 1.5–3 mm longis, ovatis, abaxialiter sericeis. Pedicellus 7–10 mm longus, velutinus. Flos et fructus velut in *B. heteropetala*.

Type. *Pires & Leite 14840* [IAN 144455], Rodovia Perimetral Norte 20 km a leste de Caracará, Terr. Roraima, Brazil, 1 Jul 1974 (holotype IAN, isotype NY).

Distribution. BRAZIL. Terr. Roraima: R. Anauá, caatinga de Barcella, Apr flr/imm frt, *Pires et al 14453, 14483 & 14493* (all MICH); type, q v.

This plant is quite intermediate between *Blepharandra cachimbensis* and *B. heteropetala*, having the stature and small cordate leaves of the former and the pink and white petals, nearly or quite entire sepals, and long anther-hairs of the latter. Its status as a species depends on morphological discontinuities that may or may not be reinforced by further collection. It may have arisen through relatively recent hybridization between *B. heteropetala* and the mostly southern *B. cachimbensis*, which was recently collected for the first time north of the Amazon (*Coelho 784*).

6. *Blepharandra cachimbensis* Anderson, Bol. Mus. Bot. Mun. (Curitiba) 26: 1. 1976.

Shrubs 1–2(–3) m tall; vegetative branches glabrous. Lamina of the larger leaves (2)–2.5–6(–6.6) cm long, 1.5–4 cm wide, elliptical, cordate at the base, flat or slightly revolute at the margin, rounded and very often emarginate at the apex, glabrous, coriaceous; petiole 2–4 mm long, glabrous; stipules 4–8 mm long, persistent on the petiole, connate with adjacent stipules of the opposite leaf to form an interpetiolar sheath, the lobes free, rounded at the apex, abaxially glabrous, adaxially hirsute at the base. Inflorescence 5–15 cm long, a terminal simple or ternate thyse, densely white- or brown-velutinous; bracts 4–8 mm long, 3–5 mm wide, triangular or ovate, concave, denticulate, caducous; cincinni 3–6-flowered; bracteoles like the bracts but smaller. Pedicel 5–12 mm long, velutinous. Calyx with the glands 1–2.5 mm long, obovate, the sepal-lobes 2.5–4 mm long, 1.7–2.5 mm wide, ovate, very broadly rounded at the apex, lacerate at the margin into many long cilia, usually distally revolute, sericeous on both sides. Petals all pink, the posterior darker than the lateral 4, all turning white in age; lateral 4 petals with the claw 1.5–2.3 mm long, the limb 3.5–5 mm long, 4–5.3 mm wide, orbicular, slightly concave, entire or denticulate; posterior petal with the claw 2.5–4 mm long, the limb 5.5–6.5 mm long, 6–7.5 mm wide, flat or concave or slightly corrugated, obtusely denticulate. Filaments 2.5–4.2 mm long, free or very slightly connate, very densely pilose on both sides, the straight, slender, basifixed hairs especially dense on the proximal half; anthers 1–2 mm long, the locules bearing relatively few, often caducous hairs on their sides and a cluster of 8–16 straight, basifixed hairs up to 0.6 mm long at the apex of each locule, the connective dark red, slightly exceeding the locules at the apex. Ovary spheroid, 1.4–2 mm in diameter, glabrous, with all 3 locules uniovulate; styles 4–5 mm long, glabrous. Fruit 2.5–3 mm in diameter, 2–2.5 mm high, subspheroid, glabrous, the seeds 3 (or fewer due to abortion).

Type. *Anderson 10896*, upper, drier part of sandy floodplain between Rio Cururú and Missão Velha, Alto Tapajós, Pará, Brazil, elev ca 200 m (holotype IAN, isotypes MICH, NY).

Distribution. Sandy campos in Amazonian Brazil, mostly in the south. BRA-

ZIL. Pará: Serra do Cachimbo, *Alvarenga* [RB 90557] (RB); type, q v; NW edge of Serra do Cachimbo, among rocks of blocky sandstone, *Anderson 10965* (IAN, MICH, NY); Cachimbo, no campo, no meio das pedras, *Bockermann 185* (SP); Alto Tapajós, Rio Cururú, Missão Velha, campo alagavel, *Egler 1040* (HB, IAN, MICH, MG, NY); Serra do Cachimbo, *Pereira 1777* (RB), *Pires et al 6112* (IAN, NY), *Prance et al 25236* (MICH), *Sick B.621* (HB, RB); Rio Teles Pires, São Benedito, *Silva 3672* (MICH). Amazonas: Estrada Manaus-Caracarái, Km 60, *D. Coelho 784* (INPA); próximo do R. Tucunuri, Prainha, campo cerrado, *Pena 328* (IAN); margém do Rio Aripuanã, campo cerrado, *Ribeiro 371* (IAN). Terr. Rondonia: Igarapé Preto, RADAM ponto 61-Q XB-SC-20, solo de arenito, campo cerrado, *Ribeiro 1096* (MICH).

Collected in flower in almost all months.

6. *Diacidia* Grisebach in Martius, Fl. Bras. 12(1): 119. 1858.

Sipapoa Maguire, Mem. New York Bot. Gard. 8(2): 124. 1953.

Trees, shrubs, or subshrubs, with mostly basifixed or sub-basifixed hairs, the leaves eglandular; proximal portion of stipules and petioles fused to form an interpetiolar sheath; distal portion of stipules (the part extending beyond the petioles) free or connate. Inflorescence a simple or compound thyrse (i.e. a raceme or panicle of cincinni) or a pseudoraceme (i.e. a raceme of 1-flowered cincinni); bracts and bracteoles eglandular. Sepals all biglandular, slightly (subgenus *Diacidia*) or greatly (subgenus *Sipapoa*) accrescent in fruit. Petals yellow, often with red claws, glabrous or with a few hairs at base of claw; lateral petals spreading or reflexed, posterior petal erect, its claw stouter than in the laterals and its limb a different shape. Stamens 6–10; filaments flattened, free or especially the posterior 3(–5) up to $\frac{1}{2}$ connate, abaxially glabrous, adaxially hirsute at the base; anthers deciduous, alike, 2-locular, each locule bearing at the apex and angled forward 1(–2) stout, basifixed, awn-like hairs [hence the name of the genus, meaning two-barbed], the connective equalling the locules or extended and bent forward between them at the apex; pollen tricolporate. Receptacle hirsute between filaments and ovary. Ovary glabrous, syncarpous, spheroid or conoid, 1–1.5 mm high, composed of 3 carpels but only 2-locular, the anterior carpel reduced to a ridge of tissue; styles 3, glabrous, straight, subulate, 2–4 mm long, unequal, one or both of the 2 posteriors shorter than the anterior, the stigmas minute and slightly internal. Fruit a spheroid or ovoid, dry, indehiscent, nut-like capsule ca 2.5 mm high and wide, glabrous, with a thin exocarp and a bony, smooth or rugose endocarp and containing 2 seeds (or 1 due to abortion), subtended and enclosed by accrescent (in subgenus *Sipapoa* red, membranous, veiny, wing-like) sepals.

Type. *Diacidia galphimiioides* Grisebach.

I have given careful consideration to Dr. Bassett Maguire's (1969) bases for maintaining *Sipapoa* distinct from *Diacidia*. The ones with which I can agree are given in the key below; for the others (habit, leaf size, anther pubescence, substrate, geographical range), recent collections or observations have eroded their ability to separate the two groups. With its reduced androecium and accrescent sepals, *Sipapoa* is obviously a natural group, but its close relationship to *Diacidia* is equally obvious. Since I prefer to emphasize relatedness at the generic level,

I have decided to combine the two groups as subgenera of a single genus. This course is consistent with the rather conservative view of genera that has prevailed in most studies of the Malpigiaceae.

Diacidia is closely related to *Blepharandra*. See the treatment of *Blepharandra* for a discussion of that relationship.

Key to the Species of *Diacidia*

1. Stamens 10; sepals only slightly accrescent in fruit, up to 3.5 mm long and 2.5 mm wide; interpetiolar stipular sheath 2–3(–6) mm long, obscure, lacking median seams; known only from elevations of 100–450 m. Subgenus *Diacidia*.
 2. Robust shrubs or small trees 0.5–2(–4) m tall; larger leaves 4–9 cm long, 1.2–5 cm wide; lateral veins of the lamina raised below; bracteoles mostly 3–7 mm long; pedicel (6–)7–10 mm long. 1. *D. galphimoides*.
 2. Subshrubs or spindly shrubs to 1 m tall; larger leaves 0.7–3 cm long, 0.3–1.6 cm wide; lateral veins of the lamina flat and usually inconspicuous below; bracteoles 1.5–2.5 mm long; pedicel 4–7 mm long. 2. *D. parvifolia*.
1. Stamens 6–9; sepals greatly accrescent in fruit, forming membranous wings 7–13 mm long and (2.5–)4–12 mm wide; interpetiolar stipular sheath 4–26 mm long, marked by median seams; known only from elevations of 650–2250 m. Subgenus *Sipapoa*.
 3. Stipule-lobes beyond petiole completely connate to form a single intrapetiolar structure.
 4. Stipules beyond petiole 28–90 mm long, broadly obtuse or rounded at the apex.
 5. Leaves densely and persistently hairy above. 3. *D. glaucifolia*, sucker shoots?
 5. Leaves glabrous above, or at most sericeous on the midrib and ciliate on the margin.
 6. Inflorescence a compound thyse, with a terminal axis and few to many lateral axes, and with the cincinni several-flowered; inflorescence, bracts, bracteoles, and sepals densely and persistently hairy; trees 2–15 m tall.
 7. Leaves glabrous or soon glabrate below. 3. *D. glaucifolia*.
 7. Leaves densely and persistently rufous-sericeous below. 4. *D. rufa*.
 6. Inflorescence a simple pseudoraceme, glabrate; bracts, bracteoles, and sepals glabrous; shrubs 0.5–3 m tall. 5. *D. stipularis*.
 4. Stipules beyond petiole 7–10 mm long, acute at the apex. 6. *D. kunhardtii*.
 3. Stipule-lobes beyond petiole nearly or quite distinct.
 8. Inflorescence a simple thyse with several-flowered cincinni, glabrous; leaves glabrous below. 7. *D. cordata*.
 8. Inflorescence a pseudoraceme, hairy; leaves hairy below.
 9. Vegetative internodes glabrous. 8. *D. hypoleuca*.
 9. Vegetative internodes hairy.
 10. Lamina of the larger leaves 3–6 cm long, 1–2.5 cm wide, glabrous or soon glabrescent above except for the very base; stipule-lobes 1–3 mm long.
 11. Fertile stamens 6; connective of the anthers much enlarged, globular at the apex; sepals ciliate on the margin; leaves glabrous above except sericeous at the very base; leaf hairs sub-basifixed above, basifixed below. 9. *D. ferruginea*.
 11. Fertile stamens 8; connective of the anthers slightly overtopping the locules but hardly or not at all enlarged; sepals glabrous on the margin; leaves initially sericeous above, soon glabrescent; leaf hairs sub-medifixed to sub-basifixed above, sub-basifixed below. 10. *D. aracaensis*.
10. Lamina of the larger leaves 6–10 cm long, 3–5.5 cm wide, densely and persistently hairy above; stipule-lobes 5–15 mm long.
 12. Abaxial surface of the lamina woolly, the hairs much twisted and

- intertwined; lateral veins prominulous below; fruit wings (i.e. enlarged sepals) cordate at the base. 11. *D. vestita*.
12. Abaxial surface of the lamina sericeous, the hairs straight, more or less appressed, and parallel; lateral veins very prominent below; fruit wings truncate at the base. 12. *D. steyermarkii*.

Subgenus *Diacidia*

1. *Diacidia galphimoides* Grisebach in Martius, Fl. Bras. 12(1): 120. 1858.

Diacidia duckeana Maguire, Mem. New York Bot. Gard. 8(2): 124. 1953. Type. *Ducke*, Cucuhy, Rio Negro, Amazonas, Brazil (holotype US!).

Shrubs or small trees 0.5–2(–4) m tall; vegetative internodes sericeous. Lamina of the larger leaves 4–6(–9) cm long, 1.2–2.7(–5) cm wide, elliptical, cuneate or rounded at the base, flat at the margin, acute or obtuse and apiculate at the apex, slightly or not glaucous on both sides, loosely sericeous to subtomentose on both sides, occasionally glabrescent in age, the hairs basifixed or sub-basifixed, the lateral veins obscure above and raised below; petiole 4–8 mm long, with the proximal 2–3 mm part of the petiolar-stipular sheath and the distal 2–5 mm free, sericeous; stipules 5–8(–13) mm long, united proximally with the opposite pair to form an obscure, smooth sheath without seams 2–3(–6) mm long, the distal 2–5 (–7) mm completely connate to produce a single intrapetiolar structure broadly rounded at the apex, abaxially sericeous, adaxially glabrous. Inflorescence 9–18 (–22) cm long, glabrous or sparsely sericeous below the lowest cincinnus, a simple thyrses, the cincinni (1–)2–10-flowered; bracts and bracteoles glabrous, the bracts ca 5 mm long and caducous, the bracteoles (3–)4–7 mm long, deciduous. Pedicel (6–)7–10 mm long, glabrous. Sepals revolute, entire, glabrous. Limb of the lateral petals 3.5–5 mm long and wide; limb of the posterior petal 4–6 mm long, 5–7.5 mm wide. Fertile stamens 10; anthers 0.8–1.3 mm long, each locule bearing 1 (–2) apical awns and abundantly tomentose on the sides and base with long, fine, twisted, persistent or deciduous hairs, the connective bent forward over the apex and down between the locules. Fruit subtended by slightly accrescent sepals, these up to 3.5 mm long, 2.5 mm wide, truncate at the base, entire at the margin, obtuse or rounded at the apex, glabrous.

Type. *Spruce* 2966, ad flumina Casiquiare, Vasiva et Pacimoni, Amazonas, Venezuela (GH! K).

Illustration. Niedenzu, 1928, p 764.

Distribution. Upper Río Orinoco and tributaries, upper Río Negro and tributaries, and Río Vaupés and tributaries, at elevations of 100–380 m, usually among granitic rocks. VENEZUELA. Amazonas: Caño Caranaben, 10 km below San Fernando de Atabapo, *Level L-58* (MICH, NY, US, VEN); Cerro Cucuy, *Maguire & Wurdack* 34921 & 34943 (both NY); Cerro Nunca, *Maguire & Wurdack* 34953 (NY, VEN); Río Guayapo, *Morillo & Ishikawa* 3470 (VEN); 5 km sur de Pendare, Río Sipapo, *Morillo & Ishikawa* 3513 (VEN); Piedra de Cocuá, *Schultes & López* 9455 (US); type, q v; cerca de la bifurcación del Casiquiare y el Río Guainía, *Ll. Williams* 14793 (G, US, VEN); bajo Río San Miguel, Guainía, *Ll. Williams* 14905 (G, US, VEN). BRAZIL. Amazonas: Alto R. Negro, 67°52'W, 1°5'N, *Coradin* 479 [IAN 149.954] (MICH); Serra de Cucui, Mun. São Gabriel, *Fróes* 12388/147 (NY); Cucui, *Luetzelburg* 22330 & 22873 (both R); S. Gabriel, *Nascimento et al* 121 [IAN 148.232] (MICH). COLOMBIA. Vaupés: Cerro de

Mitú, *Cuatrecasas* 6882 (US) & *Davis* 202 (MICH); Cerro del Varador, Río Inírida, *Alv. Fernández* 2074 (US). Cerro Mitú, *Maguire et al* 44091 (COL, NY) & 44100 (NY); Río Negro, opposite Piedra de Cocuí, *Schultes & López* 9891 (NY, US); San Felipe & vicinity, *Schultes et al* 18096 (NY, US) & 18123 (US); Mesa de Yambí, Río Karurú, *Schultes & Cabrera* 19170 (US); Río Vaupés, cerro de Tipiaca, between Mitú and Javareté, *Schultes & Cabrera* 19314 & 19318 (US); granitic slope at Cerro de Mitú, *Zarucchi* 1674 (MICH).

Collected in flower and fruit from September to May.

2. *Diacidia parvifolia* Cuatrecasas, *Webbia* 13(2): 632. 1958.

In addition to the differences given in the key, this species differs from the preceding one in having slightly smaller petals, and the connective of the anther does not extend so far forward between the locules. For a complete description see the protologue.

Type. *Cuatrecasas* 7703, San José del Guaviare, Vaupés, Colombia (holotype US!).

Distribution. Vaupés, Colombia, in savannas, often over quartzitic rocks, at elevations of 100–450 m. In addition to the collections cited in the protologue, I would refer the following collections (annotated as *D. galphimoides* by Cuatrecasas) to this species: Río Kuduyarí, Cerro Yapobodá, *Schultes & Cabrera* 14355 (US), *Schultes et al* 20049 (NY, US). Recent collections, all from Mitú and vicinity: Río Paraná-pichuna, sandstone savanna at major rapids, *Zarucchi* 1343 (MICH); lower Río Kubiyú, sandstone savanna, *Zarucchi* 1409 & 1778 (MICH); lower Río Paraná-pichuna, savanna at major rapids, *Zarucchi* 1990 (MICH).

Collected in flower and fruit in almost every month.

This is very closely related to *Diacidia galphimoides*. Plants from the Río Negro and Río Orinoco areas have large leaves and bracteoles; these constitute “typical” *D. galphimoides*. Most plants from southeastern Colombia have small leaves and bracteoles, and are recognized here as *D. parvifolia*. However, plants from Cerro Mitú in Colombia have the larger leaves and stature of *D. galphimoides* but bracteoles little larger than those of *D. parvifolia*. These plants are being called *D. galphimoides* here, but it seems clear that they represent intermediates between the two “species,” and that population deserves study to try to determine its genetic and ecological position with respect to *D. galphimoides* sens str and *D. parvifolia*.

Subgenus *Sipapoa* (Maguire) Anderson, comb et stat nov

Sipapoa Maguire, Mem. New York Bot. Gard. 8(2): 124. 1953.

Type. *Diacidia kunhardtii* (Maguire) Anderson.

In the descriptions below, the term “fruit wings” refers to the accrescent, wing-like sepals; the fruit proper is unwinged.

3. *Diacidia glaucifolia* (Maguire) Anderson, comb nov

Sipapoa glaucifolia Maguire, Mem. New York Bot. Gard. 18(2): 48. 1969.

Trees 5–15 m tall; vegetative internodes glabrous. Lamina of the larger leaves 16–27 cm long, 11–18 cm wide, broadly elliptical or obovate, obtuse or truncate

or subcordate at the base, obtuse or rounded at the apex, glaucous below, glabrous above, ciliate to glabrate on the margin, sericeous below on the midrib and lateral veins to soon glabrate, the hairs 1–1.5 mm long, basifixed, straight, fine, the veins prominent below; petiole 3.4–5.3 cm long, with the proximal 1.7–2.8 cm part of the petiolar-stipular sheath and the distal 1.3–2.5 cm free, glabrous; stipules 8.2–10.5 cm long, united proximally with the opposite pair to form a sheath 1.2–2 cm long, the distal 7–9 cm completely connate to produce a single intrapetiolar structure broadly rounded at the apex, abaxially glabrous and glaucous, marginally ciliate to glabrate, adaxially glabrous except hirsute at base inside sheath. Inflorescence 17–35 cm long, laxly rufous-sericeous, a compound thyrse, the terminal axis ternate and subtended by 2–4 unbranched lateral axes, the cincinni mostly 4–10-flowered; bracts and bracteoles sericeous or tomentose on both sides, more densely so abaxially, the bracts caducous, the bracteoles smaller and longer persistent. Pedicel 4–10 mm long, villous. Sepals revolute, dentate or lacinate, abaxially tomentose or villous, adaxially sparsely tomentose to glabrate. Limb of the petals 5–7 mm long, 4–6 mm wide. Fertile stamens (8–)9, 1 (very rarely both) of the stamens opposite the anterior-lateral petals absent; anthers 1.4–1.8 mm long, each locule bearing 1(–2) apical awns and otherwise glabrous. Fruit wings up to 9 mm long and 4 mm wide, truncate or cordate at the base, dentate or lacinate at the margin, abaxially tomentose or villous.

Type. *Maguire et al 42057*, Cerro de la Neblina, Río Yatúa, Amazonas, Venezuela (holotype NY! isotypes F! NY! US! VEN!).

Distribution. Known only from the Cerro de la Neblina in Venezuela and the nearby Serra de Pirapucú in Brazil, at elevations of 650–1100 m; see protologue.

Collected in flower and fruit from November through February.

Two intriguing collections from Neblina may represent hairy-leaved sucker shoots of this species. They are *Maguire et al 42057B*, for which the label states they are sucker shoots, and *Coradin 445* (IAN 149920 & 149920a). In the latter case the plant was described as a shrub 1.5 m tall; it may have been juvenile, or these may have been stump sprouts. Both collections are sterile. The leaves are smaller, especially narrower, than in typical specimens, and cuneate at the base. More interesting, the leaves are abundantly and persistently hairy on both sides (mostly on the midrib and veins below, uniformly above) and ciliate on the margin, with straight basifixed hairs 3–7 mm long. The petioles and stipules are also hairy. This is in marked contrast to *Maguire et al 42057A*, sterile apical shoots with glabrate leaves like those of the flowering stems. Such dimorphism between sucker shoots and apical shoots is otherwise unknown in the Malpighiaceae, and almost incredible to me. I think it possible that there is actually an undescribed species of *Diacidia* on Neblina, a shrub with hairy leaves, but until it is found fertile these two collections are best left with *D. glaucifolia*.

4. *Diacidia rufa* (Maguire) Anderson, comb nov

Sipapoa rufa Maguire, Mem. New York Bot. Gard. 18(2): 48. 1969.

Trees 2–12 m tall; vegetative internodes glabrous. Lamina of the larger leaves 8.5–17(–22) cm long, 5–10(–14) cm wide, obovate, truncate or usually slightly cordate at the base, obtuse at the apex, glaucous below (the glaucescence often

hidden by hairs), glabrous above or sericeous on the midrib, ciliate on the margin, persistently rufous-sericeous below, the hairs 1–4 mm long, basifixed, straight, fine, longer on the midrib and lateral veins but very dense over the whole surface, the veins prominent below; petiole 2–4(–5) cm long, with the proximal 1.2–3 (–3.5) cm part of the petiolar-stipular sheath and the distal 0.5–1(–1.5) cm free, glabrous; stipules 5.5–10 cm long, united proximally with the opposite pair to form a sheath 1–2 cm long, the distal 4–8 cm completely connate to produce a single intrapetiolar structure broadly rounded at the apex, abaxially sericeous to glabrate and glaucous, ciliate on the margin, adaxially glabrous except hirsute at base inside sheath. Inflorescence, flowers, and fruit $\pm$ like those of *D. glaucifolia*, the cincinni only 2–6-flowered and various parts, especially the pedicels and sepals, tending to be more densely villous.

Type. *Maguire et al* 42036, Cerro de la Neblina, Río Yatúa, Amazonas, Venezuela (holotype NY! isotypes F! US! VEN!).

Distribution. Known only from the Cerro de la Neblina and the nearby Serra de Pirapucú in Brazil, at elevations of 1600–1800 m; see protologue.

Collected in flower and fruit from November through January.

Diacidia rufa and *D. glaucifolia* are almost identical except for the size and hairiness of their leaves and stipules. Since they bloom at the same time and grow in the same mountains, it would be interesting to know how they maintain their identity. Label data reveal that *D. glaucifolia* has been collected between elevations of 650 m and 1100 m, versus 1600 m to 1800 m for *D. rufa*. While it is difficult for one who has not been there to evaluate these data, they suggest that the two species have different ecological requirements that may effect partial or complete reproductive isolation and may also select against hybrids if they do occur.

5. *Diacidia stipularis* (Maguire & Phelps) Anderson, comb nov

Sipapoa stipularis Maguire & Phelps, Mem. New York Bot. Gard. 8(2): 127. 1953.

Shrubs 0.5–3 m tall; vegetative internodes glabrous. Lamina of the larger leaves 4.5–13.5 cm long, 2.5–9.5 cm wide, elliptical or ovate or subrotund, obtuse or truncate or subcordate at the base, broadly obtuse or rounded at the apex, glaucous below, glabrous above, densely and $\pm$ persistently white- or yellowish-sericeous below, the hairs 2–2.5 mm long, basifixed, straight, fine, the lateral veins obscure or prominulous below; petiole 1.2–2.4 cm long, with the proximal 0.7–1.4 cm part of the petiolar-stipular sheath and the distal 0.4–1.0 cm free, glabrous; stipules 3.5–8 cm long, united proximally with the opposite pair to form a sheath 0.7–2 cm long, the distal 2.8–6.2 cm completely connate to produce a single intrapetiolar structure broadly obtuse or rounded at the apex, glabrous on both sides except hirsute adaxially inside sheath. Inflorescence 9–15 cm long, glaucous and apparently glabrous (actually initially strigose but the hairs caducous), a pseudoraceme; bracts and bracteoles glabrous, caducous, the bracts 8–10 mm long, the bracteoles ca 2 mm long. Pedicel 7–14 mm long, glabrous. Sepals revolute, entire or obtusely denticulate, glabrous. Limb of the petals 4–6 mm long, 4–5 mm wide. Fertile stamens 6(–7), the 4 opposite the lateral petals absent; anthers 1.1–1.6 mm long, each locule bearing 1(–2) apical awns and laterally

strigose to soon glabrate, the few hairs straight, basifixed, caducous. Fruit wings up to 12 mm long and 5 mm wide, cordate at the base, entire or paucidenticulate distally, acute at the apex, unequal, glabrous.

Type. *Cowan & Wurdack 31200*, Cerro Parú, Río Parú, Río Ventuari, Amazonas, Venezuela (holotype NY! isotypes F! MO! NY! US! VEN!).

Distribution. Known only from the type locality, at elevations of 1600–2000 m; see protologue.

Collected in flower and fruit in January and February.

6. *Diacidia kunhardtii* (Maguire) Anderson, comb nov

Sipapoa kunhardtii Maguire, Mem. New York Bot. Gard. 8(2): 125. 1953.

Shrubs or small trees to 4 m tall; vegetative internodes glabrous. Lamina of the larger leaves 4–7 cm long, 2.3–5 cm wide, elliptical to nearly rotund, obtuse or rounded at base and apex, glaucous below, sparsely sericeous to glabrate above, densely and persistently ciliate on the margin, spreading-sericeous below on the midrib and lateral veins, the hairs 2–4 mm long, basifixed, straight, very fine; petiole 17–26 mm long, with the proximal 12–19 mm part of the petiolar-stipular sheath and the distal 5–8 mm free, hirsute; stipules 22–32 mm long, united proximally with the opposite pair to form a sheath 15–22 mm long, the distal 7–10 mm completely connate to produce a single triangular intrapetiolar structure acute at the apex, abaxially sericeous, adaxially hirsute. Inflorescence 9–20 cm long, villous, a pseudoraceme (the cincinni rarely 2-flowered); bracts and bracteoles abaxially sericeous, marginally ciliate, adaxially glabrous, the bracts caducous, the bracteoles smaller and longer persistent. Pedicel 3–5 mm long, villous. Sepals revolute, glandular-dentate, abaxially tomentose to glabrate, adaxially glabrous. Limb of the petals 2.5–4 mm long, 2–4 mm wide. Fertile stamens 8, the 2 opposite the anterior-lateral petals absent or reduced to minute rudimentary filaments; anthers 1–1.5 mm long, each locule bearing 1(–2) apical awns and otherwise glabrous. Fruit wings up to 13 mm long and 4 mm wide, cordate at the base, dentate at the margin, obtuse at the apex, glabrate.

Type. *Maguire & Politi 27677*, Caño Negro, Cerro Sipapo, Amazonas, Venezuela (holotype NY! isotypes F! MO! US! VEN!).

Distribution. Known only from Cerro Sipapo, at elevations of 1450–1500 m; see protologue.

Collected in flower and fruit in December and January.

7. *Diacidia cordata* (Maguire) Anderson, comb nov

Sipapoa cordata Maguire, Mem. New York Bot. Gard. 18(2): 46. 1969.

Shrubs 0.5–1.5 m tall, the stems glabrous and often glaucous. Lamina of the larger leaves 3–6.5 cm long, 1.5–4.5 cm wide, elliptical or oblong or slightly ovate or obovate, deeply cordate at the base, obtuse or rounded at the apex, glaucous below, initially ciliate on the margin but soon quite glabrate, the veins and reticulum prominent on both sides, the midrib red; petiole 5–10 mm long, all but up to 1 mm part of the petiolar-stipular sheath, glabrous; stipules 11–16 mm long, united proximally with the opposite pair to form a sheath 4–6 mm long, the distal

7–10 mm free as 2 triangular acute epipetiolar lobes, abaxially glabrous, adaxially hirsute inside the sheath and glabrous distally. Inflorescence 5–17 cm long, glabrous, a simple thyse, the cincinni 2–6(–8)-flowered; bracts 6–9 mm long, rhombic, glabrous, caducous; bracteoles similar but smaller. Pedicel 8–12 mm long, glabrous. Sepals revolute, entire, glabrous. Limb of the petals 4–6.5 mm long, 3–4.5 mm wide. Fertile stamens 8–9, 1 or both of the 2 opposite the anterior-lateral petals absent or reduced to minute rudimentary filaments; anthers 1–1.3 mm long, each locule bearing 1–2 apical awns and laterally finely hirsute to soon glabrate. Fruit wings up to 7 mm long and 4 mm wide, cordate at the base, entire, acute or obtuse at the apex, often unequal and asymmetrical, glabrous.

Type. *Maguire et al 42537D*, Cerro de la Neblina, Río Yatúa, Amazonas, Venezuela (holotype NY! isotypes F! NY! US! VEN!).

Distribution. Known only from Cerro de la Neblina, at elevations of 1500–1800 m; see protologue.

Collected in flower and fruit in December and January.

8. *Diacidia hypoleuca* (Maguire) Anderson, comb nov

Sipapoa hypoleuca Maguire, Mem. New York Bot. Gard. 8(2): 125. 1953.

Trees 3–10 m tall; vegetative internodes glabrous, glaucous. Lamina of the larger leaves 5.5–10.5 cm long, 3–6 cm wide, elliptical or obovate, obtuse or truncate or subcordate at the base, obtuse or usually rounded or emarginate and apiculate at the apex, glaucous below, glabrous above, densely and persistently white- or yellowish-sericeous below, the hairs up to 4 mm long, basifixed, straight, very fine, the lateral veins prominent below; petiole 1.6–2.5 cm long, with the proximal 1.3–1.9 cm part of the petiolar-stipular sheath and the distal 0.2–0.6 cm free, sericeous; stipules 2–3 cm long, initially united proximally with the opposite pair to form a sheath 0.7–1.6 cm long (the sheath soon splitting open along the interpetiolar seams), the distal 1–1.8 cm nearly free (up to 3 mm connate) as 2 triangular or ovate, acute or acuminate epipetiolar lobes, abaxially glabrate on the sheath and sericeous distally, ciliate on the margins, adaxially hirsute inside the sheath and glabrous distally. Inflorescence 6–12 cm long, loosely sericeous, a pseudoraceme; bracts and bracteoles deciduous, the bracts 7–9 mm long and abaxially very densely sericeous, the bracteoles ca 3 mm long and sparsely pilose. Pedicel 6–13 mm long, tomentose. Sepals revolute, denticulate or subentire, glabrous on both sides, ciliate to glabrate on the margin. Limb of the petals 3.5–5 mm long (–7 mm in the posterior petal), 3–4.5 mm wide. Fertile stamens 9, 1 of the stamens opposite the anterior-lateral petals absent; anthers 1–1.3 mm long, each locule bearing 1(–2) apical awns and laterally finely hirsute to very soon glabrate (apparently glabrous). Fruit wings up to 10 mm long and 8 mm wide, cordate at the base, denticulate or subentire at the margin, obtuse at the apex, glabrate or ciliate on the margin; pedicel strongly reflexed in fruit.

Type. *Maguire et al 30704*, Cerro Yapacana, upper Río Orinoco, Amazonas, Venezuela (holotype NY! isotypes F! MO! US! VEN!).

Distribution. Known only from the type locality, at elevations of 1000–1200 m; see protologue. A recent collection from the same place is *Steyermark & Bunting 103138* (NY, VEN).

Collected in flower and fruit in January, April, and May.

9. *Diacidia ferruginea* (Maguire & Phelps) Anderson, comb nov

Sipapoa ferruginea Maguire & Phelps, Mem. New York Bot. Gard. 8(2): 126. 1953.

Shrubs or small trees 1–4 m tall; vegetative internodes persistently sericeous. Lamina of the larger leaves 3–4.5 cm long, 1–2 cm wide, narrowly elliptical, obtuse at the base, thickened at the margin, obtuse and apiculate at the apex, glaucous below, glabrous above except sericeous at very base, densely and persistently rufous- or yellowish-sericeous below, the hairs up to 1.3 mm long, basifixed below, sub-basifixed above, straight, very fine, the lateral veins obscure on both sides or prominent below; petiole 5–9 mm long, with the proximal 4–6 mm part of the petiolar-stipular sheath and the distal 1–3 mm free, sericeous; stipules 5–9 mm long, united proximally with the opposite pair to form a sheath 4–7 mm long (the sheath often soon splitting open along the interpetiolar seams), the distal 1–2 mm free as 2 triangular, acute, epipetiolar lobes, abaxially sericeous, adaxially hirsute inside the sheath and glabrous distally. Inflorescence 3–12 cm long, tomentose, a pseudoraceme; bracts ca 4 mm long and abaxially densely sericeous; bracteoles ca 2 mm long and sparsely pilose. Pedicel 8–12 mm long, tomentose. Sepals revolute, entire, abaxially sparsely pilose to glabrate, ciliate on the margin, adaxially glabrous. Limb of the lateral petals 3.5–4 mm long, 3.5–4.5 mm wide; limb of the posterior petal 5.5–6 mm long, 6.5–7 mm wide. Fertile stamens 6, the 4 opposite the lateral petals absent; anthers 1–1.5 mm long, each locule bearing 1(–2) apical awns and otherwise glabrous, the connective much enlarged and globular at the apex. Fruit wings up to 13 mm long and 12 mm wide, cordate at the base, entire at the margin, rounded at the apex, glabrate or ciliate on the margin; pedicel strongly reflexed in fruit.

Type. *Cowan & Wurdack 31233*, Cerro Parú, Río Parú, Río Ventuari, Amazonas, Venezuela (holotype NY! isotypes MO! VEN!).

Distribution. Known only from the type locality and vicinity, at elevations of 1700–2000 m; see protologue. Two recent collections from the same area [Cerro Asisa (La Momia), Serranía Parú] are *Hoyos & Morillo 64* and *97* (both VEN).

Collected in flower and fruit in January, February, and May.

This species is morphologically the most specialized in the genus. Apart from the very reduced androecium, it is notable for its short stipule-lobes, strongly dimorphic petals, enlarged connectives, and distinctly internal stigmas.

10. *Diacidia aracaënsis* Anderson, sp nov

Fig 15.

Arbor 3 m alta, internodiis vegetativis sericeis. Lamina foliorum majorum 3–6 cm longa, 1.2–2.5 cm lata, elliptica vel anguste ovata, basi obtusa, margine parum revoluta, apice acuta vel obtusa apiculataque, subtus glauca, supra novella sericea mox glabrescens, subtus pertinaciter sericea vel demum glabrescens, pilis supra submediofixis vel sub-basifixis (altero brachio 1.1 mm altero 0.5–0.1 mm longo), subtus sub-basifixis (altero brachio 1 mm altero 0.1 mm longo), nervis lateralibus utrinque obscuris vel paulo prominulis; petiolus 7–9 mm longus, 4–6 mm proximalibus in vagina cum stipulis coalitis, 2–4 mm distalibus liberis, sericeus; stipulae 6–8 mm longae, 4–5 mm proximalibus in vagina cum petiolo et stipulis oppositis coalitis, 2–3 mm distalibus liberis triangularibus, abaxialiter sericeae, adaxialiter hirsutae. Inflorescentia 3–11 cm longa, tomentosa, pseudoracemosa

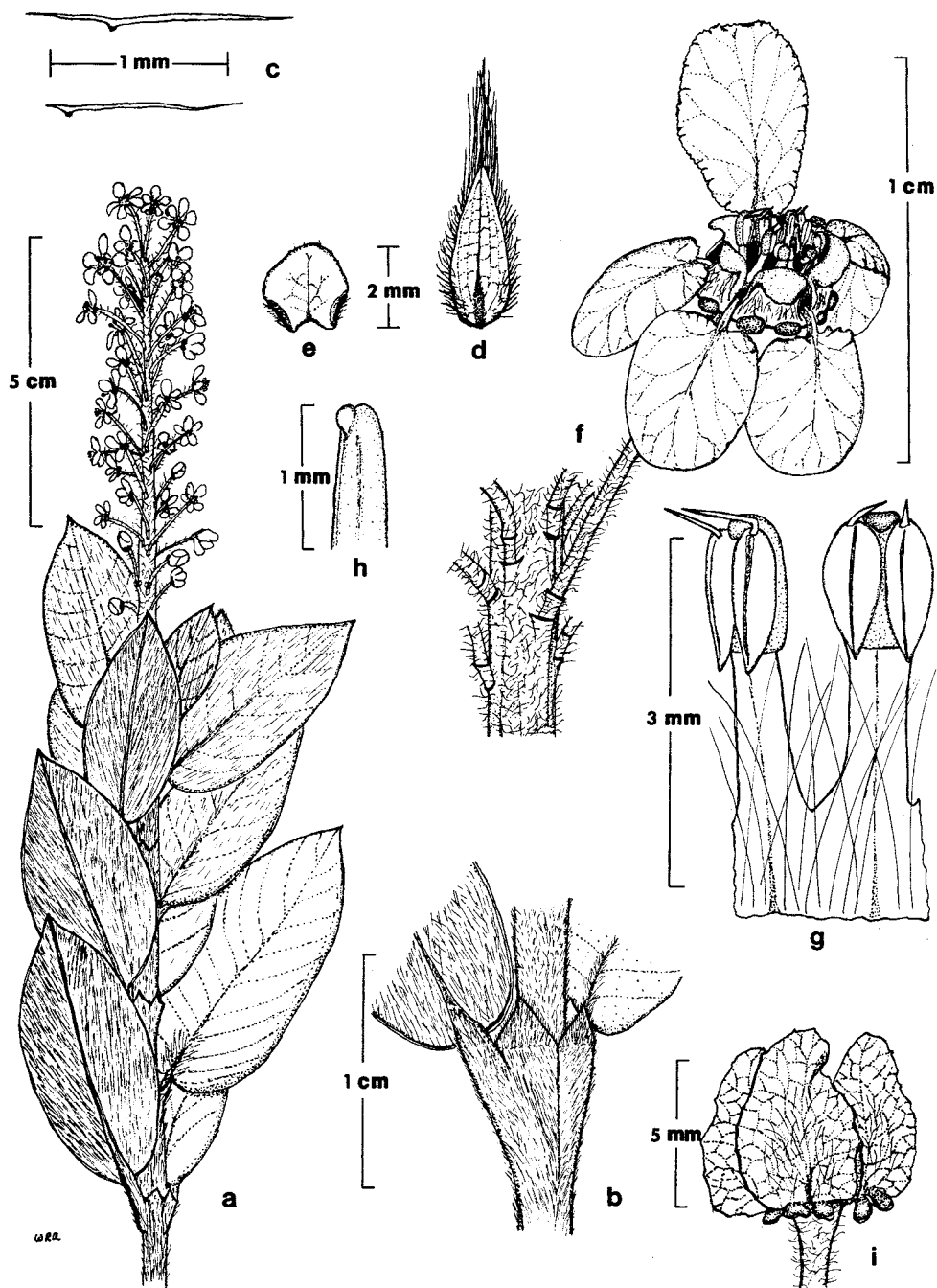


Fig 15. *Diacidia aracaënsis*. a) Flowering branch; b) stipules; c) leaf hairs (upper from adaxial surface, lower from abaxial surface); d) bract, adaxial view; e) bracteole, adaxial view; f) flower; g) stamens, adaxial view; h) stigma; i) enlarged sepals surrounding fruit. Drawn from holotype.

cincinnis unifloris, pedunculo 0.5–1.3 mm longo, bracteis bracteolisque deciduis, abaxialiter sericeis, illis ca 3 mm, his ca 1.5 mm longis. Pedicellus 8–10 mm longus, tomentosus. Sepala revoluta, minute denticulata, abaxialiter in centro sericea, margine et adaxialiter glabra. Petala 4 lateralia ungue 1 mm longo, limbo 4.5–5 mm longo et lato, late ovato, denticulato. Petalum posticum ungue 1.5 mm longo, limbo 5–6 mm longo, 3–3.5 mm lato, elliptico, denticulato. Stamina fertilia 8, 2 petalis anterioribus oppositis anantheris vel absentibus, filamentis ca 2 mm longis, liberis vel usque $\frac{1}{2}$ connatis. Antherae 1.2–1.5 mm longae, in quoque loculo 1(–2) aristas apicalibus ornatae, aliter glabrae, connectivo apice tantum parum tumido. Ovarium conicum, 1.3 mm altum. Styli 2–2.5 mm longi, stigmatibus internis. Fructus alae (maturae?) usque 7 mm longae, 5 mm latae, basi subcordatae, margine integrae vel minute denticulatae, apice rotundatae, abaxialiter sparsim sericeae, aliter glabrae.

Type. *Pires 14993*, Serra Aracá [ca 1°N, 63°W fide Prance (1976)], Amazonas, Brazil, 2 Oct 1975 (holotype IAN 145429, isotype MICH).

Known only from the type collection; named for the type locality, which has yielded a number of endemic new species.

11. *Diacidia vestita* (Benth) Benth & Hooker ex Jackson, Ind. Kew. 1: 741. 1895.

Coleostachys vestita Benth, London Jour. Bot. (Hooker) 7: 124. 1848.

Sipapoa vestita (Benth) Maguire, Mem. New York Bot. Gard. 8(2): 127. 1953.

Shrubs or small trees 3–9 m tall; vegetative internodes loosely sericeous. Lamina of the larger leaves 6–10(–13.5) cm long, 2.8–5.5 cm wide, elliptical or slightly obovate, obtuse or rounded at the base, flat or revolute at the margin, obtuse or rounded and apiculate or very shortly acuminate at the apex, slightly or not at all glaucous below, villous or subsericeous or subtomentose above, the hairs straight or slightly bent and erect to subappressed, woolly below, the hairs much twisted and intertwined (or nearly straight on the midrib), the lateral veins obscure above and prominulous below; petiole 19–32 mm long, with the proximal 14–25 mm part of the petiolar-stipular sheath and the distal 4–7 mm free, villous or woolly; stipules 20–35 mm long, united proximally with the opposite pair to form a sheath 15–25 mm long (the sheath soon splitting open along the interpetiolar seams), the distal 5–11 mm free as 2 triangular, acute or acuminate, epipetiolar lobes, abaxially subsericeous, adaxially hirsute inside the sheath and glabrous distally. Inflorescence 4–12 cm long, villous, a pseudoraceme; bracts and bracteoles abaxially sericeous or villous (especially the bracts), eventually deciduous, the bracts 3.5–5 mm long, the bracteoles 2–3 mm long. Pedicel 7–10(–12) mm long, villous. Sepals revolute, entire or denticulate, abaxially villous, ciliate on the margin, adaxially glabrous. Limb of the lateral petals 4.5–5 mm long, 3–4 mm wide; limb of the posterior petal 6 mm long, 3–4 mm wide. Fertile stamens (7–) 8, the 2 opposite the anterior-lateral petals absent and the stamen opposite 1 of the posterior-lateral petals sometimes reduced to a staminode; anthers 1.1–1.5 mm long, each locule bearing 1(–2) apical awns and otherwise glabrous or sparsely pilose and soon glabrate, the connective bent forward at the apex. Fruit wings

up to 13 mm long and 7 mm wide, cordate at the base, entire or dentate at the margin, acute or obtuse at the apex, abaxially villous; pedicel reflexed in fruit.

Type. "Mountains of British Guiana, [Robert] Schomburgk s n." (K) [probably actually from Amazonas, Venezuela; cf Maguire, 1969, p. 50].

Distribution. Known from three mountains in Amazonas, Venezuela, at elevations of 1200–1900 m: Cerro Duida, *Steyermark 58122* (NY, US), *Tate 563* (NY, US); Cerro Huachamacari, *Maguire et al 29806* (NY), *29858* (NY), *29869* (F, NY), *30091* (F, MO, NY, VEN), *30111* (NY, VEN), *30221* (NY), *30252* (NY, VEN); Sierra Parima, Brazilian frontier, 3°58'N, 64°40'W, elev 1750 m, *Cardona 3080* (VEN), 4°5'N, 64°40'24"W, elev 1500 m, *Steyermark 107499* (VEN).

Collected in flower and fruit in January, March, May, and December.

12. *Diacidia steyermarkii* (Maguire) Anderson, comb nov

Sipapoa steyermarkii Maguire, Mem. New York Bot. Gard. 18(2): 54. 1969.

Trees 3–8 m tall; vegetative internodes loosely sericeous to villous. Lamina of the larger leaves 6–10 cm long, 3–4.5 cm wide, elliptical or obovate, rounded or slightly cordate at the base, revolute at the margin, obtuse or rounded and apiculate or very shortly acuminate at the apex, glaucous below (the glaucescence hidden by the hairs), villous above, the hairs straight and erect (broken and appressed on older leaves), very densely sericeous below, the hairs straight, appressed, and parallel, the lateral veins impressed above and very prominent below; petiole 23–30 mm long, with the proximal 18–25 mm part of the petiolar-stipular sheath and the distal 3–7 mm free, villous or woolly; stipules 26–39 mm long, united proximally with the opposite pair to form a sheath 15–26 mm long (the sheath soon splitting open along the interpetiolar seams), the distal 9–15 mm free as 2 ovate or triangular, acuminate, epipetiolar lobes, abaxially villous or subsericeous, adaxially hirsute inside the sheath and glabrous distally. Inflorescence 12–15 cm long, villous, a pseudoraceme; bracts and bracteoles abaxially sericeous (especially the bracts), eventually deciduous, the bracts 4–6 mm long, the bracteoles 1.5–2 mm long. Pedicel 6–10 mm long, villous or woolly. Sepals erect or revolute, denticulate, abaxially sericeous or woolly, adaxially glabrous or sparsely pilose near the margin. Limb of the lateral petals 4–5 mm long and wide; limb of the posterior petal 5–6 mm long, 4–5 mm wide. Fertile stamens 8, the 2 opposite the anterior-lateral petals absent; anthers 1–1.5 mm long, each locule bearing 1 apical awn and otherwise glabrous, the connective bent forward at the apex. Fruit wings (immature?) up to 7 mm long and 2.5 mm wide, truncate at the base, entire or dentate at the margin, acute or obtuse at the apex, abaxially loosely sericeous; pedicel spreading in fruit.

Type. *Steyermark 98016*, Cerro Jaua, Río Kanarakuni, Río Caura, Bolívar, Venezuela (holotype NY! isotype VEN!).

Distribution. Known only from the Meseta del Jaua, Bolívar, Venezuela, at elevations of 1320–2250 m. Dr. Steyermark made the following additional collections in 1974: Cerro Sarisariñama, *109030* & *109158* (both NY); Cerro Jaua, *109282* & *109576* (both NY).

Collected in flower and fruit in February and March.

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

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

Trees, shrubs, or subshrubs, the leaves eglandular; stipules intra- and epipetiole, 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*.

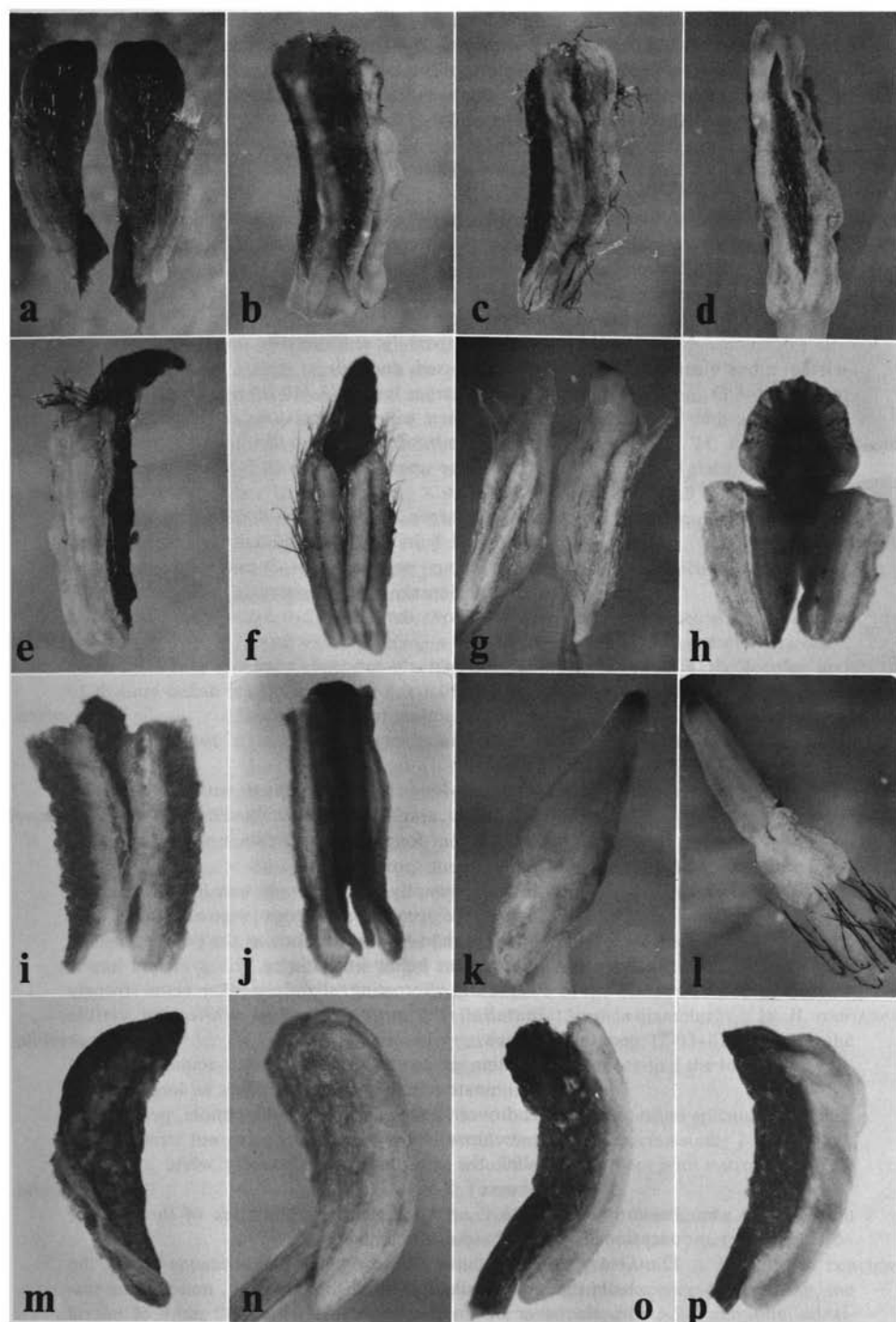


Fig 16. Anthers of *Byrsonima*. a) *B. stipulacea*, $\times 9$; b) *B. aerugo*, $\times 15$; c) *B. crassifolia*, $\times 15$; d) *B. chrysophylla*, $\times 15$; e & f) *B. coccolobifolia*, $\times 14$; g) *B. japurensis*, $\times 15$; h) *B. concinna*, $\times 20$; i) *B. laevis*, $\times 20$; j) *B. 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 laxe 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 lateralialia 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 fir (holotype MICH, isotypes NY, US, VEN).

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

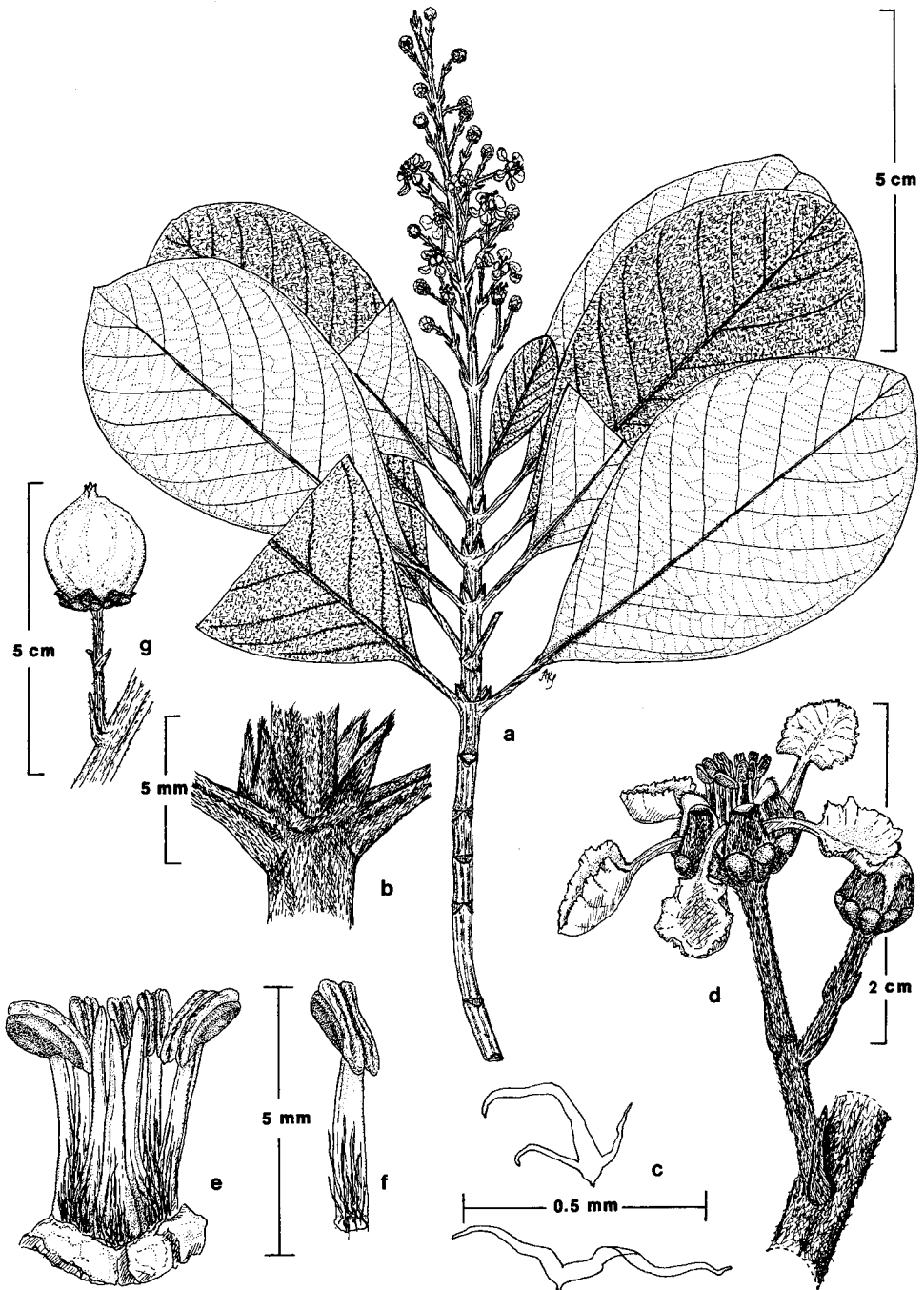


Fig 17. *Byrsonima maguirei*. a) Flowering branch; b) stipules; c) hairs from inflorescence; d) flower; e) gynoecium and five stamens; f) stamen, adaxial view; g) fruit. a-f drawn from *Maguire et al* 42303, g from *Maguire et al* 42312 by Annette Seidenschnur Mahler.

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-

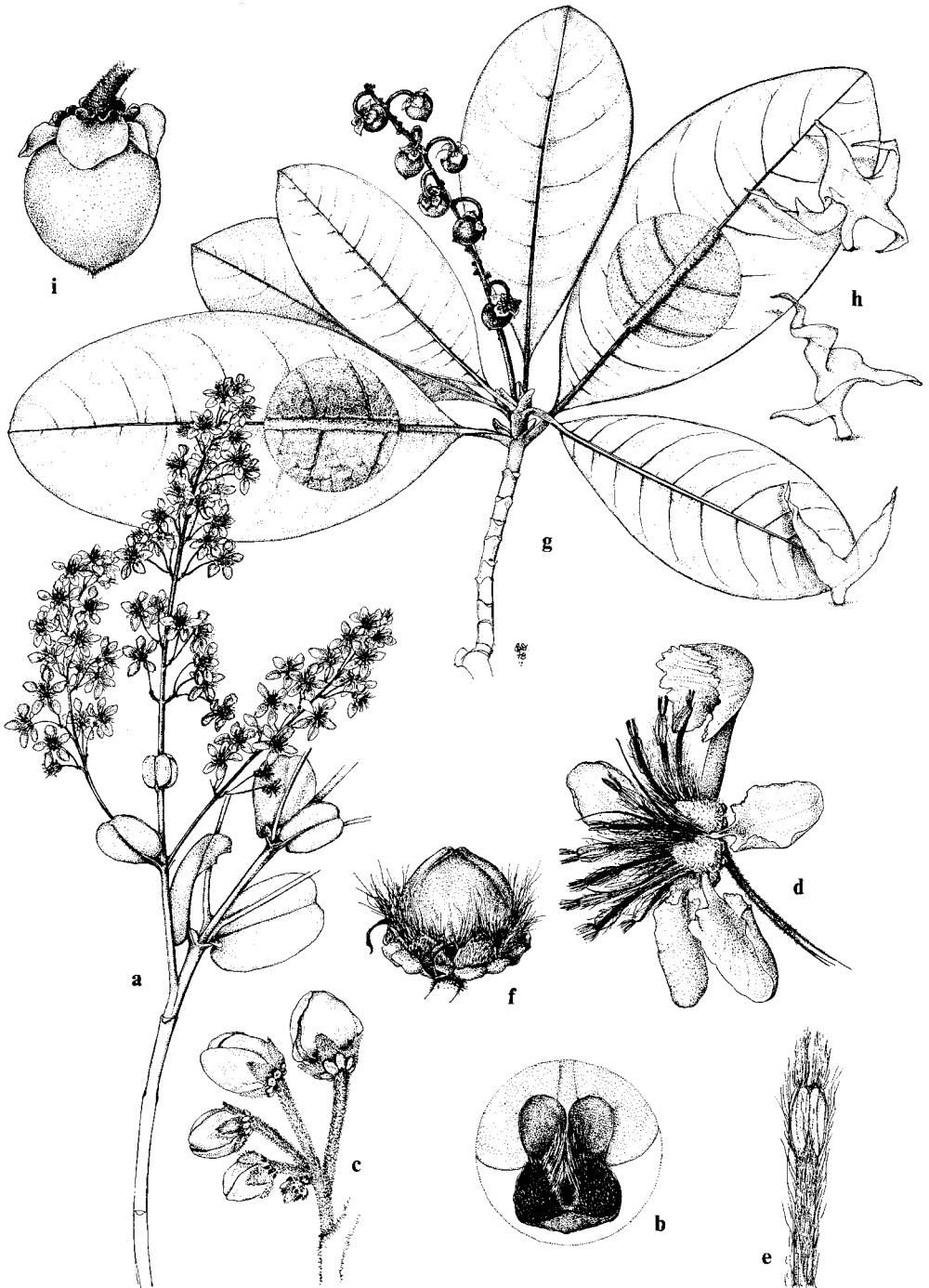


Fig 18. *Blepharandra intermedia* and *Byrsonima fanshawei*. a–f, *Blepharandra intermedia*: a) Flowering branch, $\times 0.5$; b) stipules and petiole, adaxial side, $\times 2.5$; c) cincinnus, $\times 2.5$; d) flower, $\times 3.5$; e) stamen, $\times 7.5$; f) fruit, $\times 6$. g–i, *Byrsonima fanshawei*: 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-hemispherical, 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 vestiture, 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 Benthams, 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 Bentham, 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 Benthams, *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 Benth., 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 Mucajaí 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.

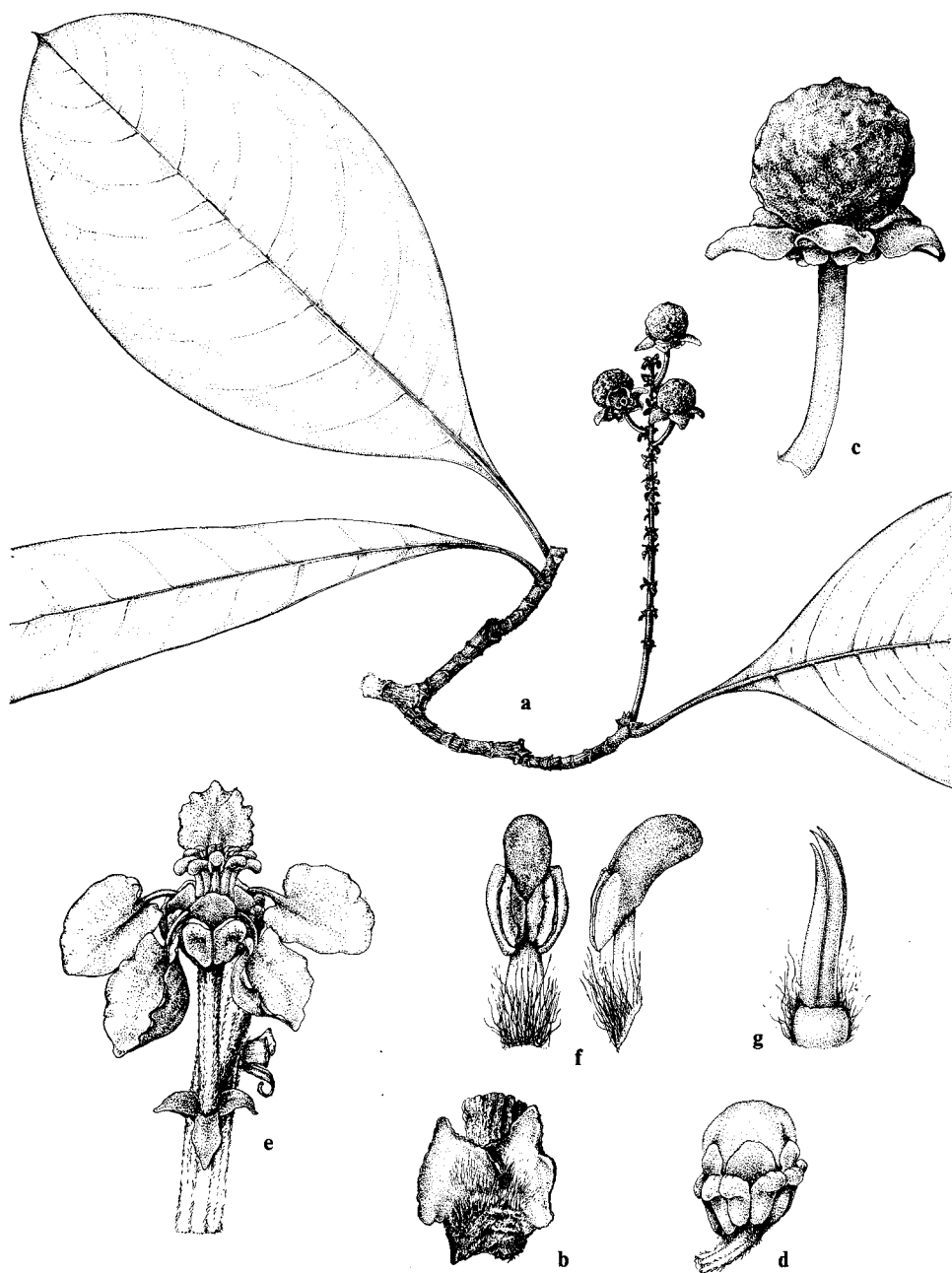


Fig 19. *Byrsonima rodriguesii*. a) Fruiting branch, $\times 0.5$; b) stipules, adaxial side, most hairs removed, $\times 2.5$; c) fruit (dried), $\times 2$; d) bud, $\times 2.5$; e) flower, $\times 2.5$; f) stamens, $\times 7.5$; g) gynoecium (glabrous ovary shown surrounded by hairs on the receptacle), $\times 5$. 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 ± 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 stramineaque, 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

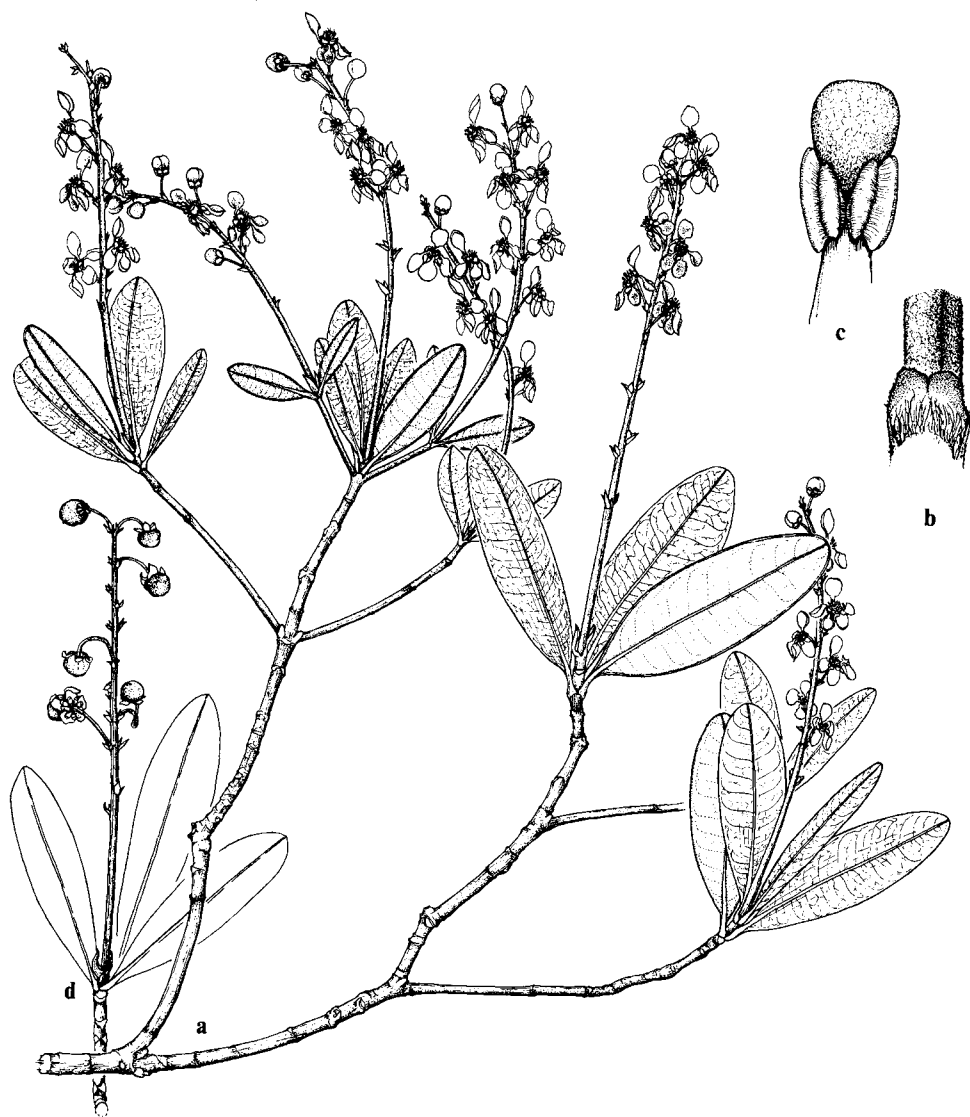


Fig 20. *Byrsonima bronweniana*. a) Flowering branch, $\times 0.5$; b) stipules, adaxial view, most hairs removed, $\times 5.5$; c) anther, $\times 10$; d) fruiting branch, $\times 0.5$. Drawn by Melissa Marshall, a-c from Maguire et al 34612A, d from Vareschi & Jaffe 8006.

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. Amazonas: 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, Amazonas, 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), *Zaruch* 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-

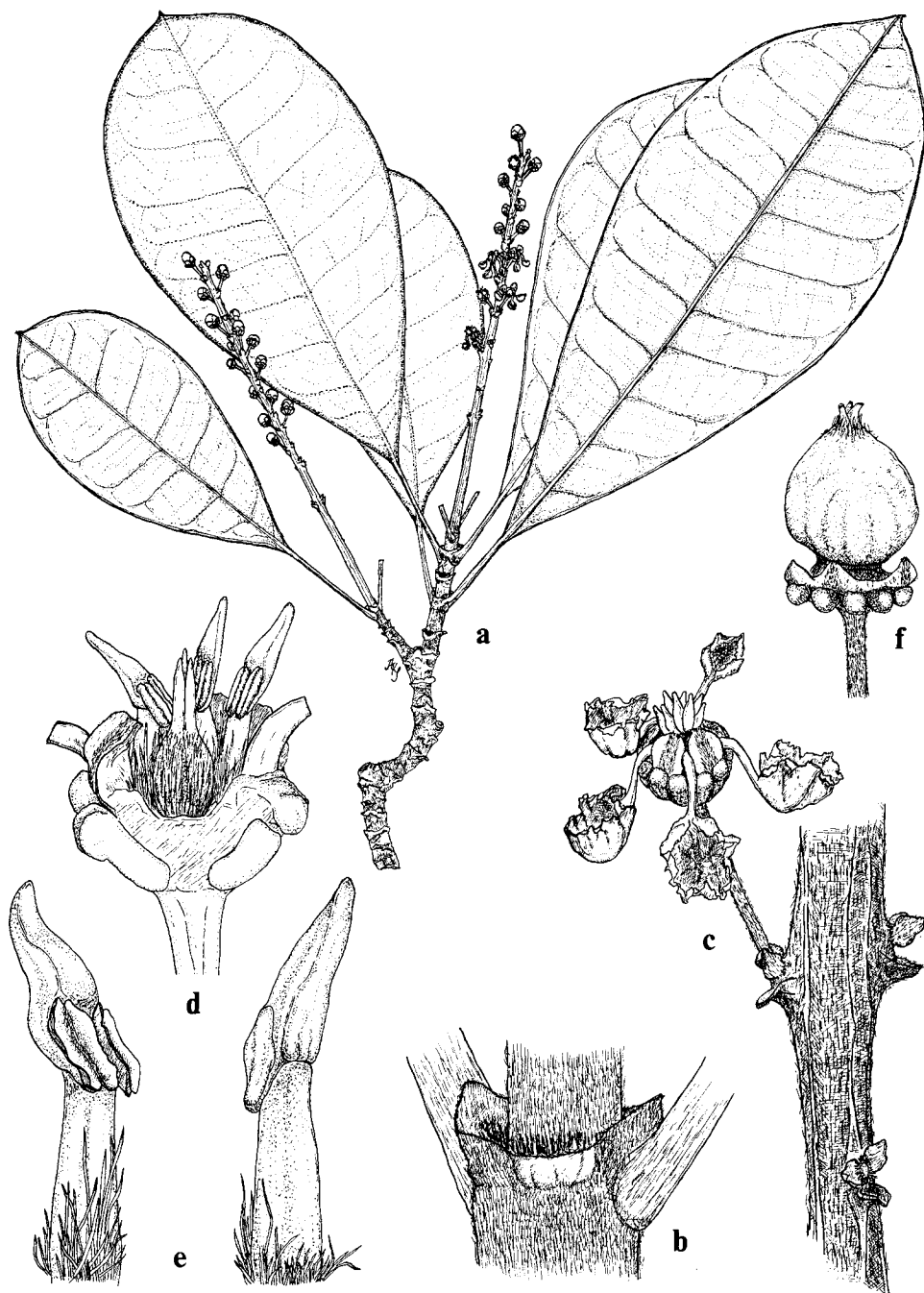


Fig 21. *Byrsonima christianeae*. a) Flowering branch, $\times 0.35$; b) stipules, $\times 5$; c) flower, $\times 3$; d) cutaway view of flower, showing gynoecium and 3 stamens, $\times 5.5$; e) stamens, $\times 14$; f) immature fruit, $\times 1.7$. Drawn by Annette Seidenschnur Mahler, a–e from the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

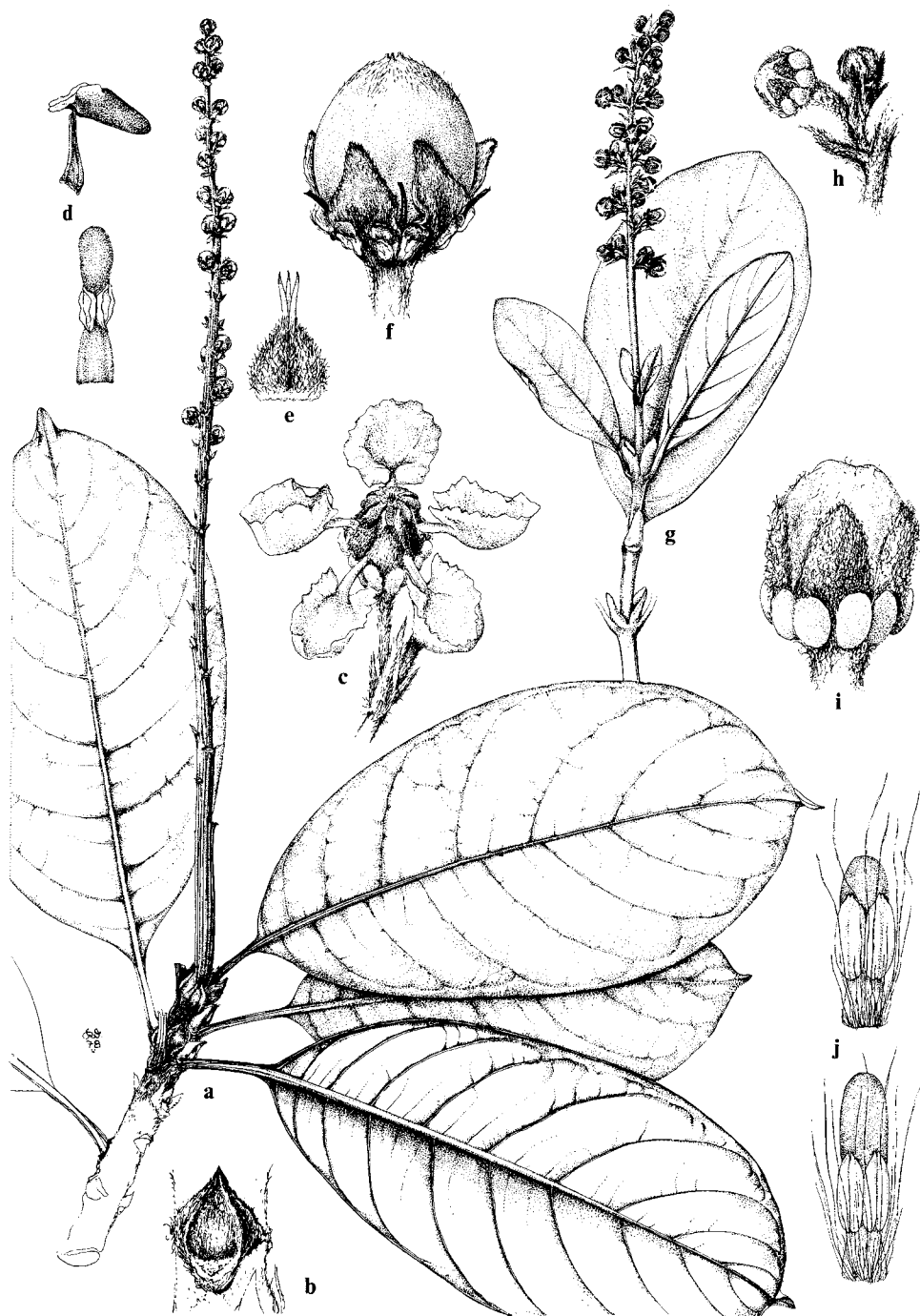


Fig 22. *Byrsonima macrostachya*, *B. chalcophylla*, and *B. tillettii*. a-b, *B. macrostachya*: a) Branch with inflorescence, $\times 0.5$; b) stipules (leaf removed), $\times 1.5$. c-f, *B. chalcophylla* var. *carraoana*: c) Flower, $\times 2.5$; d) stamens, $\times 5$; e) gynoecium, $\times 5$; f)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

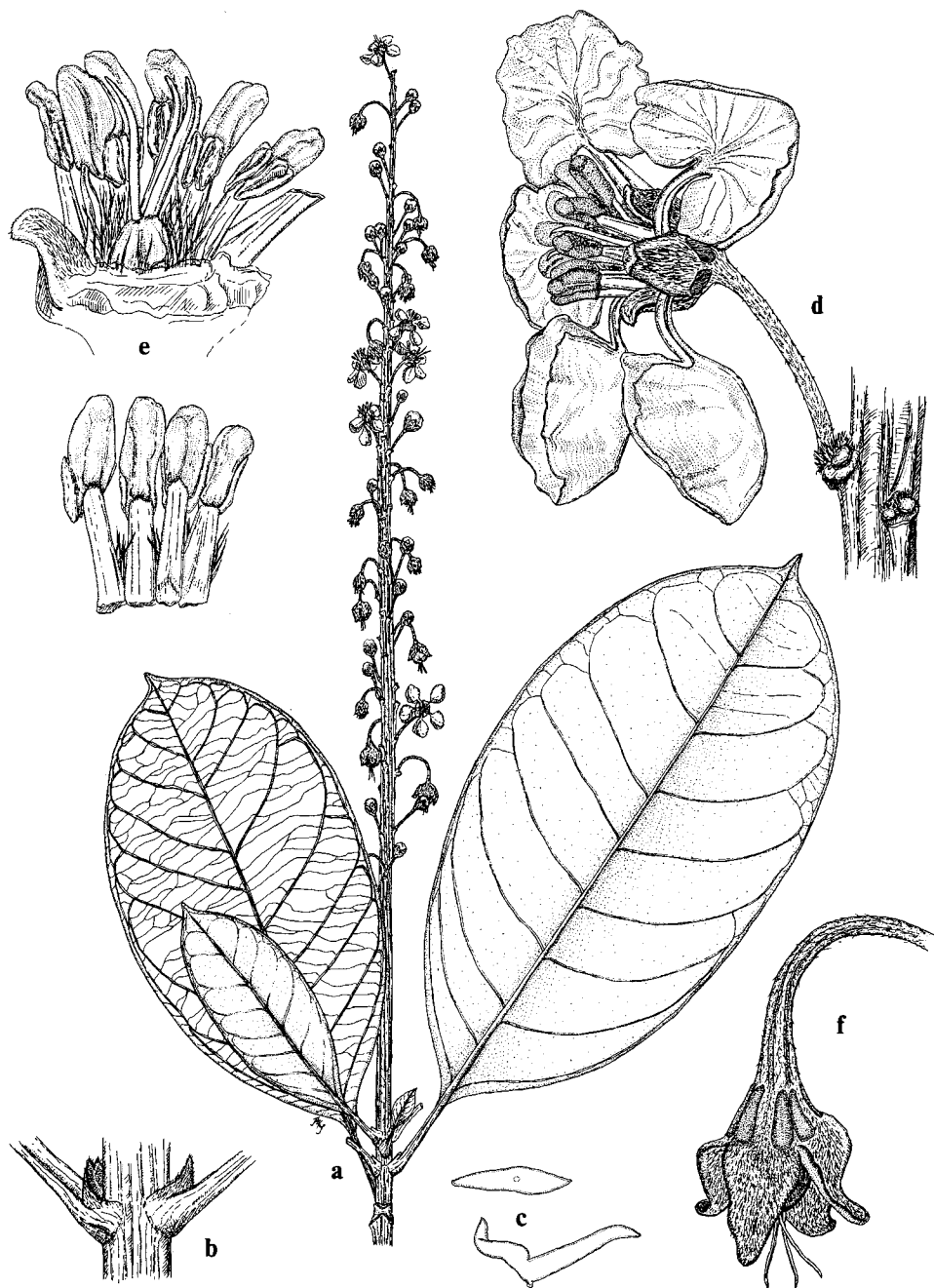


Fig 23. *Byronima wurdackii*. a) Flowering branch, $\times 0.6$; b) stipules, $\times 3.6$; c) hairs, upper from abaxial surface of lamina, lower from pedicel, $\times 170$; d) flower, $\times 5$; e) androecium and gynoecium, claw of posterior petal shown for orientation, lower 4 stamens removed from 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).

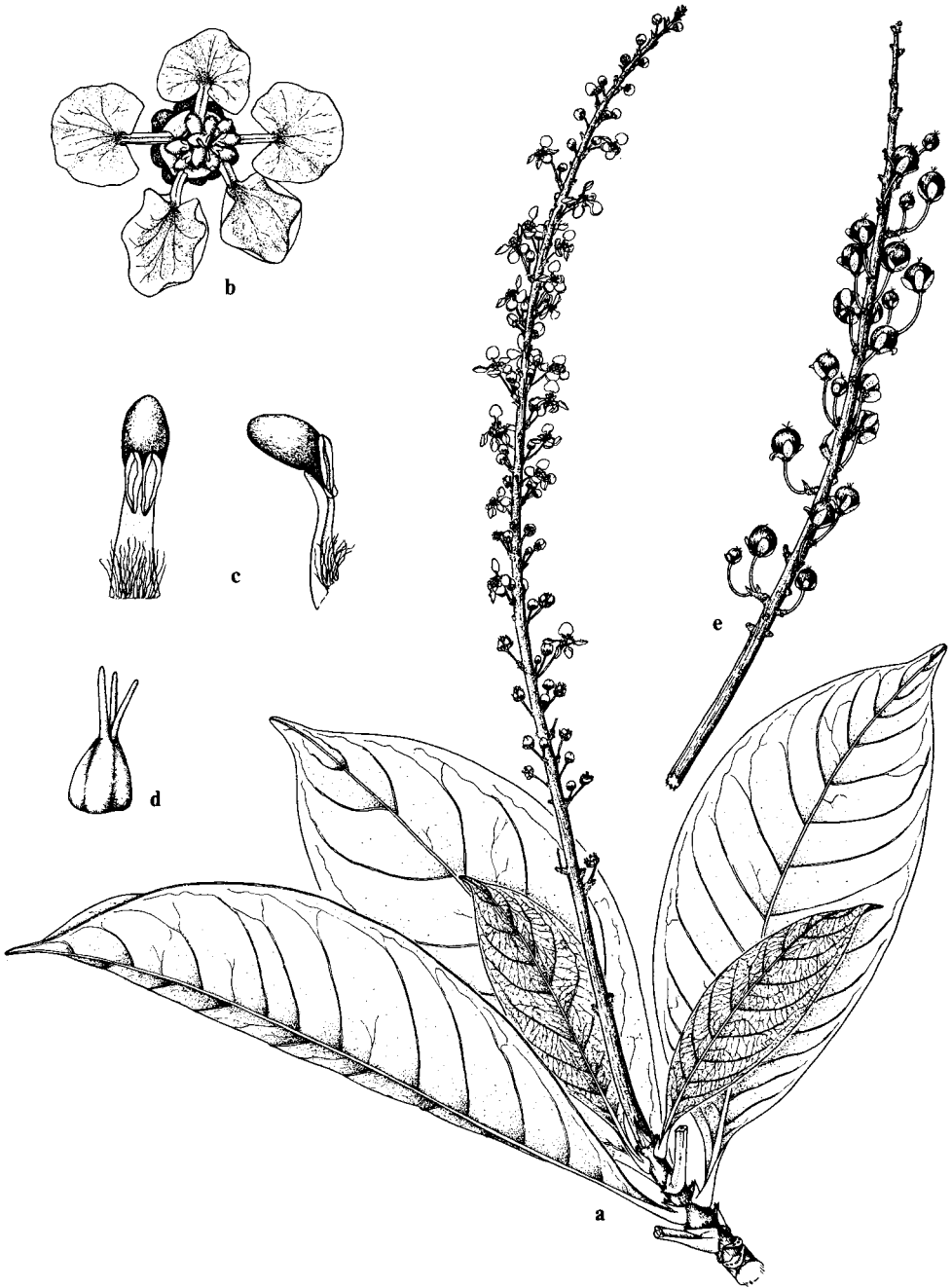


Fig 24. *Byrsonima cowanii*. a) Flowering branch, $\times 0.45$; b) flower, $\times 2.5$; c) stamens, $\times 8$; d) gynoecium, $\times 6.5$; e) infructescence, $\times 0.5$. Drawn by Melissa Marshall, a-d from the type, e from Maguire & Politi 28728.

Distribution. Known only from the type and the following recent collection. BRAZIL. Amaz nas: Caatinga alta, Taraqu , Rio Uaup s, 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

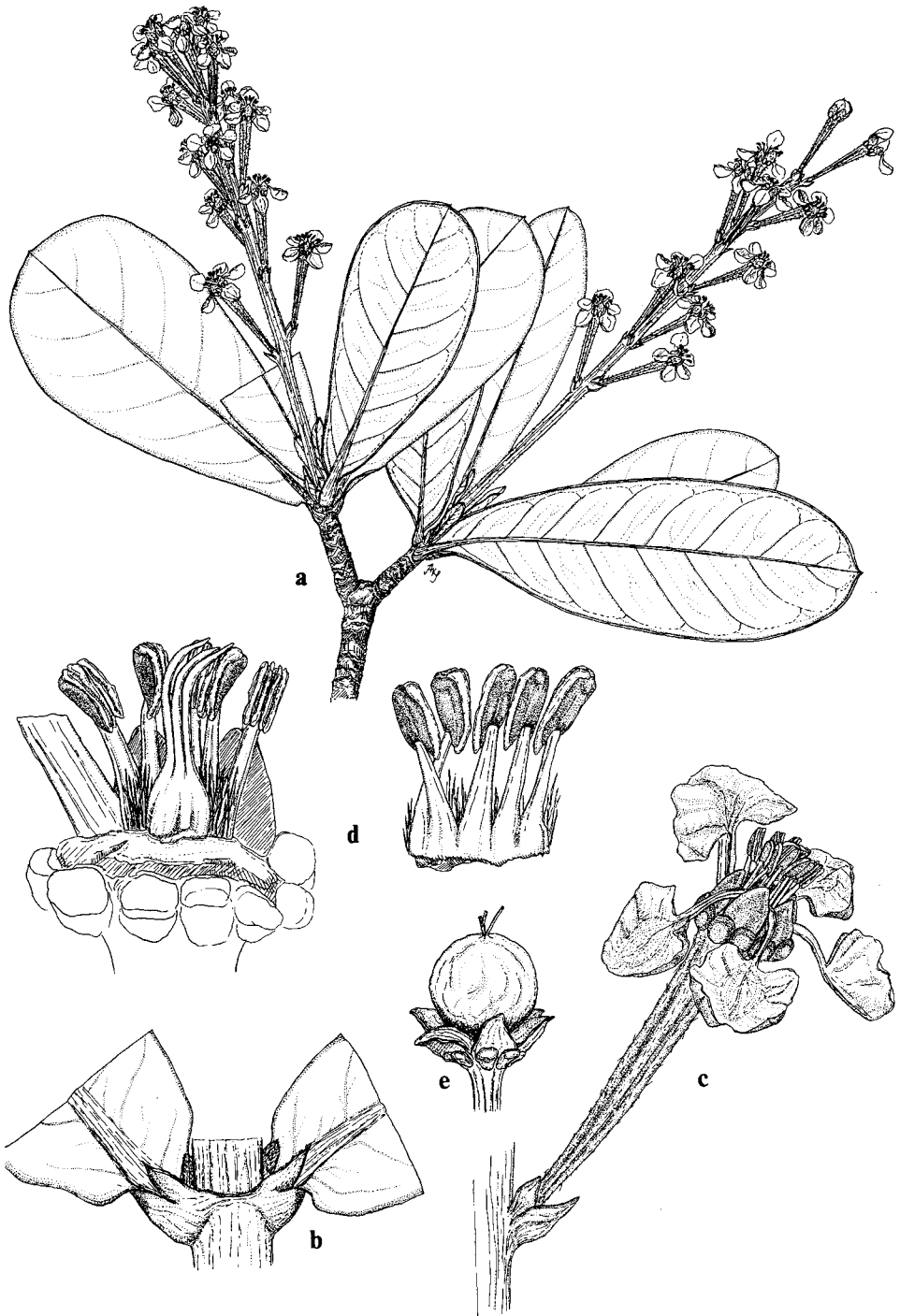


Fig 25. *Byrsonima pachypoda*. a) Flowering branch, $\times$ ca 0.8; b) leaf-bases and stipules, $\times$ 3.6; c) flower, $\times$ 3.6; d) androecium and gynoecium, with claw of psoterior petal shown on left for orientation, the 5 separate stamens (right) removed from same flower, $\times$ 6; e) fruit,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

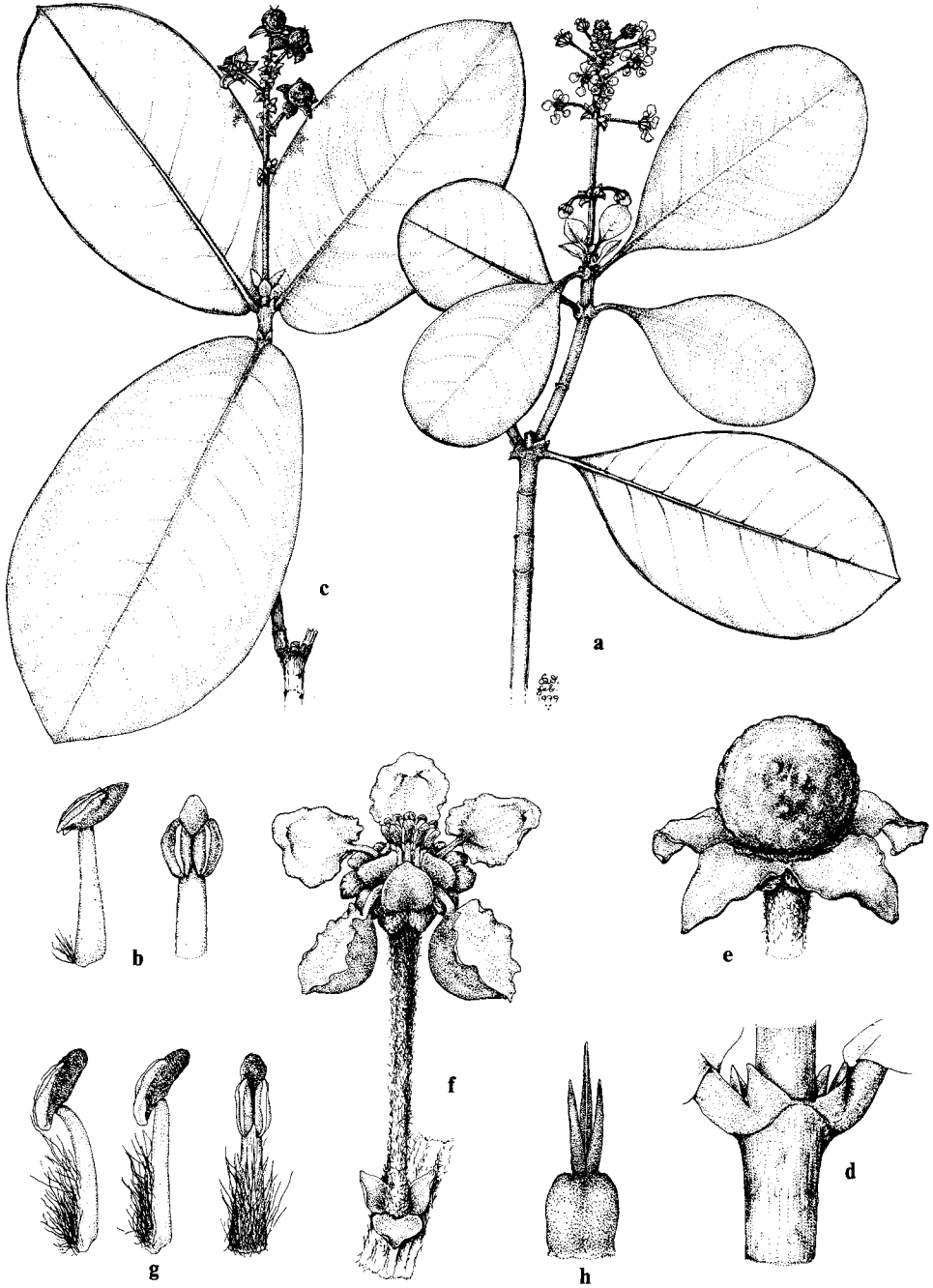


Fig 26. *Byrsonima rubrobracteata* and *B. steyermarkii*. a-b, *B. rubrobracteata*: a) Flowering branch, $\times 0.5$; b) stamens, $\times 7.5$. c-h, *B. steyermarkii*: c) Fruiting branch, $\times 0.5$; d) stipules, $\times 2.5$; e) fruit, $\times 3$; f) flower, $\times 3.5$; g) stamens, left opposite 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

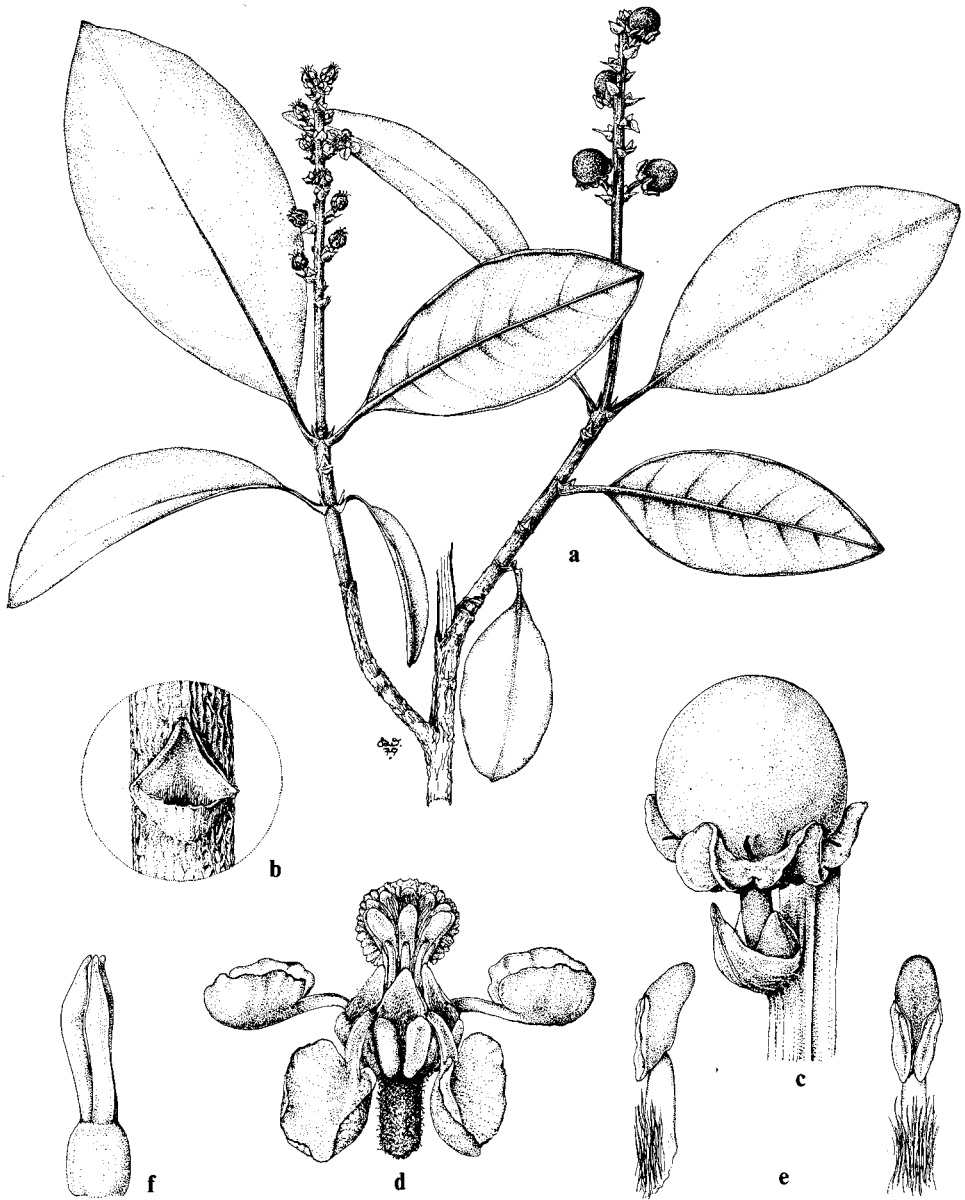


Fig 27. *Byrsonima kariniana*. a) Flowering and fruiting branches, $\times 0.5$; b) stipules, $\times 2.5$; c) fruit, $\times 2.5$; d) flower (including entire pedicel), $\times 3.5$; e) stamens, $\times 7.5$; f) gynoecium, $\times 7.5$. Drawn by Karin Douthit, a–c from Maguire & Politi 28021, d–f from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

8. *Burdachia* Adr. Jussieu in Endlicher, Gen. Pl. 1064. April 1840.

Tetrapodenia Gleason, Bull. Torrey Bot. Club 53: 289. 1926.

Shrubs or trees with coriaceous leaves bearing abaxial glands; stipules intra- and epipetiole, completely connate, coriaceous, persistent on the petiole. Inflorescence terminal, single or 2–3 together, each usually divided near the base into 3(–5) axes, each axis 4–20 cm long, a raceme of short cincinni, the bracts and bracteoles persistent, the lowest bracteole and alternate subsequent bracteoles bearing a large eccentric abaxial gland. Flower buds circinate, spheroid, the outermost petal completely covering the others. Sepals appressed in anthesis, all biglandular, the glands obovate, compressed. Petals glabrous, pink or white, strongly dimorphic, the lateral 4 with an eglandular limb borne on a slender, strongly recurved claw, the posterior with the limb at least basally glandular and borne on a thick, erect claw. Receptacle glabrous on both sides of the stamens. Filaments opposite the sepals slightly longer than those opposite the petals, glabrous, connate at the base; all 10 anthers fertile, subsimilar, glabrous, the locules linear, quite distinct, rounded at the apex, often exceeded at the apex by the thick, fleshy connective. Ovary of 3 completely connate carpels, 1 ± anterior and 2 ± posterior, 3-locular but 1 of the posterior locules empty and smaller; styles 3, apical, inbent in bud, ± straightening in anthesis, slender and subulate, that of the sterile carpel slightly shorter than the other 2, the stigma slightly internal and decurrent. Fruit an indehiscent fibrous or aerenchymatous nut, dry at maturity and without a stone, usually containing only 1 locule completely filled by 1 seed (through abortion of the other ovule and collapse of its locule and the sterile locule); seed spheroid, the cotyledons thick, 1 folded back lengthwise, the other embracing it.

Type. *Burdachia prismatocarpa* Adr. Jussieu.

Burdachia comprises four species of Amazonia and Guyana, all of which are treated below. They are usually found by rivers or in low, periodically inundated places (“igapós”), and it seems probable that the indehiscent fruits, which are dry and buoyant at maturity, are adapted to dispersal by water.

Key to the Species of *Burdachia*

1. Fruit conoid to spheroid, round in cross section, the walls smooth; leaves and vegetative stems glabrous; stipules abaxially glabrous; peduncle glabrous or with a few hairs in a line; ovary depressed-globose.
 1. *B. sphaerocarpa*.

1. Fruit pyramidal, bearing 8–9 longitudinal ribs, these extended at the base into knobs or spurs; leaves minutely sericeous or tomentose below to glabrate, some hairs usually persisting on the midrib; vegetative stems sericeous to glabrate; stipules abaxially sericeous to glabrate; peduncle sparsely to densely sericeous; ovary conoid.
2. Largest leaves mostly wider than 6 cm, up to 14 cm; stipules 6–10 mm long; fruits 14–20 mm long. 2. *B. prismatocarpa*.
2. Largest leaves mostly less than 6 cm wide; stipules 3–5 mm long; fruits up to 12 mm long.
3. Hairs on lamina sessile, straight, strongly appressed, $\pm$ persistent; pedicel proper (i e beyond the joint) glabrous; ovary and fruit glabrous. 3. *B. williamsii*.
3. Hairs on lamina short-stalked, $\pm$ serpentine, loose, deciduous, the mature lamina often glabrate except for midrib; pedicel loosely sericeous to glabrate; ovary densely tomentose; fruit tomentose to glabrate. 4. *B. duckei*.

1. *Burdachia sphaerocarpa* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 330. 1840.

Small trees 3–8 m tall, the younger vegetative stems strongly flattened and glabrous, becoming terete in age. Lamina of the larger leaves (8–)10–23 cm long, 5–10(–11.5) cm wide, ovate, elliptical, or obovate, cuneate, rounded, or slightly cordate at the base, thickened and revolute at the margin, acute or short-acuminate to rounded and often apiculate at the apex, glabrous, usually bearing 2 large glands below at base by midrib and many scattered tiny impressed glands distally, the lateral veins and often a coarse reticulum prominent below, prominent or obscure above; petiole 9–25 mm long, thick, glabrous, eglandular (except for the pair of glands at juncture of lamina and petiole); stipule-pair 5–9(–11) mm long, ovate, auriculate at the base, acuminate at the apex, coriaceous, abaxially glabrous, adaxially densely orange-hirsute. Inflorescence tomentose-sericeous to glabrate, erect or pendent in fruit, single or double, simple or divided at the base into 3(–5) axes, each cincinnus of 1–2(–6) flowers, the bract and bracteoles 1–2.5 mm long, broadly ovate or triangular, concave, abaxially glabrous, adaxially hirsute at the base; peduncle of the cincinnus glabrous or with a few hairs in a line. Pedicel 5–11(–13) mm long, glabrous, thickened in fruit. Sepals 1.5–2 mm long beyond the glands, 1.7–2.5 mm wide, broadly obtuse or rounded, membranous at the margin, glabrous, the glands 2–3 mm long. Lateral petals with the claw 4–6 mm long, the limb 6.5–9.5 mm long, 7–11 mm wide, deeply concave (outermost) to nearly flat, orbicular, deeply cordate at the base, entire or slightly erose; posterior petal with the claw 4 mm long, the limb 4–5 mm long, 3 mm wide, flat or distally reflexed, ovate or oblong, bearing 2–4 large stalked pendent glands on each side at the base and several sessile glands distally, these continuous over the apex or not. Filaments 1.5–2.2 mm long; anthers 2–4 mm long, variable in the same flower but generally longer opposite the sepals, the connective equalling the locules at the apex or extended up to 1 mm in an obtuse or rounded, erect or reflexed projection. Ovary depressed-globose, 1–1.5 mm high, glabrous; styles 4–6 mm long, glabrous. Fruit 15–28 mm long, 11–17 (–19) mm in diameter, spheroid to conoid, rounded at the base, smooth-sided and round in cross section, usually $\pm$ rostrate at the apex, “green” drying brown, glabrous, with a thick fibrous husk, 1-seeded.

Type. *Martius*, Barra do Rio Negro [Manaus], Amazonas, Brazil (P, M).

Collected in flower and fruit in diverse months, especially from March to June and September to December.

This species has populations in two disjunct areas, in both of which occur similar variations in size and shape of leaves and fruits. However, plants of the two areas do seem to differ consistently in the color of their petals, insofar as it has been noted by collectors, and that may represent a significant adaptation to different pollinators. I am recognizing two varieties on the basis of that difference, with the special purpose of emphasizing the peculiar distribution of the species. More complete collection may eventually erode the bases for recognizing these varieties.

The collections cited by Cuatrecasas (1958, p 636) as *Burdachia sphaerocarpa* are treated here as *B. prismatocarpa* var *loretoënsis*.

Key to the Varieties of *Burdachia sphaerocarpa*

- | | |
|--|-------------------------------|
| 1. Petals pink; westernmost Pará and Amazonas, Brazil. | 1a. var <i>sphaerocarpa</i> . |
| 1. Petals white; northern Guyana. | 1b. var <i>glandifera</i> . |

1a. *Burdachia sphaerocarpa* Adr. Jussieu var *sphaerocarpa*

Burdachia atractoides Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 5: 59. 1914. Syntypes. Amazonas, Brazil, *Glaziou* 13592; Manaus, *Schwacke* III 266 (RB!).

Distribution. VENEZUELA. Amazonas: 0–0.5 km NE of San Carlos de Río Negro, secondary forest and open areas, elev 120 m, *Liesner* 3685 (MICH). BRAZIL. Amazonas: terra firme, capoeira, Igarapé de S. Raimundo, Manaus, *Almeida* [INPA 3103] (INPA); primary forest, terra firme, 5 km upstream from junction of Rios Cuieiras and Branquinho, *Campbell et al* P21924 (MICH); Barcelos, Rio Domani, *Duarte* 7159 (INPA); Parintins, *Ducke* 142 (A); *Ducke* 142a (NY); igapó, Borba, Rio Madeira, *Ducke* 461 [RB 34636] (A, MO, NY, RB, US); margem, Igarapé da Cachoeira Grande, *Ducke* 780 (INPA, MO, NY, RB, US) & 793 (MO, NY, US); terra firme, margem do Rio Içana, *Fróes* 21413 (IAN, NY, US); W bank of Rio Negro, N of Manaus, *Gentry & Ramos* 12891 (MICH); praia alagavel do rio, Maués, *Pires* 37 (NY); forest on terra firme, Rio Cuieiras just below mouth of Rio Brancinho, *Prance et al* 14996 (MICH, NY); high muddy river bank, Rio Negro between mouth of Rio Caurés and Barcelos, *Prance et al* 15138 (MICH, NY); Rio Cuieiras above mouth of Rio Brancinho, flooded river bank, *Prance et al* 17728 (MICH); margem do Rio Purus, Cachoeira de Lindóia, *Rodrigues* 308 (INPA); carrasco arenoso, Manaus, *Rodrigues* 984 (INPA, US); Ponta Negra, Manaus, *Rodrigues & Coelho* 2087 (INPA); Porto de Manaus, baixo Rio Negro, região de Cacau-Pirera, *Rodrigues & Jaccoud* 8886 (INPA); Manaus, *Schwacke* III 266 (RB). Pará: praia do Lago de Faro, *Ducke* [RB 14189] (RB).

The collection from Rio Içana, *Fróes* 21413, has unusually wide leaves and 2–6 flowers in each cincinnus instead of the 1–2 found in most plants of *Burdachia sphaerocarpa*. Perhaps it deserves recognition as a variety, but that would best await further collection, especially of material with flowers.

1b. *Burdachia sphaerocarpa* var *glandifera* (Gleason) Anderson, comb et stat nov

Tetrapodenia glandifera Gleason, Bull. Torrey Bot. Club 53: 289. 1926.

Type. *De La Cruz* 3515, Amakura River, Northwest District, 8°10'N, 60°W, British Guiana [Guyana] (holotype NY! isotypes F! MO!).

Distribution. GUYANA. Overhanging Francois Creek, Mahaicony River, *Davis* 177 (NY); upper Mazaruni River, ca 60°10'W, *De La Cruz* 2043 (F, MO, NY, US) & 2176 (F, MO, NY, US); Kamakusa, upper Mazaruni River, ca 59°50'W, *De La Cruz* 2869 (F, MO, NY); type, q v; overhanging water, just below mouth of Tipuru inlet, Essequibo River, *Forest Dept.* 6110 (NY, US); Lama (?) Creek, *Jenman* 3779 (NY); *Jenman* 6413 (E, NY); riverside, sandy soil, Bootooba, Demerara River, *Persaud* 31 (F); *Persaud* 53 (F); riverside, Mallali, *Persaud* 177 (F, NY).

2. *Burdachia prismatocarpa* Adr. Jussieu, *Ann. Sci. Nat.* 2° Sér. Bot. 13: 330. 1840.

Key to the Varieties of *Burdachia prismatocarpa*

1. Ovary densely tomentose or sericeous; fruit tomentose or sericeous to glabrate; connectives of most anthers much exceeding the locules, the projection reflexed; fruit with very pronounced longitudinal ribs or winglets and basal projections. 2a. var *prismatocarpa*.
1. Ovary and fruit glabrous or at most sparsely sericeous; connectives of most anthers about as long as the locules; fruit with low, rounded ridges and short basal projections. 2b. var *loretoënsis*.

2a. *Burdachia prismatocarpa* Adr. Jussieu var *prismatocarpa*

Fig 29a–d.

Burdachia prismatocarpa var *pyramidata* Niedenzu, *Arb. Bot. Inst. Ak. Braunsberg* 5: 60. 1914.

Burdachia prismatocarpa var *argutivenosa* Cuatrecasas, *Webbia* 13: 636. 1958. Type *Cuatrecasas* 7248, Mitú, Río Vaupés, Colombia (holotype US! isotypes COL, F! NY!).

Shrubs or trees 2–15 m tall, the vegetative stems sericeous to glabrate. Lamina of the larger leaves 11–21 cm long, 6–12(–14) cm wide, ovate or elliptical, mostly rounded or cordate at the base, flat or slightly revolute at the margin, mostly obtuse or rounded at the apex, often emarginate and then sometimes apiculate, glabrate above, sparsely but $\pm$ persistently sericeous below, the hairs short, fine, sessile, bearing 2 large glands below at the base on the midrib and few to many tiny impressed glands distally scattered or concentrated along the midrib, the lateral veins strongly parallel and prominent below, the reticulum prominulous on both sides; petiole 10–25 mm long, thick, sericeous to glabrescent, eglandular; stipule-pair 6–10 mm long, ovate or triangular, acuminate to broadly rounded at the apex, concave to flat or slightly revolute and often thin at the margin, abaxially sericeous to glabrate, adaxially densely orange-hirsute in the proximal half, hirsute or glabrous distally. Inflorescence tomentose-sericeous, each cincinnus of 1–2 (–3) flowers, the bract and bracteoles 1–3 mm long, ovate, membranous at the margin, glabrous or sparsely sericeous, the bracteoles usually borne near the base of the peduncle; peduncle of the cincinnus often sericeous, especially distally. Pedicel 6–10(–12) mm long, glabrous, lengthened and thickened in fruit. Sepals 1.5–2 mm long beyond the glands, 1.5–2 mm wide, broadly obtuse, membranous at the margin, glabrous, the glands pink, 2.5–3 mm long. Petals pink or white, the lateral 4 with the claw 3–4 mm long, the limb 5–7.5 mm long, 5–8 mm wide, orbicular, deeply to shallowly concave, cordate, erose; posterior petal with the claw 2.5–3.5 mm long, the limb 3–4 mm long, 3–4 mm wide, flat or distally reflexed, ovate, bearing large, usually stalked glands at the base and smaller,

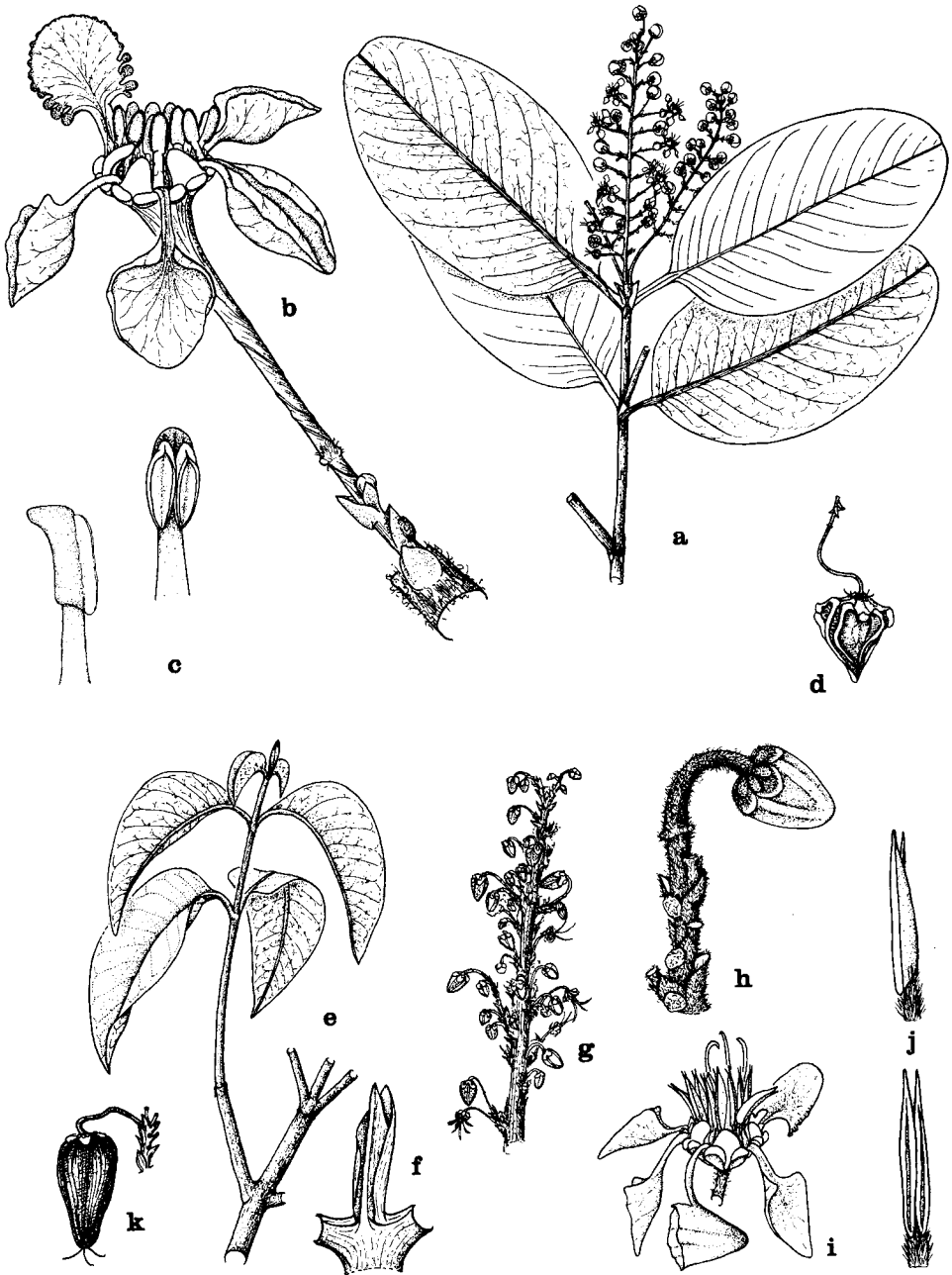


Fig 29. *Burdachia prismatocarpa* and *Glandonia williamsii*. a-d, *Burdachia prismatocarpa* var *prismatocarpa*: a) Flowering branch, $\times 0.3$; b) flower, $\times 3.6$; c) stamens, $\times 5$; d) fruit, $\times 0.6$. e-k, *Glandonia williamsii*: e) Leafy branch, $\times 0.3$; f) stipules, $\times 1.2$; g) inflorescence, $\times 0.6$; h) cincinnus with bud, $\times 3$; i) flower, $\times 2$; j) stamens, $\times 5$; k) fruit, $\times 0.6$. Drawn by Melissa Marshall, a-c from Maguire et al 31025, d from Wurdack & Monachino 39778, e-f from Williams 14154, g-j from Maguire et al 36493, k from Maguire et al 37554.

sessile glands distally, the glands usually continuous over the apex. Filaments 1.3–2 mm long; anthers 2–3 mm long, variable in the same flower, the connective projecting beyond the locules up to 1 mm, the projection obtuse or rounded, usually reflexed. Ovary conoid, ribbed, ca 1.5 mm high, densely sericeous or tomentose; styles 3–4.5 mm long, sericeous at the base. Fruit 14–20 mm long, 10–18 mm in diameter, pyramidal, bearing 8–9 longitudinal aerenchymatous ribs or winglets (3 per carpel), these usually extended as spurs and often interconnected at the base, rostrate at the apex, green drying brown, tomentose to glabrate, the wall composed of much aerenchyma reinforced by fibers, containing 1 seed (rarely 2).

Type. *Martius*, Tefé, Brazil (M?).

Distribution. Along rivers in Amazonian Brazil and Colombia and middle to upper Orinoco, Venezuela. BRAZIL. Pará: Rio Cupari, Curuçá, *Black* 48–2261 (IAN); Fordlândia, Tabocal, *Black* 48–2321 (IAN); Rio Trombetas, near cachoeira Porteira, *Campbell et al* P22339 (MICH); Tapajos, Boa Vista, *Capucho* 581 (F); vic. Obidos, *Spruce* 246 in Dec 1849 (NY). Amazonas: Maués, *Campbell et al* P22009 (MICH); Manaus, Rio Negro, *Cavalcante* 1780 (NY); Manacapurú, *Cavalcante* 1807 (NY); Igarapé da Cachoeira Grande, Manaus, *Ducke* 1225 (MO, NY, US); Mercês, Rio Negro, *Fróes* 21095 (NY); Taraquá, Rio Uaupés, *Pires* 969 (IAN); Ega [Tefé], *Poeppig* 2911 (F, NY, US); Mauá Road, Manaus, *Prance et al* 11548 (MICH, NY); Taracuá, Rio Tikié, *Schultes & López* 9684 (GH, US); São Gabriel da Cachoeira, *Spruce* 2092 in Jan–Aug 1852 (GH, MG, NY). VENEZUELA. Amazonas: Sipapo R. near confluence with Orinoco R., *Breteler* 4840 (US, VEN, WAG); in caño along stream at Moriche camp, Cerro Moriche, Río Ventuari, *Maguire et al* 31025 (MICH, NY, US, VEN); Caño Atabapure, elev 175 m, *Maguire & Maguire* 35522 (MICH, NY, US, VEN); Cerro Moriche, Serranía Yutaje, elev 150 m, *Maguire & Maguire* 35536 (MICH, NY, US, VEN). Bolívar: Río Pargueni 1–10 km above mouth, elev 90 m, *Wurdack & Monachino* 39778 (MICH, NY, US, VEN); drowned forests of Río Horeda 1–4 km above mouth, elev 90 m, *Wurdack & Monachino* 39899 (MICH, NY, US, VEN); central western lobe of Cerro Marimarota (with laguna at base of mountain), elev 100–200 m, *Wurdack & Monachino* 41109 (MICH, NY, US, VEN). COLOMBIA. Vaupés: Bacuraba Cachoeira, *Allen* 3317 (US); Bocas del Carurú, elev 230 m, *Cuatrecasas* 7066 (US); Río Vaupés, cerca de Mitú, elev 200 m, *Cuatrecasas* 7248 (F, NY, US); Alto Vaupés, Lagos de Pasos y alrededores, *Gutierrez & Schultes* 846 (GH, NY); Río Karurú, *Schultes & Cabrera* 19198 (NY, US); inundated stream across from Mitú, *Zarucchi* 1629 (MICH); Río Vaupés 1 km below Urania, *Zarucchi* 2237 (MICH). Amazonas-Vaupés, Río Apaporis: Lagunas del Churuco, elev 280 m, *García-Barriga* 13659 (NY, US); entre los ríos Kananarí y Pacoa, elev 250 m, *García-Barriga* 14020 (COL, US); Soratama, elev 250 m, *García-Barriga* 14082 (US); Soratama, *Schultes & Cabrera* 12622 (GH, NY, US) & 13736 (GH, NY, US); Raudal de Jirijirimo (below mouth of Río Kananarí), *Schultes & Cabrera* 14543 (US).

Collected in flower mostly from August to March (especially October to December) and in fruit from November to June (especially February to May).

Fruits that seem to be adapted for dispersal by water have evolved in many Malpighiaceae that grow in the Amazon region, but none is more impressive in

that respect than the fruit of *Burdachia prismatocarpa*. Its wall produces a number of ribs or winglets that are composed mostly of aerenchyma, so that the mature fruit is dry, light, and very buoyant. It is worth noting that these ribs are developed in positions that correspond to the lateral and dorsal wings in mas-cagnoid genera. If the structures are homologous, *Burdachia* might constitute an intriguing link between the byrsonimoid genera and the wing-fruited genera.

2b. *Burdachia prismatocarpa* var *loretoënsis* Anderson, var nov

Differt a *Burdachia prismatocarpa* var *prismatocarpa* limbo petali postici in dimidio proximali utrinque ca 9 glandulis parvis instructo, distaliter eglanduloso, connectivis antherarum loculos apice aequantibus vel paulo superantibus, ovario fructuque glabro vel sparsim sericeo, et fructu cristis longitudinalibus humilibus rotundatisque et umbonibus basalibus brevioribus.

Type. Woytkowski 5146, banks of Río Nanay, elev 100 m, Dept. Loreto, Peru, 8 Dec 1958 flr/imm frt (holotype US, isotypes F, MO).

Distribution. Western Amazonia. BRAZIL. Amazonas: Tonantins, Rio Solimões, Feb frt, *Mori et al* 9053 (MICH). COLOMBIA. Amazonas: Loretoyacu River, elev 100 m, Oct flr, *Schultes & Black* 8400b (GH, US) & 8523 (COL, GH, NY, US). PERU. Loreto: Mishuyacu, near Iquitos, elev 100 m, Oct–Nov flr, *Klug* 429 (F, NY, US); Río Ambiyacu, Mar frt, *Mori et al* 9231 (MICH); Maynas, Yarina cocha, Nov flr, *Torres M.* 484 (ECON): type, q v.

This is the plant that Cuatrecasas called *Burdachia sphaerocarpa* in his Prima Flora Colombiana.

3. *Burdachia williamsii* Steyermark, Fieldiana Bot. 28: 285. 1952.

Burdachia prismatocarpa var *sphaerocarpa* Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 5: 60. 1914. Lectotype. *Spruce* 3425, ad flumina Casiquiari, Vasiva et Pacimoni, Amazonas, Venezuela (GH!).

This plant has the small leaves, stipules, and fruits of *B. duckei*, the ovary glabrous, the inflorescence usually pendent (?), and otherwise resembles *B. prismatocarpa* var *prismatocarpa*. It occurs between San Fernando de Atabapo and Cucui, an area from which *B. prismatocarpa* is not known although it occurs north and south of there. Near San Fernando two collections have been made which suggest that *B. williamsii* and *B. prismatocarpa* may hybridize (*Gentry* 10967 and *Level L-100*). *Burdachia williamsii* is a rather weak segregate and might be better treated as a variety of *B. prismatocarpa*.

Type. *Ll. Williams* 14321, Maroa, Río Guainía, Amazonas, Venezuela, 13 Feb 1942 (holotype F! isotypes A! US!).

Distribution. VENEZUELA. Amazonas: E-W caño north of Cerro Yapacana, from gold mine trail to Río Orinoco, elev 130 m, *Maguire et al* 30775 (MICH, NY, US, VEN) & 30792 (NY); Caño Arapacua, Río Pacimoni, elev 120 m, *Maguire & Wurdack* 34888 (MICH, NY, US, VEN); Casiquiari, Vasiva, and Pacimoni Rivers, *Spruce* [3425] (GH); Río Temi, Yavita, *Steyermark & Bunting* 102966 (NY, VEN); Maroa, Guainía, Alto Río Negro, *Ll. Williams* 14320 (VEN), type q v, 14447 (F, MO, US, VEN), 14806 (US, VEN).

Collected in flower from January to April, in fruit in March and April.

4. *Burdachia duckei* Steyermark, Fieldiana Bot. 28: 283. 1952.

Burdachia prismatocarpa β *spruceana* Grisebach in Martius, Fl. Bras. 12(1): 23. 1858. Type. *Spruce* 1659, prope Barra [Manaus], Rio Negro, Amazônas, Brazil, Jul 1851 (holotype GOET? isotypes GH! NY!).

Lamina of larger leaves 6–13 cm long, 3–6 cm wide, revolute at the margin, loosely sericeous or tomentose to glabrescent with short-stalked, $\pm$ serpentine hairs, bearing 2 small glands below at base and no to relatively few tiny distal glands, mostly near the midrib; stipules 3–5 mm long, strongly concave. Inflorescence often pendent. Pedicel loosely sericeous to glabrate. Petals pink. Ovary densely tomentose. Fruit 9–11 mm long, 8–9 mm in diameter, the ribs only moderately developed (not extended into corky winglets), tomentose to glabrate. Otherwise similar to *B. prismatocarpa* var *prismatocarpa* and *B. williamsii*.

This species has the smallest leaves and fruits of any *Burdachia*. It is closely related to *B. prismatocarpa*, the two apparently occurring together near Manaus without hybridizing. Perhaps where populations are sympatric their flowering is allochronic; also, *B. duckei* seems to grow more often in igapós than along permanent streams.

Grisebach's epithet *spruceana* was presumably assigned the rank of forma by Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 5: 60. 1914. I have not seen that publication.

Type. *Ducke* 522, Igarapé da Cachoeira Grande, Manaus, Amazônas, Brazil, 14 Jul 1937 (holotype F! isotypes MO! NY!).

Distribution. By streams and in igapós above and below Manaus, between Barcelos and Rio Urubú. BRAZIL. Amazônas: Barcelos, *Duarte* 7161 (INPA); type, q v; Rio Cuieiras, 50 km upstream, *Kubitzki et al* P21729 (MICH); Manaus, igarapé do Tarumã, *Mello* 4029; Rio Urubú, *Prance et al* 3680 (MICH, NY) & 4735 (MICH, NY); Rio Cuieiras just below mouth of Rio Brancinho, *Prance et al* 14893 (MICH, NY); Rio Brancinho, Rio Cuieiras, *Prance et al* 17867 (MICH); Manaus, Rio Tarumãzinho, *Prance & Lleras* 23741 (MICH); Rio Cuieiras, *Rodrigues* 6727 (INPA); Manaus, Cachoeira Baixa do Tarumã, *Rodrigues & Lima* 2254 (INPA); Manaus, Cachoeira Alta do Tarumã, *Rodrigues & Lima* 2254 (INPA); Rio Negro, Ilha Gavião near mouth of Rio Branco, *Schultes* 24531 (INPA); near Manaus, *Spruce* [1659] (GH, NY); Manaus, Cachoeira Grande, *Ule* 8880 (MG). Terr. Roraima: R. Xeriuini, *Pires et al* 13921 (MICH).

Collected in flower most often from May to September, but in fruit in March, April, September, and December, which suggests some flowering in January and February.

9. *Glandonia* Grisebach in Martius, Fl. Bras. 12(1): 23. 1858.

Shrubs or trees; leaves often bearing abaxial glands; stipules interpetiolar, linear, the adjacent stipules from opposite leaves connate in pairs, the 2 pairs at each node conduplicate and equitant over the apical bud, caducous, the members of a pair often splitting apart before falling off. Inflorescence terminal, usually simple, a raceme of short cincinni, the bracts and bracteoles persistent, the lowest bracteole and alternate subsequent bracteoles bearing a large eccentric abaxial gland. Flower buds circinate, conical or pyramidal, the outermost petal completely covering the others. Sepals all biglandular, the glands obovate, com-

pressed. Petals strongly trimorphic, the outermost with the limb conical-galeiform, its claw recurved after anthesis, the other 3 laterals flat or crumpled or folded, recurved, the posterior with the flat or reflexed limb borne on a stout, erect claw. Receptacle glabrous on both sides of stamens. Filaments very short, connate at base, densely hirsute on both sides; all 10 anthers fertile, similar, subulate, the locules linear, quite distinct, tapering at the apex into 2 sterile awn-like extensions ca 0.5 mm long, exceeding the slender connective. Ovary with 3 completely connate carpels, 1 anterior and 2 posterior, all 3 locules fertile; styles 3, apical, inbent at the apex in bud, never fully straightened, subulate, the stigma minute and terminal. Fruit an indehiscent fibrous nut, cylindrical or truncate-conoid, dry at maturity and without a stone, containing only 1 locule completely filled by 1 large seed (through abortion of the other 2 ovules and collapse of their locules); seed spheroid or cylindroid, the cotyledons large, fleshy, straight and not folded, equal or one larger and slightly embracing the other.

Type. *Glandonia macrocarpa* Grisebach.

Glandonia comprises three geographically disjunct species, one from the upper Rios Negro and Orinoco, one from the vicinity of Manaus, and one from the upper Rios Purús and Madeira. The species are similar, particularly the latter two, but seem to be meaningful biological entities.

The fruit of *Glandonia*, like that of *Burdachia*, has a fibrous, inedible husk which imparts buoyancy to the mature fruit. This is presumably an adaptation for dispersal by water. All three species are usually found growing near rivers or in periodically inundated savannas or igapós.

Key to the Species of *Glandonia*

1. Lamina minutely papillose below (Fig 12c), coriaceous; stems, stipules, petioles, and midrib below appressed-tomentose, persistently so or eventually glabrate. 1. *G. williamsii*.
1. Lamina nearly or quite smooth below (Fig 12d), papyraceous; stems, stipules, and leaves glabrous (? or very soon glabrescent).
 2. Inflorescence (13–)17–28 cm long, open, with 1–2.5 cm between pairs of cincinni; lamina 15–26 cm long, 6–10 cm wide, strongly obovate; floriferous peduncle 0–1(–2) mm long, nearly or quite included by the subtending bracteole; posterior petal with large glands on proximal $\frac{1}{3}$ – $\frac{1}{2}$ of limb; pedicel 10–12 mm long. 2. *G. macrocarpa*.
 2. Inflorescence 5–11 cm long, with the cincinni crowded, up to 1 cm apart; lamina 9–18 cm long, 3.5–6.5(–8) cm wide, elliptical or slightly obovate; floriferous peduncle 2–3 mm long, raising the joint beyond the subtending bracteole; posterior petal with few small glands at base of limb; pedicel 6–8 mm long. 3. *G. prancei*.

1. *Glandonia williamsii* Steyermark, Fieldiana Bot. 28(2): 288. 1952.

Fig 12c & 29e–k.

Shrubs or small trees 2–8 m tall, the young vegetative stems flattened and tomentose or sericeous, becoming terete and glabrate in age. Lamina of the larger leaves 10–22 cm long, 3.3–10.3 cm wide, elliptical or slightly ovate or obovate, cuneate or rounded at the base, revolute at the margin, obtuse to acuminate at the apex, coriaceous, minutely papillose below, appressed-tomentose to glabrate, bearing (0–)2(–6) large glands below at the base by the midrib and several small glands distally, the lateral veins and reticulum moderately prominent below; petiole 11–24 mm long, tomentose to glabrate, eglandular; stipules 9–21 mm long, abaxially tomentose to glabrate. Inflorescence 5–18 cm long, appressed-tomen-

tose or sericeous, the cincinni mostly less than 1 cm apart, containing 3–5 flowers; bracts and bracteoles ovate, abaxially sericeous, the bracts 3–5 mm long, the bracteoles 2–3 mm long; floriferous peduncle (1–)2–4 mm long. Pedicel 8–10 mm long, densely tomentose or sericeous. Sepals 1.5–2 mm long beyond the glands, 2–2.5 mm wide, rounded, abaxially sericeous, adaxially glabrous, the glands 2–3 mm long. Petals “white” or “yellow” (perhaps the outermost yellow and the others white), glabrous or bearing a tuft of hairs abaxially at base of claw, the outermost with the “helmet” 5–6 mm long, 4–4.5 mm in diameter, erose, the claw 3–4 mm long, the other 3 laterals with the limb 4–6 mm long, 4–5.5 mm wide, obtusely sagittate, flat to conduplicate, eglandular and denticulate or erose, the claw 3.5–4.5 mm long, the posterior petal with the limb 4–5.5 mm long, 3–4 mm wide, rounded-sagittate, bearing on each side ca 10 glands on the proximal half and distally eglandular, erect or reflexed, the claw 3.5 mm long. Filaments 1.3 mm long, densely hirsute; anthers 3.5–5 mm long, bearing a tuft of straight hairs on the connective just above the insertion of the filament. Ovary 1.3 mm high, pyramidal, glabrous; styles 4.5–5.5 mm long, subequal, glabrous, the terminal 0.5 mm bent over. Fruit 14–22 mm long, 12–14 mm in diameter, cylindrical becoming conoid at maturity, bearing 7–9 low, rounded, longitudinal ribs.

Type. *Ll. Williams 14154*, Yavita, 128 m, Alto Orinoco, en sabanetas periódicamente anegadas, Amazonas, Venezuela, 2 Feb 1942 (holotype F! isotypes F! VEN!).

Distribution. Upper Río Orinoco and upper Rio Negro. VENEZUELA. Amazonas: São José Casiquiare, *Fróes 21509* (NY); NW base of Cerro Yapacana, Yapacana caño laguna, elev 125 m, *Maguire & Wurdack 34487* (NY) & *34610* (MICH, NY, VEN); Piedra Catipán, Río Yatua, elev 100–140 m, *Maguire et al 36493* (MICH, NY, US, VEN); riverine forest near Laja Catipán, elev 100–140 m, *Maguire et al 37554* (MICH, NY, US, VEN); type, q v; cerca del Río Temí, sabanetas periódicamente anegadas, elev 128 m, *Williams 14168* (F, VEN); Río Guainía, Bajo Caño San Miguel, elev 127 m, *Williams 14884* (F, US, VEN). BRAZIL. Amazonas: Rio Negro, Içana, Cach. Maçarico, *Fróes 22233* (IAN); Rio Negro, Içana, Cach. Tunuhy, *Fróes 22280* (IAN); Igarapé Toury, afl. do Rio Negro, *Fróes 27909* (UB); Taraguá, Ig. da Chuva, Uaupés, *Pires & Silva 7970* (IAN); Rio Uneiuxi, 200–300 km above mouth, *Prance et al 15516* (MICH, NY); Rio Negro, between Cocui and mouth of Rio Issana, São Marcelino, Igarapé Uabá, opposite Rio Xié, *Schultes & López 9565* (GH, US). COLOMBIA. Vaupés: Mitú and vic., along Río Vaupés 1 km below Urania, *Zarucchi 2236* (MICH).

Collected in flower from October to May, in fruit from February to June.

2. *Glandonia macrocarpa* Grisebach in Martius, Fl. Bras. 12(1): 24. 1858.

Fig 12d.

Trees to 12 m tall; young vegetative stems glabrous (? or very soon glabrescent), flattened, becoming terete in age. Lamina of the larger leaves 15–26 cm long, 6–10 cm wide, strongly obovate, cuneate or rarely abruptly rounded at the base, flat or slightly revolute at the margin, acuminate at the apex, papyraceous, smooth (not papillose) below, glabrous, eglandular or bearing several small glands below at the base and distally, the lateral veins and reticulum prominent below;

petiole 10–25 mm long, glabrous, eglandular; stipules not seen (over 1 cm long, according to Niedenzu). Inflorescence (13–)17–28 cm long, appressed-tomentose, open, the pairs of cincinni 1–2.5 cm apart, containing 2–5 flowers; bracts and bracteoles ovate or elliptical, concave, abaxially sericeous, the bracts 3.5–6 mm long, the bracteoles 1.5–4 mm long; floriferous peduncle 0–1(–2) mm long, nearly or quite included by the subtending bracteole. Pedicel 10–12 mm long, appressed-tomentose. Sepals 1.5–2 mm long beyond the glands, 2–2.5 mm wide, rounded, abaxially sericeous, adaxially glabrous, the glands 2–3 mm long. Petals white, glabrous, the outermost with the “helmet” 5–5.5 mm long and 5.5 mm in diameter, erose, the claw 5 mm long, the other 3 laterals with the limb 5.5–6.5 mm long, 6 mm wide, orbicular, cordate, $\pm$ flat, eglandular and entire or denticulate, the claw ca 4 mm long, the posterior petal with the limb 5 mm long and wide, orbicular, bearing on each side ca 5–7 large glands on the proximal $\frac{1}{3}$ – $\frac{1}{2}$, distally eglandular and $\pm$ entire, reflexed beyond the glands, the claw 3.5 mm long. Filaments 1.3 mm long, densely hirsute; anthers 4.5–5.5 mm long, bearing a tuft of straight hairs on the connective just above the insertion of the filament. Ovary 1.3 mm high, pyramidal, glabrous; styles ca 5.5 mm long, subequal, glabrous, the terminal 0.5–1 mm in bent. Fruit 20–28 mm long, 15–18 mm in diameter, cylindrical becoming truncate-conoid, bearing many (ca 15–20) unequal, rounded, longitudinal ribs, the larger ribs forming rounded spurs at base.

Type. *Spruce 1090*, in vicinibus Barra [Manaus], Prov. Rio Negro, Amazonas, Brazil, Dec–Mar 1850–51 (holotype GOET? isotypes GH! M, NY!).

Distribution. Known only from the vicinity of Manaus. BRAZIL. Amazonas, Manaus: Igarapé de Santa Maria, *Chagas & Coelho* [INPA 3504] (IAN, US); Cachoeira Alta do Tarumã, *Coelho* [INPA 2934] (NY, US); *Coelho* [INPA 3118] (US); *Coelho & Mello* [INPA 3230] (US); Estrada do Aleixo, silva paludosa non inundabili ad rivulum, *Ducke 63* (MO, NY, US) & 239 (NY); Igarapé do Crespo, ad ripas paludosas, *Ducke 1182* (MO, NY, US); *Ducke* [RB 23646] (US).

Collected in flower in November and February, in fruit in February.

3. *Glandonia prancei* Anderson, sp nov

Fig 11e–i.

A *Glandonia macrocarpa* differt lamina 9–18 cm longa, 3.5–6.5(–8) cm lata, elliptica vel parum obovata, stipulis 18–24 mm longis, inflorescentia 5–11 cm longa, cincinnis congestis usque 1 cm a se distantibus, bracteis 2–4 mm longis, bracteolis 1–3 mm longis, pedunculo florifero 2–3 mm longo, pedicello 6–8 mm longo, antheris 3–3.5 mm longis, et petalo postico basi limbi perpaucis glandulis instructo.

Type. *Prance, Pena & Ramos 3363*, banks of Rio Ipixuna, Mun. Humaitá, Rio Madeira, Amazonas, Brazil, 26 Nov 1966 flr (holotype INPA, isotypes MICH, NY).

Distribution. Southwestern Amazonia. BRAZIL. Amazonas: type, q v; flooded bank of Lago Preto, 3 km N of Lábrea, basin of Rio Purús, Oct flr, *Prance et al 8058* (INPA, MICH, NY); margin of Igapó Açu at crossing with Manaus-Pôrto Velho Road, Mar frt, *Prance et al 20557* (INPA, MICH).

This species is named in honor of Ghilleen Tolmie Prance, in recognition of his stellar contributions to botanical exploration, research, and education in Amazonian Brazil.

10. *Banisteriopsis* Robinson in Small, North American Flora 25: 131. 1910.

Banisteria sensu Adr. Jussieu, Grisebach, et Niedenzu, non Linnaeus.

Vines, shrubs, or rarely small trees, the leaves usually opposite or ternate, occasionally subopposite or alternate, bearing glands on the lamina or petiole or both, the stipules small, free, interpetiolar. Flowers borne in 4-flowered umbels, corymbs of up to 10 flowers, or pseudoracemes, these single or grouped in a paniculate or cymose inflorescence; floriferous peduncle usually absent, but well-developed in a few species, the floriferous bract and bracteoles all present, eglandular. Petals yellow, pink, or white, usually the lateral 4 spreading or reflexed and the posterior erect. Stamens 10, all fertile, the anthers alike in some species but more commonly strongly dissimilar, the connective greatly exceeding the locules in some anthers of some species. Ovary of 3 free carpels adnate to a common torus, 1 anterior and 2 posterior, all fertile; styles 3 (very rarely only the anterior developing), the stigmas terminal. Fruit schizocarpic, breaking apart into 3 samaras (or fewer due to abortion) separating from a short pyramidal torus, each samara having its largest wing dorsal, thickened on the adaxial (upper) edge, the veins terminating in the thinner abaxial edge; much shorter winglets or crests present on the sides of the nut in some species; dorsal wing rudimentary in a few species; nut usually with a functional carpophore.

Type. *Banisteriopsis cornifolia* (H.B.K.) Robinson in Small.

This wholly American genus comprises approximately 90 species. Dr. Bronwen Gates has just completed a revision of the genus, which will be published in the near future. She has very kindly given me access to her manuscript, and the treatment published here for *Banisteriopsis* in Guayana has been extracted from Dr. Gates' monograph and adapted to my format. I acknowledge her generous help with warm thanks. Since that modern revision will soon be available, I have cited only the best known synonyms here.

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

1. Petals pink, sometimes fading to pale yellow in age, some with the proximal half of the posterior petal yellow.
 2. Pedicel raised on a peduncle 0.5–3(–7) mm long; bracts and bracteoles persistent; anther locules quite glabrous; lamina (in Guayana populations) very densely metallic-sericeous below. 1. *B. muricata*.
 2. Pedicel sessile; bracts and bracteoles deciduous before or during anthesis; anther locules sparsely pilose to glabrate; lamina sparsely sericeous to glabrate below. 2. *B. caapi*.
1. Petals all yellow from the beginning.
 3. Petals, especially the lateral, very densely sericeous abaxially; styles, at least the anterior, densely bearded on the proximal half, with long spreading hairs.⁸
 4. Flowers borne only in umbels of 4; pedicels densely brown-sericeous to glabrate; lamina usually sparsely sericeous below; calyx glands 1–1.8 mm long. 3. *B. lucida*.
 4. Flowers borne in umbels of 4 subtended by 1 or 2 additional pairs; pedicels sparse-

⁸ While this paper was in press, *Banisteriopsis krukoffii* Gates was collected at Solano, 20 km NE of San Carlos de Río Negro, Amazonas, Venezuela, May flr, Liesner 7375 (MICH). It will key out with *B. lucida* and *B. pubipetala*, but differs from both in having divergent, spatulate bracts and bracteoles. *Banisteriopsis krukoffii* was previously known only from Amazonian Brazil.

- ly golden-sericeous to glabrate; lamina glabrous below; calyx glands 1.5–3 mm long. 4. *B. pubipetala*.
3. Petals glabrous; styles glabrous or bearing at most a few hairs at base.
5. Lateral petals subentire to denticulate, especially at base of limb.
6. Lamina densely tomentose or tomentose-sericeous below. 5. *B. cinerascens*.
6. Lamina very sparsely appressed-sericeous below (apparently glabrate, the hairs discernible only with a lens). 6. *B. wurdackii*.
5. Lateral petals fimbriate or lacerate or at least distinctly dentate all around the margin of the limb.
7. Lamina very densely and tightly sericeous below, the vesture producing a metallic sheen. 7. *B. lyrata*.
7. Lamina glabrous or sparsely sericeous to glabrate below.
8. Inflorescence glabrous; leaves with the lamina deeply cordate at the base, the lobes often equalling the petiole. 8. *B. pulcherrima*.
8. Inflorescence hairy; leaves with the lamina truncate, rounded, or shallowly cordate at the base.
9. Inflorescence golden-sericeous; connective of the anthers opposite the 3 anterior sepals only slightly exceeding the locules, by up to 0.5 mm; reduced leaves in the inflorescence entire, the margin eglandular or bearing tiny glands. 9. *B. maguirei*.
9. Inflorescence minutely brown- or white-tomentose; connective of the anthers opposite the 3 anterior sepals greatly exceeding the locules, by 0.6–1 mm; reduced leaves in the inflorescence usually bearing well-developed glands or ciliate processes on the margin. 10. *B. martiniana*.

Key to the Species of *Banisteriopsis* in Guayana (for specimens with fruits)

1. Locule of the nut of the samara hairy within; bracts and bracteoles deciduous before or during anthesis. 2. *B. caapi*.
1. Locule of the nut glabrous within; bracts and bracteoles persistent.
2. Nut of the samara bearing winglets, crests, ridges, or aculeate outgrowths on the sides.
3. Nut of the samara bearing several ridges or rounded or aculeate outgrowths on each side.
4. Lamina (in Guayana populations) very densely metallic-sericeous below; samara with at most a slight, rounded projection at adaxial base of dorsal wing. 1. *B. muricata*.
4. Lamina sparsely sericeous below; samara with a $\pm$ triangular appendage up to 10 mm high and 5 mm wide at adaxial base of dorsal wing. 3. *B. lucida*.
3. Nut of the samara bearing 1–3 undissected lateral wings on each side parallel to the areole.
5. Nut of the samara bearing 2 or 3 wings on each side. 4. *B. pubipetala*.
5. Nut of the samara bearing only 1 wing on each side.
6. Lamina densely tomentose or tomentose-sericeous below. 5. *B. cinerascens*.
6. Lamina very sparsely appressed-sericeous below (apparently glabrate, the hairs discernible only with a lens). 6. *B. wurdackii*.⁹
2. Nut of the samara unappendaged on the sides, the veins sometimes prominent.

Go to couplet 7 of preceding key.

⁹ *Banisteriopsis kruckoffii* Gates will also key out here; see footnote to couplet 3 of preceding key. *Banisteriopsis kruckoffii* has the flowers borne ultimately in umbels of 4 and the bracts and bracteoles divergent and spatulate; *B. wurdackii* has the flowers ultimately in short pseudoracemes of 10–20 flowers and the bracts and bracteoles appressed and triangular.

1. *Banisteriopsis muricata* (Cavanilles) Cuatrecasas, *Webbia* 13(2): 503. 1958.

Banisteria muricata Cavanilles, Tom. III, Nona Dissertatio Botanica 423. 1790.

Heteropterys argentea Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 165 (4^o ed.). 1821 [1822].

Banisteria argentea (Humboldt, Bonpland & Kunth) Sprengel, Syst. Veg. 388. 1825.

Banisteria metallicolor Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 46. 1832 [1833].

Banisteria schomburgkiana Benth., London Jour. Bot. (Hooker) 7: 129. 1848.

Banisteriopsis argentea (Humboldt, Bonpland & Kunth) Robinson in Small, North American Flora 25: 133. 1910.

Banisteriopsis schomburgkiana (Benth.) Robinson in Small, North American Flora 25: 133. 1910.

Banisteriopsis metallicolor (Adr. Jussieu) O'Donell & Lourteig, Lilloa 9: 259. 1943.

Woody vine, sometimes shrubby, the stems sericeous to glabrate. Lamina of the leaves (3.5–)5.3–12.7(–16.5) cm long, (2.3–)4.8–7.5(–9) cm wide, ovate, elliptical, or rotund, cuneate to cordate at the base, acuminate to apiculate at the apex, eglandular or bearing 2–4(–5) pairs of stipitate glands below, sparsely sericeous to glabrate above, sparsely to densely (always densely in Guayana populations) silver- or golden-sericeous below, the tertiary veins scalariform; petiole 5–16 mm long, usually sericeous, eglandular or with 1–2 pairs of cupulate glands near the apex; stipules triangular, 0.5–1 mm long. Inflorescence composed of 4-flowered umbels grouped in dense axillary and terminal cymes, usually sericeous; bracts and bracteoles 0.5–1.2 mm long, broadly triangular, persistent; peduncle 0.5–3(–7) mm long. Pedicel 3–12 mm long, usually sericeous. Sepals abaxially sericeous, adaxially sericeous near the margin, all eglandular or the lateral 4 biglandular, the glands 1.3–2 mm long. Petals pink, becoming paler in age, the posterior yellow in the proximal half, glabrous, the lateral 4 with the claw 0.8–1.4 mm long, the limb 4–8.5 mm long, 3.5–8 mm wide, orbicular, laciniate, eglandular; posterior petal with the claw 1.4–3 mm long, constricted at the apex, the limb 4–7 mm long, 3.5–6 mm wide, obovate, fimbriate with the basal fimbriae enlarged and gland-tipped. Filaments 1–3.6 mm long, the posterior 3 inflexed between the posterior styles; anthers with locules 0.6–1.2 mm long, glabrous, the connectives of those opposite the 3 anterior sepals glandular and enlarged, exceeding the locules by 0.8–1.7 mm opposite the antero-lateral sepals. Styles slender and diverging, the anterior 2.2–2.8 mm long, the posterior 2-lyrate, 2.6–3.6 mm long, the stigmas capitate. Samara sericeous, especially on the nut, with the dorsal wing (12–)20–34(–45) mm long, (9–)11–16(–20) mm wide, with at most a slight rounded projection at the adaxial base; nut with the sides rugose, tuberculate, muricate, or alulate (bearing several rounded or aculeate outgrowths in Guayana populations), the locule glabrous within.

Type. *Joseph de Jussieu*, Peru, frt (P).

Distribution. From Chiapas, Mexico, south to Argentina. Collections from Guayana and nearby: VENEZUELA. Bolívar: Entre Los Castillos y San Félix, *Bernardi* 7955 (VEN); N slope of Cerro Bolívar, elev 300–400 m, *Maguire et al* 35965 (MICH, NY, VEN); Santa Rosa, *Tovar* 2 (VEN); Ciudad Piar-Pto. Ordaz, *Trujillo* 5965 (MY). BRAZIL. Roraima: Rio Mucajai, núcleo Fernando Costa, *Black* 51–13716 (IAN); beira do Rio Branco, 5 km N Boa Vista, *Black* 51–13781

(IAN, UB); Boa Vista, *Kuhlmann 732* (MICH); Rio Branco, *Robt. Schomburgk I 844* (type of *Banisteria schomburgkiana*, BM, F, K, NY, P, US, W).

2. *Banisteriopsis caapi* (Spruce ex Grisebach) Morton, J. Wash. Acad. Sci. 21: 486. 1931.

Banisteria caapi Spruce ex Grisebach in Martius, Fl. Bras. 12: 43. 1858.

Banisteria quitensis Niedenzu, Ind. Lect. Lyc. Braunsb. 10. 1900.

Banisteriopsis inebrians Morton, J. Wash. Acad. Sci. 21: 485. 1931.

Banisteriopsis quitensis (Niedenzu) Morton, J. Wash. Acad. Sci. 21: 486. 1931.

Woody vine, the stems sericeous to glabrate. Lamina of the leaves (4.8–)8.2–15.9(–20.5) cm long, (2.5–)3.5–7.7(–11.5) cm wide, ovate, obtuse to truncate at the base, short- to long-acuminate at the apex, glabrate above, sparsely sericeous to glabrate below, bearing 2–5 pairs of sessile glands below near or at the margin and another pair near the midrib at the base: petiole 9–25 mm long, sparsely sericeous to glabrate, eglandular or biglandular near the apex; stipules 0.5–1 mm long, triangular. Inflorescence an axillary cyme of 4-flowered umbels, sparsely tomentose to velutinous, the bracts and bracteoles 1–1.8 mm long, deciduous before or during anthesis, rarely immediately afterwards. Pedicel 7–11 mm long, sessile, appressed- or tomentose-sericeous. Sepals abaxially sericeous, adaxially minutely tomentose, all eglandular or the lateral 4 biglandular, the glands 0.5–2.2 mm long. Petals pale pink, becoming pale yellow in age, glabrous, fimbriate, the lateral 4 with the claw 1–1.5 mm long, the limb 5–8.5 mm long, 4–6 mm wide, the posterior petal with claw 2.5–3 mm long, constricted at the apex, the limb 5–7 mm long, 2.5–4.5 mm wide, broadly obovate, the basal fimbriae gland-tipped. Filaments 2–4 mm long, the posterior 3 inflexed between the posterior styles; anthers with the locules sparsely pilose to glabrate, 0.3–1.2 mm long, the connectives 0.2–1.6 mm long, the anterior 5 longest and glandular, those of the anthers opposite the antero-lateral sepals exceeding the locules by 0.5–1 mm. Anterior style 2.8–3.2 mm long, straight, the posterior styles 3–4 mm long, diverging and lyrate at the base, the stigmas capitate. Samara appressed-pubescent to glabrate, with the dorsal wing 18–42 mm long, 8–22 mm wide, bearing a rounded tooth at the adaxial base; nut bearing prominent ribs on the side perpendicular to the areole, rarely with a short aculeate outgrowth, the locule hairy within.

Type. *Spruce 1012*, near Panuré, Rio Uaupés, Amazonas, Brazil, flr/frt (BM, BR, C, G, GH, K, NY, P, RB, W).

Distribution. Western Amazonia; widely cultivated by native tribes. Collections from Guayana and nearby: VENEZUELA. Amazonas: Isla El Silencio, Río Orinoco, Baniva, *Argumosa 126* (VEN); bosque secundario detras del pueblo de Sn. Carlos de Río Negro, elev 120 m, Oct flr, *Rutkis 209* (VEN). COLOMBIA. Vaupés: Río Piraparaná, *Hugh-Jones 3, 4, & 6* (all ECON); Río Kananarí, elev 250 m, *Schultes & Cabrera 13133 & 13156a* (both ECON); Río Piraparaná, *Schultes & Cabrera 17209* (ECON). Amazonas-Vaupés: Río Apaporis, Jinogojé, elev 250 m, *García-Barriga 14415* (US). BRAZIL. Amazonas: Manaus, cult. proc. Rio Curicuriari afl. R. Negro, *Ducke 153* (A).

This is one of the most famous of hallucinogenic plants. Among its many vernacular names, the most used are caapí, yagé, and ayahuasca. See Gates' mono-

graph for a discussion of the variation and taxonomy of this species, and Cuatrecasas (1958) for some information on the chemistry of the psychoactive drug.

3. *Banisteriopsis lucida* (Richard) Small, North American Flora 25: 133. 1910.

Banisteria lucida Richard, Actes Soc. d'Hist. Nat. Paris 1: 109. 1792.

Woody vine, the stems sericeous to glabrate. Leaves falcate, the lamina (3.6–) 6–13.3(–16.4) cm long, (2.2–) 3.2–6(–7.5) cm wide, elliptical, cuneate at the base, short- to long-acuminate at the apex, sparsely sericeous to soon glabrate above, sparsely sericeous (sometimes glabrescent) below, bearing minute glands on the margin, these more numerous toward the apex; petiole 4–10 mm long, sparsely sericeous to glabrate, eglandular; stipules 0.5–1 mm long, triangular, joined by an interpetiolar line. Inflorescence axillary, of 2–4 4-flowered umbels in each axil, densely brown-sericeous; bracts and bracteoles up to 1 mm long, cymbiform, appressed, persistent. Pedicel 13–20 mm long, sessile, brown-sericeous to glabrate. Sepals abaxially golden-sericeous, rounded at the apex, the lateral 4 biglandular, the glands 1–1.8 mm long. Petals yellow, abaxially densely sericeous, the lateral 4 with the claw 1–1.5 mm long, the limb dentate to lacerate, plane, broadly elliptical, that of the anterior pair 7–10 mm long and 6–8.5 mm wide, that of the posterior pair 5–7.5 mm long and 4–6.5 mm wide; posterior petal with the claw 3–3.5 mm long, constricted at the apex, the limb 4–5 mm long, 3–4 mm wide, obovate, lacerate, eglandular. Filaments glabrous, 1.4–4.4 mm long, longest opposite the styles; anthers with the locules 0.9–1.4 mm long, pubescent, the connectives not exceeding the locules, those opposite the sepals obovate, swollen distally, those opposite the petals oblong. Anterior style 2.4–4.8 mm long, stout, bent inwards at apex, densely bearded with long spreading hairs on the proximal $\frac{1}{2}$, the posterior 2 styles 2–3.4 mm long, slender, diverging from the base, directed toward the posterior petal, the stigmas truncate, not capitate. Samara sparsely sericeous, with the dorsal wing 36–63 mm long, 14–25 mm wide, usually much narrowed proximally; nut globose, 5–10 mm in diameter, the sides prominently ridged or rarely cristate, the ridges radiating from the areole, bearing apically at the base of the dorsal wing a $\pm$ triangular appendage up to 10 mm high and 5 mm wide, the locule glabrous within.

Type. *Leblond*, Cayenne, flr (holotype P, isotypes G, P, P-LAM).

Distribution. Wet tropical forests of eastern South America, extending westward through the Orinoco and Amazon drainages and around the Caribbean lowlands. Guayana collections: GUYANA. Potaro River 4 miles above Kaieteur Falls, elev 420 m, *Cowan & Soderstrom 2093* (F, NY); Kaieteur Falls, *De La Cruz 4433* (F, GH, MO, NY, US); Potaro River above Kaiatuk, *Maguire & Fanshawe 23354* (F, GH, MO, NY, US); Ireng River, between Waipa and Sand Hill Rapids, southern Pakaraima Mts, *Maguire et al 46235* (K, MICH, NY, US). VENEZUELA. Bolívar: Río Cuyuni, *Brewer 134* (VEN); Río Caroní, cerca de la boca del Jeabarú, elev 400 m, *Cardona 1178* (US, VEN); Río Carún, Alto Paragua, elev 500 m, *Cardona 2518* (VEN); Río Chicanán above Puerto Lema, elev 300 m, *Steyermark 89510* (VEN). Amazonas: above Capibara, Brazo Casiquiare, *Holt & Blake 689* (US); Río Manaviche, Alto Orinoco, *Lizot 77* (VEN); Esmeralda-Ocamo-Mavaca, *Medina 384* (VEN); Río Padamo 1 hour above mouth, Alto Orinoco, elev 150 m, *Maguire & Maguire 34721* (MICH, NY, US,

VEN); Río Orinoco near mouth of Río Maraca, elev 150 m, *Maguire & Maguire* 34748 (MICH, NY, US, VEN); flumina Casiquiari, Vasiva et Pacimoni, *Spruce* 3276 (BR, GH, MG, NY); Capihuara, Alto Casiquiare, elev 120 m, *Ll. Williams* 15719 (US, VEN); Río Orinoco just above Tama-Tama, elev 125–150 m, *Wurdack & Adderley* 43130 (MICH, NY, US, VEN) & 43650 (MICH, NY, US, VEN). BRAZIL. Amazonas: Rio Castanho, trib. of Rio Padauri, upper Rio Negro basin, elev 100–140 m, *Cardona* 1422 (US, VEN) & 1428 (US). Roraima: Uaicá airstrip, 3°33'N, 63°11'W, Rio Uraricoeira, *Prance et al* 10740 (MICH, NY).

Collected in flower and fruit in diverse months.

4. *Banisteriopsis pubipetala* (Adr. Jussieu) Cuatrecasas, Ciencia (Mexico) 23: 142. 1964.

Banisteria pubipetala Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 41. 1832 [1833].

Woody vine, the stems sparsely sericeous to soon glabrate. Lamina of the leaves (2.5–)5.1–13(–15.5) cm long, (1.1–)2.1–6(–8.3) cm wide, elliptical or obovate, cuneate to cordate at the base, short- to long-acuminate at the apex, glabrous, bearing minute glands on or just within the margin below, these more numerous toward the apex; petiole 2–8(–12) mm long, sparsely sericeous to glabrate, eglandular; stipules 0.5–1.2 mm long, triangular, situated on a more or less conspicuous interpetiolar ridge. Inflorescence compound, composed ultimately of very condensed racemes of 2–3(–5) pairs of flowers, most often a terminal umbel of 4 subtended by 1–2 additional pairs, sparsely sericeous to glabrate, the bracts and bracteoles 0.8–1.6(–2) mm long, triangular, appressed, persistent. Pedicel 10–22(–26) mm long, sessile, sparsely golden-sericeous to glabrate. Sepals abaxially golden-sericeous, the lateral 4 biglandular, the glands 1.5–3 mm long. Petals yellow, abaxially densely sericeous, the lateral 4 with the claw 1–2 mm long, the limb 7–12 mm long, 6–11 mm wide, lacinate, the anterior pair larger; posterior petal with the claw 3–5 mm long, thick, constricted at the apex, the limb 3.5–8.5 mm long and wide, orbicular, fimbriate, the basal fimbriae sometimes gland-tipped. Filaments glabrous, 1.8–5 mm long, longest opposite the anterior sepal and postero-lateral sepals and petals, shortest opposite the posterior petal, the posterior 3 usually inflexed between the posterior styles; anthers with the locules 0.8–2 mm long, sparsely to densely pilose, the connectives not exceeding the locules, those opposite the sepals obovate to narrowly obovate and apically papillate, those opposite the petals narrowly oblong and apically smooth. Styles 3–5 mm long, the anterior usually longer and thicker than the posterior 2, bearded on the proximal $\frac{1}{3}$ (to $\frac{1}{2}$ of the anterior), the stigmas capitate. Samara with the dorsal wing 20–40(–65) mm long, 9–16(–23) mm wide, glabrate; nut glabrate, bearing on each side 2–3 wings 1–3(–5) mm wide and parallel to the areole and apically at the base of the dorsal wing a triangular appendage 1.5–4(–7) mm high and 2.5–4(–9) mm wide, the locule glabrous within.

Lectotype. *Saint-Hilaire*, Catal. Cl. 762, Villa Boa, Goiás, Brazil (P).

Distribution. Widespread throughout Brazil, extending north to Colombia, west to Peru and Bolivia, and south to Paraguay; known in Venezuela only from one collection from Tachira; unknown in Guyana. Collections from near Guayana: COLOMBIA. Meta: Monte de Machadero, Ocoa, 4 km SE Villavicencio, Jan frt, *Hermann* 11115 (COL, US); sabanas de San Juan de Arama, Río Guejar, Jan frt,

Idrobo & Schultes 1329 (US); Sierra de La Macarena, Río Guapaya, Dec frt, *Philipson et al 1719* (F, NY, US). Vaupés: Mitú and vicinity, along Río Yí and Río Kubiýú, *Zarucchi et al 1817* (MICH). BRAZIL. Roraima: Rio Mucajai, ca-poeira, Sep flr, *Black 51-13610* (IAN).

5. *Banisteriopsis cinerascens* (Benth) Gates, Brittonia 31: 108. 1979.

Heteropterys cinerascens Benth, London Jour. Bot. (Hooker) 7: 131. 1848.

Banisteria cinerascens (Benth) Grisebach, Linnaea 22: 18. 1849.

Vine or spreading shrub, the stems densely sericeous, eventually glabrate. Lamina of the leaves 3.3–13.9(–17) cm long, 1.6–8 cm wide, narrowly to broadly elliptical, cuneate to truncate at the base, plane to slightly revolute at the margin, acute to short-acuminate at the apex, glabrous above, densely tomentose or tomentose-sericeous below, rarely glabrescent, bearing minute glands on the margin, the pair of glands at juncture of lamina and petiole usually enlarged; petiole 4–10(–14) mm long, densely tomentose-sericeous; stipules up to 1.5 mm long, triangular, joined by a prominent interpetiolar ridge. Inflorescence axillary, paniculate, sparsely to densely tomentose-sericeous, the branches bearing 8–20 flowers; bracts and bracteoles 0.6–1 mm long, triangular, appressed, persistent. Pedicel 6–11 mm long, sessile or borne on a peduncle up to 3 mm long, sparsely tomentose-sericeous. Sepals abaxially sparsely sericeous, adaxially glabrous, rounded at the apex, the lateral 4 biglandular, the glands 1.2–1.8 mm long. Petals yellow, glabrous, the lateral 4 with the claw 0.5–0.8 mm long, the limb 5–5.5 mm long, 3–4.5 mm wide, elliptical, concave, subentire or denticulate, especially proximally; posterior petal with the claw 1.5–2 mm long, the limb 4.5–6 mm long, 3–4 mm wide, broadly obovate, short-fimbriate, the basal fimbriae gland-tipped. Filaments 1.8–2.4 mm long; anthers with the locules 0.9–1.4 mm long, glabrous, the connectives not exceeding the locules. Styles equal, 2–2.4 mm long, diverging from the base, more or less inbent at the apex, the stigmas truncate. Samara with the dorsal wing 20–28 mm long, 8–11 mm wide, sparsely sericeous, often with a low rounded projection at the adaxial base; nut densely sericeous, bearing on each side a single wing parallel to the areole, 5–6 mm long and 0.5–2 mm wide, the locule glabrous within.

Type. Surumu/Cotingo River, Roraima, Brazil, flr, *Robt. Schomburgk II 488* (K, F, G, P, W) = *Rich. Schomburgk 773* (GOET, NY).

Distribution. Roraima, Brazil, and Bolivia. Guayana collections: BRAZIL. Roraima: Bôa Vista–BV road (BR 174), Km 76, by Uraricoeira River, elev 136 m, Oct frt, *Coradin & Cordeiro 547* (MICH); Serra do Murupu, Aug flr, *Luetzelburg 20660* (R); type, q v.

Benth, cited the two Schomburgk numbers as he did when he was citing two numbers for the same collection. Robert Schomburgk's label has the printed locality "Roraima," which would imply their camp at the southwestern base of Roraima in what is now Bolívar, Venezuela, while Richard Schomburgk's labels have the written localities "Suruma fl." or "Cotinga fl." Nevertheless, Benth clearly believed they were actually the same gathering, and I would guess that he was correct, especially since the specimens are very similar and in the same stage of flowering. The species has been found again in Roraima Territory but not in Bolívar, so the locality on Richard Schomburgk's labels is more likely to

be the correct one. The gathering, assuming there was only one, was probably made below the junction of the Cotingo and Surumu Rivers, which would explain the use of the former name on one label (the one at GOET) and Surumu on the other (the one at B and NY). All sheets of these two numbers should be considered isotypes, except, of course, for the holotype at Kew.

6. *Banisteriopsis wurdackii* Gates, Brittonia 31: 109. 1979.

Fig 30.

Banisteria cinerascens (Bentham) Grisebach var *glabrescens* Niedenzu in Engler, Pflanzenreich IV, 141: 406. 1928. Type. *Ule* 9477, Seringal S. Francisco, Rio Acre, Amazonas [probably Acre], Brazil.

Woody vine, the stems sericeous, soon glabrate. Leaves usually falcate, the lamina (7–)10–21.6 cm long, (3–)4.5–10.6 cm wide, lanceolate to broadly elliptical, acute to obtuse or rarely cordate at the base, somewhat revolute at the margin, short- to long-acuminate at the apex, glabrous above, sparsely sericeous below, the hairs 0.2–0.4 mm long, sessile, straight, bearing minute glands on the margin; petiole 7–12 mm long, sparsely sericeous, biglandular at the apex; stipules up to 1.5 mm long, triangular, joined by a prominent interpetiolar line. Inflorescence axillary, paniculate, sericeous, the branches bearing 10–20 flowers; bracts and bracteoles 0.6–1 mm long, triangular, appressed, persistent. Pedicel 6–12 mm long, sericeous, subsessile, the peduncle 0.5–2 mm long. Sepals abaxially sparsely sericeous, adaxially glabrous, rounded at the apex, the lateral 4 biglandular, the glands 1.4–2 mm long, free and reflexed apically. Petals yellow, glabrous, the lateral 4 with the claw 0.5–0.8 mm long, the limb 4.5–5.5 mm long, 3–4 mm wide, elliptical, entire or proximally denticulate; posterior petal with the claw 1.5–2 mm long, the limb 4.5–5.5 mm long, 3–4.5 mm wide, obovate, short-fimbriate, the basal fimbriae often enlarged and glandular. Filaments 0.8–2.6 mm long, that opposite the posterior petal shortest; anthers with the locules 0.8–1.4 mm long, glabrous, the connectives not exceeding the locules. Styles equal, 2–2.6 mm long, diverging from the base, more or less inbent at the apex, the stigmas truncate. Samara with the dorsal wing 24–38 mm long, 10–15 mm wide, sparsely sericeous, with a low rounded projection at the adaxial base up to 2.5 mm high and 5–8 mm wide; nut densely sericeous, bearing on each side a single wing parallel to the areole, 4–10 mm long and 2–4 mm wide, rarely absent, the locule glabrous within.

Type. *Wurdack & Monachino* 41145, Río Villacoa about 25 km from river mouth, Bolívar, Venezuela, elev 80–110 m, Jan flr/frt (holotype MICH, isotypes NY, VEN).

Distribution. Bolívar and western Amazonia north to Costa Rica. Guayana collections: VENEZUELA. Bolívar: Cerro Negro Peron, on E-W crystalline range on right bank of Río Parguaza just below El Carmen, elev 120–350 m, Dec flr, *Wurdack & Monachino* 40976 (MICH, NY, VEN); type, q v.

7. *Banisteriopsis lyrata* Gates, Brittonia 31: 108. 1979.

Fig 31.

Woody vine, the stems sericeous to glabrate. Leaves with the lamina 6–12.8 cm long, 2.9–6.5 cm wide, narrowly elliptical to elliptical or ovate, rounded or cordate at the base, obtuse to acute at the apex, glabrous above, densely and persistently sericeous below, the vestiture more or less shining and golden; petiole 6–10(–20) mm long, golden-sericeous, with a pair of prominent glands at the apex;

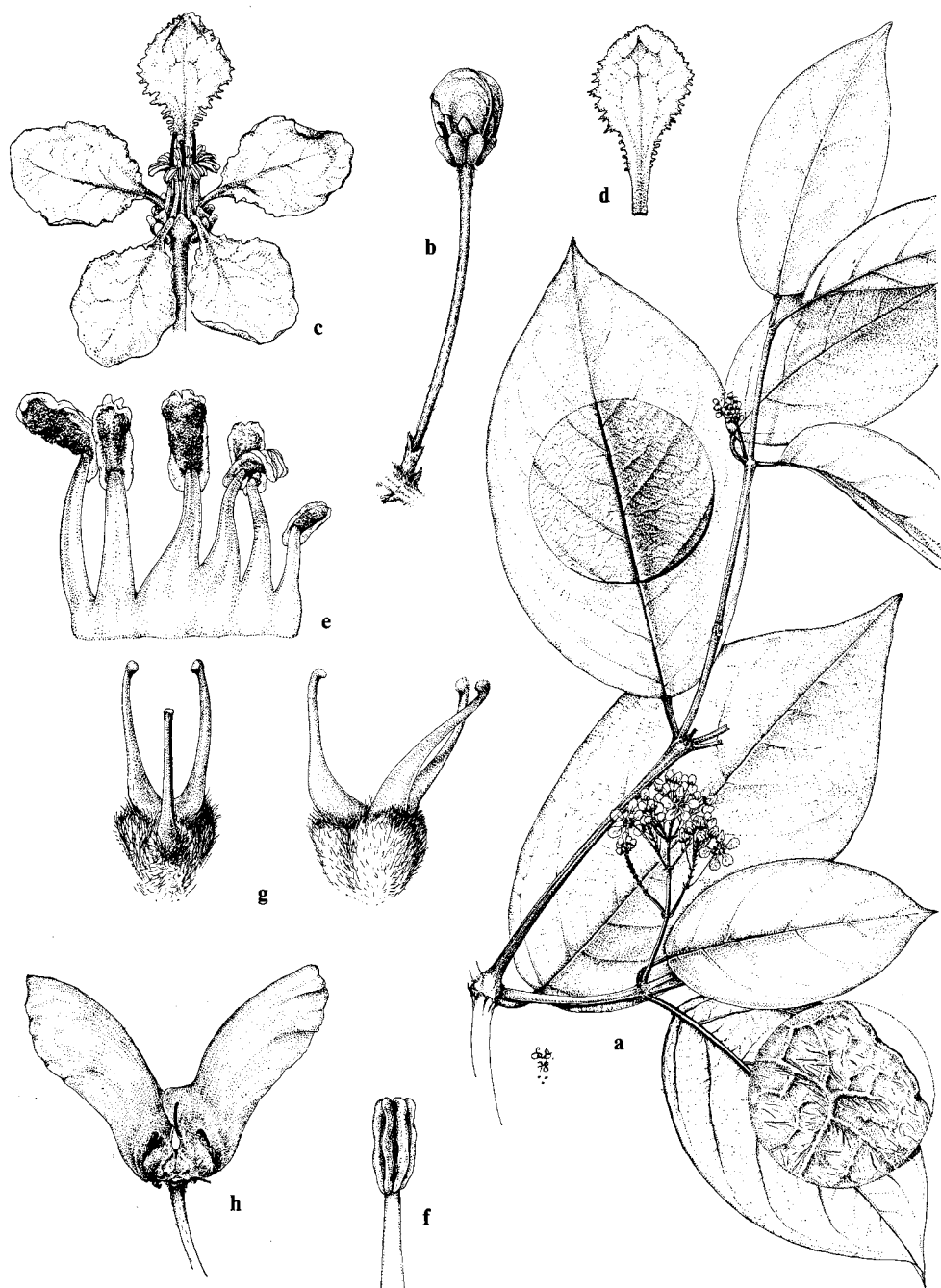


Fig 30. *Banisteriopsis wurdackii*. a) Flowering shoot, $\times 0.5$ (enlargement of upper lamina $\times 1$, lower $\times 5$); b) flower bud, $\times 3.5$; c) flower, $\times 3.5$; d) posterior (flag) petal, $\times 3.5$; e) part of androecium, stamen to left opposite anterior sepal, stamen to right opposite posterior petal, $\times 10$; f) anther, adaxial view, $\times 10$; g) gynoecium, left with anterior style in middle, right with anterior style to left, $\times 10$; h) fruit with 2 samaras developed, $\times 0.75$. Drawn by Karin Douthit, a from Wurdack & Monachino 40976, b-g from Pena 474, h from Wurdack & Monachino 41145.

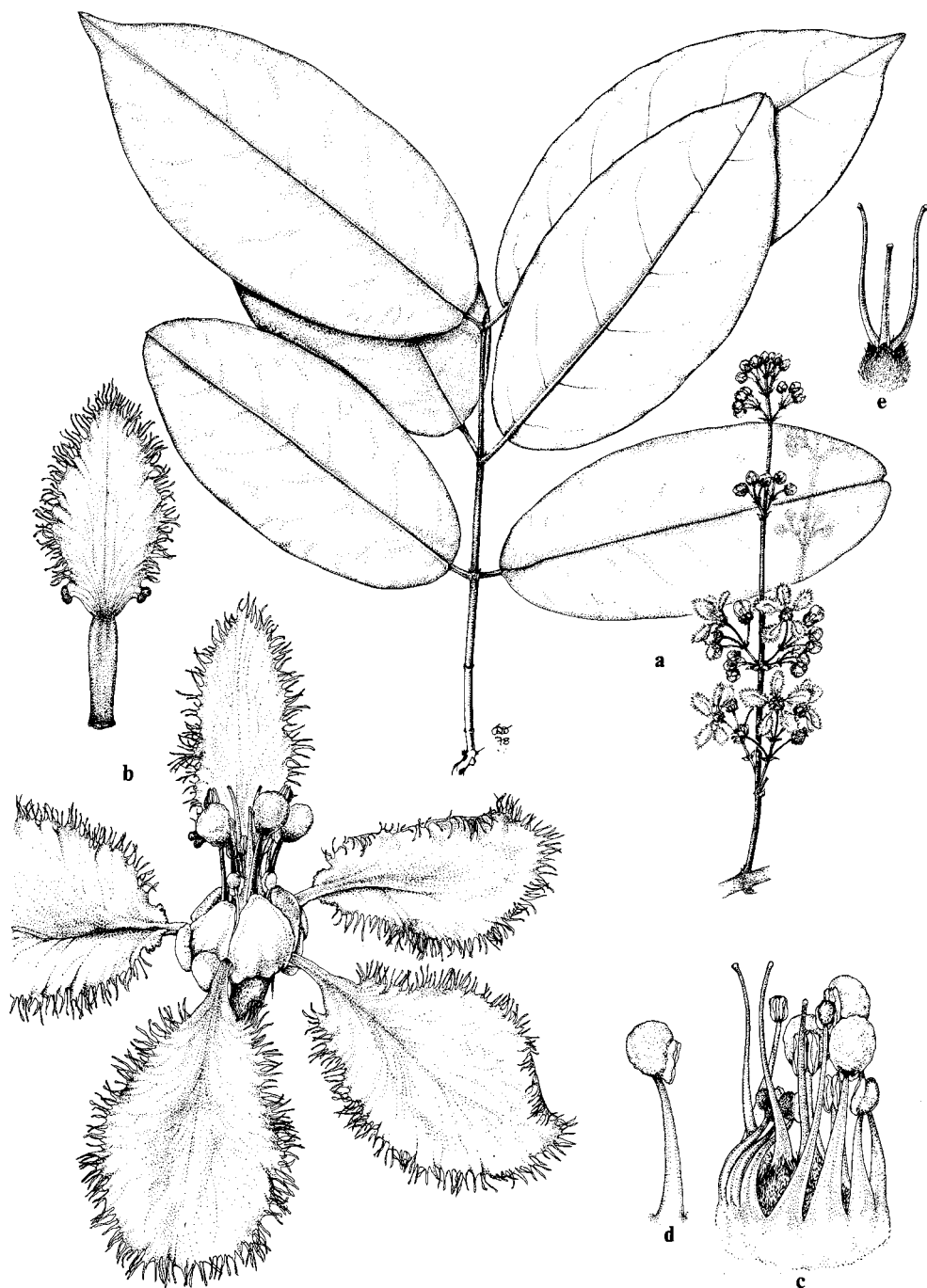


Fig 31. *Banisteriopsis lyrata*. a) Leafy shoot and inflorescence on older, leafless stem, $\times 0.5$; b) flower and posterior (flag) petal, $\times 5$; c) androecium and gynoecium, lateral-posterior view, $\times 7.5$; d) stamen opposite anterior-lateral sepal, $\times 7.5$; e) gynoecium, anterior style in center, $\times 5$. Drawn by Karin Douthit from Prance & Ramos 6960.

stipules triangular, minute. Inflorescence axillary, paniculate, the branches bearing 3–4 pairs of flowers, sparsely to densely tomentose-sericeous, the bracts and bracteoles 1–1.5(–2) mm long, broadly triangular, appressed, persistent. Pedicel 6–10 mm long, sessile, densely to sparsely sericeous. Sepals abaxially sericeous throughout or glabrous distally, adaxially glabrous, rounded at the apex, the lateral 4 biglandular, the glands 0.8–2 mm long. Petals yellow, glabrous, long-fimbriate, the lateral 4 with the claw 1–2 mm long, the limb 6–10 mm long, 4.5–7 mm wide, broadly elliptical, plane, the antero-lateral pair somewhat larger; posterior petal with the claw 3 mm long, constricted at the apex, the limb 5–8 mm long, 3.5–5 mm wide, obovate, with 2–3 prominent gland-tipped teeth proximally. Filaments opposite the 3 anterior sepals and the postero-lateral petals 3.4–4.4 mm long, longest opposite the postero-lateral petals, the other filaments 1.8–2.6 mm long, the posterior 3 inflexed between the posterior styles; anthers with the locules 0.6–1 mm long, glabrous, the connectives of the stamens opposite the 3 anterior sepals broadly obovate, much enlarged and glandular, 0.9–1.3 mm long, 0.7–1.1 mm wide, exceeding the locules by 0.2–0.7 mm. Styles glabrous, the anterior 2.4–3.4 mm long, straight and erect, the posterior 2 lyrate, 3–4.2 mm long, much longer than the anterior, slender, the stigmas capitate. Fruit unknown.

Type. *Prance et al 6960*, vicinity of Santa Barbara, 15 km E of Km 117 on Pôrto Velho to Cuiabá highway, Rondônia, Brazil, Aug flr (holotype INPA, isotypes MICH, NY).

Distribution. Southern Venezuela and Amazonian Brazil. VENEZUELA. Bolívar: Campamento Forestal "Potreritos," Reserva Forestal La Paragua, Feb flr, *Blanco 676* (MY); Río Asa, Reserva Forestal La Paragua, Feb imm flr, *Blanco 715* (NY); La Prisión, Medio Caura, elev 100 m, Mar flr, *Ll. Williams 11627* (F, MICH, US, VEN). BRAZIL. Pará: Rio Jarí, estrada que liga Monte Dourado a Caracurú, terra firme, Nov flr, *Oliveira 3501* (IAN, MICH, NY); estrada entre Planalto A e Tinguelin, Km 21, Dec flr, *N. T. Silva 2859* (IAN). Rondônia: Rio Guaporé, Fazenda Santa Rosa, Jun flr, *Black & Cordeiro 52-14867* (IAN); type, q v.

8. *Banisteriopsis pulcherrima* (Sandwith) Gates, Brittonia 31:109. 1979. Fig 32.

Banisteriopsis elegans var *pulcherrima* Sandwith, J. Arnold Arbor. 24: 223. 1943.

Shrub or vine, the stems glabrous. Lamina of the larger leaves 5.2–15.5 cm long, 3.5–11.8 cm wide, ovate, deeply cordate at the base, acute to short-acuminate at the apex, with the margin often revolute and distally ciliate or glandular-dentate, glabrous, bearing 1 pair of sessile glands below at base by midrib, the reticulum prominent on both sides; petiole 2–6 mm long, glabrous, eglandular; stipules minute. Inflorescence glabrous, axillary or terminal, decompound, the flowers borne in umbels of 4 flowers or corymbs of 6–8 flowers, the reduced or bract-like leaves of the inflorescence with marginal cilia up to 6 mm long; bracts and bracteoles 0.6–0.8 mm long, glabrous, persistent. Pedicel 12–18 mm long, glabrous, sessile. Sepals glabrous on both sides, rounded at the apex, the lateral 4 biglandular, the glands 1.5–2 mm long. Petals yellow, glabrous, lacerate, the lateral 4 with the claw 3.5–4 mm long, the limb 8–11 mm long and wide, orbicular, the antero-lateral pair larger and more concave; posterior petal with the claw 3.5

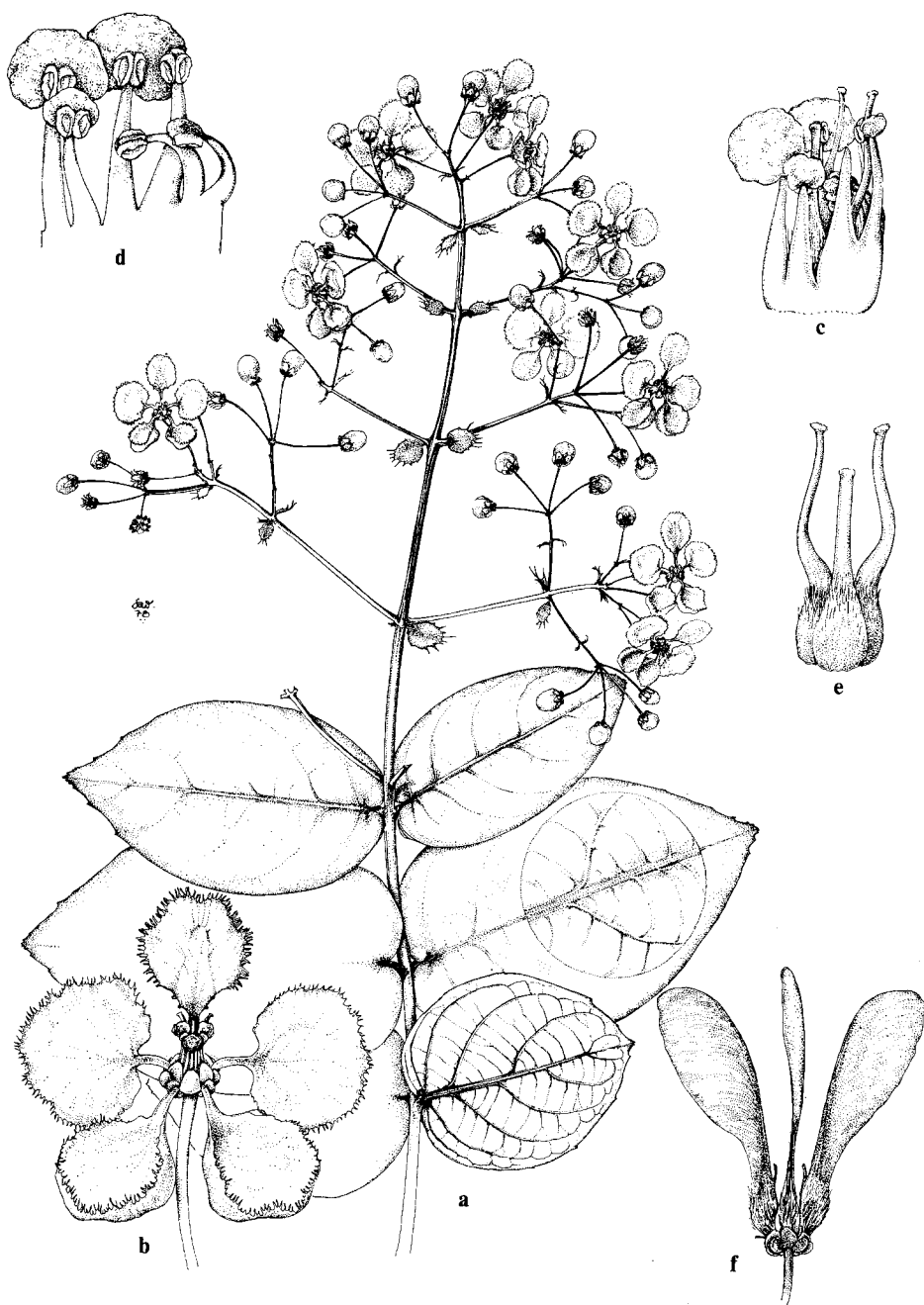


Fig 32. *Banisteriopsis pulcherrima*. a) Flowering branch, $\times 0.5$; b) flower, $\times 1.5$; c) androecium and gynoecium, side view, the enlarged anther to the left opposite the eglandular anterior sepal, 1 large anther removed, $\times 5$; d) part of androecium, the leftmost anther opposite the anterior sepal, the rightmost opposite the posterior petal, $\times 5.5$; e) gynoecium, the shorter style anterior, $\times 6$; f) fruit, the middle samara anterior, $\times 1$. Drawn by Karin Douthit, a from Maguire & Fanshawe 23125, b-f from Maguire et al 43889.

mm long, widest at the apex, the limb 8.5–9.5 mm long and wide, reflexed, broadly obovate, often with red veins, the basal teeth gland-tipped. Filaments 2.6–4 mm long, the posterior 3 inflexed between the posterior styles; anthers with the locules 0.7–1 mm long, glabrous, the connectives opposite the 3 anterior sepals globose, much enlarged and glandular, 1.2–1.6 mm long, 1.4–1.8 mm wide. Styles glabrous, the anterior straight and erect, 2.8–3 mm long, the posterior 2 diverging at the base and directed posteriorly, 3.8–4 mm long, the stigmas capitate. Samara sericeous to glabrate, especially on the nut, the dorsal wing 24–35 mm long, 10–13 mm wide, without a projection at the adaxial base; nut with the sides unappended, the veins prominent, the locule glabrous within.

Type. *Sandwith 1430*, Kaieteur savannah, Guyana, flr/frt (holotype K, isotype U).

Distribution. Endemic to western Guyana and SE Bolívar. GUYANA. Kaieteur Falls, elev 420 m, *Cowan & Soderstrom 1815 & 2030* (NY, US); Chinoweng, Wadabu Mt, *Forest Dept. 7849* (NY); Mt. Roraima, elev 2200 m, *E. Jenman 243* (US); savanna, Kaieteur Plateau, *Maguire & Fanshawe 23125* (BR, F, GH, MO, NY, P, US); Partang Rapids to first falls of Partang River, Merume Mts, Upper Mazaruni River basin, *Maguire et al 43889* (K, MICH, NY, US); Ayanganna Plateau, Upper Mazaruni basin, elev 747 m, *Tillett et al 44905* (K, MICH, NY, US); savanna E end of Karowtipu, Kako River, Upper Mazaruni basin, elev 950 m, *Tillett & Tillett 45597* (NY); Kaieteur savanna, elev 330 m, *Tutin 694* (US). VENEZUELA. Bolívar: El Dorado–La Gran Sabana, elev 1200 m, *Bunting 2964* (MY) & *3042* (F, MY); entre Kms 88 y 126, *Ant. Fernández 1120* (MY); Angel Falls, *Kunhardt 2 & 21* (NY); Cerro Piton, Cordillera Epicara, elev 400 m, *Maguire et al 53561* (NY, VEN) & *53669* (MICH, NY, VEN); Mount Roraima, forested SW-facing quebrada, elev 2040–2130 m, *Steyermark 58689* (F, NY); Km 155 S of El Dorado on road to Santa Elena, elev 1200 m, *Steyermark 111290* (MICH); between Luepa and Cerro Venamo, elev 1200 m, *Steyermark & Nilsson 83* (NY, VEN); between Cerro Uei and El Dorado, elev 800–1000 m, *Steyermark & Nilsson 835* (VEN); Km 125, S de El Dorado, *Steyermark et al 92964* (F, NY, VEN); El Dorado–Sta. Elena, Km 107, elev 560 m, *Trujillo 3541* (MY).

Collected in flower December to September, in fruit in December, February, and May to October.

9. *Banisteriopsis maguirei* Gates, Brittonia 31: 108. 1979.

Fig 33.

Woody vine, the stems golden-sericeous, sometimes glabrescent. Leaves opposite, subopposite, ternate, or subternate; lamina 4.5–12.2 cm long, 2.3–10 cm wide, ovate to orbicular, coriaceous, rounded or shallowly cordate at the base, revolute at the margin, obtuse to apiculate at the apex, bearing minute glands on or near the margin and a single pair of sessile glands beside the midrib at the base below, glabrous above, sparsely sericeous to glabrate below, with the tertiary veins scalariform; petiole 5–14 mm long, golden-sericeous to glabrate, eglandular; stipules minute. Inflorescence axillary, appressed-golden-sericeous, compound, the branches pseudoracemes of (2–)3–7 pairs of flowers, rarely 4-flowered umbels; reduced leaves of the inflorescence entire, the margin eglandular or bearing tiny glands; bracts and bracteoles up to 1 mm long, triangular, persistent. Pedicel 8–12 mm long, sessile, sericeous. Sepals sparsely sericeous abaxially,

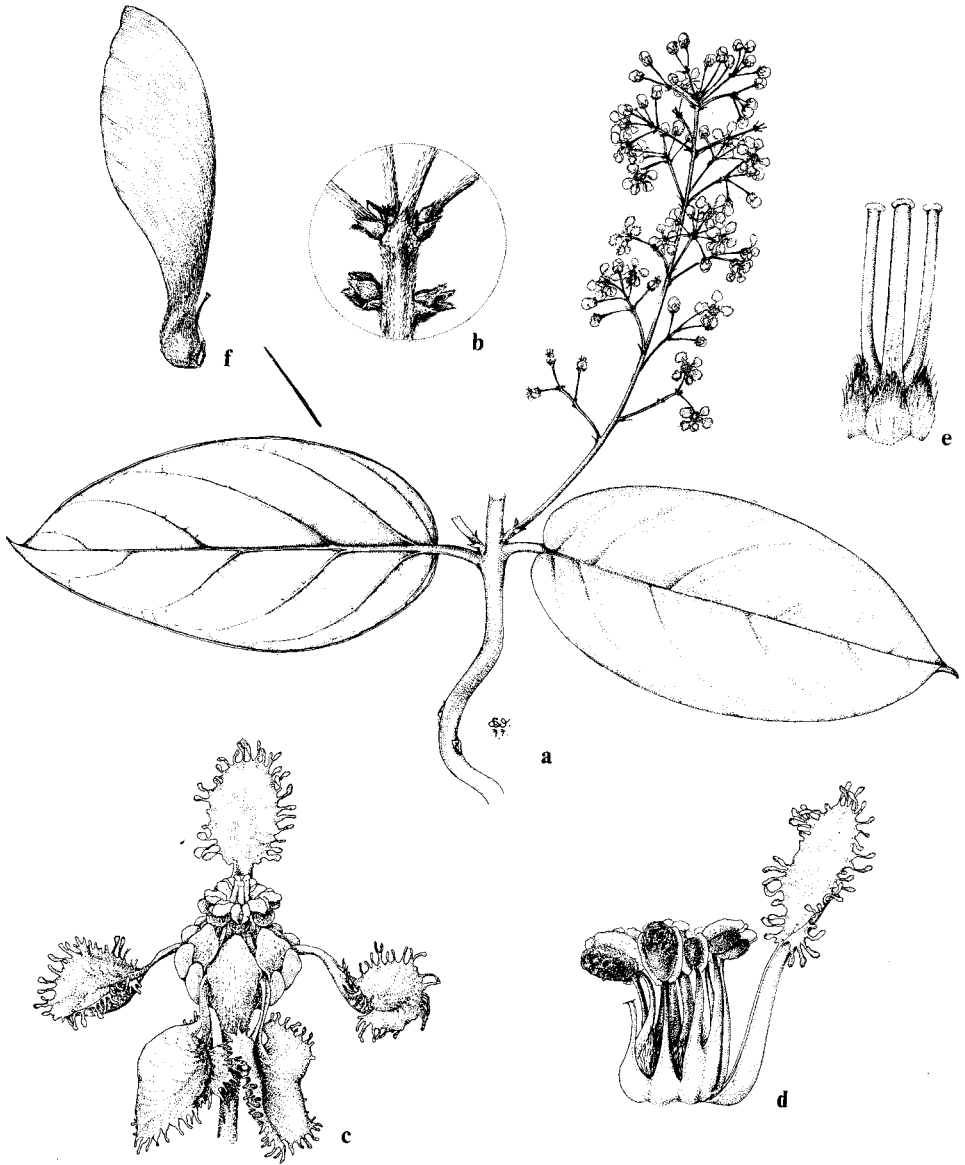


Fig 33. *Banisteriopsis maguirei*. a) Flowering branch, $\times 0.5$; b) detail of the inflorescence, $\times 5$; c) flower, $\times 5$; d) androecium, with posterior petal for orientation, $\times 7.5$; e) gynoecium, the anterior carpel in center, $\times 7.5$; f) samara, $\times 1.5$. Drawn by Karin Douthit, a–e from Steyermark 105918, f from Maguire 32850.

glabrous adaxially, rounded at the apex, the lateral 4 biglandular, the glands 1.4–2 mm long. Petals yellow, the claw and center of limb sometimes red or orange, glabrous, long-fimbriate, the lateral 4 with the claw 1.5–2.5 mm long, the limb 4–7 mm long and wide, orbicular, the antero-lateral pair larger; posterior petal with the claw 2.5–2.8 mm long, widest at the apex, the limb 3.5–5 mm long, 3–4 mm

wide, broadly ovate to orbicular, the basal fimbriae gland-tipped. Filaments 1.8–3.6 mm long; anthers with the locules 0.6–1 mm long, glabrous, the connectives of those opposite the 3 anterior sepals glandular and somewhat enlarged at the apex, exceeding the locules by 0.2–0.5 mm. Styles glabrous, the anterior 3–3.2 mm long, straight and erect, somewhat thicker than the other 2, the posterior styles 3.2–3.6 mm long, straight and subparallel or diverging, the stigmas capitate. Samara sericeous to glabrate, the dorsal wing 18–25 mm long, 8–10 mm wide, without a projection at the adaxial base; nut with the sides unappendaged, the veins prominent, the locule glabrous within.

Type. *Maguire & Politi 28323*, Caño Profundo, Cerro Sipapo, Amazonas, Venezuela, elev 1500 m, Jan flr (holotype MICH, isotypes NY, US, VEN).

Distribution. Mountains of Amazonas and western Bolívar. VENEZUELA. Amazonas: region del Duida y Marahuaca, *Barnes 50* (VEN); type, q v; Cerro Huachamacari, Río Cunucunuma, cumbre, elev 1700 m, *Maguire et al 29807* (NY), summit camp, elev 1800 m, *Maguire et al 30010* (NY, VEN) & *30096* (MICH, NY, VEN), W of Caño de Dios to ridge, *Maguire et al 30244* (NY); summit Cerro Guanay, elev 1800 m, *Maguire et al 31699* (NY, VEN); NW Ridge, Cerro Yutaje, elev 1400 m, *Maguire & Maguire 35163* (NY, VEN) & *35285* (NY); savanna, Cerro Coro-Coro, Serranía Yutaje, *Maguire & Maguire 35495* (NY, VEN); Sierra Parima, 2°27'24"N, 63°56'W, elev 1300 m, *Steysmark 105918* (NY). Bolívar: Cerro Guaikinima, elev 1800 m, *Maguire 32850* (NY, VEN); Cerro Jaua, elev 1810–1880 m, *Steysmark et al 109672* (MICH).

Collected in flower and fruit from December to May.

10. *Banisteriopsis martiniana* (Adr. Jussieu) Cuatrecasas, *Webbia* **13**(2): 498. 1958.

Banisteria martiniana Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. **13**: 284. 1840.

Banisteria leptocarpa Benthams, London Jour. Bot. (Hooker) **7**: 129. 1848.

Banisteriopsis leptocarpa (Benthams) R. O. Williams, Flora Trinidad & Tobago **1**: 131. 1929.

Woody vine, rarely shrubby. Leaves with the lamina 4.5–17 cm long, 2–8.5 cm wide, ovate to elliptical, obtuse to shallowly cordate at the base, obtuse to acute to long-acuminate at the apex, bearing on the margin minute or larger cupulate glands, more numerous distally, and below at base beside the midrib a pair of sessile or cupuliform glands; petiole 3–20 mm long, minutely tomentose to glabrate, eglandular; stipules minute, triangular. Inflorescence minutely brown- or white-tomentose, rarely glabrate, axillary, composed of 4-flowered umbels borne in condensed dichasia of usually 3 umbels, containing greatly reduced leaves with a pair of large basal glands and $\pm$ well developed glands or ciliate extensions on the margin, the bracts and bracteoles 0.6–1.2 mm long, rounded at the apex, appressed, persistent. Pedicel 6–14 mm long, sessile, glabrous or sparsely pubescent. Sepals abaxially sparsely sericeous, adaxially glabrous, rounded, eglandular or the lateral 4 biglandular, the glands 1–1.5 mm long, the sepals enlarged and spreading in fruit. Petals yellow, glabrous, dentate to lacerate, the lateral 4 with the claw 1.5–3 mm long, the limb 4.5–6.5 mm long and wide, orbicular, eglandular; posterior petal with the claw 2.5–3 mm long, thick and fleshy, constricted at the apex, the limb 4.5–6.5 mm long, 2.5–3.5 mm wide, obovate, reflexed, the narrow proximal part with 2–3 pairs of gland-tipped teeth. Filaments

1.4–3.8 mm long, those opposite the 3 styles longest, the posterior 3 inflexed between the posterior styles; anthers with the locules 0.5–1 mm long, glabrous, the connectives opposite the 3 anterior sepals globose, much enlarged and glandular, 1.2–1.6 mm long, 1–1.3 mm wide, exceeding the locules by 0.6–1 mm. Styles glabrous, the anterior straight and erect or directed anteriorly, 2–2.2 mm long, thicker than the posterior 2, the posterior styles diverging basally, 2.6–3 mm long, slender, the stigmas capitate. Samara sericeous to glabrate, the dorsal wing 16–32 mm long, 5–12 mm wide, without a projection at the adaxial base; nut with the sides unappended, smooth or with the reticulate veins prominent, the locule glabrous within.

Type. *Martin s n* [92], Cayenne (P).

Key to the Varieties of *Banisteriopsis martiniana*

1. Hairs of the inflorescence ferrugineous; lamina of the leaves plane, 4.5–12.5 cm long, bearing cupulate marginal glands; reduced leaves of the inflorescence sparsely sericeous. 10a. var *martiniana*.
1. Hairs of the inflorescence white or gray; lamina of the leaves falcate, 7–17 cm long, bearing minute marginal glands; reduced leaves of the inflorescence glabrous. 10b. var *subnervia*.

10a. *Banisteriopsis martiniana* var *martiniana*

Branches minutely puberulent to glabrate, the hairs brown. Lamina of the leaves 4.5–12.5 cm long, 2–6.9 cm wide, truncate to subcordate at the base, obtuse to short-acuminate at the apex, plane, subcoriaceous to coriaceous, sparsely sericeous to soon glabrate on both sides, the marginal glands cupulate; petiole 3–15 mm long. Inflorescence minutely tomentose, rarely glabrate, the hairs ferrugineous, the reduced leaves sparsely sericeous, the branches subtending the umbels 4–8(–15) mm long.

Distribution. Northeastern South America, common in eastern Guayana at elevations of 100–2000 m. Guayana collections: GUYANA. Kamakusa, Upper Mazaruni, *De La Cruz* 4075 (F, GH, MO, NY, US), 4160 (F, GH, MO, US), 4251 (F, GH, MO, NY, US); Kaieteur Falls, *De La Cruz* 4494 (NY, US); Samwarankna-Tipu, Pakaraima Mts, elev 1100 m, *Maguire & Fanshawe* 32499 (K, MICH, NY); Kaieteur Savannah, elev 300–360 m, *Sandwith* 1441 (NY); Kukui River, Upper Mazaruni, elev 470 m, *Tillett & Tillett* 45387 (K, MICH, NY, US); Karowtipu, Kako River, Upper Mazaruni, elev 470 m, *Tillett & Tillett* 45467 (K, MICH, NY); E end of Karowtipu, elev 950 m, *Tillett & Tillett* 45593 (K, MICH, NY, US). VENEZUELA. Bolívar: Piedra de la Virgen, El Dorado-Sta. Elena, elev 400–600 m, *Badillo & Holmquist* 6042 (F, MY); Kussarivará-Río Caroní, Urimán, elev 500 m, *Bernardi* 1627 (VEN); raudales Karabak, Río Uaiparú, Caroní, *Cardona* 1903 (US, VEN); Cerro Uaipán, Caroní, elev 1750 m, *Cardona* 2009 (VEN), elev 1640 m, *Cardona* 2044 (VEN); Kavanayén, elev 1300 m, *Ferrari* 1021 (MY); SW slope, Ptari-tepuí, elev 1500–2000 m, *Maguire & Wurdack* 33888 (NY); 2 km S of Río Chibau on Alto Río Cuyuni, elev 100 m, *Maguire et al* 53524 (MICH, NY, VEN); Cerro Pitón, Cordillera Epicara, elev 400 m, *Maguire et al* 53661 (NY, VEN) & 53704 (MICH, NY, VEN); Roraima, *Rich. Schomburgk* 999 (NY)/*Robt. Schomburgk II* 651 (F, G); Gran Sabana, Río Kukenán, base of Mt. Roraima, elev 1185–1280 m, *Steyermark* 58559 (F, US, VEN); between Kun and

waterfall at Ruémerú, S of Mt. Roraima, elev 1065 m, *Steyermark 59180* (F, NY, US); Ptari-tepuí, elev 1700–1800 m, *Steyermark 59710* (F, NY, VEN); ridge above La Laja, base of Sororopán-tepuí, elev 1375–1460 m, *Steyermark 60807* (F, NY, VEN); summit, Torono-tepuí, Chimanta Massif, elev 1955–2090 m, *Steyermark & Wurdack 1110* (MICH, NY, VEN); S de El Dorado, Km 114, elev 600 m, *Steyermark et al 93047* (NY, VEN); Km 148, elev 1350–1400 m, *Steyermark et al 104132* (NY, VEN); Cerro Uei, elev 865–1050 m, *Steyermark et al 104601* (NY, VEN). Delta Amacuro: Río Amacuro, downstream from mouth of Yarakita River, Sierra Imataca, elev 65–80 m, *Steyermark 87415* (MICH, NY).

Collected in flower and fruit in almost all months.

10b. *Banisteriopsis martiniana* var *subenervia* Cuatrecasas, *Webbia* **13**(2): 501. 1958.

Banisteriopsis martiniana var *laevis* Cuatrecasas, *Webbia* **13**(2): 502. 1958.

Branches glabrous. Lamina of the leaves 7–17 cm long, 4.1–8.5 cm wide, obtuse to cordate at the base, short- to long-acuminate at the apex, falcate, coriaceous to fleshy, glabrous on both sides, the marginal glands minute; petiole 7–20 mm long. Inflorescence minutely puberulent, the hairs white or gray, the reduced leaves glabrous, the branches subtending the umbels 1–8 mm long.

Type. *Schultes & Cabrera 16387*, Caño Guacayá, Río Miritiparaná, 0°30'S, 70°40'W, elev 210 m (holotype US, isotypes GH, NY, U).

Distribution. Tropical rain forest of Amazonian Brazil and Peru, the upper Vaupés, and the upper Orinoco. Collections from Guayana and nearby: VENEZUELA. Amazonas: Río Yatua 20–25 km above Piedra Araucaua, elev 100–140 m, *Maguire et al 41638* (MICH, NY, US, VEN). COLOMBIA. Amazonas-Vaupés: Río Apaporis, Jirijirimo, elev 250 m, *García-Barriga 13706* (NY, US); Soratama, elev 250 m, *Schultes & Cabrera 13595* (GH, NY, US), *13615* (US); Río Apaporis, Raudal de Jirijirimo, *Schultes & Cabrera 14569*, type of *B. martiniana* var *laevis* (holotype US, isotype A). Amazonas: Río Caraparaná entre las bocas y El Encanto, elev 150 m, *Schultes 3836* (GH). BRAZIL. Amazônia: S. Gabriel Serra, Rio Negro, *Luetzelburg 22128* (R).

Collected in flower and fruit in diverse months.

11. *Diplopterys* Adr. Jussieu in Delessert, *Icon. Sel.* **3**: 20, *tab.* 33. 1837 [1838].

Woody vines, often riverine. Leaves opposite, sericeous to glabrate with short, straight, appressed hairs, the stipules small, free, interpetiolar. Inflorescence axillary, shorter than the subtending leaves, of 1–several simple 4-flowered umbels or 1–several racemes of up to 7 4-flowered umbels; floriferous peduncle absent; bracts and bracteoles similar, lingulate, eglandular, spreading, persistent, borne in a cluster of 12 at base of umbel. Calyx with the lateral 4 sepals biglandular, the anterior eglandular or rarely 1-glandular. Petals yellow, fimbriate, abaxially sparsely sericeous. Stamens 10, all fertile, the filaments glabrous, those opposite the sepals longer than those opposite the petals, those of the 3 posterior stamens inflexed between the posterior styles, the anthers unequal. Ovary of 3 free carpels adnate to a common torus, 1 anterior and 2 posterior, all fertile, densely hairy; styles 3, free, with capitate terminal stigmas. Fruit schizocarpic, breaking apart

into 3 mericarps (or fewer due to abortion) separating from a short pyramidal torus; nut of the mericarp with a hard woody pericarp, bearing a dorsal crest and 2–several lateral winglets or crests parallel to the areole and interconnected by ridges, sericeous.

Type. *Diplopterys pauciflora* (G. F. W. Meyer) Niedenzu.

Diplopterys was established by Jussieu for the single species *D. paralias*, which is now considered a synonym for *D. pauciflora*. Niedenzu amplified the genus to include *Jubelina*, *Mezia*, and *Diplopterys spruceana* Niedenzu, as well as *D. pauciflora*. His amplified *Diplopterys* is a very artificial group that must be dismembered. *Jubelina* and *Mezia* are recognized here as distinct mascagnoid genera. *Diplopterys spruceana* is here transferred to *Mascagnia*, as *M. heterocarpa*, because of its similarity to *M. leucanthele* and *M. guianensis*. That reduces *Diplopterys* to its type again, to which one can add the species treated here and two new ones soon to be described by Dr. Bronwen Gates. These constitute a group of closely related species clearly derived from *Banisteriopsis*, indeed, scarcely distinguishable from it in flower. The samara has lost the elongated dorsal wing of *Banisteriopsis*, the nut is enlarged, and the lateral winglets are enlarged and interconnected, so that the two genera are quite easily distinguished in fruit. Dr. Gates has decided to maintain *Diplopterys* as a natural and convenient segregate from *Banisteriopsis*, a decision which I support. She will include a brief revision of *Diplopterys* in her forthcoming monograph of *Banisteriopsis*, which see for more discussion of the relationship of the two groups. The treatment of *Diplopterys* in this paper is adapted from her manuscript.

Diplopterys cabrerana (Cuatrecasas) Gates, *Brittonia* 31: 109. 1979.

Fig 34.

Banisteriopsis cabrerana Cuatrecasas, *Webbia* 13(2): 493. 1958.

Woody vine, the stems golden-sericeous to eventually glabrate. Lamina of the leaves (8.5–)10–21(–26) cm long, (3–)4.1–9 cm wide, elliptical, falcate, truncate at the base, long-acuminate at the apex with the acumen up to 3 cm long, coriaceous, glabrate above, sparsely sericeous below, the revolute margin bearing many minute impressed glands; petiole (4–)8–15(–22) mm long, sericeous to glabrate, bearing 2 large convex glands at the apex; stipules minute, triangular, often joined by an interpetiolar line. Inflorescence axillary, composed of 4-flowered umbels borne singly or in short racemes or condensed panicles, sericeous, the bracts and bracteoles (1.5–)2–3 mm long, lingulate, spreading. Pedicel 5–12 mm long, sessile, sparsely sericeous to glabrate. Sepals reflexed apically, the lateral 4 biglandular with the glands 1–1.8 mm long, the anterior eglandular or rarely bearing 1 gland. Petals yellow, sparsely sericeous abaxially in the middle of the limb, long-fimbriate, eglandular, the antero-lateral pair with the claw 1–1.5 mm long, the limb 7–8 mm long and wide, concave, the postero-lateral pair with the claw 0.5–1 mm long, the limb 5–7 mm long, 4–5.5 mm wide, broadly elliptical, flat, the posterior petal erect, the claw 2.5–3.5 mm long, constricted at the apex, the limb 4.4–5.5 mm long, 3–4.5 mm wide, obovate. Filaments 1.6–2.8 mm long, glabrous, up to $\frac{1}{3}$ connate; anthers 0.8–1 mm long, the locules sparsely hairy to glabrate, those opposite the sepals with the connective broadly obovate and papillose, those opposite the petals with the connective oblong and smooth to papillose. Styles 1.4–1.6 mm long, the anterior slightly shorter than the posterior



Fig 34. *Diplopterys cabrerana*. a) Habit, $\times 0.5$; b) leaf base with glands, $\times 1.5$; c) umbel of 4 buds, $\times 2$; d) petals, upper a postero-lateral, lower a posterior (flag), $\times 4$; e) part of androecium, stamen to left opposite anterior sepal, stamen to right opposite posterior petal, $\times 10$; f) gynoecium, anterior style in center, $\times 10$; g) mericarp with short wings, abaxial view (left), adaxial view (middle), cross section (right), $\times 1$; h) mericarp with long wings, abaxial view (left), adaxial view (right), cross-section (below), $\times 1$. Drawn by Karin Douthit, a-f from Schultes & Cabrera 17297, g from Krukoff 8971, h from Williams 14965.

2, straight and parallel or the posterior 2 diverging, bearing stiff straight hairs at the base, the stigmas capitate. Mericarp without a carpophore, sericeous, circular, the nut up to 15 mm long and wide, bearing a dorsal crest or winglet 1–5 mm wide and essentially 4 ridges or winglets on each side 0.5–10 mm wide, irregular, dissected and interconnected with transverse ridges.

Type. *Schultes & Cabrera 17297*, Caño Teemeeña, Río Piraparaná, Vaupés, Colombia, Sep flr (holotype US!).

Distribution. Native in western Amazonia; widely cultivated as an hallucinogen. Apparently natural populations: VENEZUELA. Amazonas: selva tupida de rebalsa, Minisia, Río Orinoco, arriba de San Fernando de Atabapo, elev 126 m, Apr frt, *Ll. Williams 14965* (A, US, VEN). COLOMBIA. Vaupés: Type, q v, & *Schultes & Cabrera 17459*, Sep imm flr (NY, US). BRAZIL. Amazônas: shore of creek Belém, Mun. São Paulo de Olivença, Oct–Dec frt, *Krukoff 8971* (A, MICH, MO, NY, US). Apparently cultivated populations: BRAZIL. Pará: I.A.N. forest, Belém, *Archer 7917* (IAN, NY); Ananindeua, *Pires 4747* (IAN, US). COLOMBIA. Vaupés: Río Pira-paraná, *Hugh-Jones 2* (ECON); Río Kananarí, *Schultes & Cabrera 13134* (ECON). Putumayo: Mocoa, *Chindoy B. 281* (US); Puerto Porvenir, *Cuatrecasas 10597* (F, US); Mocoa, *García-Barriga et al 18684* (ECON); Umbria, *Klug 1971* (A, BR, F, GH, MICH, MO, NY, SP, US); Río Rumiayaco, *Naranjo 9* (ECON); Mocoa, *Plowman 2034* (US); Río Caquetá, down-river from Puerto Limón, *Plowman 2159* (US) & *2177* (GH). ECUADOR. Río Bomboisa, *Hagen 141* (NY); Yanzasa, *Mathias & Taylor 5260* (LA). PERU. Loreto: Iquitos, *Mathias & Taylor 3883* (LA). San Martín: Tarapoto, *Plowman 6040* (MICH).

This plant is widely used by Indians, alone or with *Banisteriopsis caapi*, to make hallucinogenic drinks. It has commonly been misidentified as *Banisteriopsis rusbyana*, especially in the ethnobotanical literature. See the discussion by Dr. Bronwen Gates in her forthcoming monograph.

12. Stigmaphyllon Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 48. 1832 [1833].

Brachypterys Adr. Jussieu in Delessert, Icon. Sel. 3: 20. 1837 [1838]. Type: *Brachypterys australis* Adr. Jussieu in Delessert, loc. cit., nom superfl = *Stigmaphyllon paralias* Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 59. 1832 [1833].

Woody or herbaceous vines, rarely shrubs. Leaves opposite or rarely alternate or subopposite, the lamina entire or lobed, the petiole usually long and bearing two large glands at its apex, the stipules interpetiolar, free, inconspicuous. Inflorescence a dichasium of congested pseudoracemes, these usually corymbose or umbellate, rarely reduced to a few flowers; bracts and bracteoles small; floriferous peduncle and pedicel present, or the peduncle absent. Lateral 4 sepals biglandular, the anterior eglandular. Petals yellow or yellow and red, the posterior (flag) erect and smaller than the spreading lateral 4. Filaments unequal in length and thickness, thickest opposite the carpels (i.e. opposite the anterior sepal and the 2 posterior-lateral petals); anthers 10, very unequal, the 4 opposite the lateral sepals with much-reduced locules and the 1 opposite the posterior petal often small. Ovary of 3 carpels partially connate, 1 anterior and 2 posterior, all fertile or, according to Niedenzu, the anterior sterile in some species; styles 3, with the apex internally stigmatic and dorsally truncate, hooked, or (most often) bearing

a foliaceous appendage, the latter symmetrical on the anterior style and unilateral on the posterior styles. Fruit schizocarpic, breaking apart into 3 samaras (or fewer due to abortion) separating from a pyramidal torus, each samara having its largest wing dorsal, thickened on the adaxial (upper) edge, the veins terminating in the thinner abaxial edge; much shorter winglets or crests present on the sides of the nut in some species; dorsal wing rudimentary in a few species.

Type. *Stigmaphyllon auriculatum* (Cavanilles) Adr. Jussieu.

Stigmaphyllon comprises approximately 80 species of the American tropics and subtropics; one species (*S. ovatum*) has been found at least once in West Africa.

Key to the Species of *Stigmaphyllon* in Guayana

1. Lamina of the leaf cordate at the base, usually obtuse or rounded (occasionally acute or slightly acuminate) at the apex, with several prominent marginal glands and the venation basally palmate; pedicel about as long as the peduncle; petals erose or dentate; stamens opposite the posterior-lateral petals about as long as that opposite the anterior sepal; nut of samara with a lateral crest at right angles to axis of wing; wing of samara narrowed beyond nut, then flared, widest distally.
 2. Anterior style with the dorsal appendage foliaceous, i.e. extended on each side into broad, rounded folioles, similar to the appendages of the posterior styles but symmetrical.
 1. *S. hypoleucum*.
 2. Anterior style with the dorsal appendage hook-shaped, unwinged, quite different from the foliaceous appendages of the posterior styles.
 2. *S. brachiatum*.
1. Lamina of the leaf cuneate to rounded at the base, acuminate at the apex, with the margin eglandular (or rarely with a few tiny, obscure glands) and the venation pinnate, even at the base; pedicel usually at least twice as long as the peduncle; petals fimbriate, especially the posterior 3; stamens opposite the posterior-lateral petals distinctly shorter than that opposite the anterior sepal; nut of samara without a lateral crest, often longitudinally rugose (parallel to axis of wing); wing of samara widest at the base.
 3. *S. puberum*.

1. *Stigmaphyllon hypoleucum* Miquel, Linnaea 18: 51. 1844.

Fig 35.

Banisteria fulgens sensu Lamarck, Encycl. Bot. 1: 368. 1783, non Linnaeus.

Banisteria heterophylla Willdenow, Sp. Pl. 2(1): 742. 1799, non *Stigmaphyllon heterophyllum* Hooker, Bot. Mag. 4014. 1843.

Banisteria splendens de Candolle, Prodr. 1: 588. 1824, nom superfl.

Stigmaphyllon fulgens (Lamarck) Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 289. 1840.

Stigmaphyllon purpureum Benthham, London Jour. Bot. (Hooker) 7: 128. 1848. Type. *Robt. Schomburgk I 737*, Pirarara, Guyana (K).

Stigmaphyllon splendens (de Candolle) Cuatrecasas, Webbia 13(2): 531. 1958.

Vines, the stems thinly sericeous to eventually glabrate. Lamina of the larger leaves (6)–8–16 cm long, (6.5)–7.5–15 cm wide, broadly ovate to circular, moderately to deeply cordate at the base, usually obtuse to rounded or retuse and mucronate at the apex (less often acute or slightly acuminate), with several small marginal glands and often indented at the glands, sericeous to soon glabrescent above, very densely to thinly but persistently sericeous below, the hairs 0.2–0.4 (–0.5) mm long, usually sessile and very tightly appressed, occasionally short-stalked and looser, the lateral veins basally palmate; petiole 25–95 mm long, sericeous, with 2 large apical glands; stipules ca 0.7 mm long and 1.5 mm wide, triangular, persistent or deciduous. Floriferous bracts 0.5–1 mm long, eglandular; peduncle and pedicel about equal, each 4–7 mm long (–10 mm in fruit); bracteoles 1–1.5 mm long, eglandular or each bearing 2 tiny basal glands. Sepals obtuse or

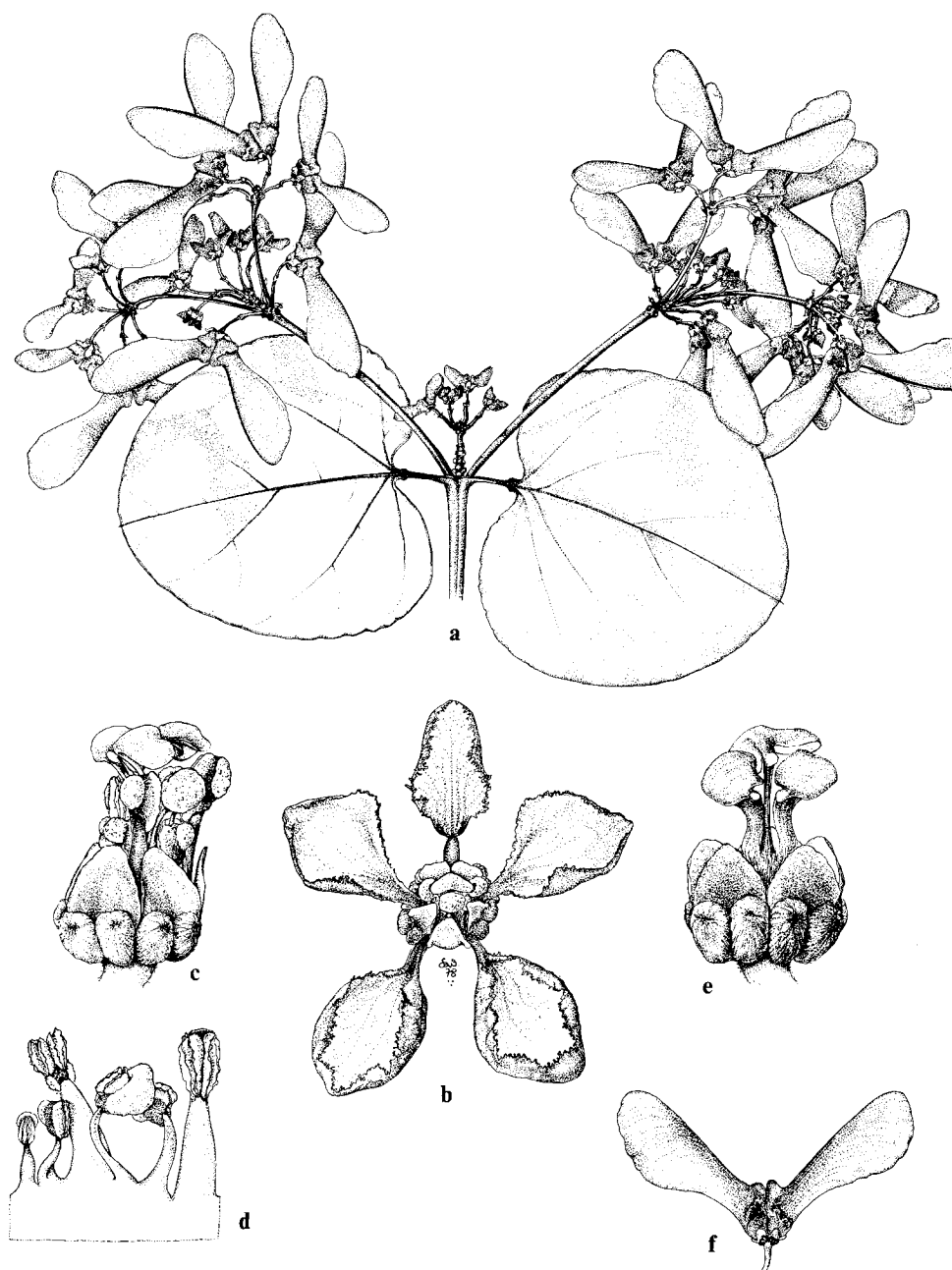


Fig 35. *Stigmaphyllon hypoleucum*. a) Fruiting branch, $\times 0.5$; b) flower, $\times 2.5$; c) flower with petals removed, side view, anterior sepal to right, $\times 5$; d) part of androecium, stamen to right opposite anterior sepal, stamen to left opposite posterior petal, $\times 5$; e) styles, posterior view, anterior style in center, $\times 5$; f) fruit of 2 samaras, $\times 0.75$. Drawn by Karin Douthit from Wurdack 34434.

rounded at the apex, abaxially sericeous, adaxially glabrous. Petals yellow or red and yellow (the outermost often $\pm$ red and the posterior often with basal red blotches), dentate or erose, glabrous or thinly sericeous; anterior-lateral petals with the claw 1.5–2.5 mm long, the limb 7–13 mm long, 7–11 wide, truncate at the base; posterior-lateral petals with the claw 0.5–1.5 mm long, the limb 6–10 mm long and wide, cuneate at the base; posterior petal with the claw 3–3.5 mm long, the limb 5–9 mm long, 4–7 mm wide, constricted at the base. Filaments glabrous, flanged and connate in the proximal $\frac{1}{3}$ – $\frac{1}{2}$, 3–3.5 mm long opposite anterior sepal, anterior-lateral sepals, and posterior-lateral petals, 2–2.6 mm long opposite anterior-lateral petals, posterior-lateral sepals, and posterior petal; anthers glabrous, the anterior 7 1.1–1.7 mm long, the 2 opposite the anterior-lateral sepals with large, glandular connectives and the locules much-reduced; posterior 3 anthers 0.6–0.9 mm long, all with small locules. Ovary with all 3 locules fertile; styles 2.5–4 mm long, often proximally hirsute, all with large, rounded horizontal or pendent folioles covering the opposite anthers; anterior style straight, with the dorsal appendage 1.5 mm long, 1.7–2.5 mm wide; posterior styles somewhat twisted, the dorsal appendage 2 mm long, 1.2–1.5 mm wide. Samara 34–45 mm long, sericeous to glabrate, the wing 12–17 mm wide, narrowest beyond nut and then flared, widest distally, bearing a basal adaxial projection 2–4 mm high; nut bearing an often dissected lateral crest to 2 mm wide.

Type. *Focke 683*, juxta flumina Boven-Cottica, Surinam (U?).

Distribution. Northern South America, principally the Guianas, Venezuela, and Amazonian Brazil. Guayana collections: GUYANA. Upper Mazaruni River, *De La Cruz 2194* (NY); Tumatumari, Potaro River, *Gleason 66 & 437* (both NY); Garraway Stream, Potaro River, *Maguire & Fanshawe 22973* (NY, VEN). VENEZUELA. Bolívar: NE de Canaima, *Agostini 299* (VEN); Ciudad Bolívar and vicinity, *Bailey & Bailey 1411* (NY); SE de Sta Elena, elev 850 m, *Bernardi 6740* (NY); Upata-San Félix, *Blanco 434* (MY, NY, VEN); NE of Upata, *Breteler 5104* (WAG); Pica a Ocla, SE del Dorado, *Ant. Fernández 1072* (MY); Jabillal-La Cocuiza, orillas del Caura, Mun. Aripao, *Ant. Fernández 1719* (MY); Tumere-mo-Anacoco, 50 km from Guyana frontier, elev 140–200 m, *Gentry et al 10685* (MICH); Km 105–112, El Dorado–Sta Elena, *Morillo et al 2932* (MICH); Río Reforma above junction with Río Toro, Sierra Imataca, *Steyermark 87917* (MICH, NY); Río Nichare, 6°15'N, 65°5'W, elev 200–250 m, *Steyermark & Gibson 95736* (NY, VEN, WAG); Río Churani, *Vareschi 8278* (VEN); pie de Auyantepui, *Vareschi & Foldats 4533* (VEN); La Unión, Medio Caura, elev 80 m, *Ll. Williams 11239* (US, VEN); La Ceiba, Medio Caura, elev 160 m, *Ll. Williams 11511* (VEN); La Prisión, Medio Caura, elev 100 m, *Ll. Williams 11539a* (VEN); El Palmar, elev 150 m, *Ll. Williams 12919* (US, VEN); Cerro Bolívar, lower slope forest, elev 325–415 m, *Wurdack 34434* (NY, VEN). Amazonas: Río Orinoco, Tamatama, elev 100–150 m, *Holt & Gehrig 277* (US), *Ll. Williams 15217* (US, VEN), *Wurdack & Adderley 43641* (MICH, NY, US, VEN). COLOMBIA. Amazonas: woodland near Río Caquetá, Araracuara, *Maguire et al 44142* (MICH, NY). BRAZIL. Terr. Roraima: Arimutã region, *Coradin & Cordeiro 943* (MICH); Mucajaí-Caracarái road, *Coradin & Cordeiro 1004* (MICH); Canto Galo, Rio Mucajaí between Pratinha and Rio Apiaú, *Prance et al 3964* (MICH, NY); Serra Tepequem, elev 1200 m, *Prance et al 4437* (MICH, NY); Uaicá, Rio Uraricoeira at 3°33'N, 63°11'W, *Prance et al 10909* (MICH, NY).

Collected in flower and fruit at various times, but in Guayana most frequently from January to July.

Cuatrecasas (1958) has shown that the name *Stigmaphyllon fulgens* cannot be applied to this species because its basionym is a later homonym (actually a misapplication) of a Linnaean name. However, Cuatrecasas should not have used de Candolle's name *Banisteria splendens*, because it is a superfluous name and therefore illegitimate. In his protologue de Candolle cited as a synonym the legitimate name *Banisteria heterophylla* Willdenow, which he set aside because it was inappropriate. Willdenow's name cannot be used in *Stigmaphyllon* because there is already a *Stigmaphyllon heterophyllum*, so I am adopting the next oldest name, *S. hypoleucum* Miquel. There are at least two older names, one of which may eventually displace this one (*S. richardianum* Jussieu and *S. macropodum* Jussieu, both published in the Synopsis in 1840), but it is not obvious from the descriptions or photographs of the types that these species are conspecific with *S. hypoleucum*, so for the present the latter name seems to be the best choice.

The description above is based only on the collections cited; the flowers are smaller in some extra-Guayana populations.

This species is very variable, particularly in size, shape, and hairiness of the leaves. However, the variations in different characters are not well correlated. In different parts of the range, almost every degree of sericeousness is associated with leaves varying from very large and orbicular to small, ovate, and acute. There is also considerable variation in size and coloration of the petals. The older name *Stigmaphyllon martianum* Adr. Jussieu (1840) seems to apply to plants from Manaus and that part of Amazonia with the leaves ovate, truncate or slightly cordate at the base, acute to acuminate at the apex, not indented at the margin, and very thinly sericeous below, and with very large, mostly yellow petals. A few Guayana collections approach it, but I have treated them here as *S. hypoleucum* sens lat. The whole complex, including *S. hypoleucum*, *S. martianum*, and *S. brachiatum*, needs thorough revision.

The appendage of the anterior style is quite atypical in *Maguire et al 44142* and *Williams 11239*. In both the lateral folioles are reduced and the axis is extended, producing an appendage intermediate between that of *Stigmaphyllon hypoleucum* and *S. brachiatum*. See further discussion under *S. brachiatum*.

2. *Stigmaphyllon brachiatum* Triana & Planchon, Ann. Sci. Nat. 4me Sér. Bot. 18: 316. 1862.

This species seems hardly different from *Stigmaphyllon hypoleucum* except for the styler character given in the key; the appendages of the posterior styles also tend to be smaller in *S. brachiatum*. See the description of *S. hypoleucum*.

Type. *Triana*, Villavicencio, Colombia.

Distribution. Northern South America. Guayana collections: VENEZUELA. Bolívar: Carretera El Pao-San Félix, elev 250 m, *Aristeguieta 2285* (NY, VEN); Santa María de Erebató, 5°5'N, 64°40'W, elev 350 m, *Steyermark et al 109847* (NY). Amazonas: San Juan de Manapiare, elev 375–425 m, *Agostini 1504* (MICH); Mavaca, *Aristeguieta & Lizot 7371* (NY, VEN); Isla del Ratón, elev 90 m, *Breteler 4721* (VEN, WAG); El Maco, Río Ventuari, *Foldats 108A* (VEN); Boca del Vichada, elev 100 m, *Holt & Gehriger 221* (NY, US); Base Camp, Cerro

Camani, elev 200 m, *Maguire 31802* (NY, VEN); San Juan de Manapiare, elev 100 m, *Morillo 3174* (VEN); Casiquiari, Vasiva, and Pacimoni Rivers, 1853–4, *Spruce 3277* (MG, NY). COLOMBIA. Vaupés: Mitú to Monfort, *E. W. Davis 107* (MICH); Miraflores, elev 300 m, *Gutierrez V. & Schultes 819* (COL); Río Guaviare, desembocadura del Ariarí con el Río Guayabero, *Pinto E. & Sastre 938* (COL).

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

The shape of the styler appendages is traditionally important in the taxonomy of *Stigmaphyllon*, and on that basis Niedenzu placed *S. brachiatum* and *S. hypoleucum* in different subgenera. However, except for the presence or absence of lobes on the appendage of the anterior style the two species are indistinguishable. It seems probable that *S. brachiatum* is derived from *S. hypoleucum* by loss of the folioles on the anterior style. This idea is supported by *Williams 11239*, which is from the Medio Caura where *S. hypoleucum* is common and *S. brachiatum* unknown. Its anterior style is intermediate between the two forms, and in the circumstances the intermediate form seems likelier to have originated directly through modification of local *S. hypoleucum* than through hybridization. Indeed, *Stigmaphyllon brachiatum* may not be a monophyletic taxon. In Bolívar it mimics eastern forms of *S. hypoleucum*, while the populations of western Amazonas and Colombia are more like the Orinoco populations of *S. hypoleucum*, which suggests its origin on at least two occasions, perhaps more. This raises an obvious question about its taxonomic status, which I shall not attempt to resolve here.

A most interesting collection is *Maguire et al 44142* from the Río Caquetá in Colombia. The anterior style has an extended axis and small, triangular folioles, the result being unlike the usual condition in either species. In other respects the plants are most like Colombian collections of *S. brachiatum*. *Stigmaphyllon hypoleucum* sensu stricto is not yet known from Colombia, but Maguire's intermediate leads me to predict that it will be found there, probably on the lower Ríos Vaupés, Apaporis, or Caquetá.

3. *Stigmaphyllon puberum* (L. Richard) Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 289. 1840.

Banisteria pubera L. Richard, Cat. Lebl. in Act. Soc. Hist. Nat. Paris 1: 109. 1792.

Vines, the stems densely sericeous to eventually glabrate. Lamina of the larger leaves 10–15 cm long, 4–7 cm wide (–10.5 cm in Central America), narrowly to broadly ovate or subelliptical, cuneate to rounded at the base, entire and nearly or quite eglandular at the margin, acuminate at the apex, sericeous to glabrate above, the hairs often persistent on the midrib, persistently sericeous below, the venation pinnate, even at the base, the reticulum prominulous above; petiole 15–45 mm long, densely sericeous, biglandular at the apex; stipules minute to 1 mm long, subulate or triangular, borne near base of petiole, persistent. Inflorescence densely sericeous, each umbel with 4–8(–15) flowers; bracts 1–2 mm long, eglandular; peduncle 1–4 mm long; bracteoles 1–1.5 mm long, eglandular. Pedicel 4–8 mm long, usually at least twice as long as peduncle. Sepals ovate, rounded at the apex, abaxially sericeous, adaxially glabrous. Petals yellow and red, fimbriate (the posterior 3 more deeply so than the anterior 2), glabrous; anterior-lateral

petals with the claw 2–2.6 mm long, the limb 7.5–10 mm long and wide, truncate at the base; posterior-lateral petals with the claw 0.5–1(–2) mm long, the limb 5.5–7.5 mm long and wide, cuneate at the base; posterior petal with the claw 3–3.5 mm long, the limb 5–6 mm long, 4–5 mm wide, constricted at the base. Filaments glabrous, up to $\frac{1}{2}$ connate, 3.5–4.5 mm long opposite the anterior sepal, 1.8–2.8 mm long opposite anterior-lateral petals, posterior-lateral sepals, and posterior petal, (2.5–)3–3.5 mm long opposite anterior-lateral sepals and posterior-lateral petals; anthers glabrous, the anterior 7 1–1.3 mm long, the 2 opposite the anterior-lateral sepals with large, globose, glandular connectives and the locules much-reduced; posterior 3 anthers 0.5–0.9 mm long, all with small locules. Ovary with all 3 locules fertile; anterior style 4–4.5 mm long, the dorsal appendage an arching axis 1.1–1.3 mm long, bearing pendent folioles, the total width ca 2.6 mm; posterior styles 2.5–3.5 mm long, the dorsal appendage 0.8–1.3 mm long, 0.6–0.8 mm wide, horizontal or somewhat pendent. Samara 22–40 mm long, sericeous to glabrate, 10–15 mm wide, widest at the base with the wing partly surrounding the nut; nut without a lateral crest but often longitudinally rugose (parallel to axis of wing).

Type. *Leblond 44*, French Guiana (G).

Distribution. Lowlands of northern South America to Belize and the West Indies. Collections from Guayana and nearby: GUYANA. Kamakusa, upper Mazaruni River, Jul flr/frt, *De La Cruz 4087* (NY); Mazaruni Station, Jul frt, *Forest Dept. 2971* (NY) & Jan frt, *Forest Dept. 4935* (NY); Oko Creek, Cuyuni River, elev 90 m, *Tutin 342* (US). VENEZUELA. Delta Amacuro: Between La Margarita and Puerto Miranda, Río Acure, elev 80–100 m, Nov flr, *Steyermark 87775* (MICH).

13. *Heteropterys* Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 163 (4^o ed.). 1821 [1822].

Woody vines, shrubs, or small trees, the leaves opposite or very rarely alternate or whorled, usually bearing glands on the lamina or petiole or both, the stipules very small, free, triangular, borne on or beside base of petiole, often apparently absent. Flowers borne in umbels, corymbs, or pseudoracemes, these single or grouped in racemes or panicles, axillary or terminal or both; floriferous peduncle usually developed, absent in some species, subtended by a bract and bearing 2 bracteoles at or below the apex, the bract and/or the bracteoles glanduliferous in some species. Petals mostly yellow or pink, occasionally white, bronze, maroon, or lilac, glabrous in all but a few species. Stamens 10, all fertile, the anthers more or less alike and glabrous in all but a few species, the connective never exceeding the locules. Ovary of 3 carpels partially connate, 1 anterior and 2 posterior, all fertile; styles 3, the apex with a large internal stigma and dorsally rounded, truncate, acute, or hooked. Fruit schizocarpic, breaking apart into 3 samaras (or fewer due to abortion) separating from a short pyramidal torus, each samara having its largest wing dorsal, thickened on the abaxial (lower) edge and (in most species) bent upward, the veins terminating in the thinner adaxial edge; much shorter winglets or crests present on the sides of the nut in some species; dorsal wing rudimentary in a few species.

Type. *Heteropterys purpurea* (L.) H.B.K.

This is a difficult genus of perhaps 120 species, with one in Africa (*H. leona*), the rest occurring from Mexico to Argentina.

Key to the Species of *Heteropterys* in Guayana

1. Sepals erect or incurved; petals exposed early and through most of the enlargement of the bud.
 2. Pedicels sessile.
 3. Woody vine; petiole usually 10–20 mm long; lamina 10–15 cm long, 5–11 cm wide, the hairs (especially below) clearly stalked.
 4. Leaves tomentose, with serpentine or twisted hairs, golden-brown below; posterior petal with the claw 2.5–3 mm long and the limb 5 mm in diameter; filaments 2.5–3 mm long. 1. *H. neblinensis*.
 4. Leaves velutinous, with erect bifurcate hairs, greenish below; posterior petal with the claw 1.5 mm long and the limb ca 3 mm in diameter; filaments 1.3–2 mm long. 2. *H. olivacea*.
 3. Shrub or slender tree to 2.5 m tall; petiole 5–10 mm long; lamina 3–8 cm long, 2–4 cm wide, the hairs nearly or quite sessile. 3. *H. steyermarkii*.
 2. Pedicels pedunculate.
 5. Mature lamina glabrous or glabrate below or only sparsely sericeous, the vesture not apparent without a lens.
 6. Petals yellow, abaxially smooth or with the midvein prominent; anthers loosely sericeous; petiole 15–22 mm long, eglandular or biglandular at or above the middle; lamina 9–20 cm long, 5–12 cm wide; samara 63–80 mm long. 4. *H. lasserii*.
 6. Petals pink or white and pink, abaxially prominently winged; anthers glabrous; petiole 4–12 mm long, usually biglandular near the base; lamina 6–12.5 cm long, 3.3–6.5 cm wide; samara 28–37 mm long. 5. *H. cristata*.
 5. Mature lamina persistently and prominently sericeous or tomentose below.
 7. Leaves tomentose below; petals pink or pink and white, 4 or all of them abaxially prominently winged; nut of the samara usually bearing short lateral crests or winglets; lamina of larger leaves 4.5–12.5 cm long, 3–6.5 cm wide.
 8. Lamina eventually glabrate below, soon glabrate and shining above; pedicel 5–9 mm long; bracteoles appressed; stigma laterally compressed, higher than wide. 5. *H. cristata*.
 8. Lamina quite persistently tomentose below, ± persistently tomentose above and not shining; pedicel 2–3 mm long; bracteoles spreading; stigma laterally expanded, at least twice as wide as high. 6. *H. beeheyana* var *alata*.
 7. Leaves tightly sericeous below; petals yellow, abaxially carinate; nut of the samara with the sides quite smooth; lamina of larger leaves 11–20 cm long, 6.5–10.5 cm wide. 7. *H. macrostachya*.
 1. Sepals revolute at the apex; petals concealed by sepals during enlargement of the bud.

Subgenus *Parabanisteria* (Morton) Morton.

 9. Inflorescence composed of umbels or corymbs of 4–6(–8) flowers or of short crowded pseudoracemes with 1–3 pairs of flowers and then a terminal umbel, the axis (excluding the floriferous peduncles and pedicels) up to 1.5 cm long (sometimes to 2.5 cm in *H. nervosa*).
 10. Lamina glabrous below.
 11. Branches of the inflorescence usually with 1–3 pairs of flowers below the terminal umbel; very fine reticulum about as prominent above as below. 8. *H. nervosa*.
 11. Branches of the inflorescence usually without flowers developed below the terminal umbel; reticulum more prominent on one side than on the other.
 12. Largest leaves with the petiole up to 5 mm long and the lamina up to 7.7 cm long and 3.2 cm wide, the lateral veins only prominulous below. 9. *H. murcapiresii*.

12. Largest leaves with the petiole 7–15 mm long and the lamina 11–21 cm long and 4.5–9 cm wide, the lateral veins prominent below. 10. *H. siderosa*.
10. Lamina sparsely to densely sericeous or tomentose-sericeous below (older leaves sometimes eventually glabrescent).
13. Bracts (and often bracteoles) reflexed or revolute; lamina sparsely sericeous below, the vestiture visible only with a lens.
 14. Axillary and terminal panicles 10–30 cm long; pedicels about as long as peduncles, neither twice nor half as long. 10. *H. siderosa*.
 14. Axillary panicles (including pedicels but excluding fruits) 1.5–3 cm long; pedicel over twice as long as peduncle. 11. *H. oligantha*.
13. Bracts and bracteoles ascending; lamina moderately to densely sericeous or tomentose-sericeous below, the vestiture visible without a lens.
 15. Sepals with the hairs uniformly dark brown; petals sparsely pilose, especially on the margins, to glabrate; lamina of the larger leaves 2–4 cm wide, the reticulum not visible above. 12. *H. cuatrecasasii*.
 15. Sepals with the hairs proximally rust-brown, distally white; petals abaxially persistently sericeous; lamina of the larger leaves 5–7 cm wide, the reticulum visible above. 13. *H. dichromocalyx*.
9. Inflorescence composed of elongated pseudoracemes not terminating in umbels, these mostly over 2.5 cm long, often much longer.
16. Lamina of the largest leaves 17–30 cm long and (7–)8–13 cm wide; wing of the samara 22–37 mm wide.
 17. Bracts 5–8 mm long, 3–6 mm wide; bracteoles 4–5 mm long, 3–4 mm wide; samara 3.5–5 cm long, the nut 1.7 cm or more across, the abaxial edge of the wing recurved; lateral petals with the limb mostly 4.5–6.5 mm long, 4.2–5.5 mm wide. 14. *H. multiflora*.
 17. Bracts and bracteoles 2–3 mm long, 1.5–2 mm wide; samara 5–6 cm long, the nut less than 1 cm across, the abaxial edge of the wing bent upward; lateral petals with the limb 3–4.6 mm long, 2.8–4.2 mm wide. 15. *H. riparia*.
16. Lamina of the largest leaves up to 17 (rarely 18) cm long and 7 (very rarely 8) cm wide; wing of the samara 5–14 mm wide.
 18. Lamina obtuse or rounded at the apex; leaves opposite, alternate, or whorled, often variable on the same stem, strictly decussate usually only in short, small-leaved forms (juveniles? stump sprouts?); shrublets, shrubs, or small trees. *H. oblongifolia* complex.
 19. Lamina moderately to strongly revolute, with the fine reticulum much more prominent above than below; vegetative internodes nearly or quite glabrous; lower epidermis papillose (due to protruding starch grains in guard cells), often glaucous. 16. *H. oblongifolia*.
 19. Lamina nearly or quite flat, with the reticulum about as prominent below as above or more prominent below; vegetative internodes minutely sericeous to glabrate; lower epidermis smooth or obscurely papillose, not glaucous. 17. *H. atabapensis*.
18. Lamina acute or acuminate at the apex, or if obtuse the plant a woody vine; leaves strictly decussate; shrubs, small trees, or woody vines.
 20. One or both bracteoles usually bearing 1–2 prominent abaxial glands; petiole sometimes bearing 1–2 glands on the distal half; wing of the samara usually flabelliform, the abaxial edge often recurved. 18. *H. orinocensis*.
 20. Bracteoles usually eglandular, rarely with minute marginal glands; petiole eglandular; wing of the samara elongated, obovate or falcate, the abaxial edge usually curved or bent abruptly upward.
 21. Samara reflexing during elongation and developing with the wing pointed downward; lamina “glaucous” below due to the prominent whitish guard cells; campos near Caracará, Roraima Territory, Brazil. 19. *H. catoptera*.

21. Samara developing with the wing ascending; lamina not glaucous below; widespread in northern South America. 20. *H. macradena*.

1. *Heteropterys neblinensis* Anderson, sp nov

Fig 36.

Liana lignosa, ramis teretibus sericeis. Folia opposita vel raro verticillata; lamina 10–15 cm longa, 6–11 cm lata, subcircularis vel late ovata vel elliptica, basi plerumque rotundata, margine revoluta, apice rotundata apiculataque vel abrupte brevi-acuminata, supra primo tomentosa pede pilorum brevi trabecula serpentina demum glabrescens praeter nervos principales, subtus dense et pertinaciter sulphureo-tomentosa pede pilorum ca 0.2 mm longo trabecula 0.6–1.2 mm longa subdirecta, serpentina, vel valde tortuosa, eglandulosa vel sub margine aliquot glandulis parvis munita, nervis lateralibus et tertiariis supra impressis subtus prominentibus; petiolus 14–20 mm longus, 2–3 mm diametro, pertinaciter sericeus vel demum glabrescens, basi biglandulifer glandulis 1.5–3 mm diametro; stipulae non visae. Inflorescentia racemus (vel raro panicula) 7–11 umbellarum, axillaris et terminalis, 10–22 cm longus, tomentoso-sericeus; umbella 5–15(–20?)-flora, in pedunculo 1–5 cm longo portata, 2 bracteis parvis glanduliferis subtenta, bracteis bracteolisque floriferis 1–1.5 mm longis, eglandulosis, persistentibus, pedunculo florifero nullo. Pedicellus 7–15 mm longus, 1–1.5 mm diametro, appresso-tomentosus. Sepala 4 lateralialia 8 glandulas 1.5–2.5 mm longas ellipticas vel obovatas non compressas 2–2.5 mm superantia, 2.5–2.7 mm lata, anticum eglandulosum vel biglandulosum, omnia ovata vel triangularia, apice obtusa, appressa, abaxialiter sericea, versus marginem glabra, adaxialiter glabra. Petala aenea vel lutea et aenea, glabra, concava, abaxialiter laevia, 4 lateralialia recurvata, ungue 2–2.5 mm longo, limbo 5 mm longo latoque, margine denticulato eglanduloso; posticum atriis, erectum, ungue 2.5–3 mm longo, limbo 5 mm longo, 4.5–5.5 mm lato, margine toto circuitu glanduloso-dentato. Filamenta 2.5–3 mm longa, glabra, basi connata, recta vel paulo sinuata, 2 petalis postico-lateralibus opposita multo crassiora quam ceteris; antherae 1.3–2 mm longae, 2 petalis postico-lateralibus oppositae longissimae, glabrae, connectivo proximaliter atrorubro distaliter luteo. Ovarium 1.5 mm altum, sericeum; styli ca 2.5 mm longi, anticus paulo brevior, glabri vel basi sericei, recti vel paulo divergentes, apice “pedaliformi” i e plano et dorsaliter brevissime uncinato unco rotundato. Samara 32–35 mm longa, tomentoso-sericea; ala dorsalis ca 25 mm longa, 11–12 mm lata, margine abaxiali recto vel paulo sursum curvato; nux 8 mm longa, 5–6 mm alta, lateribus ecristata paulo rugulosa.

Type. *Maguire, Wurdack & Bunting 37207*, escarpment overlooking Cañon Grande below Cumbre Camp, summit, Cerro de la Neblina, Amazonas, Venezuela, elev 1700–2000 m, 10 Jan 1954 frt (holotype MICH, isotypes NY, US, VEN).

Distribution. Known only from the type locality and nearby. Paratypes: *Maguire et al 42111*, Nov flr (NY); *Maguire et al 42464*, Dec flr (MICH, NY, VEN); *Maguire et al 42537B*, Dec frt (NY).

Heteropterys neblinensis is referable to Niedenzu's section *Macroprosopis* series *Holopetalum*. It is distinguished from the known species of that series by its terete stem, its leaves rounded at the base and sulphur-yellow below, its many-flowered umbels, and the petals “bronze” or “pale yellow tinged with bronze.”

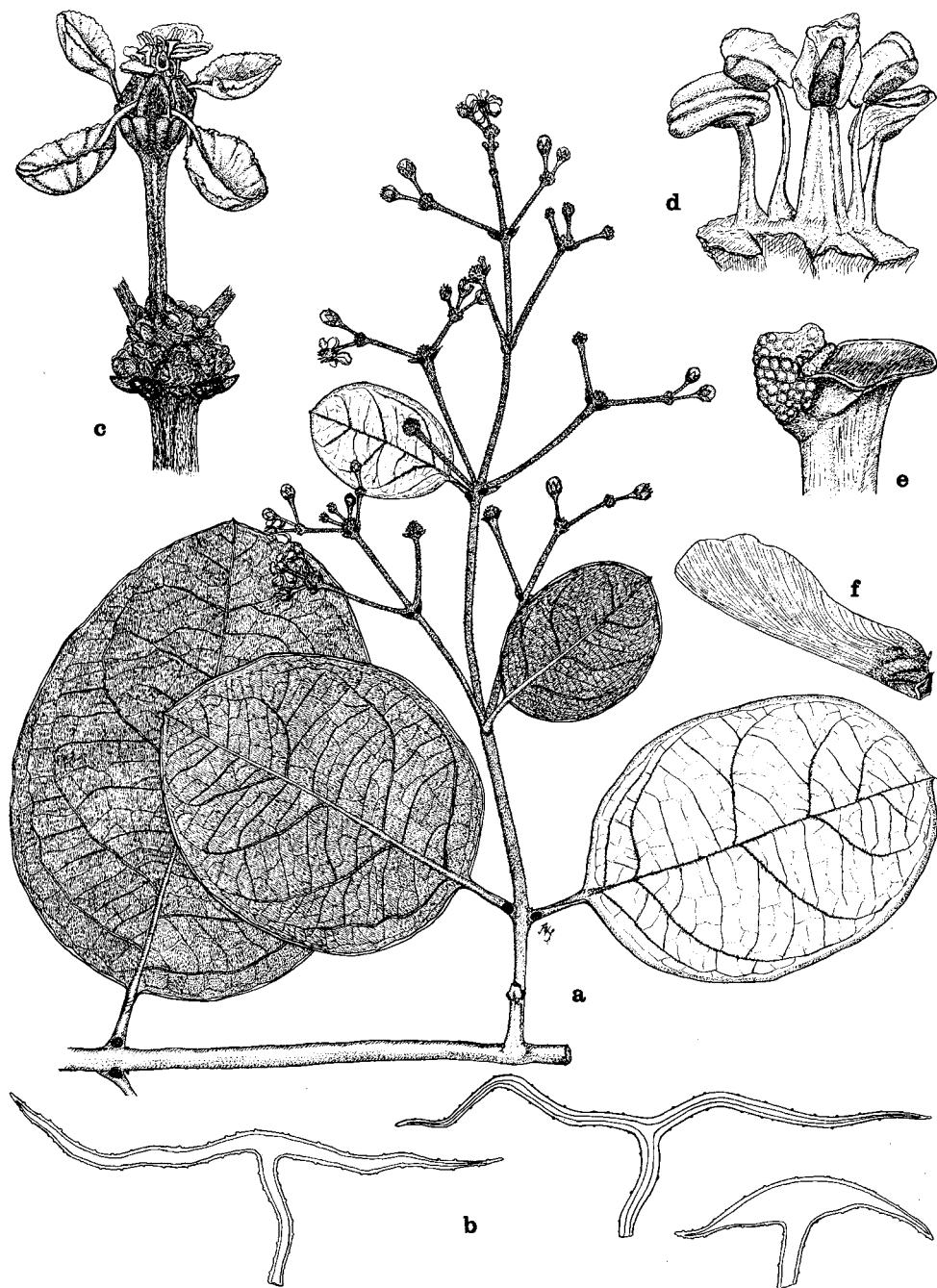


Fig 36. *Heteropterys neblinensis*. a) Flowering branch, $\times 0.5$; b) hairs, left to right from adaxial side of lamina, abaxial side, and axis of inflorescence, $\times 75$; c) flower, $\times 3$; d) stamens, left one opposite posterior petal, $\times 9$; e) stigma, $\times 28$; f) samara, $\times 1.1$. Drawn by Annette Seidenschur Mahler, a-e from Maguire *et al* 42111, f from Maguire *et al* 37207.

The species most similar to *H. neblinensis* is *H. olivacea*; the characters that distinguish them are summarized in the key. This species is named for the Cerro de la Neblina, which has one of the most interesting endemic floras in South America.

2. *Heteropterys olivacea* (Cuatrecasas) Anderson, comb nov

Stigmaphyllon olivaceum Cuatrecasas, Ciencia 23(4): 141. 1964.

Vine, the younger stems velutinous, the older stems glabrescent and woody. Lamina 12.5–13.5 cm long, 6.7–7.5 cm wide, elliptical, obtuse or rounded at the base, slightly revolute at the margin, acute with a short process at the apex, persistently velutinous on both sides, the hairs below denser but finer than above and mostly colorless except on the veins, erect, long-stalked, V-shaped to almost T-shaped, the epidermis showing through as green except on the veins, the lateral and tertiary veins impressed above and prominent below; petiole 13–15 mm long, velutinous, with 2 large basal glands; stipules not seen. Inflorescence an axillary or terminal panicle of umbels, the umbel with 5–8 flowers, subtended by 2 small glandular bracts, the floriferous bracts and bracteoles 0.5–1 mm long, eglandular, persistent, the floriferous peduncle absent. Pedicel 7 mm long, 1 mm in diameter, velutinous. Sepals ca 1 mm long beyond the glands, 1.3 mm wide, appressed, sometimes very slightly revolute at the margin, abaxially velutinous except glabrous and membranous near the ciliolate margin, adaxially glabrous, the lateral 4 bearing 8 glands, the anterior eglandular. Petals yellow, glabrous, the lateral 4 with the claw ca 1.5 mm long and the limb 4–5 mm in diameter, entire or denticulate; posterior petal with the claw 1.5 mm long and the limb ca 3 mm in diameter, with an entire, slightly glandular-thickened margin. Filaments 1.3–2 mm long, glabrous, connate at the base, straight, the 2 opposite the posterior-lateral petals much thicker than the others; anthers 1.4–1.7 mm long, longest on the thicker filaments, glabrous, the connective proximally dark red, distally yellow. Ovary 0.8 mm high, velutinous; styles ca 2 mm long, straight, pedaliform at the apex with the dorsal projection very short and rounded. Fruit unknown.

Type. *Schultes & Cabrera 14591*, Río Apaporis, Raudal de Jirijirimo (below mouth of Río Kananarí), Amazonas-Vaupés, Colombia, 0°5'N, 70°40'W, elev 270 m, 25 Nov 1951 flr (holotype US!).

Presumably Dr. Cuatrecasas described this species in *Stigmaphyllon* because of its umbellate inflorescence. However, the ten subequal anthers and the three subequal unappendaged stigmas make that placement very doubtful. Moreover, this plant is very similar in most characters to the undoubted *Heteropterys* described above as *H. neblinensis*. I am therefore fairly sure that *Heteropterys* is its correct genus, although it is still known only from the type, which lacks fruits.

3. *Heteropterys steyermarkii* Anderson, sp nov

Fig 37.

Frutex vel arbor parva 1.5–2.5 m alta, ramis paucis, tenuibus, sericeis. Folia opposita vel raro verticillata; lamina foliorum majorum 3–8 cm longa, 2–4 cm lata, elliptica, late elliptica, vel paulo obovata, coriacea, basi cuneata vel rotundata, margine crassiuscula, interdum paulo revoluta, apice obtusa vel rotundata et saepe apiculata, utrinque sericea vel appresso-tomentosa pilis fere sessilibus

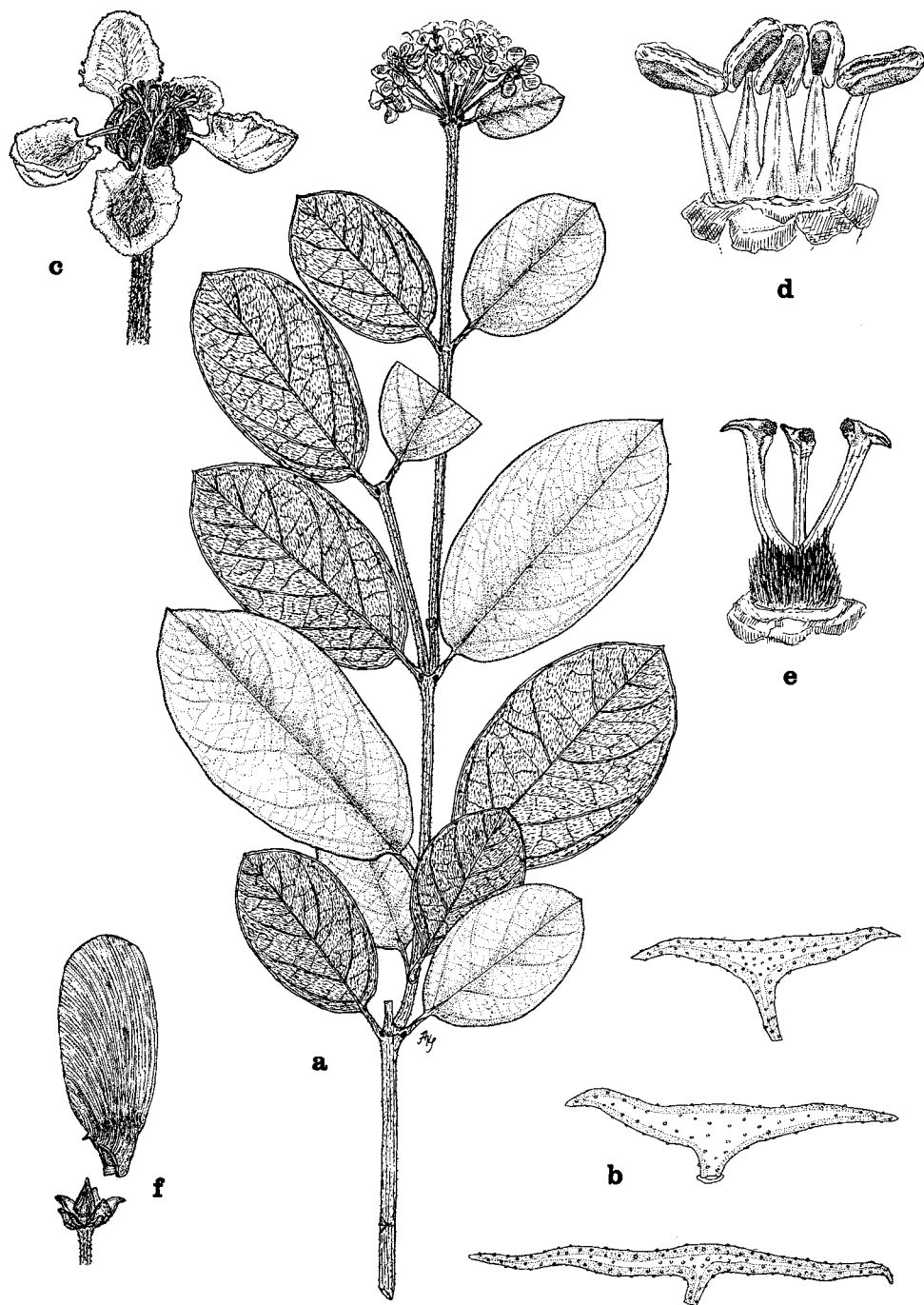


Fig 37. *Heteropterys steyermarkii*. a) Flowering branch, $\times 0.7$; b) hairs, lowest from abaxial side of lamina, others from axis of inflorescence, $\times 130$; c) flower, $\times 2.7$; d) stamens, the middle one opposite the posterior petal, $\times 9$; e) gynoecium, the middle style opposite the anterior sepal, $\times 9$; f) samara and torus, $\times 1.3$. Drawn from the type by Annette Seidenschnur Mahler.

et persistentibus vel supra demum deciduis, vel in eodem populo fere glabra permox glabrata, subtus epidermide albo- vel luteo-papillosa, nervis utrinque prominulis vel supra obscuris; petiolus 5–10 mm longus, sericeus, basi biglandulifer, glandulis 0.5–1 mm diametro; stipulae non visae. Inflorescentia umbella terminalis 3–11-flora, 2 foliis vel bracteis glanduliferis subtenta, bracteis bracteolisque floriferis usque 1 mm longis, eglandulosis, persistentibus, pedunculo florifero nullo. Pedicellus 8–15 mm longus (–22 mm in fructu), sericeus. Sepala glandulas 0.8–1.5 mm longas ellipticas vel circulares non compressas 1–1.8 mm superantia, 1.9–2.4 mm lata, 4 lateralia biglandulosa, anticum eglandulosum vel 1–2 glandulis parvis munitum, omnia ovata, apice obtusa, appressa, abaxialiter sericea, adaxialiter glabra. Petala glabra, concava, abaxialiter laevia, 4 lateralia brunneo-marronina, patentia, ungue 1.8 mm longo, limbo 5 mm longo, 6 mm lato, margine denticulato eglanduloso; posticum album, erectum, ungue 2.5 mm longo, limbo 4 mm longo, 5 mm lato, margine basi vel toto circuitu glanduloso-dentato. Filamenta 1.5–2 mm longa, glabra, basi $\frac{1}{3}$ connata, recta; antherae 1.4–1.6 mm longae, connectivo toto aequaliter luteo. Ovarium 1 mm altum, sericeum: styli 2 mm longi, anticus paulo brevior, glabri, recti, apice pedaliformi dorsaliter uncinato unco 0.4 mm longo, angusto, obtuso. Samara 18–30 mm longa, tomentoso-sericea; ala dorsalis 13–24 mm longa, 8–14 mm lata, margine abaxiali plerumque leviter sursum curvato; nux 5–7 mm longa, 4–5 mm alta, lateribus ecristata rugulosa; torus pyramidalis 2–3 mm altus.

Type. *Steyermark 105119*, common, dominant, spindly, simple-stemmed, ligneous plant 1.5–2 mm tall, Cumbre del cerro Autana, sabana y afloramientos expuestos, Amazonas, Venezuela, 4°52'N, 67°27'W, elev 1230–1240 m, 20–22 Sep 1971 fl/frt (holotype MICH, isotypes F, K, NY, U, US, VEN).

Distribution. Known only from Cerros Autana and Sipapo. Paratypes: VENEZUELA. Amazonas, Cerro Sipapo (Paráque): Pockets in rocky savanna near Camp Savanna, elev 1500 m, Dec frt, *Maguire & Politi 27524* (MICH, NY, VEN); marsh, elev 1500 m, Dec frt, *Maguire & Politi 27694* (NY); South Basin Savanna, elev 1860 m, Jan frt, *Maguire & Politi 28673* (NY, VEN).

This most interesting species is named in honor of Julian Steyermark, whose tireless efforts have so greatly advanced botany in Venezuela. Like the preceding two species it is referable to Niedenzu's section *Macroprosopis* series *Holopetalum*, but these three species are probably more closely related to each other than any of them is to any of the species known to Niedenzu. Among many distinguishing features, *H. steyermarkii* is especially notable for the erect habit, small leaves, several-flowered terminal umbels, petals brown-maroon (the laterals) and white (the posterior), and long dorsal hook at the apex of the styles.

4. *Heteropterys lasserii* Anderson, sp nov

Fig 38.

Liana lignosa, ramis sericeis lenticellis parvis creberrimis mox evolutis. Foliorum lamina 9–20 cm longa, 5–12 cm lata, late elliptica, basi cuneata vel subrotundata, margine crassiuscula plana vel revoluta, apice rotundata et abrupte brevi-acuminata, adulta utrinque glabrata vel supra costa et subtus ubique sparsim sericea pilis minimis sessilibus appressisque, nervis supra obscuris subtus $\pm$ prominentibus, eglandulosa vel subtus basi 2–6-glandulifera; petiolus 15–22 mm longus, sericeus vel demum glabratus, eglandulosus vel 2(–4)-glandulifer glandulis

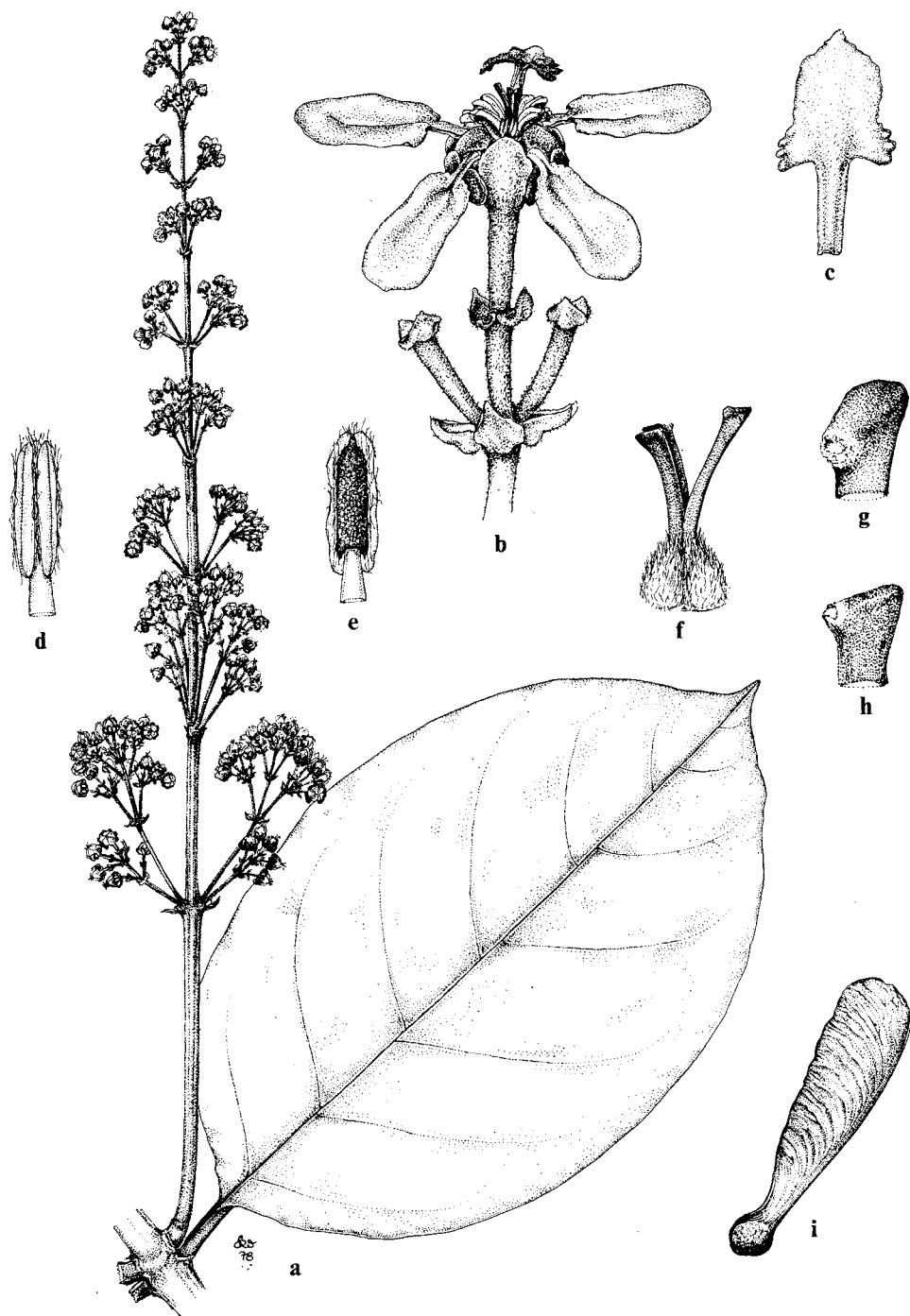


Fig 38. *Heteropterys lasseri*. a) Leaf and inflorescence, $\times 0.5$; b) flower in umbel, $\times 3.5$; c) posterior (flag) petal, $\times 5$; d) anther, adaxial side, $\times 7.5$; e) anther, abaxial side, $\times 7.5$; f) gynoeceium, anterior carpel to right, $\times 7.5$; g) apex of posterior styles, $\times 25$; h) apex of anterior style, $\times 25$; i) samara, $\times 0.5$. Drawn by Karin Douthit, a–h from Steyermark et al 92913, i from Forest Dept. 4528.

prope vel super medium; stipulae non visae. Inflorescentia axillaris et terminalis, sericea, panícula floribus in umbellis 4–6-floris vel umbella 4-flora et 2 floribus proximalibus, bracteis floriferis 1.5–2.5 mm longis ovatis involutis, eglandulosus vel 1(–2)-glanduliferis, pedunculo 3–5 mm longo, bracteolis bracteis similibus saepe minoribus, sub apice pedunculi portatis. Pedicellus 4–5 mm longus sericeus. Sepala omnia eglandulosa vel 4 lateralía biglandulosa et anticum 0, 1, vel 2 glandulis munitum, glandulas 1.8–2.8 mm longas ellipticas 1–1.5 mm superantia, 1.8–2 mm lata, ovata, apice obtusa vel rotundata, appressa, abaxialiter sericea, adaxialiter glabra. Petala lutea, carnosa, abaxialiter laevia vel basi paulo carinata et glabra vel (praecipue in ungue) sparsim sericea, 4 lateralía patentia, ungue 1.5–2 mm longo, limbo 3.5–4.5 mm longo, 3–4 mm lato, obovato, concavo, basi sagittato vel truncato, margine subintegro et paulo revolutus; posticum ungue 2–2.5 mm longo, limbo 3 mm longo, 2.2–3 mm lato, reflexo, $\pm$ plano, basi sagittato et utrinque 3–5 glandulis munito, distaliter eroso vel subintegro. Filamenta 1.5–2 mm longa, glabra, basi connata, recta; antherae 1.5–2.1 mm longae, $\pm$ reflexae, loculis dense et laxe sericeis vel tomentosus, connectivo atrorubro apice luteo. Ovarium 1.5 mm altum, sericeum, sine cristis vel alulis lateralibus; styli glabri, 2 postici 1.5–2 mm longi, $\pm$ recti, apice desuper applanato dorsaliter rotundato-truncato; anticus 2–2.4 mm longus, divergens, apice a lateribus compresso dorsaliter truncato. Samara 63–80 mm longa, sericea; ala dorsalis 53–70 mm longa, 17–20 mm lata, proximaliter angustata sed nucem anguste semiamplectens, margine abaxiali recto vel paulo sursum curvato; nux globosa, 9–11 mm diametro, lateribus rugosa et e cristata vel 1 cristula 1.5 mm longa lataque munita.

Type. *Steyermark, Dunsterville & Dunsterville 92913*, bosque húmedo montañoso, vecindades del salto, Río Venamo, Bolívar, Venezuela, elev 900 m, 9 Jan 1964 flr (holotype VEN, isotype NY).

Paratypes. VENEZUELA. Bolívar: Dto. Roscio, carretera El Dorado–Santa Elena de Uairén, mas arriba de la Laja, elev 800–1200 m, Jun flr, *Badillo & Holmquist 6086* (MY); Kavanayen, quebrada de Pakairao, May flr, *Lasser 1928* (F, NY, VEN). GUYANA. Black Ck., Groete Ck. Essequibo R., Apr frt, *Forest Dept. 4528* (NY).

Heteropterys lasseri is named in honor of Dr. Tobias Lasser, eminent student of the Venezuelan flora and Director of the Instituto Botánico in Caracas.

5. *Heteropterys cristata* Benthám, London Jour. Bot. (Hooker) 7: 131. 1848.

Heteropterys carinata Benthám, London Jour. Bot. (Hooker) 7: 133. 1848. Type: *Robert Schomburgk II 632/Richard Schomburgk 958*, near Roraima, “British Guiana” [actually Bolívar, Venezuela], Nov 1842 flr (holotype K).

Woody vines, the stems sericeous or tomentose to glabrate, with many small lenticels. Lamina of the larger leaves 6–12.5 cm long, 3.3–6.5 cm wide, smaller in the inflorescence, ovate, obtuse or rounded at the base, acute or acuminate at the apex, initially sericeous or tomentose, soon glabrate and shining above, soon to eventually glabrate below, often bearing a row of small impressed glands parallel to the margin but set in from it, the fine reticulum usually prominulous on both sides, occasionally obscure above; petiole (4)–6–12 mm long, sericeous or tomentose to glabrate, usually biglandular near the base; stipules none (?) or minute, 0.1–0.2 mm long, triangular, borne on base of petiole. Inflorescence ax-

illary and terminal, paniculate, with the flowers ultimately borne in umbels or tight corymbs of 4–10 flowers, sericeous or tomentose, with small leaves or bracts bearing several large glands, the floriferous bracts 1–2 mm long, eglandular, persistent, the peduncle 3–7 mm long and bearing below its apex 2 appressed bracteoles 0.6–1 mm long. Pedicel 5–9 mm long. Sepals 1–1.7 mm long beyond the glands, 1–2 mm wide, triangular, appressed, abaxially uniformly tomentose or sericeous, adaxially glabrous or sericeous toward the margins, the lateral 4 bearing 8 elliptical, compressed glands 1.7–2.5 mm long and hairy on the inner edges, the anterior sepal eglandular. Petals pink or pink and white, glabrous, not papillose on the adaxial face, the lateral 4 with the winged claw 1–1.5 mm long, the limb 3.3–4 mm long, 1.6–2 mm wide, entire, with a prominent abaxial wing 1–1.5 mm wide and usually extending beyond the limb; posterior petal with the claw 2 mm long and the limb (3–)3.5–4.5 mm long, 2–2.5 mm wide, entire, distally crumpled, with an abaxial wing 0.4–1.4 mm wide. Filaments 1.5–2 mm long, glabrous, almost free to $\frac{1}{2}$ connate, straight; anthers 0.8–1.2 mm long, glabrous, subequal. Ovary 1.5 mm high, tomentose; styles 1.2–2 mm long, glabrous, straight and erect or somewhat reflexed, the anterior usually shorter and slenderer than the posterior 2, dorsally truncate, acute, or apiculate at the apex, laterally compressed. Samara 28–37 mm long, appressed-tomentose to glabrate; dorsal wing 26–32 mm long, 13–14 mm wide, the abaxial margin bent upward; nut 6 mm long, 4–5 mm high, bearing on both sides a lateral crest or wing 1–5 mm wide, subentire or dissected into several winglets; torus ca 2 mm high.

Type. *Robert Schomburgk* I 279/*Richard Schomburgk* 328, Essequibo, British Guiana [Guyana], 1839 (holotype K, isotype US!).

Distribution. Lowlands, northern South America. GUYANA. Mazaruni River, Sep flr, *Abraham* 415 (NY); bank of the Potaro River, Tumatumari, Jul frt, *Gleason* 353 (NY); type of *H. cristata*, q v. BRAZIL. Terr. Roraima: Rio Mucajaí, Serra do Trunfo [Triunfo?], Nov flr, *Black* 51–13530 (IAN, US); Serra do Mel, Surumú, *Ule* 8182 (MG, NY). Amazonas: Rio Aracá, Nov flr, *Fróes & Addison* 29255 (UB). VENEZUELA. Amazonas: Orinoco River, southern part of Isla del Ratón, edge of granitic outcrop, primary forest, elev 90 m, Nov flr/frt, *Breteler* 4732 (MICH, VEN, WAG).

This species is defined rather broadly here, perhaps too broadly. The collections cited are variable in the vesture of the inflorescence and young leaves, a character which often marks species in the Malpighiaceae. However, in this case the variation seems to be nearly continuous. The collections from Guyana and *Fróes & Addison* 29255 have rather short, sessile or subsessile, appressed hairs, becoming slightly serpentine and short-stalked in the type of *H. cristata*. The only collection from the Orinoco, *Breteler* 4732, has distinctly stalked and serpentine hairs. This trend culminates in the two collections from Roraima Territory and, judging from Bentham's description, in the type of *H. carinata*. In these plants the young leaves are loosely tomentose, with stalked strongly twisted hairs that are gradually deciduous.

The extra-Guayana species *Heteropterys floridana* Cuatrecasas is very closely related to *H. cristata* and may not eventually stand as distinct. It is known only from the type, *Klug* 2153, collected in flower on the Río Putumayo in Loreto, Peru, and *Mori et al* 9155, collected in fruit on the Rio Solimões at Rio Jandiatuba in Amazonas, Brazil. Both collections are distinguished by their very short, ses-

sile, appressed, somewhat persistent leaf hairs and their eglandular petioles. In addition, the type has only small wings on the petals, about 1 mm wide and hardly longer than the petal limb.

The type of *H. carinata* was collected by the Schomburgks in November, 1842, near Roraima. According to Richard Schomburgk's Travels, vol. 2, pp 180–222 in the translation, they spent the entire month of November on the southwest side of Roraima in what is now Venezuela.

Flowering specimens in *Clonodia* will key out to *Heteropterys cristata* if they are taken for *Heteropterys* instead of *Clonodia*. They can be readily distinguished from *H. cristata* by the papillose inner face of at least the posterior petal and by the ultimate unit of the inflorescence being an elongated pseudoraceme instead of a tight corymb or umbel of 4–10 flowers.

6. *Heteropterys beecheyana* Adr. Jussieu var *alata* Anderson, var nov

Fig 44a–e.

Differt a *Heteropterys beecheyana* var *beecheyana* petalis lateralibus abaxialiter alatis alis 0.7–1 mm latis, petalo postico carinato vel anguste alato, foliis non supra rugosis, et glandulis foliorum majorum plerumque non stipitatis.

Shrub to 8 m tall or woody vine, the stems tomentose or subvelutinous to eventually glabrate, with many small lenticels. Lamina of the larger leaves 4.5–7.5 cm long, 3–5.2 cm wide, ovate, mostly rounded or cordate at the base, rounded or retuse and often mucronate at the apex, densely and persistently tomentose on both sides, eglandular below or bearing a pair of flat glands at the base, the veins flush above, prominent below; petiole (4–)6–8(–10) mm long, tomentose, eglandular or bearing 2 flat glands, usually between middle and apex; stipules not seen. Inflorescence paniculate, the flowers ultimately borne in umbels, corymbs, or very short crowded pseudoracemes of 4–14 flowers, tomentose, with small leaves often bearing 2 large slightly stalked basal glands, the floriferous bracts and bracteoles 1–1.5 mm long, eglandular, spreading, the peduncle 3–5 mm long. Pedicel 2–3 mm long, tomentose. Sepals 1–1.8 mm long beyond the glands, 1.2–1.5 mm wide, ovate or triangular, appressed, abaxially carinate and sparsely sericeous to distally glabrous, adaxially glabrous, the lateral 4 bearing 8 elliptical or obovate glands 1–1.3 mm long, the anterior sepal eglandular or rarely 1(–2)-glandular. Petals pink or pink and white, glabrous, the lateral 4 spreading or reflexed, with the claw 1.2–1.5 mm long, the limb 2.8–3.5 mm long, 2.2–2.5 mm wide, entire or denticulate, with an abaxial wing 0.7–1 mm wide; posterior petal erect, with the thick claw 2.2–2.5 mm long, the limb 2.5–2.8 mm long, 2.2–2.7 mm wide, often crumpled, dentate, abaxially carinate or with a narrow wing to 0.3 mm wide. Filaments 1.5–2 mm long, shortest opposite the posterior and antero-lateral petals, glabrous, up to $\frac{1}{3}$ connate, straight or somewhat incurved; anthers 0.9–1.3(–1.5) mm long, glabrous, subequal, the connective dark red. Ovary ca 1 mm high, sericeous; styles 1.9–2.4 mm long, glabrous except at base, divergent, dorsally acute at the apex, the stigma laterally expanded, ca 0.5 mm wide and 0.2 mm high. Samara 18–30 mm long, red, sericeous, borne erect; dorsal wing 15–26 mm long, 7–12 mm wide; nut 3–4 mm long, 2.5–3.5 mm high, spheroid, the sides rarely smooth, usually bearing 1–several crests or winglets 0.5–2 mm wide; torus ca 1 mm high.

Type of var *alata*: *Wurdack & Monachino 39811*, Cerro San Borja, Río Orinoco, Bolívar, Venezuela, elev 100–300 m, 12 Dec 1955 flr (holotype MICH, isotypes NY, US, VEN).

Lectotype of *H. beecheyana*: *Linden 909*, Mexico (P).

Distribution. Venezuela and Colombia east of the Andes, especially common in the Llanos Orientales of Colombia (see collections cited by Cuatrecasas). Guayana collections: VENEZUELA. Bolívar: Type, q v; Cerro San Borja, Dec frt, *Wurdack & Monachino 39816* (MICH, NY, US, VEN). Amazonas: 12.5 km S of Puerto Ayacucho, Nov flr, *Davidse 2832* (MICH); Caño Negro, ca 67°W, Río Ventuari, Cerro Parú, elev 200 m, Jan flr/frt, *Maguire et al 31618* (NY); Puerto Ayacucho, elev 100–200 m, Nov flr/frt, *Maguire et al 36071* (MICH, NY, US, VEN); road from Sanariapo to Puerto Ayacucho, elev 100–120 m, Nov flr, *Maguire et al 36146* (MICH, NY, VEN).

Heteropterys beecheyana is a variable species ranging from Mexico to Bolivia. The petals are usually smooth or at most carinate, except in the populations east of the Andes in Colombia and Venezuela, where they are winged. Except for this one prominent feature, there is little to distinguish our plants, so it seems best to treat them as a geographical variety.

7. *Heteropterys macrostachya* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 275. 1840.

Heteropterys apiculata Miquel, Stirp. Surin. 81. 1851. Type. *Kappler*, Marowijne River, Surinam (U?).

Woody vine, rarely a spreading shrub, the young stems sericeous, lenticellate. Lamina of the larger leaves 11–20 cm long, 6.5–10.5 cm wide, elliptical or slightly ovate or obovate, cuneate to rounded at the base, obtuse, short-acuminate, rounded, or retuse and mucronate at the apex, coriaceous, very soon glabrate and shining above or sericeous on the midrib, very densely and persistently metallic-sericeous below, the hairs producing a golden or silvery sheen, with an irregular row of small impressed glands below set in from the margin, the lateral veins and reticulum prominulous on both sides; petiole 8–13 mm long, sericeous, 2–4-glandular at or above the middle; stipules minute, ca 0.2–0.3 mm long, borne on (or beside?) the base of the petiole, often apparently absent. Inflorescence a raceme or panicle of 4–6-flowered umbels, sericeous, the floriferous bracts 1–1.5 mm long, eglandular, the peduncle 3–6 mm long, the bracteoles like the bracts and quite apical. Pedicel 2–5 mm long, sericeous. Sepals 0.5–2 mm long beyond the glands, 1.5 mm wide, triangular, appressed, abaxially uniformly sericeous, adaxially glabrous, the lateral 4 bearing 8 elliptical glands 2–3.5 mm long and sericeous on the inner edges, the anterior eglandular but appearing glanduliferous due to lateral displacement of adjacent glands. Petals yellow, glabrous, abaxially carinate, the lateral 4 spreading, with the claw 1.2–1.5 mm long, the limb 3–5 mm long, 2–3.5 mm wide, truncate or sagittate at the base, entire or denticulate; posterior petal erect, with the thick claw 1.5–2.5 mm long, the limb 3–4.5 mm long, 2.5–3.5 mm wide, glandular-dentate on the proximal $\frac{1}{2}$ – $\frac{2}{3}$. Filaments 1.5–3 mm long, glabrous or abaxially sparsely sericeous, $\frac{1}{2}$ – $\frac{2}{3}$ connate, straight; anthers 1.2–1.6 mm long, glabrous, subequal, reflexed, the connective dark red. Ovary 1.5 mm high, sericeous; styles 1.2–2.3 mm long, glabrous, straight or

slightly divergent, dorsally truncate at the apex. Samara 30–65 mm long, sericeous, borne nearly erect; dorsal wing 25–57 mm long, 12–27 mm wide, the abaxial edge straight or somewhat recurved; nut subspheroidal, 5–10 mm in diameter, smooth-sided; torus ca 3 mm high.

Type. *L. C. Richard*, French Guiana (G, P).

Distribution. Riverine forests from Costa Rica and Trinidad to Bolivia and central Brazil. Collections from Guayana and adjacent localities: VENEZUELA. Bolívar: Río Paragua, Raudal de Guaiquinima, elev 475 m, *Steyermark 90809* (NY); Salto Para, Río Caura, elev 200 m, *Steyermark et al 113011* (MICH) & *Ll. Williams 11483* (US, VEN); Piedra Marimare, E bank of Río Orinoco opposite head of Isla El Gallo, *Wurdack & Monachino 40860* (MICH, NY, US, VEN); Río Suapure between mouth and Los Aceites (35 km upstream), elev 80–90 m, *Wurdack & Monachino 41328* (MICH, NY, VEN). COLOMBIA. Amazonas-Vaupés: Río Apaporis entre el Río Pacoa y el Río Kananarí, Soratama, elev 250 m, *Schultes & Cabrera 13533* (NY, US). BRAZIL. Amazonas: Rio Negro, at Isla Macará, near mouth of Rio Padauri, *Cardona 1313* (US, VEN); between Cachoeira do Caranguejo and falls of the Rio Cauaburi, *Silva & Brazão 61000* (MG, MICH, NY, US).

Collected in flower and fruit at diverse times, most commonly from November to February.

This species is quite variable, especially in size and shape of the leaves and samaras, and my description does not attempt to accommodate extra-Guayana variation. It is based only on the collections cited above.

***Heteropterys* subg *Parabanisteria* (Morton) Morton, Taxon 17: 319. 1968.**

Heteropterys subg *Euheteropterys* Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 2: 42. 1903.

Banisteria subg *Parabanisteria* Morton, Proc. Biol. Soc. Washington 43: 157. 1930.

Floriferous peduncle usually developed, the bracteoles apical; many species with some individuals or populations with 4 sepals biglandular and others with all sepals eglandular; sepals completely concealing the petals during enlargement of the bud, revolute at the apex in anthesis; petals yellow, abaxially smooth, the lateral 4 spreading, the posterior erect; filaments glabrous, slightly connate; connective of the anther often proximally dark red and distally yellow-glandular; nut of the samara quite smooth-sided, without lateral crests or winglets.

Type. *Heteropterys laurifolia* (L.) Adr. Jussieu.

This is a very natural, easily recognized group, comprising at least 25 species and quite possibly half again as many. The species are similar and the differences between them subtle, so that the group is taxonomically much more difficult than the rest of *Heteropterys*. Niedenzu's key often does not work, and he seems to have misapplied a number of names for which he did not see the types. Since I cannot revise the group here, I have employed a broad species concept except where segregates are obvious. Unfortunately, my nomenclature differs appreciably from that of Niedenzu and Cuatrecasas. This treatment is offered as a provisional one for Guayana, in anticipation of further changes when the subgenus is revised.

8. *Heteropterys nervosa* Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 26. 1832 [1833].

Heteropterys suberosa Grisebach, Linnaea 13: 229. 1839. Type. *Sieber* (sent by Hoffmannsegg, Willdenow herb. 8845), "pr. Pará" [near Belém], Pará, Brazil (B).

Banisteria mossii Morton, Proc. Biol. Soc. Washington 43: 157. 1930.

Type. *Moss 15*, Pará [Belém], Pará, Brazil (US).

Heteropterys mossii (Morton) Cuatrecasas, Webbia 13(2): 478. 1958.

Woody vine; vegetative stems (but not the inflorescence) moderately to very prominently lenticellate. Lamina of the larger leaves 7–13(–17) cm long, (2–)4–6.5(–8) cm wide, elliptical, ovate, or somewhat obovate, cuneate or rounded at the base, acuminate at the apex, glabrous and shining, sometimes with a submarginal row of small impressed glands below, the lateral veins and fine reticulum usually prominent or prominulous on both sides; petiole (6–)8–13 mm long, sparsely sericeous or glabrate, eglandular; stipules minute, interpetiolar at base of petioles. Inflorescence axillary and terminal, racemose or paniculate, the flowers borne ultimately in a short, crowded pseudoraceme up to 2.5 cm long, with (0–)1–3 pairs of flowers and then a terminal umbel of 4–6 flowers, sericeous to subtomentose, the floriferous bracts and bracteoles 1.5–3 mm long, ovate or elliptical, concave, often spreading, sericeous on both sides, eglandular or with minute marginal glands, the peduncle 2–6 mm long. Pedicel 2–6 mm long. Sepals eglandular or 4 biglandular. Petals glabrous, with the claw 2–2.5 mm long and the limb ca 3 mm long, 2.6 mm wide, entire or denticulate. Filaments 1.5–2.5(–3) mm long, longest opposite the sepals; anthers 0.7–1 mm long, with the connective mostly dark red, yellow at the apex. Styles 1.8–3 mm long, glabrous, straight or divergent, dorsally with a very short hook at the apex ca 0.1 mm long or rarely a prominent hook 0.3 mm long. Samara 22–40 mm long; dorsal wing 17–32 mm long, 9–13(–16) mm wide, the abaxial edge straight or curved upward; nut 4–8 mm long, 2.5–3.5 mm high, cylindroidal.

Type. *St. Hilaire*, western Minas Gerais, Brazil (P).

Distribution. Lowland South America from Guyana west to Amazonian Colombia and south to Rondônia and Minas Gerais, along rivers and in more or less open savannas, often on white sand. Guayana collections seen: GUYANA. Upper Mazaruni River, ca 60°10'W, *De La Cruz* 2098 (GH, MO, NY) & 2221 (GH, NY); Mazaruni Station, *Forest Dept.* 2974; Bartica-Potaro Road, *Forest Dept.* 4176 (NY). VENEZUELA. Amazonas: San Antonio, Río Orinoco, *Ll. Williams* 15040 (US, VEN). COLOMBIA. Vaupés: Guaracapuri Cachoeira, Río Vaupés, E of Mitú, *Allen* 3382 (MICH, NY, US); Bocas del Carurú, *Cuatrecasas* 7047 & 7058 (both US); Río Guainía between Maroa and Victorino, elev 130 m, *Maguire & Wurdack* 35588 (COL, MICH, NY, US); Mitú, *Pérez Arbeláez & Cuatrecasas* 6756 (COL); Raudal Sapo, Río Guainía, Puerto Colombia, elev 240–255 m, *Schultes et al* 18220 (GH, NY, US); Mitú and vicinity, *Zarucchi* 1926, 1982, 2149 (all MICH). Amazonas-Vaupés: Río Apaporis, Soratama, elev 250 m, *Schultes & Cabrera* 13770 (GH, US).

Collected in flower and fruit mostly from July to November.

This is the species that was called *Heteropterys anoptera* by Niedenzu and *H. mossii* by Cuatrecasas. Although I have not seen the type of *H. nervosa*, its

photograph (Field Museum neg. 35591) compares very well with recent collections from south-central Brazil. Niedenzu never saw the St. Hilaire type. The species is rather distinctive, due to its short, crowded, corymbose racemes. The material from north of the Amazon differs from southern specimens in that the vegetative stems usually have much more numerous and prominent lenticels. However, in other respects the plants from north and south are similar. The description given above is based only on the collections cited.

I do not know whether or not *Heteropterys anoptera* Adr. Jussieu is a synonym for *H. nervosa*. The type of *H. anoptera* is a St. Hilaire collection in fruit from Olho d'Agua in Minas Gerais (here designated lectotype). Niedenzu never saw it, nor have I, not even a photograph, and since Jussieu applied the name to plants that I would call *H. nervosa* (eg *Martius* from Serra Frio) and to ones that I would exclude (eg *Claussen* from Minas Gerais) it is clearly best to await study of the type before deciding the status of this name.

The photograph of the type of *Heteropterys suberosa* (Field Museum negative 12799) shows a plant indistinguishable from the northern forms of *H. nervosa* (= *H. mossii*). If the northern, more lenticellate forms were segregated, the correct name would be *H. suberosa*, not *H. mossii*.

9. *Heteropterys murcapiresii* Anderson, sp nov

Fig 39a-e.

Frutex scandens (?). Foliorum lamina 3.5–7.7 cm longa, 1.9–3.2 cm lata, elliptica vel anguste ovata, basi cuneata vel rotundata, apice acuta, obtusa, vel rotundata, coriacea, glabra (adulta), subtus prope marginem aliquot glandulis parvis impressis munita, nervis lateralibus et reticulo supra obscuro vel prominulo subtus prominulo vel $\pm$ prominenti; petiolus 2–5 mm longus, glaber, eglandulosus; stipulae non visae. Inflorescentia racemus vel panícula umbellarum, umbella 4-flora, sericea, bracteis bracteolisque floriferis 1–1.5 mm longis, pedunculo 4–5 mm longo. Pedicellus 4–6 mm longus. Sepala glandulas 2.3 mm superantia, 1.2–1.6 mm lata, apice revoluta, abaxialiter tomentella, adaxialiter glabra, 4 lateralía 7–8 glandulis 1.1–1.4 mm longis munita, anticum eglandulosum. Petala glabra, margine erosa, ungue 2.3–2.7 mm longo, limbo 3.2–3.7 mm longo, 3–3.2 mm lato. Filamenta 2.3–3.5 mm longa, glabra, basi connata, $\pm$ recta vel demum torta; antherae ca 0.8 mm longae, glabrae, connectivo in $\frac{1}{4}$ – $\frac{1}{3}$ proximali atrorubro distaliter luteo. Ovarium 1 mm altum, tomentellum; styli 2.8–3.3 mm longi, glabri, $\pm$ recti, apice a lateribus compresso dorsaliter brevi-uncinato unco 0.1–0.2 mm longo. Fructus ignotus.

Type. *Pires, Cavalcante, Magnago & Silva 14456*, Campo e caatinga de *Barcella*, Rio Anauá, Terr. Roraima, Brazil, 30 Apr 1974 flr (holotype RB, isotypes MG, MICH).

Paratype. *Pires et al 14446*, Rio Anauá, Terr. Roraima, Brazil, 30 Apr 1974 flr (IAN, NY).

Heteropterys murcapiresii is notable for its small, glabrous, coriaceous leaves and the small bracts and bracteoles. It bears a superficial resemblance to some forms of *H. oblongifolia* from the Alto Orinoco area, but is readily distinguished by its inflorescence terminating in 4-flowered umbels. The species is named for João Murça Pires, one of the foremost botanists of Amazonian Brazil.

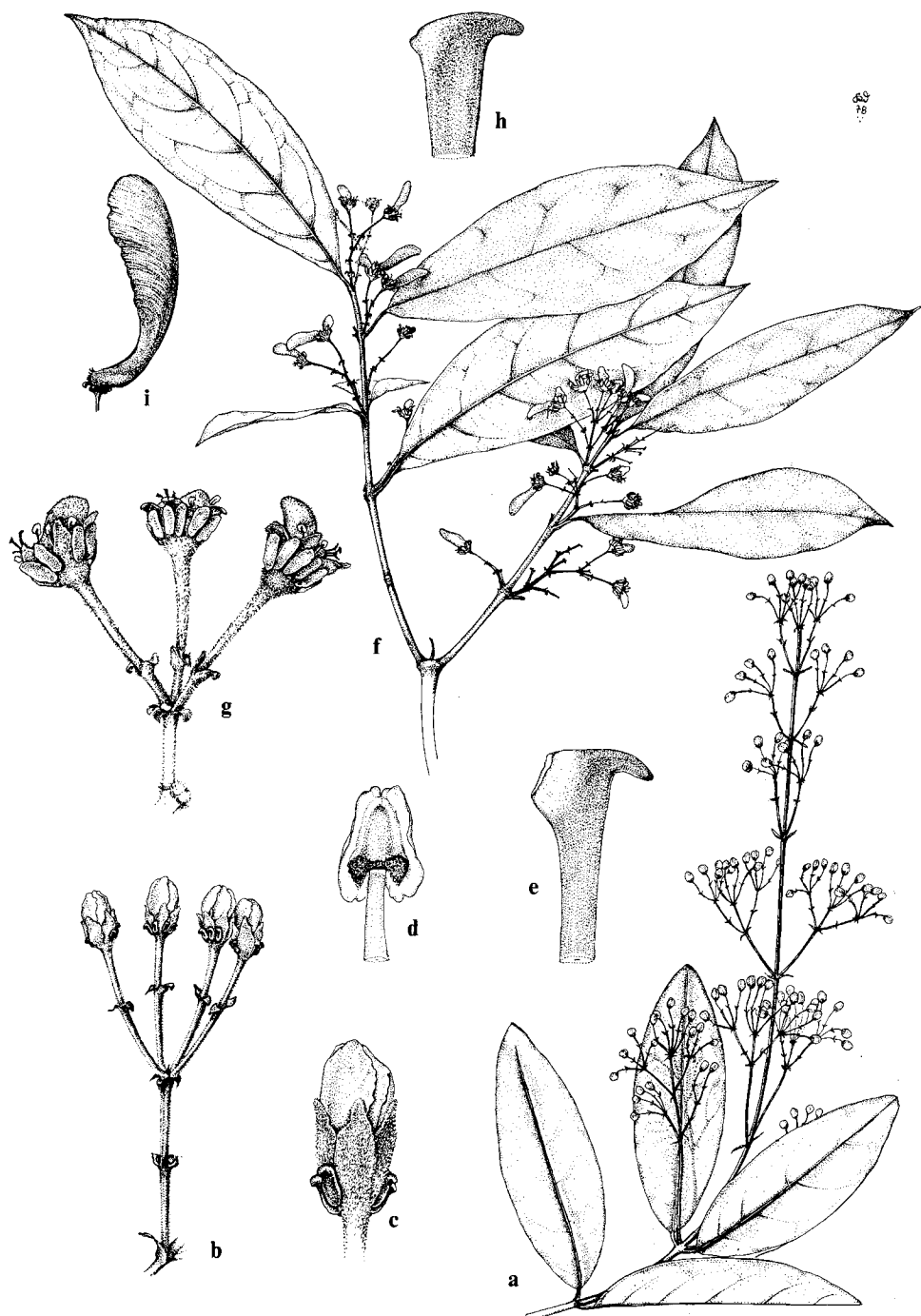


Fig 39. *Heteropterys murcapiresii* and *H. oligantha*. a-e, *H. murcapiresii*: a) Flowering branch, $\times 0.5$; b) umbel, $\times 1.5$; c) flower bud about to open, $\times 5$; d) anther, abaxial view, $\times 15$; e) apex of style, $\times 30$. f-i, *H. oligantha*: f) Branch, $\times 0.5$; g) umbel, $\times 2.5$; h) apex of style, $\times 30$; i) samara, $\times 0.5$. Drawn by Karin Douthit, a-e from Pires 14456, f-h from Forest Dept. 3769, i from Forest Dept. 3865.

10. *Heteropterys siderosa* Cuatrecasas, Webbia 13(2): 476. 1958.

Woody liana; stems sericeous, lenticellate. Lamina of the larger leaves 11–21 cm long, 4.5–9 cm wide, elliptical or slightly obovate, cuneate to rounded at the base, acuminate to rounded at the apex, glabrous and shining above, sparsely sericeous below with short, appressed hairs, to glabrate, with a submarginal row of small impressed glands, the coarser veins more prominent below than above, the finest reticulum sometimes visible above; petiole 7–15 mm long, sericeous to glabrate, eglandular; stipules not seen. Inflorescence a branched panicle 10–30 cm long, with flowers borne ultimately in umbels of 4–6(–8), subtomentose, lenticellate on the main axis, the bracts 1–2 mm long, reflexed; peduncle 2.5–4 mm long; bracteoles 1–2 mm long, revolute or reflexed, eglandular or with 1–2 tiny basal marginal glands. Pedicel 2–5 mm long. Sepals eglandular or 4 biglandular. Petals glabrous, with the claw 1.7–2.5 mm long, the limb 2.5–3.2 mm long and wide, entire or slightly erose. Filaments 1.5–2.7 mm long; anthers 0.9–1.3 mm long, the connective dark red, yellow at the apex. Styles 2–2.5 mm long, glabrous, straight or slightly bowed, dorsally truncate at the apex or with a short, blunt hook up to 0.1 mm long. Samara 45–50 mm long, borne nearly horizontally; dorsal wing 38–42 mm long, 12–17 mm wide, the abaxial edge straight or recurving slightly before bending upward; nut 7–8 mm long, 3–5 mm high, with a narrow extension of the wing along the upper edge.

Type. *Schultes 5646*, upper Apaporis basin, confluence of Ajaju and Macaya (Puerto Hevea), Vaupés, Colombia, Jul flr (holotype US! isotypes GH! US!).

Distribution. Amazonian Venezuela and Colombia. VENEZUELA. Amazonas: Río Cunucunuma above Culebra Rapids, elev 200 m, Dec flr, *Maguire et al 30395* (MICH, NY, US, VEN); lowland and slope forests, cerro de la Neblina, Río Yatua, elev 140–1700 m, Jan flr, *Maguire et al 37387* (MICH, NY, US, VEN); Caño Tama-Tama, just above Tama-Tama, Río Orinoco, elev 125–150 m, Jun flr, *Wurdack & Adderley 43157* (MICH, NY, US, VEN). COLOMBIA. Vaupés: Type, q v; Río Paraná-pichuna, Mitú and vicinity, Jun frt, *Zarucchi 1327* (MICH); stream near base of Cerro de Mitú, Jun flr/frt, *Zarucchi & Balick 1766* (MICH).

11. *Heteropterys oligantha* Anderson, sp nov

Fig 39f–i.

Liana lignosa, ramis sericeis mox glabratis. Foliorum majorum lamina 8–11.6 cm longa, 3–4.1 cm lata, elliptica, basi cuneata, apice acuminata, supra glabrata vel in costa sparsim sericea, subtus glaucescens et sparsim sed pertinaciter sericea et aliquot glandulis impressis inter marginem et costam munita, nervis majoribus subtus prominentibus, reticulo supra prominulo; petiolus 4–8 mm longus, sericeus vel demum glabratus, eglandulosus; stipulae non visae. Inflorescentia panicula axillaris 1.5–3 cm longa, floribus in umbella 4-flora interdum 2 floribus proximilibus adjectis, sericea, bracteis bracteolisque 1–1.3 mm longis, revolutis, deciduis vel persistentibus, pedunculo 1.5–3 mm longo (–4 mm in fructu). Pedicellus 6–8 mm longus (–10 mm in fructu), sericeus, apice tumidus. Sepala apice revoluta, in paratypo eglandulosa, in holotypo 4 lateralia 8 glandulis 1.6–1.9 mm longis munita, abaxialiter sericea adaxialiter glabra. Petala ignota. Filamenta 1.6–2.4 mm longa, glabra, basi connata; antherae 0.8–1 mm longae, glabrae. Styli ca 2.7 mm longi, glabrae, $\pm$ recti, apice dorsaliter uncinato unco 0.1–0.2 mm longo. Samara 45–55 mm longa, sericea praecipue in nuce, falciformis, nuce $\pm$ horizon-

tali, ala $\pm$ erecta; ala dorsalis 40–50 mm longa, 13–17 mm lata, margine abaxiali valde sursum curvato; nux 10–12 mm longa, 5–6 mm alta, a lateribus compressa.

Type. *Forest Department of British Guiana 3769*, 1½" diam rope from crown of *Licania* in Kakaralli-Clump Wallaba forest, Mahdia R. Potaro R. 107 miles Bartica-Potaro Road, Guyana, 16 Jan 1943 young frt (holotype NY).

Distribution. Known only from the type and the following paratype. GUYANA. Kakaralli-Clump Wallaba forest, Eagle Mt., Jan frt, *Forest Dept. 3865* (NY).

This species is named for the short, few-flowered axillary inflorescence, with the flowers ultimately borne in umbels of four, sometimes subtended by an additional pair. It is also notable for the long, falcate samaras, the small, revolute bracts and bracteoles, and the glaucescence of the undersurface of the leaves.

12. *Heteropterys cuatrecasii* Anderson, sp nov

Fig 40.

Frutex scandens, ramis sericeis pilis atrobrunneis demum canescentibus. Foliorum majorum lamina 4–9 cm longa, 2–4 cm lata, ovata vel elliptica, basi cuneata vel rotundata, apice acuminata, coriacea, supra laxe sericea saepe mox glabrescens, subtus pertinaciter tomentoso-sericea vel demum glabrescens, eglandulosa vel subtus margine aliquot glandulis minimis impressis munita, nervis lateralibus supra invisibilibus subtus prominulis; petiolus 5–9 mm longus, sericeus, eglandulosus; stipulae non visae. Inflorescentia panicula axillaris et terminalis brevis et conferta, tomentoso-sericea pilis atrobrunneis vel demum canescentibus, floribus in umbellis vel corymbis 4–6(–8)-floris, bracteis 2–3 mm longis, eglandulosis, pedunculo 2–5 mm longo, bracteolis 1.5–2.5 mm longis, ellipticis, appressis, eglandulosis. Pedicellus 3–5 mm longus, tomentoso-sericeus. Sepala 4 lateralia 8 glandulas 1–1.6 mm longas circulares vel ellipticas virides 2.4–2.9 mm superantia, 1.7–2 mm lata, triangularia, apice revoluta, abaxialiter omnino tomentosa pilis atrobrunneis, adaxialiter glabra, anticum eglandulosum vel raro 1 glandula parva munitum. Petala lutea, margine et abaxialiter paucipilifera vel demum glabrata, ungue 2–2.4 mm longo, limbo 2.3–2.8 mm longo latoque, margine eroso vel denticulato. Filamenta 2.4–3 mm longa, usque $\frac{1}{3}$ connata, glabra, recta vel paulo curvata; antherae 0.8–1.1 mm longae, glabrae, connectivo omnino nigro. Ovarium 1.5 mm altum, sericeum; styli 1.8–2 mm longi, basi sericei, recti, erecti vel divergentes, apice truncati. Samara 21–33 mm longa, $\pm$ pertinaciter tomentoso-sericea; ala dorsalis 15–26 mm longa, 9–16 mm lata, margine abaxiali recto vel leviter sursum curvato; nux 5–8 mm longa, 4–6 mm alta; torus ca 2 mm altus.

Type. *Cowan & Wurdack 31339*, frequent in higher sabanitas, cumbre, Cerro Parú, along west rim S from camp caño, Amazonas, Venezuela, elev 2000 m, 7 Feb 1951 frt (holotype MICH, isotypes NY, US, VEN).

Distribution. Known only from the Serranía Parú and nearby Cerro Huachamacari. Paratypes: VENEZUELA. Amazonas: Laguna Asisa, cerro Asisa (La Momia), Serranía Parú, 4°14'N, 65°56'W, elev 1310 m, May bud, *Hoyos & Morillo 38* (VEN); dense woodland along right fork of Caño de Dois, Cerro Huachamacari, elev 1800 m, Dec flr, *Maguire et al 30196* (NY, VEN); northernmost sabanita before high point, cumbre, Cerro Parú, elev 2000 m, Feb frt, *Cowan & Wurdack 31228* (NY, VEN).

Heteropterys cuatrecasii is named in honor of Dr. José Cuatrecasas, whose excellent treatment of the Malpighiaceae of Colombia has been extremely helpful in the preparation of this paper. It is notable for the small, acuminate leaves,

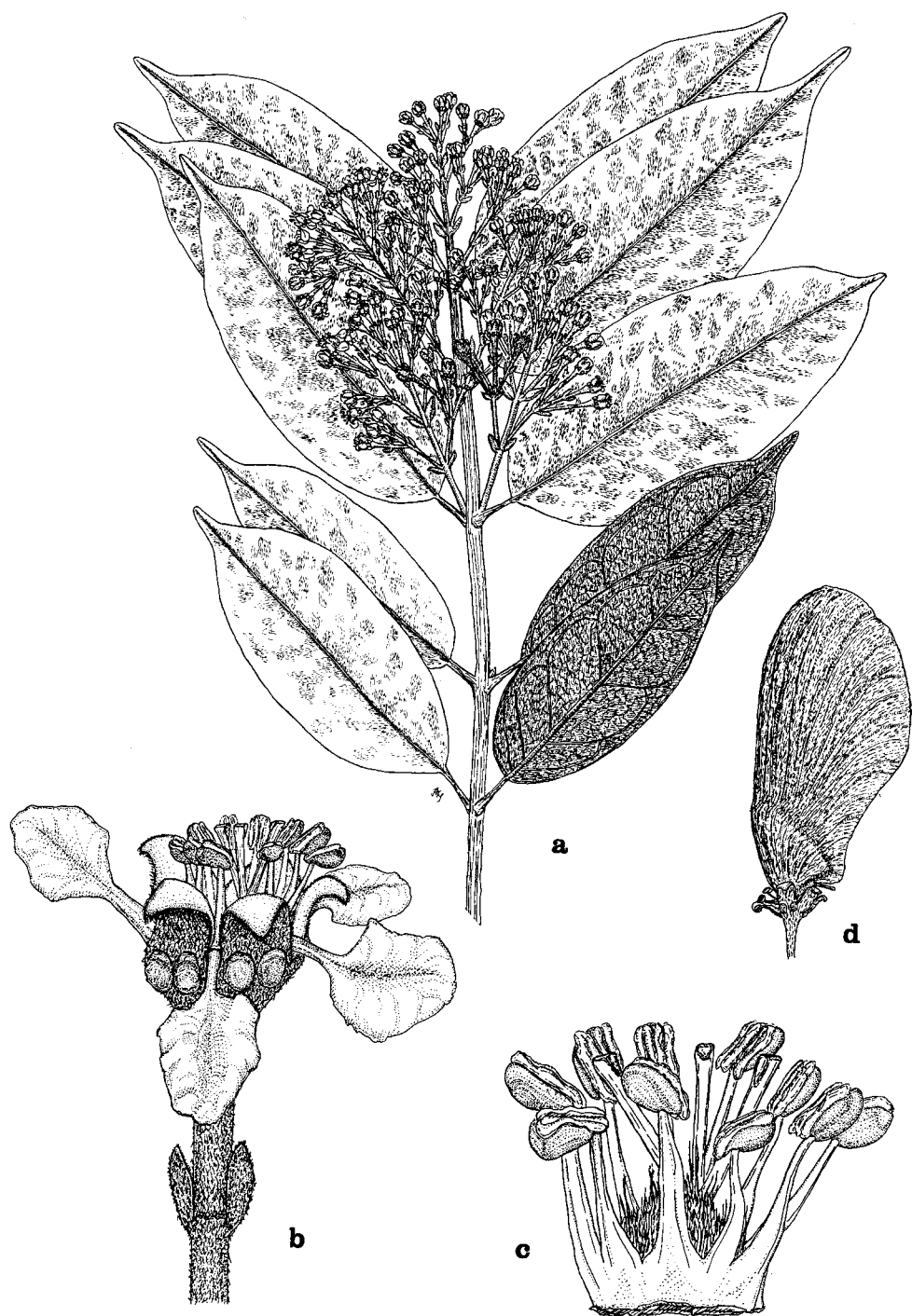


Fig 40. *Heteropterys cuatrecasii*. a) Flowering branch, $\times 0.7$; b) flower, posterior petal to left, $\times 4.7$; c) androecium and gynoecium, central stamen opposite posterior petal, central style opposite anterior sepal, $\times 10$; d) samara, $\times 1.3$. Drawn by Annette Seidenschnur Mahler, a-c from Maguire et al 30196, d from Cowan & Wurdack 31339.

which are persistently tomentose-sericeous below and have the veins not visible above, the short crowded inflorescence, the elliptical appressed bracteoles, the roundish green calyx glands, the small petals with sparse, deciduous hairs on the margin and abaxial surface, the truncate styles, and the small samaras.

13. *Heteropterys dichromocalyx* Anderson, sp nov

Fig 41a–f.

Liana lignosa, ramis sericeis. Foliorum majorum lamina 11–12 cm longa, 5–7 cm lata, elliptica, basi cuneata vel rotundata, apice acuminata, supra mox glabrata nitidaque, subtus $\pm$ pertinaciter sericea pilis 0.15–0.3 mm longis, sessilibus, rectis, appressis, aliquot glandulis parvis, impressis, marginalibus vel submarginalibus in dimidio distali munita, reticulo utrinque prominulo; petiolus 8–10 mm longus, sericeus, eglandulosus; stipulae minutae, interpetiolares, prope basim petioli portatae. Inflorescentia panícula brevis axillaris et terminalis, sericea, floribus in umbellis 3–6-floris, bracteis 1.5–2.5 mm longis, eglandulosis, pedunculo 2–4 mm longo, bracteolis 1.5–2 mm longis, ascendentibus, eglandulosis. Pedicellus 4.5–6 mm longus, sericeus. Sepala 4 lateralía 8 glandulas 1.2–1.5 mm longas, circulares vel ellipticas, virides 2.5–3 mm superantia, ca 2 mm lata, triangularia, apice revoluta, abaxialiter sericea pilis proximalibus ferrugineis distalibus albis, adaxialiter sparsim pilosa, anticum eglandulosum. Petala lutea, abaxialiter pertinaciter sericea, margine eroso vel subintegro, 4 lateralía ungue 2.5–2.7 mm longo, limbo 2.7–3 mm longo, 2.2–2.7 mm lato; petalum posticum ungue 2.2 mm longo, limbo 2.7 mm longo, 2.3 mm lato. Filamenta 2.6–3.4 mm longa, usque $\frac{1}{3}$ connata, glabra, recta vel paulo curvata; antherae 0.7–0.9 mm longae, glabrae, reflexae, connectivo atrorubro apice luteo. Ovarium ca 1.2 mm altum, sericeum, carpellis lateribus laevibus; styli 2.7–3 mm longi, in dimidio proximali sericei, recti vel leviter curvati, erecti vel divergentes, apice truncati vel dorsaliter rotundati. Fructus ignotus.

Type. *Silva & Brazão 60610*, high forest from Igarapé Anta up slopes to Pico da Neblina, elev 1350–2000 m, Amazonas, Brazil, 14 Dec 1965 flr (holotype MG, isotypes MICH, NY, US).

Known only from the type. This species is named for the hairs of the sepals, which are proximally brown and distally white. It is similar in many respects to *H. cuatrecasii*, and it is that similarity, in addition to the revolute sepals and carpels without lateral crests, that makes me confident that this is a *Heteropterys* even without seeing fruits. In addition to these features, *H. dichromocalyx* is notable for the leaves shiny above and thinly sericeous below with tiny marginal or submarginal glands, the inflorescence terminating in umbels, and the small sericeous petals.

14. *Heteropterys multiflora* (de Candolle) Hochreutiner, Bull. New York Bot. Gard. 6: 277. 1910.

Malpighia reticulata Poirlet in Lamarck, Encycl. Méth. Bot. Suppl. 4: 8. 1816. Type. *Martin*, Cayenne (P).

Byrsonima reticulata (Poirlet) de Candolle, Prodr. 1: 581. 1824.

Banisteria multiflora de Candolle, Prodr. 1: 589. 1824.

Heteropterys reticulata (Poirlet) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 2: 54. 1903, non *H. reticulata* Grisebach.

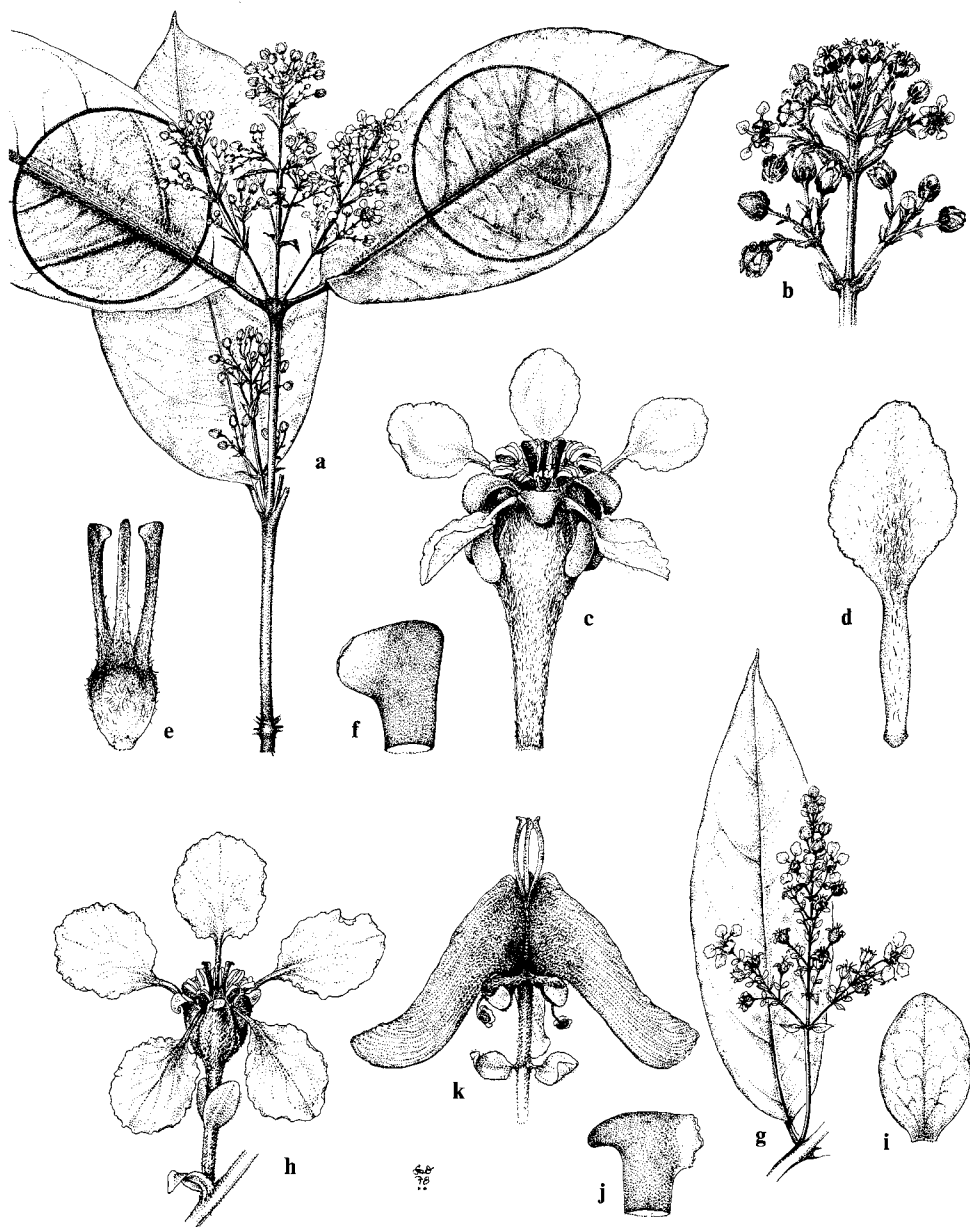


Fig 41. *Heteropterys dichromocalyx* and *H. catoptera*. a-f, *H. dichromocalyx*: a) Flowering branch, $\times 0.5$, the circles $\times 1.5$; b) portion of inflorescence, $\times 1$; c) flower, $\times 5$; d) petal, abaxial side, $\times 10$; e) gynoecium, $\times 7.5$; f) style apex, $\times 25$. g-k, *H. catoptera*: g) Leaf and axillary panicle, $\times 0.5$; h) flower, $\times 2.8$; i) bracteole, $\times 7.5$; j) style apex, $\times 25$; k) immature fruit, $\times 2.5$. Drawn from the types by Karin Douthitt.

Woody liana; stems sericeous, soon glabrate. Lamina of the largest leaves 23–29 cm long, 9.5–12.5 cm wide, often smaller near the inflorescence, ovate or elliptical to obovate, rounded at the base, abruptly acuminate at the apex with the acumen 1–2 cm long, glabrous above, thinly but $\pm$ persistently sericeous below with short, appressed hairs, to eventually glabrate, with a submarginal row of small impressed glands, the coarse veins prominent below, the finest reticulum prominent above; petiole 7–14 mm long, thinly sericeous to glabrate, eglandular; stipules not seen. Inflorescence a terminal and axillary panicle, with flowers borne ultimately in pseudoracemes 6–20 cm long, sericeous to glabrate, the bracts 5–8 mm long, 3–6 mm wide, loosely sericeous on both sides, usually with small marginal glands, often deciduous, the peduncle (2–)4–6 mm long, the bracteoles 4–5 mm long, 3–4 mm wide. Pedicel 5–8 mm long. Calyx bearing 8 elliptical glands 2.5–3.5 mm long on the 4 lateral sepals, the anterior eglandular. Petals glabrous, the lateral 4 reflexed, with the claw 3–4 mm long, the limb (4–)4.5–6.5 mm long, 4.2–5.5 mm wide, dentate; posterior petal erect, the claw slightly longer, the limb smaller. Filaments 3–4.8 mm long; anthers ca 1 mm long, glabrous or with a small tuft of hairs at the apex of each locule, the connective globose, dark red with a narrow yellow band over the apex. Styles 3.8–4.5 mm long, glabrous or sericeous on the proximal half, straight or eventually bent, the apex triangular and extended dorsally into a hook 0.3–0.6 mm long. Samara 35–50 mm long, borne $\pm$ horizontally, finely sericeous; dorsal wing 20–25 mm long, 27–37 mm wide, flabellate to semicircular, the abaxial edge somewhat to strongly recurved; nut flattened, trapezoidal, 17–25 mm in diameter.

Type. Cayenne (G).

Distribution. Riverine forests in lowland northeastern South America; also reported to occur in Colombia and Jamaica. VENEZUELA. Amacuro: Río Cu-yubini, elev 90 m, Nov flr, *Steyermark 87498* (MICH). GUYANA. Essequibo River, Jan flr, *Atkinson 84* (MICH); Kaieteur Falls, Potaro River, Oct–Nov flr, *De La Cruz 4491* (MO, NY); Kamuni Creek, Groete Creek, Essequibo River, frt, *Fanshawe 531* (NY). BRAZIL. Pará: Belém-Mosqueiro, Mar flr, *N. T. Silva 59708* (MICH).

15. *Heteropterys riparia* Cuatrecasas, *Webbia* 13(2): 483. 1958.

Woody vine; stems sericeous, soon glabrate and developing many prominent lenticels. Lamina of the larger leaves 17–30 cm long, 7–12 cm wide, ovate or elliptical, broadly cuneate to rounded at the base, acuminate at the apex, quite glabrous (mature) or bearing a few tiny appressed hairs below on the midrib, with a submarginal row of rather few small impressed glands, the reticulum visible but not or only slightly raised above; petiole 9–13 mm long, glabrous or with a few appressed hairs, eglandular; stipules not seen. Inflorescence a panicle, with the flowers borne in pseudoracemes (2–)3–13 cm long, tomentose-sericeous, the bracts and bracteoles 2–3 mm long, 1.5–2 mm wide, the peduncle 1–2.5 mm long. Pedicel 2.5–3.5 mm long. Calyx eglandular or bearing 8 glands 1.6–1.8 mm long on the 4 lateral sepals. Petals glabrous, erose, the lateral 4 with the claw 2.5–3.5 mm long, the limb 3–4.6 mm long, 2.8–4.2 mm wide; posterior petal with the claw 2.5–3.5 mm long, the limb 2.7–3.6 mm long, 2.8–3 mm wide, the veins

sometimes dark red. Filaments 2–2.9 mm long; anthers 0.8–1.4 mm long, glabrous, the connective dark red. Styles 2.5–3.1 mm long, basally sericeous, straight or bent, the apex dorsally with a very short to moderately long hook 0.05–0.2 mm long. Samara 50–60 mm long, borne $\pm$ erect; dorsal wing 22–27 mm wide, flabellate, the abaxial edge bent upward; nut 15 mm long, 7–9 mm high.

Type. *Schultes & Cabrera 16591 p p*, Jinogojé, Río Apaporis, Amazonas-Vaupés, Colombia, Jun flr (holotype US!).

Illustration. Schultes 1975, p 125.

Distribution. Along rivers in Amazonian Colombia and Peru. COLOMBIA. Meta: Llanos Orientales entre Cumaral y Restrepo, Jan frt, *García-Barriga 4942* (COL). Amazonas-Vaupés, Río Apaporis: Jirijirimo, Jun frt, *Schultes & Cabrera 12428* (GH, US); Soratama, Jun flr, *Schultes & Cabrera 12654* (US); Jinogojé, Jun flr, type q v & *Schultes & Cabrera 16665* (NY, US). Putumayo: Puerto Ospina, Jul frt, *Schultes 4029* (US). PERU. Loreto: Prov. Maynas, Río Ampiyacu, Pebas and vicinity, between Estirón and Tierra Firme, “tree 6 m tall,” Apr flr, *Plowman et al 6998* (MICH).

The *Heteropterys oblongifolia* complex

Heteropterys oblongifolia sensu lato is restricted to the low savannas of the Alto Orinoco and south to the Río Pacimoni. There are two morphological entities, which I am treating here as two species, *H. oblongifolia* and *H. atabapensis*. Superimposed on that pattern of variation is another which confuses the picture. In both of the species recognized here one encounters parallel ranges in size of plant and width of leaves, from very short plants with narrow leaves to large plants with broad leaves. I am interpreting this variation as phenotypic plasticity and giving it no taxonomic importance, for two reasons: 1) the variation is continuous, and 2) all sizes can be collected in the same place (eg *Wurdack & Adderley 42776 & 42778*). There remains the question of whether recognition of two species is justifiable. The two are sufficiently different that most plants are easily assigned to one or the other, and so far they have not been collected in the same place (see Fig 42). However, they are certainly closely related, and more intensive collection of the savannas of southern Amazonas may reveal intermediate forms that will make the recognition of two taxa impossible.

16. *Heteropterys oblongifolia* Gleason, Bull. Torrey Bot. Club 58: 377. 1931.

Fig 43h.

Shrublets, shrubs, or small trees 20 cm to 4 m tall, the vegetative internodes nearly or quite glabrous. Leaves opposite, alternate, or borne in whorls of 3 or 4, ascending; lamina of the larger leaves 6–12(–13.6) cm long, 1–5(–5.6) cm wide, narrowly to broadly elliptical or somewhat ovate or obovate, cuneate or rounded at the base, moderately to strongly revolute at the margin, obtuse, rounded, or retuse at the apex (or acute in the narrowest forms), sparsely sericeous and soon glabrate, mostly with a submarginal row of impressed glands below, papillose below (due to protruding starch grains in guard cells) and often glaucous, the fine reticulum much more prominent above than below; petiole 0–5 mm long, glabrate, eglandular; stipules not seen. Inflorescence a panicle with the flowers borne in

pseudoracemes, sericeous with dark brown hairs, the bracts (0.5–)1–2.5 mm long, usually eglandular, the peduncle 1.5–5(–6) mm long, the bracteoles 0.5–1.5 mm long, eglandular. Pedicel 5–10 mm long. Calyx bearing 8 glands 1.3–2.5 mm long on the 4 lateral sepals, the anterior sepal eglandular or occasionally bearing 1–2 small glands. Petals glabrous, the claw 2–3.5 mm long, the limb 3–5 mm long, 3–5.7 mm wide, erose. Filaments 1.5–2.5(–3.4) mm long; anthers 0.6–0.8 mm long, glabrous, the connective dark red in the center, yellow distally and laterally. Styles 2–2.5 mm long, glabrous or basally sericeous, straight, the apex dorsally rounded or truncate or with a very short, blunt hook up to 0.1 mm long. Samara 20–27 mm long, borne ascending to erect; dorsal wing 10–11 mm wide, the abaxial edge straight or curving upward; nut 5–6 mm long, 4 mm high.

Type. *Tate 297*, Grand Savanna, Esmeralda, Amazonas, Venezuela (holotype NY!).

Distribution (Fig 42). Savannas of the Alto Orinoco south to the Río Pacimoni. VENEZUELA. Amazonas: Pie del Duida, *Fariñas et al 499* (VEN); Cerro Yapacana, NW slopes, elev 800–1000 m, *Maguire et al 30522* (NY, VEN); Cerro Yapacana, NW base, elev 130 m, *Maguire et al 30535* (NY), *30551* (NY, VEN), *30803* (NY), *34550* (NY, VEN); Sabana Grande, between Esmeralda and base of Cerro Duida, elev 175 m, *Maguire & Wurdack 34698* (MICH, NY, US, VEN); Victorino, Río Guainía, elev 135 m, *Maguire & Wurdack 35701* (MICH, NY, US, VEN); NW base of Cerro Yapacana, *Maguire et al 36579* (NY, VEN); 50 km above mouth of Río Pacimoni, elev 100–140 m, *Maguire et al 36665* (MICH, NY, VEN), *36678A* (MICH, NY, US, VEN), *37557* (MICH, NY, US, VEN), *37585* (NY, VEN); Sabana Hechimoni, Río Siapa, elev 100–130 m, *Maguire et al 37616* (MICH, NY, US, VEN); Esmeralda Savanna, elev 200 m, *Steyermark 57841* (NY), *Tate 288* (NY) & type q v; San Antonio, Río Orinoco, elev 121 m, *Ll. Williams 15049* (US, VEN).

Collected in flower and fruit mostly from November to April.

17. *Heteropterys atabapensis* Anderson, sp nov

Fig 43a–g.

Frutex 10 cm–4 m altus, ramis vegetativis minute sericeis vel demum glabrat. Folia opposita, alterna, vel verticillata; lamina foliorum majorum 3.5–10(–12) cm longa, (0.5–)1–6.5 cm lata, ovata vel elliptica vel raro linearis, basi cuneata, rotundata, vel cordata, $\pm$ plana, apice obtusa vel rotundata, primo sericea permox glabrata, plerumque subtus aliquot glandulis impressis submarginalibus munita, epidermide abaxiali non vel tantum obscure papillosa et non glaucescenti, reticulo grosso utrinque aequaliter prominenti vel valdius subtus; petiolus 0–2 mm longus, sericeus vel glabratus, eglandulosus; stipulae non visae. Inflorescentia panicula floribus in pseudoracemis, sericea pilis atrobrunneis, bracteis (0.5–)1–2.5 mm longis, eglandulosis, pedunculo (0–)1–6 mm longo, bracteolis 0.5–1.5 mm longis, plerumque eglandulosus. Pedicellus 5–14 mm longus. Flores ut in *H. oblongifolia*, praeter glandulas calicinales saepe minora et petala limbo saepe paulo majore. Samara 10–23 mm longa, portata ascendens vel erecta; ala dorsalis 5–10 mm lata, margine abaxiali recto vel sursum curvato; nux 3–7 mm longa, 3–5 mm alta.

Type. *Wurdack & Adderley 42778*, Río Atabapo 20 km above San Fernando de Atabapo, savanna on right bank of Caño Cumaré, Amazonas, Venezuela, elev 125–140 m, Jun flr (holotype NY).

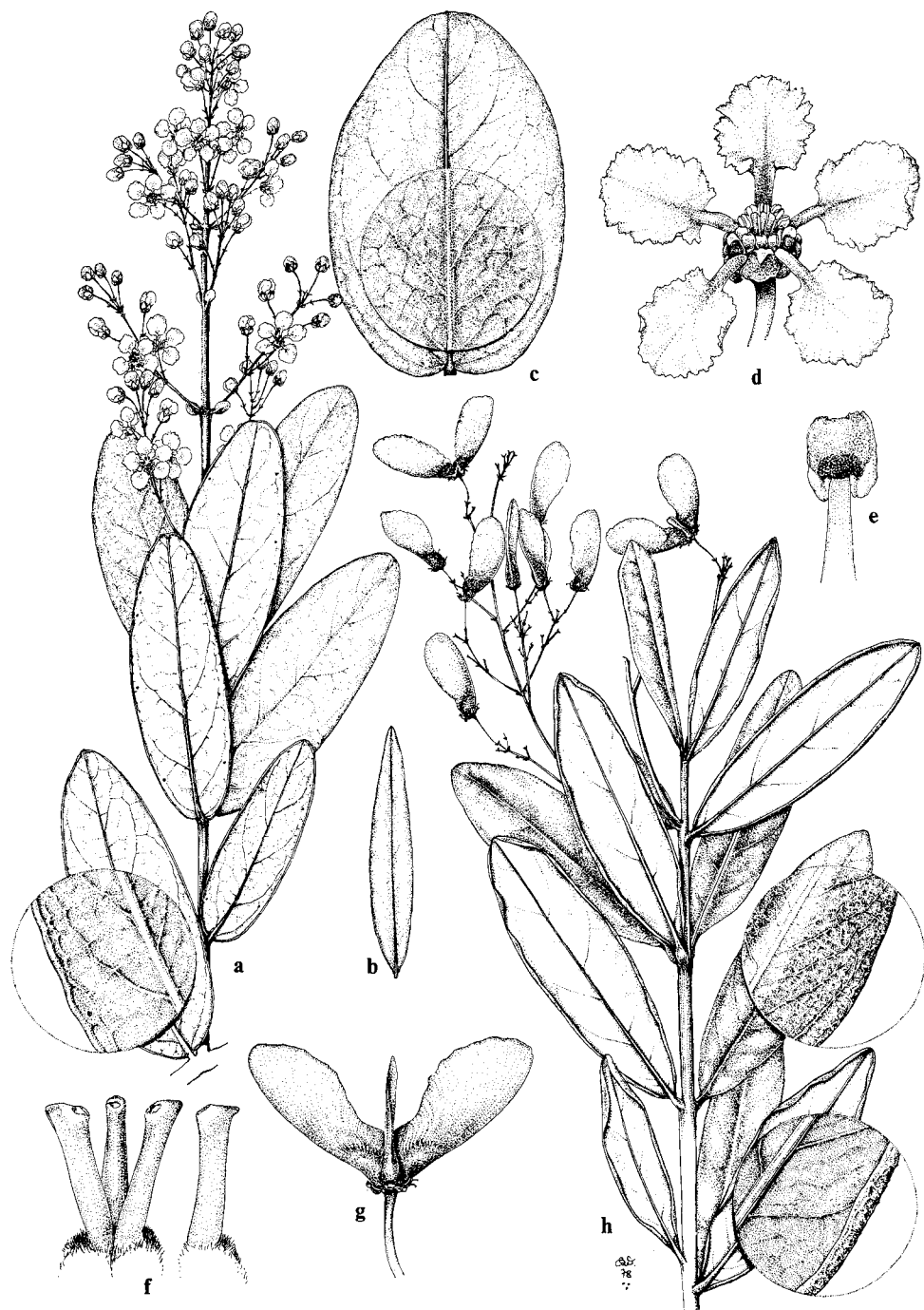


Fig 43. *Heteropterys atabapensis* and *H. oblongifolia*. a–g, *H. atabapensis*: a) Flowering branch, $\times 0.5$; b & c) leaves from other collections, $\times 0.5$; d) flower, $\times 2.5$; e) anther, abaxial view, $\times 12.5$; f) gynoeceum and side view of style, $\times 7.5$; g) fruit, $\times 1$. h, *H. oblongifolia*, fruiting branch, $\times 0.5$. Drawn by Karin Douthit, a from Wurdack & Adderley 42778, b from Maguire *et al* 36282, c & g from Maguire & Wurdack 35575, d–f from Wurdack & Adderley 43765, h from Maguire *et al* 37585.

Distribution (Fig 42). Savannas from the upper Río Guainía north along the Ríos Atabapo and Orinoco to the Río Sipapo, at elevations of 125 to 200 m. VENEZUELA. Amazonas: Santa Cruz, Río Atabapo cerca de la desembocadura del Río Atacaví, Sep flr, *Foldats* 3797 (NY, VEN); Base Camp, Cerro Sipapo, Dec flr, *Maguire & Politi* 27986 (MICH, NY, VEN), Feb frt, 28822 (NY); Río Guainía, Sabana El Venado, Apr flr/frt, *Maguire & Wurdack* 35569 (NY), 35575 (NY); 1 km E of Maroa, "vining," Apr frt, *Steyermark & Bunting* 102805 (NY, VEN); Río Orinoco 8 km below mouth of Río Atabapo, May flr/frt, *Wurdack & Adderley* 42685 (NY, VEN); Caño Cumaré, Río Atabapo 20 km above San Fernando de Atabapo, Jun flr, *Wurdack & Adderley* 42776 (NY) & type q v and Aug flr, 43765 (NY, VEN); Sabana Manacal, Río Atabapo 15 km above Guarinumo, Jun frt, *Wurdack & Adderley* 42971 (NY, VEN). COLOMBIA. Vaupés: 1 km W of Cacagual (Piedra Cacaguati), Río Atabapo, Nov flr, *Maguire et al* 36282 (COL, MICH, NY), Sep flr, 41441 (NY).

18. *Heteropterys orinocensis* (Humboldt, Bonpland & Kunth) Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 276. 1840.

Banisteria orinocensis Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 162 (4° ed.). 1821 [1822].

Heteropterys acutifolia Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 276. 1840. Type. Northern Brazil (P, Field Mus. neg. 35576).

Heteropterys helicina Grisebach in Martius, Fl. Bras. 12: 67, tab. 12. 1858. Type. *Spruce* 247, Nov 1849–Mar 1850, in vicinibus Santarém, Pará, Brazil (isotypes E! GH! NY!).

Woody vine; vegetative internodes thinly sericeous to glabrate, dark purplish, lenticellate. Lamina of the largest leaves (9–)11–18 cm long, 3.5–7 cm wide, 2–3.5 times as long as wide, ovate or rarely elliptical, rounded at the base, obtuse, acute, or acuminate at the apex, nearly or quite glabrous above, thinly sericeous to glabrate below, eglandular or with a few impressed submarginal glands below, the fine reticulum often whitish and usually prominent on both sides; petiole sericeous or often glabrate, eglandular or often biglandular near the apex; stipules not seen. Inflorescence a panicle, the flowers borne in pseudoracemes 3–12 cm long, sericeous to glabrate, the bracts 2–3 mm long, usually eglandular, the peduncle 1–5(–8) mm long, the bracteoles 1.5–2.5 mm long, usually bearing 2 abaxial glands. Pedicel 4–9 mm long. Calyx bearing 8 elliptical glands 1.8–2.5 mm long on the 4 lateral sepals, the anterior sepal eglandular or rarely bearing 2 small glands. Petals glabrous, erose, the lateral 4 with the claw 2.5–3.5 mm long, the limb 4–6.5 mm long and wide; posterior petal similar, the claw slightly longer, the limb slightly smaller. Filaments 2–3.6 mm long, strongly unequal in same flower; anthers 0.8–1 mm long, glabrous, the connective dark red. Styles 2.5–3.5 mm long, the apex truncate or extended dorsally into a hook up to 0.2 mm long. Samara (16–)19–23 mm long, borne horizontally; dorsal wing (8–)11–13 mm wide, usually $\pm$ flabellate, the abaxial edge usually slightly to strongly recurved, rarely straight; nut 6–9 mm long, 5–6 mm high.

Type. *Humboldt & Bonpland*, Río Orinoco near San Borja, Amazonas, Venezuela (P).

Distribution. Common along rivers throughout Amazonia and north to the middle Orinoco, at elevations of 80–125 m. Guayana collections studied: VENEZUELA. Bolívar: Río Pargueni, *Wurdack & Monachino* 39785 (NY, VEN); Río

Orinoco between mouth of Río Pargueni and mouth of Río Horeda, *Wurdack & Monachino* 39881 (MICH, NY, VEN); island in Río Orinoco between Puerto Paez and Orupe, *Wurdack & Monachino* 39968 (NY). Amazonas: Sipapo R. near confluence with Orinoco, *Breteler* 4828 (VEN, WAG); mouth of Río Parú, *Cowan & Wurdack* 31561 (MICH, NY, VEN); San Antonio, Río Orinoco, *Curran* 188 (MICH, NY); Río Negro near Cerro Cucuy, *Maguire & Wurdack* 34939 (MICH, NY, VEN); arriba de la boca del Río Cuao, *Morillo & Ishikawa* 3538 & 3541 (both VEN); Río Negro, cerca de la frontera colombo-venezolano-brasilera, *Morillo et al* 4120 (MICH); Río Sanariapo, *Ll. Williams* 15948 & 15948a (both US); between San Fernando de Atabapo and Río Orinoco, *Wurdack & Adderley* 42677 (NY); Río Orinoco between Minicio and mouth of Río Atabapo, *Wurdack & Adderley* 43719 (MICH, NY, US, VEN). BRAZIL. Amazonas: mouth of Rio Xie, upper Rio Negro basin, *Schultes & Lopez* 9208 (GH, IAN, US). COLOMBIA. Vaupés: Río Guaviare al otro lado de San Fernando, Venezuela, *Araque Molina & Barkley* 18Va212 (US).

Collected in flower and fruit in diverse months.

Heteropterys acutifolia is placed in synonymy under this species on the basis of the cited photograph of the type, which shows leaves and fruits of the shape characteristic for the species. The description in the protologue fits the plant in the picture, not only as to leaf shape, but also as to details such as the absence of petals and the shape of the young fruits, so that I am fairly sure it really is the type. The label distributed by Field Museum with the photograph ascribes the collection to Claussen, but I doubt that that is correct. The printed label that usually accompanied Claussen's collections is absent (at least from the photograph), and Jussieu does not mention Claussen in the protologue. Moreover, Jussieu states that the type came "e parte boreali Brasiliae," presumably the Amazon, while Claussen collected only in Minas Gerais and around Rio de Janeiro. If I am wrong and this does prove to be a Claussen collection from Minas Gerais, then I am probably also wrong to equate it with *H. orinocensis*, which is not known from Minas Gerais and very probably does not grow there.

19. *Heteropterys catoptera* Anderson, sp nov

Fig 41g-k.

Liana lignosa, internodiis vegetativis parce sericeis demum glabrata. Foliorum majorum lamina 10–13.5 cm longa, 3.8–4.7 cm lata, elliptica vel anguste ovata, basi cuneata vel subrotundata, apice acuminata, subtus glaucescens, sericea supra mox glabrata, subtus pilis minimis appressisque $\pm$ persistentibus, eglandulosa vel prope marginem aliquot glandulis abortivis munita, reticulo utrinque aequaliter vel supra valdius prominenti; petiolus 6–7 mm longus, sericeus demum glabratus, eglandulosus; stipulae 0.15 mm longae, triangulares, interpetiolares. Inflorescentia panicula, ramis complanatis et sericeis, floribus confertis in pseudoracemis (2–)3–7 cm longis, bracteis 2.5–5 mm longis, infimis petiolatis et biglanduliferis aliter eglandulosis, pedunculo 2–3 mm longo, bracteolis 2–2.5 mm longis, eglandulosis, membranaceis et translucentibus reticulo visibili, ovatis apice rotundatis. Pedicellus 3–4 mm longus. Sepala eglandulosa, 3.3 mm longa, 1.2 mm lata, apice revoluta, abaxialiter sericea, adaxialiter glabra. Petala lutea, glabra, 4 lateralia ungue 2.5–3 mm longo, limbo 4.5–5 mm longo, 4–4.5 mm lato, margine erosa vel dentato; petalum posticum ungue 3 mm longo, limbo 4 mm longo latoque. Filamenta 2–3 mm longa, 2 petalis postico-lateralibus opposita crassiora; antherae

0.8–1.2 mm longae, glabrae, connectivo atrorubro. Ovarium ca 1 mm altum, sericeum; styli 2.5–3 mm longi, arcuati, glabri, apice dorsaliter uncinato unco ca 0.2 mm longo. Samara immaturissima usque 16 mm longa, 3 mm lata, reflexa ala dorsali valde descendenti et proximaliter ultra nucem producta.

Type. *Pires, Cavalcante, Magnago & Silva 14340*, campos de Caracaraí, Terr. Roraima, Brazil, 27 Apr 1974 fl/imm frt (holotype IAN, isotypes MICH, RB).

This peculiar species is known only from the type. Its name refers to the downward-pointing wings of the young fruit, its main distinguishing feature. I would expect the wings to maintain that orientation at maturity, but only collection of more mature material will tell us that for certain. The species is also notable for the glaucescence of the underside of its leaves (due to whitish guard cells), the slender crowded pseudoracemes, and the membranous, translucent bracts and bracteoles with the reticulum visible.

20. *Heteropterys macradena* (de Candolle) Anderson, comb nov

Banisteria macradena de Candolle, Prodr. 1: 590. 1824.

Banisteria eglandulosa de Candolle, Prodr. 1: 590. 1824. Type. Cayenne (G), non *Heteropterys eglandulosa* Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 27. 1832 [1833].

Heteropterys candolleana Adr. Jussieu, Ann. Sci. Nat. 2^e Sér. Bot. 13: 276. 1840, new name for *Banisteria eglandulosa* DC.

Heteropterys lessertiana Adr. Jussieu, Ann. Sci. Nat. 2^e Sér. Bot. 13: 276. 1840. Type. Poiteau, Cayenne (G, P).

Woody vines, shrubs, or small trees; stems usually prominently lenticellate. Lamina of the largest leaves (7–)8–13(–17) cm long, (3–)4–6.5(–8) cm wide, ovate or elliptical, cuneate or rounded at the base, occasionally obtuse or rounded but mostly acuminate at the apex, sericeous on both sides, soon glabrate above, the hairs $\pm$ deciduous or sometimes persistent below, a submarginal row of glands usually present below, the reticulum usually prominent on both sides; petiole 4–10 mm long, sericeous to glabrate, eglandular; stipules minute, interpetiolar. Inflorescence axillary and terminal, usually paniculate, sericeous, the flowers borne in elongated pseudoracemes, the bracts 2–3(–4) mm long, eglandular or with minute marginal glands, the peduncle 1–3(–4) mm long, the bracteoles 1.5–3 mm long, usually eglandular, rarely with minute marginal glands. Pedicel 5–6 mm long. Calyx eglandular or the lateral 4 sepals biglandular. Petals glabrous, erose or dentate, the claw 3–4 mm long, the limb 3.7–5(–6) mm long, 3.7–5 mm wide. Filaments 2.2–4.5 mm long, strongly unequal in same flower; anthers 0.8–1.2 mm long, glabrous, the connective globose, dark red. Styles 3–5 mm long, glabrous, straight or the posterior 2 somewhat lyrate, the apex truncate or, usually, extended dorsally into a hook up to 0.2 mm long. Samara 25–35(–40) mm long, borne ascending; dorsal wing (8–)10–14 mm wide, obovate or falcate, the abaxial edge usually bent upward $\pm$ abruptly beyond the nut or gradually curved upward; nut 5–9 mm long, 3–5 mm high, round in cross-section.

Type. Cayenne (G).

Distribution. Northern South America. Collections from in and near Guayana: VENEZUELA. Bolívar: Isla del Río Hacha, 6°15'N, 62°47'W, *Agostini* 228 (NY, VEN), 334 (US), 335 (US, VEN); Ciudad Piar, Cerro Bolívar, elev 500 m, *Arísteguieta* 2198 (MY, VEN); La Laja, El Dorado-Sta. Elena de Uairen, *Badillo & Holmquist* 6068 (MY); San Félix, elev 30–40 m, *Bernardi* 7780 (VEN); Río

Caroni, boca de Tirika, elev 400 m, *Cardona 1166* (US, VEN); Alto Paragua, 500 m, *Cardona 2453* (VEN); El Arenal, Dto. Cedeño, *Ferrari 1268* (MY); Salto El Llovizno, Río Caroni, *Pannier 829a* (VEN); Río Nichare, 6°15'N, 65°5'W, elev 200–250 m, *Steyermark & Gibson 95688* (NY, VEN); Río Tirica to mouth of Río Torono, elev 500 m, *Steyermark & Wurdack 1299* (MICH, NY, US, VEN); Río Kukenán, *Tamayo 2869* (US, VEN); Río Caroni, Paso Caruachi, *Trujillo 5781* (F, MY); La Ceiba, Medio Paragua, elev 70 m, *Ll. Williams 12639* (US, VEN); La Paragua, *Ll. Williams 12711* (US, VEN); San Mateo, Bajo Paragua, elev 75 m, *Ll. Williams 12833* (MICH, US, VEN) & *12839* (US, VEN); Cerro Bolívar, elev 750 m, *Wurdack 34391* (MICH, NY, US, VEN); Raudal Budare, Río Suapure, elev 110 m, *Wurdack & Monachino 41245* (NY) & *41246* (MICH, NY, US, VEN). Amazonas: Pto. Ayacucho, *Curran 58* (MICH, NY); Savanna at Sta. Barbara, *Maguire et al 32043* (MICH, NY, US, VEN); Sierra Parima, 2°27'24"N, 63°56'W, elev 1300 m, *Steyermark 106148* (NY); Sierra Parima, 3°49'N, 64°36'W, elev 795–830 m, *Steyermark 107027-A & 107209* (both NY); Pto. Ayacucho, elev 95 m, *Ll. Williams 13147* (US, VEN); Tamatama, elev 121 m, *Ll. Williams 15101* (US, VEN); Esmeralda, elev 143 m, *Ll. Williams 15313* (A, US, VEN). COLOMBIA. Vaupés: Calamar, Río Unilla, elev 240 m, *Cuatrecasas 7324* (COL); Miraflores, elev 270 m, *Schultes 5371* (GH, NY, US). Amazonas-Vaupés: Río Apaporis, *Schultes & Cabrera 15944* (NY, US). BRAZIL. Terr. Roraima: Serinha, Rio Mucajaí, elev 500 m, *Prance et al 4234* (MICH); Serra do Mel, Surumu, *Ule 8183* (MG).

Collected in flower and fruit mostly from January to May.

As construed here, this is an exceedingly variable species, especially with respect to habit and size and shape of leaves. It is to be hoped that a future revision will result in its division into two or more natural, morphologically homogeneous taxa.

Many of the plants placed here would have been called *H. suberosa* by Niedenzu and *H. acutifolia* by Cuatrecasas. I have placed both of those names in synonymy (under *H. nervosa* and *H. orinocensis* respectively), but even if I had not the epithet *macradena* is older than either of them. Niedenzu considered *macradena* a synonym for the older name *laurifolia*, but judging from the photograph of the type (Field Mus. neg. 33404) I can see little basis for that decision. In fact, almost no collections from South America seem to be conspecific with the many collections of *H. laurifolia* from Central America, Mexico, and the West Indies. Although a variable species, *H. laurifolia* regularly has the reticulum, including the ultimate veinlets, white or yellowish below and thereby in strong contrast to the green laminar tissue.

14. *Clonodia* Grisebach in Martius, Fl. Bras. 12(1): 26. 1858.

Skoliopterys Cuatrecasas, *Webbia* 13(2): 451. 1958.

Atopocarpus Cuatrecasas, *Webbia* 13(2): 454. 1958.

Woody vines or shrubs. Leaves decussate; stipules none (?) or minute (ca 0.3 mm long), triangular, borne on the stem at the base of the petiole. Inflorescence a pseudoraceme, simple or compound to form a panicle, terminal or terminal and lateral; bracts and bracteoles persistent. Calyx bearing 8–10 glands. Petals pink and/or white, abaxially winged, the lateral 4 recurved, the posterior ± erect. All

10 stamens fertile, glabrous, the filaments basally to $\frac{1}{2}$ connate, straight or the posterior 3 (especially the 1 opposite the posterior petal) sigmoid. Ovary of 3 fertile carpels, connate at the base, free distally, 1 anterior and 2 posterior; styles 3, strongly unequal, the anterior thinner and usually shorter than the other 2, bent toward the posterior petal, the 2 posterior styles turned toward the anterior sepal; stigmas internal, the apex of the styles dorsally truncate to prominently hooked. Fruit a dry schizocarp comprising 3 (or less by abortion) indehiscent mericarps with the wings reduced to winglets or rounded outgrowths, separating from a short pyramidal torus.

Type. *Clonodia racemosa* (Adr. Jussieu) Niedenzu.

Clonodia is a genus of two or three species, the two treated below plus possibly *C. ovata* Niedenzu, which I have not seen. Niedenzu's other species, *C. sessilis*, is a synonym for *Mascagnia benthamiana* (Grisebach) Anderson; the two species had the same Spruce collection as type.

This is one of several groups of Malpighiaceae that have become distinctive by losing the fruit-wing of their samara-bearing ancestors. In general, I am opposed to granting generic status to such species, especially when other characters leave no room for doubt as to the affinities of the derived species. However, I am recognizing *Clonodia* because there is some doubt (at least in my mind) about its origin. The fruit, especially that of *C. complicata*, does seem to be mascagnoid, and the racemose inflorescence and winged petals suggest *Mascagnia* species. However, similar inflorescences and identical winged pink and white petals occur in *Heteropterys* species, which also tend to have many small, punctiform lenticels like those of *Clonodia*. Moreover, the carpels in *Heteropterys* are often only connate at the base, leaving a short torus as in *Clonodia*, while those of *Mascagnia* are usually (always?) connate their whole length and separate from a long, slender torus. The fruit of *Diplopterys* is certainly a far cry from that of *Banisteriopsis*, but its derivation from a species of *Banisteriopsis* seems certain and in flower *Diplopterys* is practically indistinguishable from *Banisteriopsis* (see discussion above under *Diplopterys*). By the same token, perhaps the fruit of *Clonodia* came from a *Heteropterys* that started with lateral crests and lost the large dorsal wing. Other types of data will have to be sought to shed some light on the relationships of *Clonodia*.

Key to the Species of *Clonodia* in Guayana

1. Mericarp with the nut 7 mm in diameter, bearing thick, often much-dissected winglets or crests with rounded edges and the veins obscure or invisible; most hairs of the inflorescence composed of a bulbous stalk, distally bifurcate; lamina of the larger leaves (9-)11-16.5 cm long, 5-9 cm wide, persistently sericeous below or eventually glabrate; petals all densely papillose or verrucose adaxially, the posterior more strongly so; abaxial wing of the lateral petals shorter than the limb; filament opposite the posterior petal almost as long as the two adjacent filaments. 1. *C. racemosa*.
1. Mericarp with the nut 4-5 mm in diameter, bearing thin winglets with clearly visible veins; hairs of the inflorescence composed of a slender stalk and a much longer crosspiece at right angles to it; lamina of the larger leaves (5.5-)7.5-11.5(-13) cm long, (3-)4-6(-7) cm wide, soon nearly or quite glabrate; posterior petal usually adaxially papillose, the laterals smooth or basally papillose; abaxial wing of the lateral petals about as long as the limb or longer; filament opposite the posterior petal much shorter than the 2 adjacent filaments, hardly longer than the short filaments opposite the anterior-lateral petals. 2. *C. complicata*.

1. *Clonodia racemosa* (Adr. Jussieu) Niedenzu, Arb. Bot. Inst. Akad. Braunsberg 5: 13. 1914.

Heteropterys racemosa Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 274. 1840.

Clonodia verrucosa Grisebach in Martius, Fl. Bras. 12(1): 26. 1858. Type. *Spruce 1094*, in vicinibus Barra [Manaus], Amazônas, Brazil, Dec 1850–Mar 1851 (K, NY!).

Atopocarpus papillosus Cuatrecasas, Webbia 13(2): 454. 1958. Type. *Alv. Fernández 2202*, Río Inírida, Vaupés, Colombia (holotype COL!).

Woody vines; vegetative stems appressed-tomentose to glabrate, terete, with many tiny punctiform lenticels. Lamina of the larger leaves (9–)11–16.5 cm long, 5–9 cm wide, ovate or elliptical, rounded at the base, acute or abruptly acuminate at the apex, loosely sericeous to glabrate above, thinly sericeous below, persistently so or eventually glabrate, usually granulate above, with the reticulum prominent on both sides, bearing many (rarely few) glands below $\pm$ in 1 row on each side; petiole 5–10 mm long, sericeous to glabrate, bearing 2 glands at or somewhat above the base and occasionally 2–4 additional glands distally. Inflorescence a simple pseudoraceme terminating terminal and lateral shoots, 5–13 cm long, comprising (20–)30–60 flowers, tomentose, with some hairs T-shaped but most composed of a bulbous stalk, distally bifurcate; bracts 1–2 mm long, subulate, eglandular; peduncle 1.5–4.5(–6) mm long; bracteoles 0.5–1 mm long, ovate, borne between the middle and the apex of the peduncle, eglandular or rarely 1 with a small gland. Pedicel 5–12(–15) mm long, loosely sericeous or subvelutinous. Sepals beyond the glands 1.5 mm long, 1.5–2 mm wide, triangular, appressed after anthesis, abaxially sericeous, adaxially glabrous, bearing apparently 8 glands (actually 10, those of the anterior sepal $\pm$ connate with the adjacent glands) 2.5–3 mm long. Petals pink or pink and white, glabrous or bearing a few hairs abaxially, the lateral 4 with the claw 1.5–2.5 mm long, the limb 4.5–5.5(–6.5) mm long, 3–4 mm wide, oblong or rhomboidal, dentate or subentire, adaxially papillose, bearing a small abaxial wing 1–1.5 mm wide and 2–3 mm high, never reaching as high as the limb; posterior petal with the claw 3–3.5 mm long, thick, the limb 4.5–5 mm long, 3–4 mm wide, obovate, laciniate, adaxially densely papillose or verrucose, abaxially with a small wing or only carinate. Filaments opposite the anterior-lateral petals 1.5 mm long, the other 8 2.5–3 mm long, those opposite the posterior-lateral petals thicker than the other 8; anthers 0.8–1.8 mm long, the posterior 3 smallest. Ovary 1.5–2 mm high, sericeous; styles glabrous or basally sericeous, the anterior 1.5–2 mm long, the posterior 2 2.5 mm long, the apex with a short (0.2 mm) to very pronounced (0.5 mm) dorsal hook. Mericarp densely sericeous, the nut subglobose, 7 mm in diameter, bearing thick winglets or crests with the veins obscure, including a central dorsal winglet 2–4 mm wide, entire or dissected, and many irregular crests on each side, projecting 2–3 mm, dissected or partly connate, some parallel or highly irregular in orientation; ventral areole subcircular, 3 mm in diameter.

Type. *Martius*, Lac. Coari, Rio Solimões, Amazônas, Brazil (M, P).

Distribution. Amazonian Colombia and Brazil. COLOMBIA. Vaupés: Río Kuduyarí, *Allen 3179* (COL); near Mitú, *Davis 214* (MICH); type of *Atopocarpus papillosus*, q v; Río Kuduyarí, *Schultes & Cabrera 17896* (NY). BRAZIL. Amazônas: Rio Negro, at Isla Macará, near mouth of Rio Padauiri, *Cardona 1277* (NY, US, VEN) & *1285* (NY, US); Tapera, Padauiry, Rio Negro, *Fróes 22701*

(IAN); near Livramento, Mun. Humaitá, *Krukoff* 6700 (NY) & 6702 (MICH, NY, US); Ponta Negra, sandy river bank, Rio Negro, vic. Manaus, *Prance et al.* 9091 (MICH, NY); Rio Negro between Ilha Uabetuba and Ilha da Silva, flooded river margin, *Prance et al.* 15223 (MICH, NY); Manaus, *Schwacke III* 505 (GOET); type of *C. verrucosa*, q v; prope Barra, May 1851, *Spruce* 1545 (NY); inter Santarém et Barra, Oct 1850, *Spruce* (E); Manaus, *Ule* 5992 (NY). Pará: Rio Maicurú, várzea, *Pires* 6597a (IAN).

Collected in flower and fruit mostly from October to February, once in May.

An older name that might apply to this plant is *Hiraea nitida* H.B.K.; see the discussion under *Mascagnia* in this paper.

Pires 6597a is typical in most respects, but its peduncles are long and its mericarp is intermediate between that of *Clonodia racemosa* and *C. complicata*. The winglets are thick and densely sericeous as in *C. racemosa*, but they are much less dissected and have a more regular, parallel orientation than is found in other plants of *C. racemosa*. This collection, from Pará, is also disjunct from the rest of the species. Further collection may allow a reassessment of its taxonomic disposition.

2. *Clonodia complicata* (Humboldt, Bonpland & Kunth) Anderson, comb nov Fig 44f–l.

Hiraea complicata Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 171. (4^o ed.). 1821 [1822].

Mascagnia complicata (Humboldt, Bonpland & Kunth) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 3: 4. 1908.

Mascagnia lehmanniana Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 8: 59. 1926. Type. *Lehmann* 8766, near Orocué, Meta, Colombia (NY! fragment of holotype).

Clonodia racemosa var *orinocensis* Niedenzu, Pflanzenr. IV 141: 580. 1928. Type. *Rushy & Squires* 166, Manoa, lower Orinoco, [Terr. Delta Amacuro], Venezuela (NY! isotype).

Skoliopterys lehmanniana (Niedenzu) Cuatrecasas, Webbia 13(2): 452. 1958.

Shrubs or woody vines, usually growing along streams or in low, seasonally inundated places; stems loosely sericeous to glabrate, terete, with many tiny punctiform lenticels. Lamina of the larger leaves (5.5–)7.5–11.5(–13) cm long, (3–)4–6(–7) cm wide, ovate, rounded or cuneate at the base, acute at the apex, loosely sericeous at first but nearly or quite glabrate at maturity, usually granulate above, with the reticulum prominent on both sides, usually bearing below on each side a row of (2–)4–8 glands between midrib and margin; petiole (3–)5–8 mm long, loosely sericeous to glabrate, eglandular or bearing 2(–4) glands, often near the middle. Inflorescence a pseudoraceme, terminal and sometimes also axillary, simple or rarely ternate, 3–13 cm long, comprising 20–50 flowers, tomento-sericeous with all the hairs composed of a short, slender stalk and a much longer crosspiece at right angles; bracts 1.5–3 mm long, subulate, eglandular; peduncle 2–3.5 mm long; bracteoles 1–1.5 mm long, narrowly triangular, borne near the middle of the peduncle, eglandular. Pedicel 5–10 mm long, sericeous. Sepals beyond the glands ca 1.5 mm long and wide, triangular, appressed after anthesis, abaxially sericeous, adaxially glabrous, bearing 8(–10) glands (2–)2.5–2.8 mm long, free at the apex. Petals pink and/or white, glabrous, the lateral 4 with the claw 1.5–2(–2.5) mm long, the limb 4–5 mm long and wide, erose, adaxially smooth or basally papillose, bearing a prominent abaxial wing 1–1.5 mm wide and 3 mm high, reaching as high as the limb or higher; posterior petal with claw

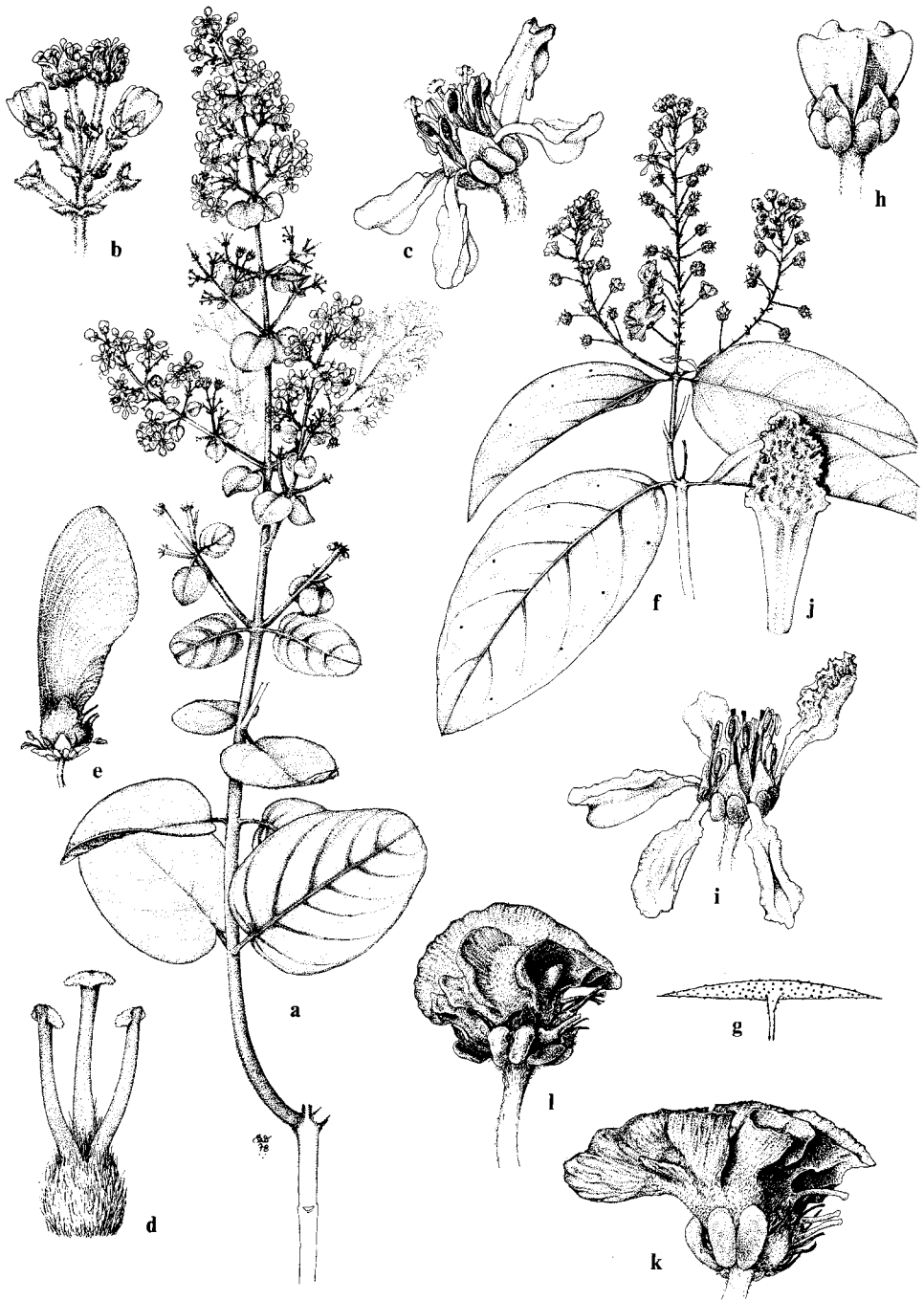


Fig 44. *Heteropterys beecheyana* var *alata* and *Clonodia complicata*. a–e, *Heteropterys beecheyana* var *alata*: a) Flowering branch, $\times 0.5$; b) cluster of flowers, $\times 2.5$; c) flower, $\times 3.5$; d) gynoecium, $\times 10$; e) samara, $\times 1.5$. f–l, *Clonodia complicata*: f) Flowering branch, $\times 0.5$; g) hair from inflorescence, $\times 88$; h) flower bud, $\times 5$; i) flower, $\times 3.5$; j) flag (posterior) petal, showing papillose adaxial surface, $\times 5$; k & l) fruits (only 1 mericarp developed in each), $\times 4$. Drawn by Karin Douthit, a–d from Wurdack & Monachino 39811, e from Wurdack & Monachino 39816, f–k from Breteler 4829, l from Cardona 822.

2.5–3.5 mm long, thick, abaxially carinate, widening distally into the limb 3.5–5 mm long, 4 mm wide, dentate, adaxially nearly smooth to densely papillose with large flat papillae, abaxially with a short narrow wing. Filaments strongly unequal, those opposite the sepals 2.5–3 mm long, slender, the 3 opposite the anterior-lateral petals and the posterior petal 1.4–2 mm long, usually slender, the 2 opposite the posterior lateral petals 2–2.7 mm long, very stout; anthers 1–1.5 mm long, subsimilar, those opposite the petals slightly longer and having larger connectives than those opposite the sepals. Ovary 1.5 mm high, sericeous; styles glabrous, the anterior 1.5–2 mm long, the posterior 2–3 mm long, the apex dorsally truncate or with a very short hook. Mericarp sparsely sericeous or tomentose, with the nut subglobose, 4–5 mm in diameter, bearing thin winglets with clearly visible veins, including a central dorsal winglet 0.5–2 mm wide, dentate to entire, extended forward at the apex 2 mm and sometimes downward at the base up to 5 mm, and 3–5 winglets on each side 1–3 mm long and wide, mostly at right angles to the central winglet, sometimes connate at the apex with it; ventral areole subcircular, 2.5 mm in diameter.

Type. *Humboldt & Bonpland*, Carichana, Orinoco, [Bolívar, Venezuela] (P).

Distribution. Río Orinoco and tributaries in Venezuela and Colombia. VENEZUELA. Terr. Delta Amacuro: Manoa, *Rusby & Squires* 166 (NY). Bolívar: zona inundada, bajíos de Ciudad Bolívar, desembocadura del Río Maruanta, *Aristeguieta* 4862 (US, VEN); Raudal del Perro, Alto Paragua, *Cardona* 793 (NY, US, VEN); Río Torono, Alto Paragua, *Cardona* 822 (NY, VEN); marsh, 31 km W of Caicara along Hwy 19 to Ciudad Bolívar, elev 60 m, *Davidse* 4361 (MO); Ciudad Bolívar, elev 35 m, *Holt & Blake* 841 & 852 (US); Río Paragua, between Río Torono and Salto de Auraima, elev 275 m, *Killip* 37535 (VEN); Temblador, Medio Caura, elev 100 m, *Williams* 11614 (F, MO, VEN); edges of Río Pargueni 1–10 km above mouth, elev 90 m, *Wurdack & Monachino* 39773 (NY). Amazonas: ribera, Raudales de Santa Bárbara de Orinoco, *Argumosa* 129; Sipapo River, near confluence with Orinoco River, elev 90 m, *Breteler* 4829 (US, VEN, WAG); margins of Río Orinoco just above mouth of Río Atabapo, elev 125–150 m, *Wurdack & Adderley* 42729 (MICH, NY, US, VEN). COLOMBIA. Vichada: Puerto Carreño, *Cuatrecasas* 4000 (F, US). Boyacá: low area, flooded during part of rainy season, Orocué, elev 140 m, *Haught* 2837 (F). Meta: near Orocué, *Lehmann* 8766 (NY). Vaupés: Amanawén, *Romero* 1236 (US).

Collected in flower in almost all months.

One of the collections cited above, *Wurdack & Adderley* 42729, has a most peculiar gynoecium. The styles lack the usual apical hook, and instead of a discrete stigma the receptive area (if indeed there is one) seems to be decurrent on the inner face of the style. Moreover, the carpels frequently contain a second, smaller ovule. The carpels of Malpighiaceae consistently contain only one ovule, and other plants of this species conform to that rule. I cannot guess the origin of the peculiarities in this particular population, but in the absence of any evidence that they have persisted I am inclined to dismiss them as a transient abnormality of no systematic significance.

15. *Mascagnia* Bertero in Colla, Hort. Ripul. 86. 1824.

Vines, mostly woody, with decussate leaves usually bearing glands on the lamina or petiole or both, the stipules small, free, triangular, inter- or epipetiole.

Flowers mostly borne in pseudoracemes, these single or grouped in panicles, axillary or terminal or both, the pseudoracemes sometimes reduced and congested to form corymbs, a few species bearing flowers in pairs or 4-flowered umbels; floriferous peduncles usually well developed, subtended by a bract and bearing 2 bracteoles at or slightly to well below the joint, 1 or both bracteoles glanduliferous in some species. Lateral 4 sepals usually biglandular, the anterior usually eglandular, biglandular in a few species. Petals yellow, pink, or lilac (or white?), the posterior usually at least somewhat differentiated from the lateral 4. Stamens 10, all fertile, the anthers more or less alike. Ovary of 3 often crested carpels connate along a central axis, 1 anterior and 2 posterior, all fertile; styles 3, the apex with a large internal stigma and dorsally rounded, truncate, acute, or short-hooked. Fruit schizocarpic, breaking apart into 3 (or less by abortion) samaras, each samara having its largest wings lateral, 2 discrete wings or a single wing through confluence of the laterals at the base or at base and apex; dorsal wing smaller, sometimes reduced to a crest or lost; intermediate winglets present or absent; wings reduced to horny rudiments in a few species.

Type. *Mascagnia americana* Bertero.

This is a diverse and perhaps unnatural genus of about 55 species, found from Mexico to Argentina.

In addition to the species treated below, there is another possible *Mascagnia* in Guayana about whose identity I am uncertain. That is *M. nitida* (H.B.K.) Niedenzu, based on *Hiraea nitida* H.B.K., its type collected near Santa Bárbara del Alto Orinoco. Judging from the photograph of the type, I am certain this is none of the species described here under *Mascagnia*. It may really be a species of *Mascagnia*, one that has not been found again on the Orinoco. Another possibility is that this is another collection of the plant which Kunth described as *Hiraea complicata*, in which case *Mascagnia nitida* will become a synonym for *Clonodia complicata* (H.B.K.) Anderson; see *Clonodia* in this paper. A third possibility is that this is a collection of *Clonodia racemosa* (Adr. Juss.) Niedenzu; if so, *nitida* will replace *racemosa* as the correct epithet for that species. However, *Clonodia racemosa* is not known from even the Río Negro in Venezuela, much less the Río Orinoco, and the branching of the inflorescence in the type is atypical for *C. racemosa*, so this last possibility is probably remote. The correct disposition of this name must await study of the type and perhaps re-collection of this species from the Alto Orinoco.

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

1. Petals completely concealed by the sepals during enlargement of the bud, emerging only at anthesis.
 2. Petals abaxially densely and persistently tomentose or loosely sericeous.
 3. Margin of the bracteoles and sepals with a row of stalked clavate or capitate glands; petals yellow. 1. *M. glandulifera*.
 3. Margin of the bracteoles and sepals eglandular; petals lilac or pink. 2. *M. macrodisca*.
 2. Petals glabrous.
 4. Calyx glands 10 (all 5 sepals biglandular); bracteoles 2–4.5 mm long, elliptical or obovate, broadly obtuse or rounded at the apex; petals yellow, turning red in age.

5. Leaf hairs stalked, the branches straight or serpentine and often ascending, persistent or deciduous.
 6. Mature leaves very densely and persistently tomentose below.
 3. *M. guianensis*.
 6. Mature leaves glabrate or thinly hispid below.
 4. *M. leucanthele*.
 5. Leaf hairs sessile, straight, appressed, persistent below.
 5. *M. heterocarpa*.
 4. Calyx glands 8 (lateral 4 sepals biglandular, anterior sepal eglandular); bracteoles up to 2 mm long, ovate or triangular, acute or slightly obtuse at the apex; petals yellow, not changing color in age.
 7. Anthers 1–1.5 mm long, bearing a few hairs abaxially at the base and sericeous between the locules; calyx glands 1.7–2.5 mm long; petals with the limb 3.5–5 mm long, 2.5–3.5 mm wide; ultimate pseudoracemes (1–)2–6 cm long; floriferous bracts 1–2 mm long, often bearing 1 or 2 large glands or eglandular.
 8. Lamina of the larger leaves 4.5–7.5(–9.5) cm wide, golden- or silvery-sericeous below, the reticulum ± prominent below.
 6. *M. benthamiana*.
 8. Lamina of the larger leaves 9–12 cm wide, dark brown-sericeous below, the reticulum below ± obscured by outer layer of hairs.
 7. *M. castanea*.
 7. Anthers 0.5–0.7 mm long, glabrous; calyx glands 0.5–1.5 mm long; petals with the limb 2.3–2.5 mm long, 1.5–1.7 mm wide; ultimate pseudoracemes 0.3–2.5 cm long; floriferous bracts 0.5–0.9 mm long, eglandular.
 8. *M. poeppigiana*.
 1. Petals (at least the outermost) exposed during enlargement of the bud.
 9. Petals abaxially densely and persistently sericeous.
 9. *M. microcarpa*.
 9. Petals glabrous.
 10. Pedicels sericeous or subvelutinous; sepals abaxially sericeous; leaves usually persistently sericeous or velutinous below, occasionally glabrescent; wing of the samara sparsely sericeous.
 11. Petiole biglandular near the middle; floriferous peduncle 0(–1) mm long; sepals revolute in anthesis; lateral petals with the limb 2.3–2.5 mm long, 1.5–1.7 mm wide; anthers 0.5–0.7 mm long.
 8. *M. poeppigiana*.
 11. Petiole eglandular; floriferous peduncle 2–5.5 mm long; sepals appressed in anthesis; lateral petals with the limb 4.5–5 mm long, 2.5–4 mm wide; anthers 1.2–1.7 mm long.
 12. Leaf hairs below dark brown or reddish, usually with sinuous and/or ascending branches; inflorescence an axillary panicle of 3–5(–7) corymbs with the flowers congested and ascending; dorsal wing of samara 2–5 mm wide.
 10. *M. sepium*.
 12. Leaf hairs below white or stramineous, straight, appressed; inflorescence a simple axillary pseudoraceme with the flowers evenly spaced and ± horizontal; dorsal wing of samara none or a crest up to 1.5 mm wide.
 11. *M. schunkei*.
 10. Pedicels and sepals glabrous; leaves glabrous or soon glabrate; wing of the samara glabrescent, nearly or quite glabrate at maturity.
 13. Lamina of larger leaves 8–15 cm long, 4–7.5 cm wide, cordate at the base, crispate at the margin; petiole 3–5 mm long; petals yellow.
 12. *M. eggersiana*.
 13. Lamina of larger leaves 14–25 cm long, 6–11 cm wide, obtuse or rounded at the base, smooth at the margin with a discolored band 0.5–1 mm wide; petiole 11–18 mm long; petals white.
 13. *M. dissimilis*.

Key to the Species of *Mascagnia* in Guayana
(for specimens with fruits)

1. Fruit wings reduced to rudimentary crests.
 5. *M. heterocarpa*.
1. Fruit wings developed (although short and thick in *M. microcarpa*).

2. Lateral wing of the samara continuous at the base, continuous at the apex or incised part way or completely to the nut.
3. Calyx glands 8 (lateral 4 sepals biglandular, anterior sepal eglandular).
 4. Petiole bearing 2–10 small glands in 2 rows; samara 4–10 cm wide, with the dorsal wing 5–10 mm wide. Go to couplet 3 of preceding key.
 4. Petiole eglandular; samara 2–3.6(–4.2) cm wide, with the dorsal crest or wing 0–5 mm wide. Go to couplet 10 of preceding key.
3. Calyx glands 10 (all 5 sepals biglandular). Go to couplet 6 of preceding key.
2. Lateral wings of the samara discrete, i e, divided to the nut at base and apex.
 5. Mature lamina so densely sericeous below as to be completely concealed by the hairs. Go to couplet 7 of preceding key.
 5. Mature lamina glabrate or sericeous below, but the hairs not dense enough to completely conceal the laminar tissue.
 6. Pedicel several times as long as the peduncle; lamina glabrate or very sparsely sericeous below, bearing a row of glands on the revolute margin; fruit wings thick, coriaceous or aerenchymatous; inflorescences shorter than the subtending leaves. 9. *M. microcarpa*.
 6. Pedicel about as long as the peduncle; lamina persistently sericeous below, bearing 2–several glands below parallel to but set in from the margin; fruit wings papery and brittle; inflorescence often apical, much branched, and exceeding the subtending leaves. 2. *M. macrodisca*.

1. *Mascagnia glandulifera* Cuatrecasas, Webbia 13: 365. 1958.

Woody vine; stems sericeous to glabrate. Lamina of the larger leaves 11–14.5 cm long, 4.5–8 cm wide, elliptical, rounded at the base, abruptly acuminate at the apex, sericeous to glabrate on both sides or the hairs persistent below and often on the midrib above, eglandular or with 1–3 sessile marginal glands on each side near the base; petiole 8–13 mm long, sericeous, bearing (2–)4–10 small glands in 2 rows; stipules minute, triangular, borne on the petiole slightly above its base. Flowers borne in axillary and terminal pseudoracemes or panicles, the ultimate pseudoracemes 3–8 cm long and containing 10–20 flowers; bracts caducous, 3–5 mm long, ovate, abaxially tomentose, adaxially glabrous or tomentose at the margin, bearing many small stalked clavate or capitate marginal glands; peduncle 2–5 mm long, bearing 2 bracteoles at its apex, the bracteoles like the bracts but persistent or eventually deciduous. Pedicel 3–5 mm long. Sepals completely concealing the petals until anthesis, ca 5 mm long (–7 mm in fruit) and 2 mm wide, narrowly elliptical, bearing many small stalked clavate or capitate glands on the margin and distally on the adaxial surface, tomentose on both sides, the lateral 4 each bearing 2 large abaxial glands 1.5 mm long (–2.5 mm in fruit), the anterior without abaxial glands. Petals yellow, abaxially densely tomentose, 5–9 mm long, the posterior petal with dark veins and a longer claw and much smaller limb than the lateral petals. Filaments 2–4.5 mm long, very unequal, the longest opposite the anterior sepal, glabrous, $\pm$ straight, connate at the base; anthers ca 1 mm long, glabrous. Styles 3.5–4 mm long, the anterior slightly shorter than the posterior 2, glabrous, straight, very short-hooked dorsally at the apex. Samara 4.5–6 cm wide, hispid with the hairs often at glandular dots, the lateral wings membranous, 2–3 cm wide, continuous at the base, divided to the nut at the apex, undulate and coarsely toothed at the margin; central dorsal wing 6–10 mm wide, $\pm$ semicircular, entire or erose; intermediate winglets none or very small; ventral areole ovate, 3.5 mm long, 2.5 mm wide.

Type. *Schultes & Cabrera 13208*, Soratama, entre el Río Pacoa y el Río Kanari, Río Apaporis, elev 250 m, Amazonas-Vaupés, Colombia, 31 Jul 1951 (holotype US! isotype NY!).

Illustration. *Schultes 1975*, p 129.

Distribution. VENEZUELA. Amazonas: 12–15 km NE of San Carlos, elev 100 m, *Morillo et al 4206* (MY). BRAZIL. Amazônia: mixed woodland, Camp 5 (Palmito Camp), elev 750 m, Rio Cauaburi, Rio Negro, *Maguire et al 60426* (NY). COLOMBIA. Amazonas-Vaupés: Soratama, Río Apaporis, type q v, also *Schultes & Cabrera 13594* (US). PERU. Loreto: Maynas, Iquitos, Santo Thomas, *Revilla 1748* (MICH).

Collected in flower and fruit in July and August, and in fruit in April and November.

2. *Mascagnia macrodisca* (Triana & Planchon) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 3: 16. 1908.

Hiraea macrodica Triana & Planchon, Ann. Sci. Nat. 4 Sér. Bot. 18: 326. 1862.

Mascagnia anisopetala (Adr. Jussieu) Grisebach var *macrodisca* (Triana & Planchon) Kostermans, Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 25: 5. 1936.

Woody vines; stems persistently sericeous. Lamina of the larger leaves 9–14 (–18) cm long, 4–8 (–12) cm wide, elliptical or slightly ovate or obovate, cuneate or rounded at the base, short-acuminate at the apex, sericeous to soon glabrate above, persistently sericeous below with short, straight, sessile hairs, bearing below in the proximal half 1–several small glands on each side in a row parallel to but set in from the margin; petiole 10–22 mm long, persistently sericeous, usually bearing 2–8 small glands in 2 rows; stipules minute, triangular, borne at the base of the petiole. Flowers borne in axillary and terminal pseudoracemes or panicles, the ultimate pseudoracemes 2–9 cm long and containing 6–20 (–30) flowers; bracts 1.5–3 mm long, ovate or triangular, eglandular, abaxially sericeous, adaxially glabrous; peduncle 3–5 mm long; bracteoles like the bracts but smaller, borne between the middle and the apex of the peduncle. Pedicel 3–4 mm long (–6 mm in fruit). Sepals completely concealing the petals until anthesis, ca 4.5 mm long, $\frac{1}{2}$ connate, abaxially sericeous, adaxially glabrous, revolute after anthesis, the lateral 4 biglandular with the glands 2.5–3.5 mm long and distally free and revolute, the anterior sepal eglandular. Petals violet (or pink?), abaxially densely sericeous or tomentose, adaxially sparsely tomentose, 4.5–5.5 mm long, dentate or glandular-fimbriate, subequal. Filaments 2–3 mm long, subequal, glabrous, straight, ca $\frac{1}{2}$ connate; anthers 1–1.3 mm long, glabrous. Styles 2.5–3.5 mm long, glabrous, straight, erect or divergent, dorsally rounded, truncate, or apiculate at the apex. Samara 4–8 cm wide, sericeous, the lateral wings membranous, 2–4 cm wide, continuous at the base or rarely divided nearly or quite to the nut, divided to the nut at the apex, sinuate, entire; central dorsal wing 5–10 mm wide, semicircular or trapezoidal, entire; intermediate winglets none; ventral areole ovate, 4–5 mm long, 3–4 mm wide.

Type. *Triana 5568-6*, Villavicencio, Colombia, elev 460 m, Feb 1856 (COL! G, MO).

Distribution. Southern Venezuela, SE Colombia, and Loreto, Perú. Guayana collections: VENEZUELA. Bolívar: Pica Caicara del Orinoco–San Juan de

Manapiare Km 172, 6°N, 66°W, elev 450 m, *Delascio Chitty 2220* (MICH); 47 km N of Tumeremo, forest at base of Altiplanicie de Nuria, *Steyermarck 89315* (NY); La Prisión, Medio Caura, elev 120 m, *Ll. Williams 11647* (F, US, VEN). Amazonas: Mavaca, Alto Orinoco, *Aristeguieta & Lizot 7388* (NY, VEN). COLOMBIA. Vaupés: Río Guaviare, San José del Guaviare, elev 240 m, *Cuatrecasas 7477* (F, US); Alto Vaupés, Miraflores, elev 300 m, *Gutierrez V. & Schultes 700* (GH).

Collected in flower November to January, in fruit December to April.

The only collections from the Alto Orinoco (*Aristeguieta & Lizot 7388* and *Delascio Chitty 2220*) have fruits that are atypical in that the lateral wings are partially to completely divided at the base; moreover, the petals of the former were reported to be pink. In other respects they are similar to other collections of *M. macrodisca*. Perhaps they represent a taxon that deserves recognition, but that must await the availability of more, better documented collections.

3. *Mascagnia guianensis* Anderson, sp nov

Fig 45a-f.

Tetrapterys leucanthele Grisebach ex Rich. Schomburgk, Reisen Br.-Guiana 1003. 1848 [1849], nomen nudum.

Mascagnia leucanthele sensu Niedenzu, Pflanzenreich IV. 141: 108. 1928, non *M. leucanthele* Grisebach in Martius, Fl. Bras. 12(1): 96. 1858.

Liana lignosa, ramis vegetativis sericeis demum glabratis. Foliorum majorum lamina 6–10(–13) cm longa, 3–5(–6) cm lata, elliptica, basi cuneata vel rotundata, margine valde revoluta, apice plerumque rotundata et apiculata vel rarius acuminata, supra tomentosa vel demum glabrata, subtus pertinaciter dense tomentosa, pilis stipitatis trabeculo recto vel flexuoso 1–2 mm longo, subtus saepe glandulis aliquot parvis in serie sub margine instructa; petiolus 8–15(–20) mm longus, appresso-tomentosus, prope medium biglandulifer; stipulae minutae, in dimidio proximali petioli portatae. Inflorescentia dichasium terminale, compositum, foliis reductis rotundis instructum, axibus aureo-tomentosis, floribus in umbellis (3–)4-floris, bracteis 3–4(–6) mm longis, spathulatis, utrinque tomentosis, eglandulosis, pedunculo 3–6(–9) mm longo, tomentoso, bracteolis apice vel sub apice pedunculi, 2–4 mm longis, spathulatis vel ellipticis, utrinque tomentosis vel supra subglabratis, eglandulosis vel 1-glanduliferis. Pedicellus 5–10 mm longus, tomentosus. Sepala in alabastro petala omnino includentia, 4–5 mm longa, anguste triangularia, post anthesin revoluta, basi connata, abaxialiter tomentosa, adaxialiter apice puberula cetera glabra, omnia 5 biglandulifera, glandulis 2–2.3 mm longis. Petala lutea demum rubescentia, glabra, 4–6 mm longa, 2.5–3 mm lata, obovata, 4 lateralibus ungue ca 1 mm longo et margine integra vel erosa, posticum ungue ca 2 mm longo et margine dentatum. Filamenta 2.5–3 mm longa, illa sepalis opposita quam illa petalis opposita parum longiora, abaxialiter sericea, adaxialiter glabra, $\frac{1}{2}$ connata; antherae 1–1.3 mm longae, glabrae. Ovarium 1.5 mm altum, tomentosum, stylis 2–2.3 mm longis, aequalibus, glabris, crassis, rectis et erectis, apice dorsaliter paulo rotundatis, stigmatibus fere terminalibus. Samara 2.3–3.5 cm alta, 2.5–4 cm lata, suborbicularis, alis lateralibus membranaceis, 1.3–2 cm latis, basi continuis, apice discretis, margine sinuatis; ala dorsalis centralis 4–7 mm lata, semicircularis, integra vel lobata; alulae dorsales intermediae nullae; areola ventralis ovata, 3 mm longa, 2–2.5 mm lata.

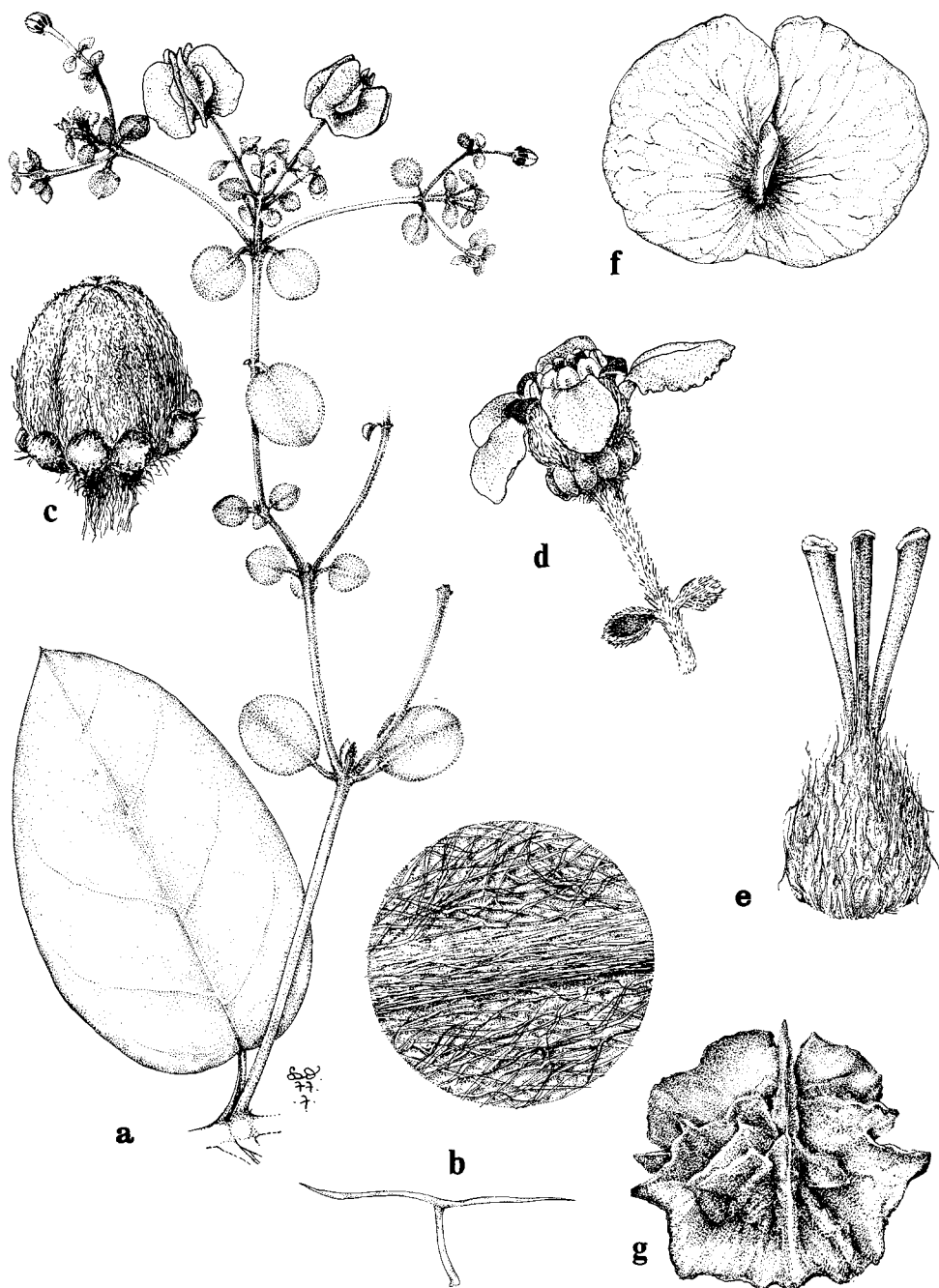


Fig 45. *Mascagnia guianensis* and *M. heterocarpa*. a-f, *M. guianensis*: a) Flowering and fruiting branch, $\times 0.8$; b) abaxial surface of lamina, $\times 23$ (above) and enlarged hair, $\times 38$ (below); c) flower bud, $\times 7.7$; d) flower, $\times 3.8$; e) gynoecium, $\times 11.5$; f) samara, $\times 1.2$. g) *M. heterocarpa*, mericarp, $\times 2.3$. Drawn by Karin Douthit, a, b, & f from Gleason 825, c-e from Forest Dept. 3644, g from Ducke 1169.

Type. *Gleason 825*, dense upland forest, Rockstone, British Guiana [Guyana], 15 Jul–1 Aug 1921 (holotype NY).

Distribution: GUYANA. Berbice-Rupununi Cattle Trail, *Abraham 234* (NY); upper Mazaruni River, about 60°10'W, *De La Cruz 2231* (MO, NY, US); Malali, Demerara River, lat. ca 5°35'N, *De La Cruz 2653* (NY); Barima River, 8°20'N, 59°50'W, *De La Cruz 3401* (NY); Mazaruni Station, *Forest Dept. 3644* (NY); dry sandhills E of Rockstone, *Gleason 753* (NY); type, q v; Rockstone, *Hitchcock 17289* (NY); Demerara, *Jenman 4087* (US); white sand 1.5 miles from Atkinson Field, *Robertson & Austin 278* (MO); Moraballi Creek, near Bartica, Essequibo River, *Sandwith 484* (NY), 529 (NY, US); Demerara, *Warren s n* (F). SURINAM. Forest of Zandery, *Samuels 254* (NY). FRENCH GUIANA. Rivière du Maroni, *Mélinon 116 & 258* (NY); Godebert, *Wachenheim 399* (NY).

Collected in flower and fruit at diverse times, especially from May to November.

This rather common species is widely known as *Mascagnia leucanthele* Grisebach, but it must have a new name because the type of that name, *Spruce 2070*, came from the upper Rio Negro and is referable to a related but distinct species.

4. *Mascagnia leucanthele* Grisebach in Martius, Fl. Bras. 12(1): 96. 1858.

Mascagnia spruceana Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 3: 17. 1908, nom superfl.

Woody vines; branches loosely sericeous to glabrate. Lamina of the larger leaves 8–14 cm long, 5–8 cm wide, broadly elliptical, cuneate at the base, abruptly short-acuminate at the apex, tomentose to soon glabrate on both sides or thinly hispid below with stalked T-shaped or Y-shaped hairs, eglandular (?); petiole 10 mm long, tomentose to glabrate, eglandular; stipules minute, borne on the stem at base of petiole. Inflorescence an open, compound, terminal dichasium, the axes persistently white-tomentose, containing much-reduced, persistently white-tomentose, orbicular leaves bearing a row of abaxial glands inside the margin, the flowers borne in pairs; bracts 3–5 mm long, elliptical or obovate, tomentose on both sides, eglandular; peduncle 7–10 mm long, tomentose; bracteoles borne at the apex of the peduncle, like the bracts but usually slightly smaller and more rounded at the apex. Pedicel 6–10 mm long, tomentose. Sepals completely concealing the petals until anthesis, ca 4 mm long, triangular, revolute after anthesis, abaxially densely tomentose, adaxially puberulent, all 5 biglandular, the glands 3–3.5 mm long. Petals yellow, turning red in age, glabrous, 5.5–6.5 mm long, 2.5–3 mm wide, bluntly dentate, the posterior with the claw thicker and 2 mm long vs. 1 mm in the laterals. Filaments 3–3.5 mm long, those opposite the sepals slightly longer than those opposite the petals, glabrous, $\pm$ straight, ca $\frac{1}{2}$ connate; anthers 1–1.3 mm long, glabrous, soon reflexed. Styles ca 2 mm long, the anterior slightly shorter, sericeous proximally, stout, straight, and erect, dorsally truncate or rounded at the apex, the stigmas appearing almost terminal. Samara ca 4 cm wide and 3–4 cm high, suborbicular, the lateral wings membranous, ca 2 cm wide, continuous at the base, divided to the nut at the apex, undulate and coarsely toothed at the margin; central dorsal wing ca 7 mm wide, trapezoidal, toothed and often lobed; intermediate winglets none or 1–several seta-like structures as high as the width of the dorsal wing or shorter; ventral areole broadly ovate, 4.5 mm high, 4 mm wide.

Type. *Spruce 2070*, Rio Negro between Barcellos and São Gabriel, Amazonas, Brazil, Dec (GOET?, M). *Spruce 2070* is also the type of *M. spruceana* Nied.

Distribution. Known only from the type and the following collection, both from the upper Rio Negro. BRAZIL. Amazonas: road margins Camanaus-Uaupés road, near Camanaus, sandy soil, terra firme, *Prance et al 15927* (MICH, NY).

Collected in flower and fruit in November and December.

The name of this rare species has been applied to a closely related plant of the Guianas, described here as *M. guianensis*. Since the only collection cited by Grisebach in the protologue is *Spruce 2070* from the Rio Negro, that has to be the type.

5. *Mascagnia heterocarpa* Anderson, nom nov

Fig 45g.

Malpighiodes spruceana Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 3: 18. 1908, non *Mascagnia spruceana* Niedenzu.

Diplopterys spruceana (Niedenzu) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 4: 21. 1912.

Woody vines; branches sericeous to eventually glabrate. Lamina of the larger leaves 9–16 cm long, 6–9(–12) cm wide, elliptical, cuneate or rounded at the base, revolute at the margin, abruptly acuminate or rounded and apiculate at the apex, sericeous above to soon glabrate or the midrib sericeous, moderately to thinly but persistently sericeous below, the hairs short, sessile, straight, parallel, and fine, bearing few to many small glands below in 1–3 rows parallel to but set in from the margin; petiole 9–18(–22) mm long, persistently golden-sericeous, bearing (0–)2–4(–8) small impressed glands; stipules not seen. Inflorescence a compound panicle terminating in umbels or corymbs of 4(–8) flowers, the axes golden-sericeous; bracts 3–5 mm long, elliptical or obovate, abaxially densely and adaxially thinly sericeous, eglandular; peduncle (3–)5–9 mm long; bracteoles like the bracts but (2–)2.5–4 mm long, borne between the middle and the apex of the peduncle. Pedicel 6–11 mm long. Sepals completely concealing the petals until anthesis, ca 4 mm long and 2 mm wide, triangular, revolute after anthesis, abaxially sericeous, adaxially glabrous, all 5 biglandular, the glands 2–2.5 mm long. Petals yellow, turning red in age, glabrous, 4–5.5 mm long, ca 2 mm wide, erose or subentire, reflexed, the posterior with the claw ca 2 mm long vs. 1 mm in the laterals. Filaments 2.5–3 mm long, abaxially somewhat sericeous, $\pm$ straight, ca $\frac{1}{2}$ connate; anthers 1–1.5 mm long, glabrous, soon reflexed. Styles 2–2.5 mm long, subequal, sericeous at the base, stout, straight and erect to soon recurved-divergent, dorsally truncate or rounded at the apex, the stigmas appearing almost terminal. Mericarp 12–18 mm long, 12–17 mm wide, sericeous, lacking membranous wings, the large nut bearing instead many coriaceous or corky crests or winglets 2–4 mm high or wide, comprising a central dorsal crest extending over the apex, ca 4–6 often reticulate crests on each side $\pm$ at right angles to the dorsal crest, and sometimes partial fusion of these crests to produce a dissected rudiment of the lateral wing, continuous at the base, discrete at the apex; ventral areole ovate, 7 mm long, 6 mm wide.

Type. *Spruce 1093*, in vicinibus Barra [Manaus], Amazonas, Brazil, Dec–Mar 1850–51 (isotypes E! GH! M, NY!).

Distribution. Known only from Manaus and vicinity. BRAZIL. Amazonas, Manaus: Igarapé do Pensador, terra firme, arenosa, capoeira, *Coelho s n* [INPA

3000] (INPA, US); BR 17, Km 9, terra firme, úmido, arenoso, capoeira grossa, *Coelho s n* [INPA 3078] (IAN, INPA, US); igarapé do Parque 10, terra firme, solo arenoso, úmido, *Coelho s n* [INPA 6740] (INPA); Estrada do Aleixo, ad ripas paludosas rivuli, *Ducke 1169* (GH, NY, US); igarapé dos Francêses, terra firme, úmido, arenosa, capoeira fechada, *Mello & Coelho s n* [INPA 3175] (INPA); type, q v.

Collected in flower from October to December, in fruit from December to February.

I have not seen the original publications of either *Malpighiodes spruceana* Niedenzu or *Mascagnia spruceana* Niedenzu; but if Niedenzu's later treatment in Pflanzenreich reflects the protologues, it is clear that the two epithets had different types referable to different species, and that Niedenzu was well aware of that fact and intended to publish two names. *Malpighiodes spruceana* is a legitimate name, but it cannot be transferred to *Mascagnia* because there already exists the name *Mascagnia spruceana* Niedenzu which, although superfluous and therefore illegitimate, still serves as an earlier homonym. Therefore, I am proposing a new name for this species when it is treated as a species of *Mascagnia*; in other genera its epithet would revert to *spruceana*. The epithet proposed, *heterocarpa*, refers to the fact that the fruit of this species is so different from that of most species of *Mascagnia*, including its closest relatives.

Considered by itself, this species would hardly seem referable to *Mascagnia*. However, it is so similar in so many characters to *Mascagnia leucanthele* and *M. guianensis* that the close relationship of these three species seems certain. As has happened in almost every wing-fruited genus of Malpighiaceae, the fruit of this species has simply lost its membranous wings. While this has the unsettling effect of depriving the plant of its most useful generic character, that does not seem to me sufficient basis for erecting a separate genus or for putting it into an artificial cluster of unrelated species with similar fruits, as did Niedenzu. When, as in the case of *Clonodia*, there exists a serious question as to the origin of a peculiar plant, then erecting a genus for it may be justifiable, but in this case the plant has close extant relatives that cannot be excluded from *Mascagnia*, and it seems best to me to place it with them.

This is not a species of Guayana, but it is included here because the treatment of its two close relatives, both species of lowland Guayana, offered a good opportunity to clarify the identity and relationships of this interesting plant.

6. *Mascagnia benthamiana* (Grisebach) Anderson, comb nov

Tetrapterys benthamiana Grisebach in Martius, Fl. Bras. 12(1): 88. 1858.

Mascagnia sericans Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 3: 21. 1908.

Malpighiodes benthamiana (Grisebach) Niedenzu, Verz. Vorles. Lyc. W.-S. 1909/10: 31, not. 13. 1909.

Clonodia sessilis Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 8: 63. 1926.

Woody vines, often on stream banks or in seasonally inundated places; stems sericeous to soon glabrate. Lamina of the larger leaves 9–18(–21) cm long, 4.5–7.5(–9.5) cm wide, narrowly to broadly ovate, rounded (rarely slightly cordate) at the base, revolute at the margin, acuminate at the apex, sericeous to soon glabrate above, persistently golden- or silvery-sericeous below, the hairs so dense

and appressed as to completely conceal the lamina and usually giving the leaf a metallic sheen, bearing many to few (occasionally no) small marginal glands, otherwise eglandular, the reticulum $\pm$ prominent on both sides; petiole (2–)4–11 mm long, sericeous to glabrate, bearing 2 large glands at or slightly above the base; stipules ca 0.3 mm long, borne on the petiole beside or slightly above the glands. Inflorescence a sericeous, compound, axillary or terminal panicle containing bracts 3 mm long bearing 2 large glands, the flowers ultimately borne in pseudoracemes (1–)2–6 cm long of 4–16 flowers; floriferous bracts 1–2 mm long, ovate, bearing 2 large abaxial glands or eglandular; peduncle none or up to 4 mm long; bracteoles 0.7–1.5(–2) mm long, triangular, borne at the apex of the peduncle. Pedicel 3–6 mm long, sericeous. Sepals completely concealing the petals until anthesis, 3–4 mm long, ca 1.5 mm wide, revolute after anthesis, membranous at the margins, obtuse or rounded at the apex, abaxially thinly sericeous, adaxially glabrous, the lateral 4 biglandular with the glands 2–2.5 mm long and often revolute at the apex, the anterior sepal eglandular. Petals yellow, glabrous, the limb 3.5–5 mm long, 2.5–3.5 mm wide, erose, the claw 1–2 mm long, thicker in the posterior petal. Filaments 1.5–2 mm long, glabrous, straight, up to $\frac{1}{3}$ connate; anthers 1–1.5 mm long, bearing a few straight hairs abaxially at the base and sericeous between the locules. Ovary 1–1.5 mm high, sericeous; styles 1.2–2.3 mm long, subequal, glabrous except hirsute at the base, stout, recurved-divergent, dorsally rounded or truncate at the apex, the stigmas internal but sometimes appearing nearly terminal. Samara usually with 2 discrete trapezoidal lateral wings 11–20 mm wide, sinuate at the margin or lobed or incised to the nut, occasionally only 5–10 mm wide and irregularly much dissected; central dorsal wing or crest 2–7 mm wide, subentire or sinuate, often extended forward at the apex between the lateral wings; intermediate winglets usually none, rarely several small crests or processes; ventral areole ovate, 2–3 mm in diameter.

Type. *Spruce*, in vicinibus Santarém, Pará, Brazil, Nov.–Mart. 1849–50 (holotype GOET? isotypes E! G, GH! M, NY!).

Distribution. Amapá and upper Rio Negro south to Paraguay. Guayana collections: BRAZIL. Amazônas: Isla Macana cerca de la confluencia del Rio Padauri, Rio Negro, Jan fl, *Cardona 1275* (VEN). COLOMBIA. Amazonas: Río Caraparaná entre las bocas y El Encanto, elev 150 m, May frt, *Schultes 3827a* (COL, GH).

Collected in flower and fruit in various months in different areas.

This is a widespread and exceedingly variable species. The description given above does not attempt to include all the variation in the species; it is taken from the representatives seen from Amazonian Peru and Colombia and northern Brazil. The species usually has a mascagnoid samara, but occasionally the lateral wings are much dissected, and it was one of these collections that Grisebach and Niedenzu treated as a *Tetrapteryx*. Other characters show the Spruce type to be conspecific with Amazonian populations of *Mascagnia sericans* Niedenzu. The same Spruce collection is also the type of *Clonodia sessilis* Niedenzu.

7. *Mascagnia castanea* (Cuatrecasas) Anderson, comb nov

Heteropteryx castanea Cuatrecasas, *Webbia* 13(2): 475. 1958.

Type. *Schultes & López 10014*, upper Rio Negro basin, Rio Dimití, at base

Serra Dimití, Amazônas, Brazil, 12–19 May 1948 flr (holotype US! isotypes IAN! US!).

This plant is known only from the type; for a full description see the protologue. Its fruit is not known, but its flowers and many vegetative characters are so like those of *Mascagnia benthamiana* that I transfer the name to *Mascagnia* with some confidence. Indeed, they are so similar that perhaps it would be better to treat *M. castanea* as a variety of *M. benthamiana*. Resolution of its status had better await revision of this whole variable complex, by which time perhaps more material of *M. castanea*, including fruits, will be available.

8. *Mascagnia poeppigiana* (Adr. Jussieu) Anderson, comb nov

Hiraea poeppigiana Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 260. 1840.

Tetrapterys poeppigiana (Adr. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 87. 1858.

Mascagnia subsericea Cuatrecasas, Webbia 13(2): 370. 1958. Type. *García-Barriga 14089*, So-ratama, Amazonas, Colombia, elev 250 m, Dec frt (holotype US! isotype NY!).

Mascagnia mater-dei Cuatrecasas, Brittonia 11: 167. 1959. Type. *Schultes 6228*, Iberia, Madre de Dios, Peru, Jun frt (holotype US! isotypes COL, NY!).

Woody vines, the stems sericeous to eventually glabrate. Lamina of the larger leaves 8.5–15(–19) cm long, 5–9 cm wide, ovate or elliptical or slightly obovate, cuneate to rounded at the base, acuminate to rounded and apiculate at the apex, sericeous to soon glabrate above, persistently golden- or silvery-sericeous below, the hairs so dense and appressed as to completely conceal the lamina and give the leaf a metallic sheen, bearing several small, flat or cylindrical marginal glands, otherwise eglandular, the fine tertiary veins obscure or prominulous above and strongly parallel; petiole 7–9(–11) mm long, sericeous to glabrate, bearing 2 glands at or slightly above the middle; stipules ca 0.3 mm long, triangular, borne on the petiole at or slightly above the base. Inflorescence a sericeous, compound, axillary or terminal panicle containing bracts up to 3 mm long and eglandular or bearing 2 small glands, the flowers ultimately borne in pseudoracemes 0.3–2.5 cm long of 2–13 flowers; floriferous bracts and bracteoles 0.5–0.9 mm long, ca 0.5 mm wide, triangular, eglandular; peduncle 0(–1) mm long. Pedicel 3.5–4 mm long (–5 mm in fruit), sericeous to glabrescent. Sepals incompletely covering petals before anthesis, ca 1.5 mm long and 1.2 mm wide, revolute in anthesis, membranous at the margin, rounded at the apex, abaxially thinly sericeous in the center, adaxially glabrous, the lateral 4 biglandular with the glands 0.5–1.5 mm long and subpeltate, the anterior sepal eglandular. Petals yellow (the posterior with red veins?), glabrous, the limb 2.3–2.5 mm long, 1.5–1.7 mm wide, subentire or erose, the claw 1 mm long in the lateral 4, 1.5–2 mm long in the posterior. Filaments ca 1.5 mm long, glabrous, straight, basally connate; anthers 0.5–0.7 mm long, glabrous, the connective dark red. Styles 1.3 mm long in flower, subequal, glabrous, slightly bowed, dorsally rounded or truncate at the apex. Samara sericeous, with 2 discrete, basically trapezoidal lateral wings 10–15 mm wide, grossly and irregularly toothed or lobed; central dorsal crest or wing 1–3 mm wide, entire or dentate; intermediate processes none or 1–several, ca 1 mm high.

Lectotype. *Poeppig 2799*, near Ega, Rio Tefé, Amazônas, Brazil, Nov flr (G, NY! US! W!).

Distribution. Western Amazonia. COLOMBIA. Amazonas: type of *M. subsericea*, q v. BRAZIL. Amazônas: Rio Japurá, Dec–Jan frt, syntype (lectopara-

type) of *M. poeppigiana*, *Martius s n* (M); lectotype of *M. poeppigiana*, q v. PERU. Madre de Dios: Iberia, Jun frt, *Schultes* 6228 (NY, US) and Jun flr, *Schultes* 6229 (US).

The type and paratype of *Mascagnia mater-dei* differ in several respects from the other collections cited. The glands on the petiole are slightly recessed. The glands on the margin of the lamina are cylindrical instead of flat, and more numerous. Also, the hairs on the lamina are longer and looser, producing a less metallic effect. However, in most respects the species is reasonably homogeneous. It is in the same complex as *M. benthamiana* and *M. castanea*.

9. *Mascagnia microcarpa* (Sandwith) Anderson, comb nov

Diplopterys microcarpa Sandwith, Kew Bull. 1931: 183. 1931.

Woody vines, the stems sericeous, soon glabrate. Lamina of the larger leaves 9–13(–16) cm long, 4–7(–8) cm wide, ovate or elliptical, cuneate or rounded at the base, revolute at the margin, acuminate at the apex, very sparsely sericeous to nearly or quite glabrate on both sides, bearing many tiny impressed glands on the adaxial surface of the revolute margin; petiole 8–13 mm long, sericeous to glabrate, eglandular or bearing 2(–4) small glands on the distal half; stipules 0.3–0.5 mm long, triangular, interpetiolar. Inflorescences axillary congested panicles shorter than (usually less than half the length of) the subtending leaf, sericeous throughout to glabrate, the flowers mostly borne in corymbose clusters of 4–8 or more; bracts 1.5–3 mm long, ovate or triangular, appressed, eglandular; peduncle 1–3 mm long; bracteoles 1–1.5 mm long, ovate or triangular, appressed, eglandular, borne at the apex of the peduncle. Pedicel 5–20 mm long, sericeous to glabrate. Sepals leaving the outer petal exposed during enlargement of the bud, ca 3 mm long and 2 mm wide, appressed after anthesis, broadly rounded at the apex, abaxially densely sericeous except the margin, adaxially glabrous, the lateral 4 biglandular with the glands 2.5–3 mm long, free at the apex, the anterior sepal eglandular. Petals yellow, very densely golden-sericeous abaxially on claw and limb except margin, the lateral 4 reflexed, with the claw ca 2.5 mm long and the limb 5–7 mm long, 4–6 mm wide, concave, denticulate or erose, the posterior $\pm$ erect, with the claw 2–3 mm long and the limb 3–5 mm long, 2–3 mm wide, flat or crumpled, glandular-fimbriate $\pm$ all around the margin. Filaments 2.5–3 mm long, abaxially proximally sericeous, adaxially sparsely sericeous, straight, $\frac{1}{3}$ – $\frac{1}{2}$ connate; anthers 1.3–1.8 mm long, those opposite the sepals longer (with more pendent locules) than those opposite the petals, glabrous or sparsely sericeous abaxially on the connective. Ovary 1–1.5 mm high, sericeous; styles 2.5–3 mm long, equal, glabrous except at base, straight and divergent, dorsally rounded or truncate or very short-apiculate at the apex, with broad internal stigmas. Samara with the nut 5–8 mm in diameter and the wings small and thickened, coriaceous or aerenchymatous, the 2 lateral wings discrete, 5–9 mm wide, coarsely and irregularly toothed, the central dorsal wing 1–3 mm wide or reduced to a rounded ridge, entire; intermediate winglets none; ventral areole elliptical, 5–7 mm long, 2.5–4 mm wide.

Type. *Sandwith* 289, Moraballi Creek, near Bartica, Essequibo River, British Guiana [Guyana], 18 Sep 1929 (holotype K, isotype NY!).

Distribution. Guayana collections: GUYANA. Mazaruni River: long. 60°10'W,

De La Cruz 2269 (NY), 2361 (F, GH, MO, NY), & 2399 (F, GH, MO, NY); *Kamakusa*, long. ca 59°50'W, *De La Cruz* 2892 (F, GH, MO, NY); *Jenman* 5370 (NY).

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

This is a lowland species that is included here only because the Mazaruni collections cited above place it within the flora of Guayana as defined in this paper.

This species is quite unlike other species of *Mascagnia* in Guayana. It is very closely related to *M. sinemariensis* (Aublet) Grisebach, from which it differs only in the samara, which has an enlarged nut and reduced, corky wings in *M. microcarpa*.

10. *Mascagnia sepium* (Adr. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 96. 1858.

Hiraea sepium Adr. Jussieu in Saint-Hilaire, Fl. Bras. Merid. 3: 19. 1832 [1833].

Woody vines. Lamina of the larger leaves 8–16 cm long, 6–8.5 cm wide, elliptical or ovate, rounded or cordate at the base, acuminate at the apex, tomentose to glabrate above except on the midrib, velutinous to subsericeous below with the hairs reddish, sessile, with erect to subappressed and often sinuous arms, occasionally glabrescent, bearing 2–4 impressed yellow glands near the base and 2–4 similar glands distally; petiole 8–16 mm long, reddish-velutinous to glabrate, eglandular; stipules ca 0.5 mm long, triangular, interpetiolar. Inflorescence axillary, 2–7(–9) cm long, shorter than the subtending leaf, a panicle of 3–5(–7) short, congested, corymbose pseudoracemes of 5–20 flowers; bracts 1–1.5 mm long, eglandular; peduncle 2–5 mm long; bracteoles 0.5–1 mm long, eglandular, borne at the middle of the peduncle or below or above but always well below the apex. Pedicel 7–15 mm long, sparsely but persistently sericeous or subvelutinous. Sepals appressed after anthesis, exceeding the glands by ca 1 mm, obtuse or acute, abaxially sericeous, adaxially glabrous, the lateral 4 biglandular with the glands 2.5–3 mm long, decurrent, free and slightly reflexed at the apex, the anterior sepal eglandular. Petals yellow, glabrous, exposed during enlargement of the bud, the laterals with limb 5 mm long and 4 mm wide, the claw ca 1.7 mm long, the posterior with a smaller limb and thicker claw. Filaments 1.5–2 mm long, glabrous, $\pm$ straight, connate only at the very base; anthers 1.2–1.5 mm long, glabrous. Ovary densely tomentose-sericeous; styles 2–2.5 mm long, green (at least at the apex), the anterior distinctly shorter and slenderer than the posterior 2, divergent, dorsally truncate or acute at the apex. Samara 1.8–3 cm high, 1.6–3 cm wide, broadly ovate to orbicular, sparsely and loosely sericeous, the lateral wing membranous, continuous at base and apex, often shallowly notched at the apex, entire or sinuate at the margin; nut eccentric i e inserted above the center of the wing; central dorsal winglet 2–5 mm wide; intermediate winglets none; ventral areole ovate, 1.5–3 mm long, 1–2.5 mm wide.

Type. *St. Hilaire*, Rio de Janeiro, Brazil (P).

Distribution. "Argentina and Paraguay to Tobago and Honduras" (fide Niedenzu, Pflanzenreich, p 95). Collections from Guayana and nearby: BRAZIL. Amazônas: Rio Uaupés, between Ipanoré and confluence with Rio Negro, Serra Wabeesee, below Bela Vista, *Schultes & Pires* 9142 (NY, US). VENEZUELA.

Amazonas: Orinoco River, Isla del Ratón, elev 90 m, *Breteler* 4702 (VEN, WAG). Bolívar: La Marabutana, entre Ikabaru y los Caribes, elev 400 m, *Bernardi* 6548 (NY); La Gran Sabana, 2 km W of Kamarata, elev 450 m, *Koyama & Agostini* 7257 (NY, VEN); headwaters and upper part of Quebrada Caballape, W of Hato de Nuria, E of Miamo, elev 230–350 m, *Steysmark* 88663 (NY); between San Ignacio de Yuruani and San Francisco de Yuruani, S of El Dorado on road to Santa Elena, elev 1200 m, *Steysmark* 111399 (VEN); Río Parguaza, 3–5 km below El Carmen, ca 50 km above river mouth, elev 110 m, *Wurdack & Monachino* 40941 (NY). GUYANA. Upper Rupununi River, near Dadanawa, *De La Cruz* 1797 (NY); vicinity of Bartica, Essequibo River, *De La Cruz* 1878 (NY).

Collected in flower and fruit in all months.

As Cuatrecasas pointed out in his *Prima Flora Colombiana*, Niedenzu's concept of this species was very broad. Careful study of the complex throughout its range may eventually allow its subdivision, but that is beyond the scope of this paper. The plants called *Mascagnia sepium* in northern South America are relatively homogeneous morphologically, and the description given above is based on them alone, not on the whole range of variation of the species. These plants have each axillary inflorescence compound and both bracteoles eglandular, unlike plants from central and southern Brazil. They are also notable for their reddish pubescence.

11. *Mascagnia schunkei* Anderson, sp nov

Fig 46.

Liana lignosa, ramis sericeis demum glabratis. Foliorum majorum lamina 5.5–17 cm longa, 2.3–6.5 cm lata, elliptica vel parum ovata obovatave, basi cuneata vel rotundata, apice acuminata, supra sericea mox glabrata vel costa pertinaciter sericea, subtus pertinaciter sericea, utrinque pilis sessilibus, rectis appressisque, niveis, stramineis, vel aureis, subtus basi biglandulosa vel eglandulosa; petiolus 5–15 mm longus, sericeus, eglandulosus; stipulae 1–2 mm longae, subulatae, interpetiolares. Inflorescentia pseudoracemus axillaris, simplex, (2–)3–10 cm longus, omnino sericeus, floribus 10–50, horizontalibus vel parum reflexis, non in corymbo congestis, bracteis 1–2.5 mm longis, subulatis, eglandulosis, pedunculo 3–5.5 mm longo, bracteolis 0.5–1.5 mm longis, eglandulosis vel 1 (rarius ambabus) glandulam parvam gerenti, apice vel parum sub apice pedunculi portatis. Pedicellus 5–9 mm longus, sericeus. Sepala 4 lateralia 8 glandulas 2.5–3 mm longas 0.5–1.5 mm superantia, anticum eglandulosum, omnia triangularia, integra, apice acuta vel obtusa, abaxialiter in centro sericea, adaxialiter glabra, per anthesin appressa. Petala lutea (vel rosea?), glabra, exposita in alabastro accrescenti, 4 lateralia limbo 4.5–5 mm longo, 2.5–3.5 mm lato, obovato vel elliptico, minute denticulato, basi truncato vel parum hastato, ungue 1.3 mm longo; posticum limbo parum minore. Filamenta 1.5–2 mm longa, glabra, recta, brevissime connata; antherae 1.5–1.7 mm longae, glabrae. Ovarium ca 1 mm altum, dense hirsutum, stylis 1.5–2 mm longis, antico quam 2 posticis minore, rectis et erectis vel divergentibus, apice dorsaliter rotundatis, truncatis, vel breviter apiculatis. Samara 2.5–3.6 cm alta lataque, ovata vel orbicularis, sparsim appresso-sericea; ala lateralis membranacea, basi continua, apice paulo emarginata vel usque nucem incisa, margine integra vel sinuata; nux supra medium alae sita; crista dorsalis

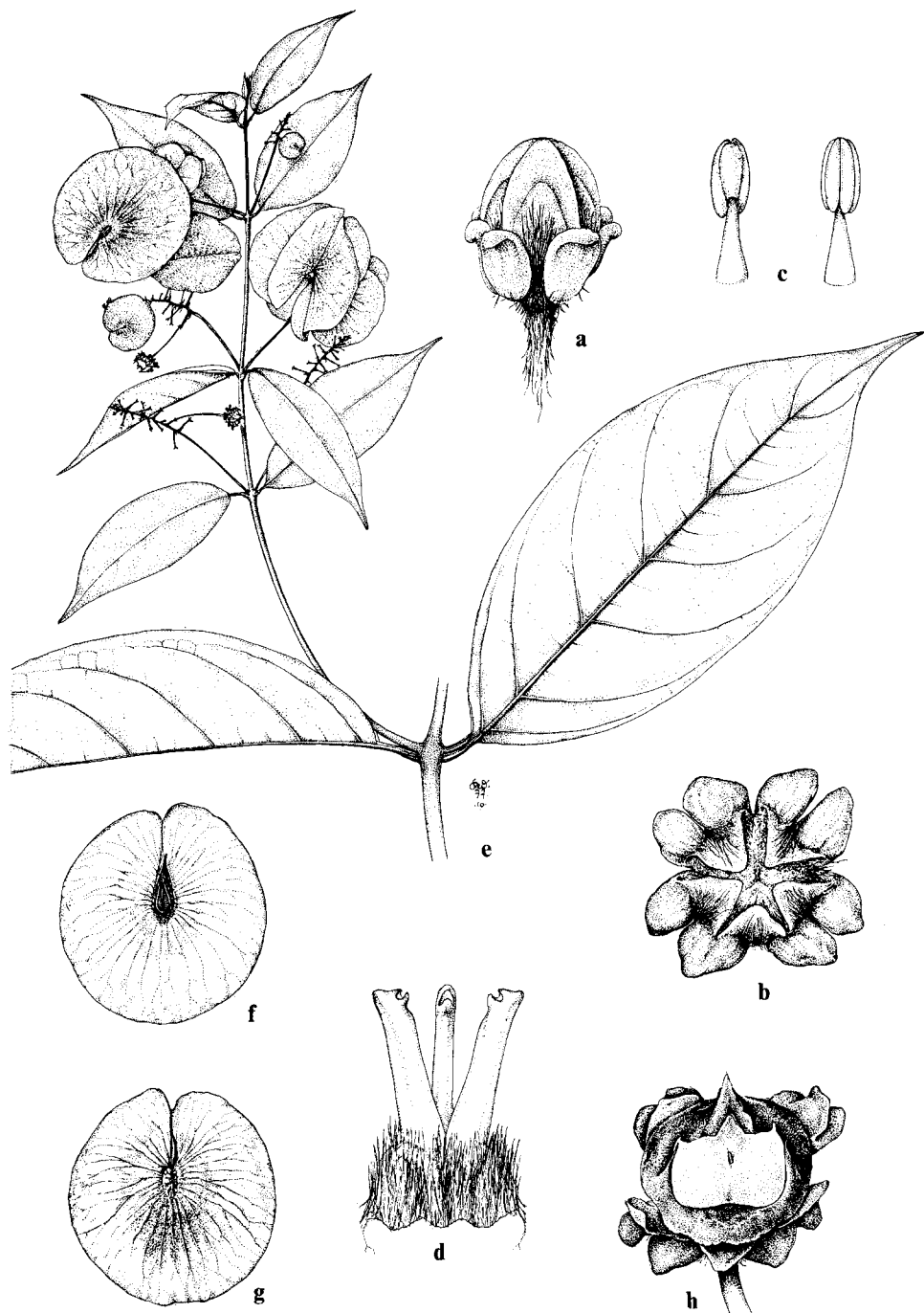


Fig 46. *Mascagnia schunkei*. a) Flower bud, $\times 5$; b) calyx from above, eglandular sepal forward, $\times 5$; c) stamens, $\times 5$; d) gynoecium, $\times 10$; e) fruiting branch, $\times 0.5$; f) samara, adaxial view, $\times 0.75$; g) samara, abaxial view, $\times 0.75$; h) torus after release of samaras, $\times 5$. Drawn by Karin Douthit, a–d from Schunke 7877, e–h from Schunke 6195.

nulla vel usque 1.5 mm lata; crista ventralis brevis, interdum in sinu apicali producta; areola ventralis ovata, 3.5 mm longa, 2 mm lata.

Type. *Schunke V* 6195, east of Tingo María, Huánuco, Peru, elev 700 m, 24 Oct 1962 frt (holotype F, isotype LA).

Distribution. Amazonian Venezuela, Brazil, and Peru. VENEZUELA. Amazonas: Mavaca, Jan flr, *Schwabe s n* (VEN). BRAZIL. Pará: Km 345, Belém-Brasília Highway, Aug flr/frt, *Maguire et al 56081* (MICH). Amazonas: forest on terra firme, serra near Namorado Novo, watershed between Rio Curuquetê and Rio Madeira at Abunã, Aug frt, *Prance et al 14710* (MICH). PERU. Loreto: Rio Ucayali below Requena, upland forest on sandy soil, Dec flr/frt, *Gentry et al 21306* (MICH). San Martín: bosque alta con mucha sombra, Río de la Plata, 1 km abajo de Tocache (márgen derecha del Río Huallaga), Prov. Mariscal Cáceres Dtto. Tocache Nuevo, elev 400 m, Jul flr, *Schunke V. 7877* (MICH). Huánuco: type, q v.

Mascagnia schunkei is named for José Schunke Vigo, the collector of the type, whose many collections from Amazonian Peru have greatly advanced our knowledge of that flora. It is in a group of similar species including *M. cynanchifolia* Grisebach, *M. strigulosa* (Rusby) Niedenzu, and *M. hirsuta* Niedenzu. Of these, *Mascagnia cynanchifolia* is the most distinctive, because it has the flowers congested and ascending, the petals bearing a few hairs abaxially, and the filaments and anthers sericeous. It seems to be endemic to Manaus; I have seen from there an isotype (NY) and a Ducke collection (MICH, RB). The other species all have the flowers evenly spaced and mostly horizontal, and the petals, filaments, and anthers are glabrous. *Mascagnia schunkei* has the hairs of both sides of the lamina straight and appressed, and the upper side is usually soon glabrate. In *M. strigulosa*, of which I have seen the holotype (NY) and a recent collection (*Prance 3463*, MICH, NY), the hairs are acutely bifurcate above and acutely bifurcate to substraight below, and persistent on both sides. I have not seen the type of *M. hirsuta*, but Niedenzu described the leaves as hirsute on both sides, rather than sericeous, which suggests a vesture most like that of *M. strigulosa*.

Color of the petals is known for only a few collections in this whole complex. Some are described as pink, and some as yellow. This difference, if real, should eventually aid in the taxonomy of *Mascagnia*, but at present I have too few observations to use the character. *Schunke 7877* is supposed to have had greenish-yellow petals, and in *Gentry et al 21306* they are described as pink.

12. *Mascagnia eggersiana* (Niedenzu) Anderson, comb et stat nov

Mascagnia tenuifolia Niedenzu var *eggersiana* Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 3: 10. 1908.

Woody vines, the stems puberulent, soon quite glabrate. Lamina of the larger leaves 8–15 cm long, 4–7.5 cm wide, ovate or elliptical or slightly obovate, cordate at the base, crispate at the margin, acuminate at the apex, sparsely sericeous to soon glabrate on both sides, bearing 2–6 small glands below at the base and often a pair in the distal 1/3; petiole 3–5 mm long, sparsely sericeous to glabrate, eglandular; stipules 0.5–1 mm long, triangular, turning dark red or black, interpetiolar. Inflorescence a sparsely velutinous axillary or terminal panicle containing reduced leaves, the flowers borne in corymbose or elongated pseudoracemes 1.5–6 cm

long, of 5–25 flowers; bracts 0.5–1.5 mm long, eglandular; peduncle 1.5–4.5 mm long, peltate at the apex in age, glabrescent; bracteoles ca 0.5 mm long, eglandular, borne mostly at or below the middle of the peduncle. Pedicel 5–9 mm long, glabrous. Sepals appressed after anthesis, exceeding the glands by 1.5 mm, 1.5 mm wide, ovate, obtuse at the apex, glabrous on both sides, the lateral 4 biglandular with the glands 2.5–3 mm long, free and slightly reflexed at the apex, the anterior sepal eglandular. Petals yellow, glabrous, exposed during enlargement of the bud, the laterals with the limb 3 mm long, 3 mm wide, ovate, erose or coarsely dentate, the claw 2 mm long, the posterior with a thicker claw and more deeply incised limb. Filaments 1.5–2 mm long, longest opposite the sepals, glabrous, straight, connate only at the very base; anthers ca 0.8 mm long, glabrous, the connective slightly glandular-swollen. Ovary 1.5 mm high, sparsely sericeous; styles 1.7–2 mm long, subequal, divergent, dorsally truncate or with a very short hook at the apex. Samara 2–3 cm high, 2–2.5 cm wide, ovate, soon quite glabrate, the lateral wing membranous, continuous at base and apex, emarginate at the apex or incised up to halfway to the nut, sinuate at the margin; nut eccentric; central dorsal winglet 3–5 mm wide; intermediate winglets none; ventral areole narrowly ovate, 5.5 mm long, 2 mm wide.

Type. *Eggers 13518*, Venezuela, 1891 (C, Field Mus. neg. 21344).

Distribution. VENEZUELA. Bolívar: edges of savanna and morichal near Pilon, 5 km NE of mouth of Río Parguazu, elev 100 m, Jan flr/frt, *Wurdack & Monachino 41130* (NY, VEN). Aragua: selva hacia Rancho Grande, elev 1000 m, Jul frt, *Trujillo 5083* (MY).

Nieden zu described two distinct species as varieties of *Mascagnia tenuifolia*, var *amazonica* and var *eggersiana*. I here designate *Spruce 4958* from Tarapoto, Peru (MG! NY!) as lectotype of *Mascagnia tenuifolia* Niedenzu, which will result in the use of that name for Niedenzu's var *amazonica*. The other variety is here raised to the status of species. The two species can be distinguished by the following characters:

1. Petals yellow; larger leaves cordate at the base, crispate at the margin; apex of styles dorsally truncate or very short-hooked; ovary sparsely sericeous, samara quite glabrate; apex of peduncle peltate in age. *M. eggersiana*.
1. Petals pink; larger leaves rounded at the base, slightly revolute but not crispate at the margin; apex of the 2 posterior styles dorsally long-hooked, the anterior with a short hook; ovary densely sericeous, samara sparsely but persistently sericeous; apex of peduncle truncate. *M. tenuifolia*.

13. *Mascagnia dissimilis* Morton & Moldenke, *Phytologia* 1: 19. 1933.

Woody vines, the stems glabrous or glabrate, older stems up to 1 cm in diameter. Lamina of the larger leaves 14–25 cm long, 6.5–11 cm wide, ovate or oblong, obtuse or rounded at the base, smooth and slightly revolute at the margin with a discolored band 0.5–1 mm wide, abruptly acuminate at the apex with the acumen 10–15 mm long, initially sericeous but very soon glabrate, eglandular or bearing up to 4 impressed glands at the base below and up to 6 distally, the reticulum raised or obscure on both sides; petiole 11–18 mm long, glabrous, eglandular; stipules ca 1 mm long, triangular, interpetiolar. Inflorescence axillary, minutely velutinous, an open panicle of 5–8 elongated to subcorymbose pseudoracemes 2–10 cm long, composed of (4–)7–40 flowers each; bracts 0.7–1 mm

long, eglandular; peduncle (2-)3-5(-8) mm long; bracteoles ca 0.5 mm long, eglandular or abaxially somewhat callose, borne between the middle and the apex of the peduncle or at the apex. Pedicel 11-14(-23) mm long, glabrous. Sepals exceeding the glands by 0.7-1.5 mm, obtuse or rounded at the apex, entire or denticulate, glabrous on both sides, the lateral 4 biglandular with the glands 2-3 mm long, the anterior sepal eglandular. Petals white, glabrous, the outermost exposed in the enlarging bud, with the limb ca 5 mm long, 3-3.5 mm wide, obovate, minutely denticulate, membranous, abaxially carinate, the winged claw ca 1 mm long. Filaments 1.5-3 mm long, glabrous, flanged and connate at the base, distally slender except opposite the posterior-lateral petals, those 2 filaments thick and broad; anthers 1.5-1.7 mm long, glabrous. Ovary sparsely sericeous; styles ca 2.5 mm long, the anterior slightly longer than the posterior 2, glabrous, laterally flattened, dorsally truncate or with a very short hook at the apex. Samara (2-)2.5-3.6 cm high, (2-)2.5-3.2(-4.3) cm wide, ovate or orbicular, glabrate at maturity or with a few hairs on the nut, the lateral wing membranous, continuous at base and apex, emarginate at the apex, entire or slightly sinuate; nut eccentric; central dorsal winglet 2-6 mm wide; intermediate winglets none; ventral areole ovate, about 3 mm long and 2 mm wide.

Type. *Lawrance* 546, El Umbo, Boyacá, Colombia, 21 Oct 1932 frt (holotype NY! isotype A!).

Distribution. Western Amazonia. VENEZUELA. Amazonas: Tamatama, edge of Orinoco, elev 121 m, May frt, *Ll. Williams* 15107 (F, US, VEN). BRAZIL. Amazonas: Rio Papury, Vaupés, Rio Negro, Oct frt, *Fróes* 21200 (IAN, NY, US). COLOMBIA. Antioquia: Tirana Creek, at confluence with Río Anorí, Mpio Anorí, Apr frt, *Soejarto et al* 3928 (NY). Boyacá: type, q v. Caqueta: 10 km S of San José de Fragua, elev 320 m, Jan bud, *Gentry et al* 9141 (MICH). PERU. Loreto: Prov. Maynas, Puerto Almendra, Feb flr/frt, *Revilla* 2351 (MICH).

This species is similar to *Mascagnia nervosa* Niedenzu, from which Cuatrecasas (1958) distinguishes it by the lack of a prominent reticulum on the upper side of the leaves in *M. dissimilis*. That characteristic is not very consistent, and the separation is better achieved on the basis of the larger ovate or oblong leaves of *M. dissimilis* with a distinctive discolored band at the margin. *M. nervosa* seems to be a species of NW Venezuela and adjacent Colombia and Panamá.

A possible synonym for *M. dissimilis* is *Mascagnia filipes* Macbride, described in 1950 in the Flora of Peru with *Klug* 815 from Mishuyacu near Iquitos as type; I have not seen that collection.

16. Jubelina Adr. Jussieu in Delessert, Icon. Sel. 3: 19, tab. 32. 1837 [1838].

Diplopterys subgenus *Jubelina* (Adr. Jussieu) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 4: 17. 1912.

Woody vines or lianas. Leaves opposite, the petiole eglandular, the lamina bearing impressed glands or rarely eglandular, the lateral veins interconnected by $\pm$ parallel tertiary veins, the stipules small or minute, triangular, borne at the base of the petiole. Inflorescence axillary and terminal, decompound, thyriform, containing much-reduced bract-like leaves below the floriferous bracts, the flowers ultimately borne in umbels of 4 or corymbs of 6; bracts and bracteoles large, pubescent on both sides, persistent; peduncle shorter than or at most equal to

the pedicel; old flowers (not setting seed) deciduous at the peduncle-pedicel joint. Sepals nearly free, narrowly ovate or oblong or obovate, the anterior sepal eglandular, the 4 lateral sepals each bearing 1 large gland formed by the $\pm$ complete fusion of 2 (except in *J. uleana*, with 6–8 distinct glands on the 4 lateral sepals). Petals pink or yellow, the lateral 4 spreading, the posterior erect. Receptacle glabrous. Stamens 10, the filaments and anthers glabrous, the connectives not extended beyond the locules. Ovary of 3 carpels, adaxially adnate to a common axis, 1 anterior and 2 posterior, all fertile; styles 3, subterminal, the apex with a large internal stigma and dorsally truncate or short-hooked. Fruit sericeous to glabrate, schizocarpic, comprising 3 (or less by abortion) 1-seeded samaras on a pyramidal torus, each samara bearing at least 2 large lateral wings usually continuous at the base and a smaller central dorsal wing, and often additional wings, winglets, or crests between them, the fertile locule accompanied on each side by a parallel sterile cavity developed during maturation of the fruit.

Type. *Jubelina riparia* Adr. Jussieu.

This is a mascagnoid genus of six known species: one in Central America and northern Colombia, one in Amazonian Peru, two in northwestern Amazonia (treated below), and two in northeastern Amazonia. It is most closely related to *Mezia*, which see for notes on their similarities and differences.

Key to the Species of *Jubelina* in Guayana

1. Stem hairs with a short cylindrical stalk and longer branches at right angles to it, producing a $\pm$ appressed vesture; lamina with 2–4(–6) glands at the base below and 2–6 distally in a single row; calyx glands revolute at the apex; posterior-lateral petals dentate but eglandular, only the posterior petal glandular-fimbriate; anterior style straight, posterior styles arcuate-ascending; samara without wings or winglets between the central dorsal wing and the lateral wings. 1. *J. bracteosa*.
1. Stem hairs with a long fusiform stalk and very short erect branches, producing a velutinous vesture; lamina with (8–)10–30 scattered glands below, often not in a single row; calyx glands attached for their whole length; posterior-lateral petals as well as the posterior petal glandular-fimbriate; all 3 styles straight; samara with 2 intermediate dorsal wings parallel to and higher than the central dorsal wing and many transverse winglets between them and the lateral wings. 2. *J. magnifica*.

1. *Jubelina bracteosa* (Grisebach) Cuatrecasas, Webbia 13: 446. 1958.

Mascagnia bracteosa Grisebach in Martius, Fl. Bras. 12(1): 97. 1858.

Diplopterys bracteosa (Grisebach) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 4: 20. 1912.

Woody vine with the stems subsericeous or appressed-tomentose, the hairs with a very short stalk and the limb at right angles to it and straight to somewhat serpentine. Lamina of the larger leaves 13–18 cm long, 7–12 cm wide, broadly elliptic, cuneate or rounded at the base, flat or slightly revolute at the margin, rounded or more often abruptly short-acuminate at the apex with the acumen 2–13(–20) mm long, bearing 2–4(–6) impressed glands below at the base and 2–6 in a single row distally, persistently velutinous to tomentose on both sides, more densely so below, the hairs with the arms longer than the stalk and suberect to parallel to the lamina and becoming serpentine, the nerves and reticulum prominent above, prominent below; petiole 14–23 mm long, subsericeous. Inflorescence lax to crowded, tomentose or subsericeous, containing much-reduced glandiferous leaves, the flowers borne in umbels of 4, the bracts and bracteoles

pink (?), 4–6.5 mm long, 1.5–2(–2.5) mm wide, narrowly oblong or spatulate, appressed-tomentose or subsericeous on both sides, the peduncle 0–1.5 mm long. Pedicel 5–7 mm long, subvelutinous, thickened in fruit. Sepals 4.5–5.5 mm long, 1–1.4 mm wide, narrowly oblong, reflexed, distally inflated with aerenchyma, tomentose on both sides, the anterior eglandular, the lateral 4 all bearing 1 large gland 1.5–2 mm long and wide, broadly ovate, acute and revolute at the apex, often emarginate at the base. Petals pink; lateral 4 petals sparsely to densely sericeous abaxially, the claw 2.5–3.5 mm long and 0.3–0.5 mm in diameter, the limb 4.5–6.5 mm long and 6–7.5 mm wide, rotund, the anterior-laterals deeply concave and entire to erose, the posterior-laterals shallowly concave and dentate; posterior petal glabrous, the claw 3.5 mm long, 0.7–1 mm in diameter, the limb 3.5–5 mm long, 2.5–4.5 mm wide, $\pm$ flat and rectangular, glandular-fimbriate all around the margin. Filaments 2–3.3 mm long, the longest opposite the anterior sepal, ca $\frac{1}{3}$ connate; anthers 1–1.4 mm long, those opposite the sepals with slightly swollen glandular connectives. Ovary ca 1 mm high, hispid; styles glabrous, the anterior 2.5 mm long, straight, the posterior 2 2.8 mm long, arcuate-ascending, the apex with a short rounded dorsal hook. Immature samara elliptical, ca 35 $\times$ 25 mm, the nut ca 12 mm in diameter, the ventral areole linear, 10 mm long, 2 mm wide; lateral wings continuous at the base, free at the apex, ca 13 mm wide, 26 mm high (i.e. from base to apex), flat, entire or slightly repand; central dorsal wing 6 mm wide, 17–20 mm high, semicircular, extended forward at the apex between the lateral wings; intermediate wings and winglets none, represented only by a crest on each side of the central dorsal wing, ca 1 mm wide and continuous at the apex with the lateral wing.

Lectotype. *Spruce* 2853, Rio Uaupés, Amazonas, Brazil (isotypes G, NY!).

Distribution. Rio Uaupés/Vaupés and upper Rio Negro. VENEZUELA. Amazonas: Carretera San Carlos-Solano, 2–6 km SO de Solano, elev 100 m, Apr flr, *Morillo et al* 3980 (MICH); San Simón de Cocuy, 1–2 km NO de la Piedra de Cocuy, elev 100 m, Apr flr, *Morillo et al* 4141 (VEN). BRAZIL. Amazonas: Pari Cachoeira, Rio Tiquié [69°45'W, 0°15'W], Dec flr, *Coelho & Francisco* 274 (INPA); Rio Papury, Vaupés, Rio Negro, Oct flr, *Fróes* 21173 (IAN, NY); Panurê, Rio Uaupés, *Spruce* 2853 (NY). COLOMBIA. Vaupés: Mitú, selva, elev 200 m, Oct flr, *Cuatrecasas* 7255 (US); Piracuara, Nov flr/frt, *Romero Castañeda* 3753 (COL).

The collection by Romero Castañeda is the first for this species with fruit, albeit immature. It indicates that *Jubelina bracteosa* is closely related to *J. wilburi* Anderson; in fact, the drawing of the samara published with that species (*Brittonia* 28: 411. 1976 [1977]) could almost serve for *J. bracteosa*, except for the longer lateral wings in *J. wilburi*.

2. *Jubelina magnifica* Anderson, sp nov

Fig 47.

Liana lignosa, ramis velutinis demum glabratis, pilis usque 1 mm longis, erectis, fusiformibus, distaliter brevibifurcatis, brachiis $\pm$ erectis saepe inaequalibus. Foliolorum majorum lamina 18–28 cm longa, 10–18 cm lata, late ovata vel elliptica, basi rotundata, margine paulo revoluta, apice abrupte acuminata acumine saepe usque 2(–2.5) cm longo, utrinque velutina subtus densissime, pilis bifurcatis, subtus (8–)10–30 glandulis impressis dispersis instructa, nervis lateralibus et venis

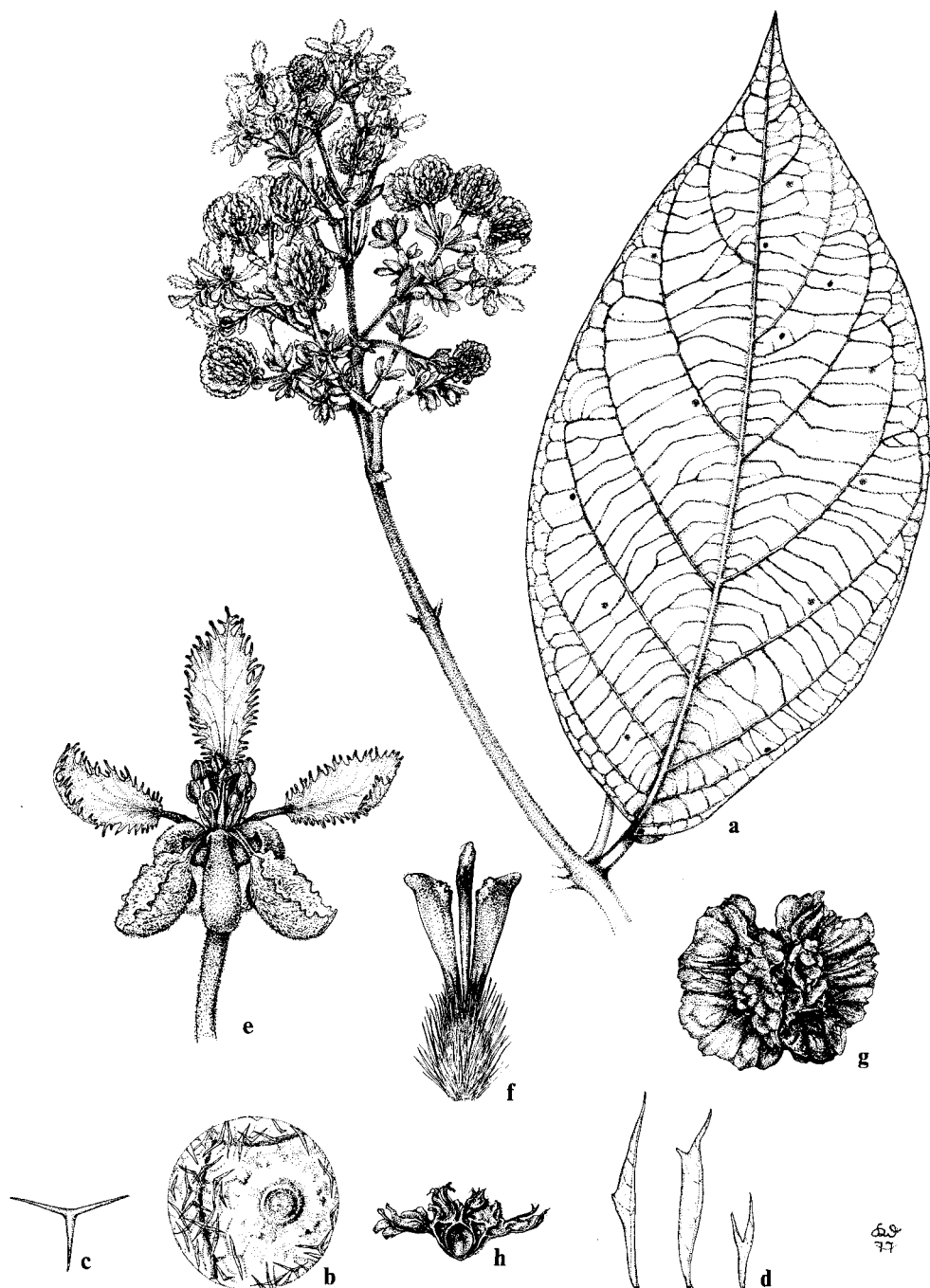


Fig 47. *Jubelina magnifica*. a) Flowering branch, $\times 0.5$; b) detail, abaxial surface of leaf, $\times 10$; c) hair from abaxial surface of leaf, $\times 25$; d) stem hairs, $\times 25$; e) flower, $\times 2.5$; f) gynoecium, $\times 10$; g) samara, abaxial view, $\times 0.5$; h) samara, cross-section, $\times 0.5$. Drawn by Karin Douthit, a-f from Maguire *et al* 36748, g and h from Wurdack & Adderley 43579.

tertiariis parallelis subtus prominentibus; petiolus (9-)13-20(-25) mm longus, velutinus; stipulae ca 1.5 mm longae. Inflorescentia velutina, foliolis glanduliferis instructa, floribus in umbellis 4-floris, bracteis floriferis 6-8 mm longis, 3-4 mm latis, obovatis vel ellipticis, utrinque appresso-tomentosis vel subsericeis, eglandulosis, pedunculo 0-2.5 mm longo, bracteolis bracteis similibus. Pedicellus 8-15 mm longus, velutinus vel tomentosus, in fructu crassior. Sepala 6.5-7 mm longa, 1.8-2.5 mm lata, anguste oblonga, reflexa, distaliter clavata aerenchymate inflata, utrinque tomentosa, anticum eglandulosum, 4 lateralialia omnia 1 glandulam magnam 2-2.8 mm longam, 1.5-2.5 mm latam, late ovatam vel circularem, apice non revolutam gerentia. Petala rosea, 4 lateralialia abaxialiter sericea, inter sepala patentia, 2 antico-lateralialia ungue 2.5-3.5 mm longo, 0.5-0.8 mm diametro, limbo 6-7 mm longo, 7-9 mm lato, profunde concavo, margine eroso et eglanduloso vel basi pauciglandulifero, 2 postico-lateralialia ungue 1.7-3 mm longo, 0.7 mm diametro, limbo 6-6.5 mm longo, 5-5.5 mm lato, plano vel parum concavo, margine toto circuitu glanduloso-fimbriato; petalum posticum glabrum, erectum, ungue 3-3.5 mm longo, 1-1.4 mm diametro, limbo 5-7.5 mm longo, 3-4 mm lato, elliptico vel obovato, plano, margine toto circuitu glanduloso-fimbriato. Filamenta glabra, basi connata, 2.4-3 mm longa, illa sepalis opposita quam illa petalis opposita longiora; antherae glabrae, 1-1.7 mm longae, in eodem flore heterogeneae. Ovarium 2 mm altum, dense hispidum, stylis 2-3 mm longis, glabris, rectis, subaequalibus, apice dorsaliter truncatis vel breviuncinatis. Samara immatura subcircularis, 5 × 4.5 cm, nuce ca 2 cm diametro, loculum fertilem 7-8 mm diametro et 2 cavernulas laterales ca 4 mm diametro continente, areola ventrali lineari, 12-15 mm alta et 2-3 mm lata, basi in rostrum 2 mm longum producta, alis lateralibus basi discretis vel confluentibus sed profunde emarginatis, apice discretis, utraque semicirculari 10-15 mm lata, corrugata et margine repanda, ala dorsali centrali redacta, ca 5 mm lata et 25 mm alta (e apice ad basin), semicirculari, apice nucis inter alas laterales parum producta, alis dorsalibus intermediis utrinque 1 ad alam centralem paralleli ca 8-12 mm lata et ca 30 mm alta, apice basique cum ala laterali confluenti, valde plicata vel corrugata, margine grosse dentata, alulis inter alam lateralem et alam dorsalem intermediam ca 10, 3-7 mm latis, irregularibus, saepe lobatis, plerumque transversis.

Type. *Maguire, Wurdack & Bunting 36748*, igarapé forest of uppermost Río Yaciba, Ríos Pacimoni-Yatua, Casiquiare, Amazonas, Venezuela, elev 100-140 m, 12 Dec 1953 fl/frt (holotype NY [no. 1 of 2 sheets], isotypes MICH, NY [no. 2 of 2 sheets], US, VEN).

Distribution. Known only from the type locality and nearby localities. VENEZUELA. Amazonas: type loc. q v, *Maguire et al 36694*, Dec fl/imm frt (MICH, NY, US, VEN), *36694-A*, Dec fl (NY), *36743*, Dec fl (MICH, NY, US, VEN), type q v; uppermost Río Yatua, elev 100-140 m, Jun fl, *Maguire et al 42601* (NY); Río Siapa between Raudal Gallineta and Salto Gallineta, elev 130-150 m, Jun fl/frt, *Wurdack & Adderley 43579* (MICH, NY, US, VEN).

Collected in flower and fruit in December and June.

This species is named for its large velutinous leaves, dense inflorescences, and large complicated fruits; it must be a truly magnificent vine. Its closest relatives are *Jubelina riparia* and *J. rosea*; they can be separated by the following key:

1. Lamina of the larger leaves 18-28 cm long, 10-18 cm wide, acuminate at the apex with the acumen up to 2(-2.5) cm long, bearing (8-)10-30 scattered glands below; all 4 lateral petals

densely sericeous abaxially; central dorsal wing of the samara only $\frac{1}{2}$ or less the width of the 2 parallel intermediate dorsal wings, hidden between them.

J. magnifica.

1. Lamina of the larger leaves 12–19 cm long, 9–13 cm wide, rounded or short-acuminate at the apex with the acumen up to 1 cm long, bearing 0–4(–6) glands below at the base and (0)–2–6(–8) glands distally in a single row; posterior-lateral petals much less sericeous than the anterior-lateral ones or glabrate; central dorsal wing of the fruit equal to or wider than the 2 parallel intermediate dorsal wings.

2. Samara (according to descriptions and figures) with the lateral wings only 0.7–1 cm wide beyond the nut, $\pm$ corrugated, coarsely toothed at the margin; intermediate dorsal wings connected to the lateral wings by many crowded irregular crests; lamina with 2–4(–6) glands below clustered at or near the base, plus 1–2 on each side distally.

J. riparia.

2. Samara with the lateral wings 3–3.5 cm wide beyond the nut, $\pm$ flat, sinuate at the margin; intermediate dorsal wings connected to the lateral wings by a few small parallel crests; lamina without glands below at the base, but usually bearing 1–3(–4) on each side in a row distally.

J. rosea.

Jubelina riparia Adr. Jussieu has as its type *Leprieur* in 1832 from the Oiapoque River in French Guiana (P, F!). The following recent collections have extended its range into Brazil: Terr. Amapá: right bank of Rio Amapari 2–3 miles above Serra do Navio, Nov flr, *Cowan 38591* (MICH, NY); along the Rio Araguari, vic. Camp 12, 1°11'N, 52°8'W, Sep flr, *Pires et al 51345* (NY). Pará: várzea do Aurá, Anandindéua, Sep flr, *Pires 4744* (US).

Jubelina rosea (Miquel) Niedenzu is based on *Hiraea rosea* Miquel, its type being *Kappler 1807* from the Marowijne River in Surinam (U?). Until recently it was known only from the type, another collection from Surinam cited by Kostermans (1936), and *Mélinon* in 1864 from French Guiana (F, NY). However, two new collections were made in Surinam in 1976, one of which is in fruit and dramatically confirms that this species, so like *J. riparia* in other respects, has quite distinctive fruits. These collections are *Mori & Bolten 8399* from Brownsberg Nature Park, edge of forest, Mazaroni Plateau, 90 km S of Paramaribo, Sep flr (MICH), and *Mori & Bolten 8551* from Lely Mountains, 175 km SSE of Paramaribo, elev 500–700 m, Oct flr (MICH). Both of these are from upland localities, presumably quite different from the riverine localities of all known collections of *J. riparia*. This suggests a possible ecological difference between the two species in addition to the morphological differences given in the above key.

17. *Mezia* Schwacke ex Niedenzu, Nat. Pflanzenfam. 3(4): 58. 1890.

Stenocalyx Turczaninow, Bull. Soc. Nat. Mosc. 31(1): 393. 1858, non *Stenocalyx* Berg, 1854, Myrtaceae.

Diplopterys Adr. Jussieu sect *Mezia* (Schwacke ex Niedenzu) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 4: 16. 1912.

Woody vines or lianas. Leaves opposite, the petiole eglandular, the lamina bearing impressed glands or eglandular, the stipules minute, interpetiolar, caducous. Inflorescence tightly reddish- or dark brown-sericeous throughout, axillary and terminal, decompose, containing much-reduced bract-like leaves below the floriferous bracts, the flowers ultimately borne in umbels of 4; bracts smaller than the bracteoles, abaxially sericeous, adaxially glabrous or sparsely sericeous near the margin, eglandular, deciduous before maturation of the fruit; peduncle well developed; bracteoles borne just below the flower, large, globose-

cymbiform, the inner enclosing the bud until anthesis, the outer enclosing both bud and inner bracteole, abaxially sericeous, adaxially glabrous or sparsely sericeous, often splitting at the apex at anthesis, persistent or deciduous; pedicel very short, to 2 mm long in fruit; old flowers (not setting seed) deciduous at base of peduncle, not at joint between peduncle and pedicel. Sepals free, narrowly oblong or spatulate, rounded at the apex, abaxially tomentose, adaxially glabrous or bearing a few hairs, the anterior sepal eglandular, the 4 lateral sepals each bearing 2 large compressed glands, these distinct or partially to completely connate. Petals yolk-yellow, plane or slightly concave, the lateral 4 reflexed, the posterior erect or reflexed in the limb. Receptacle glabrous. Stamens 10, the filaments basally to $\frac{1}{2}$ or more connate, the 2 opposite the postero-lateral petals longer and thicker than all others; anthers dimorphic, the 5 opposite the sepals differing in size and shape of the connective, and sometimes in pubescence, from the 5 opposite the petals. Ovary of 3 carpels, adaxially adnate to a common axis, 1 anterior and 2 posterior, all fertile, sericeous; styles 3, subterminal, the apex with a large internal stigma and dorsally truncate or short-hooked or pedaliform, the anterior style shorter and often slenderer than the 2 posterior styles. Fruit schizocarpic, comprising 3 (or less by abortion) 1-seeded samaras borne on a pyramidal torus, each samara bearing 2 large lateral wings free or more often continuous at the base, a smaller dorsal wing, and often additional crests or winglets between them or outside the lateral wings.

Type. *Mezia araujei* Schwacke ex Niedenzu.

This is a mascagnoid genus, distinguished by its four-flowered umbels, the reddish or dark brown sericeousness of the inflorescence, the very large bracteoles that completely enclose the flower until anthesis, the very short (practically absent) pedicel, the long narrow sepals four of which bear large compressed or rarely connate glands, and the dimorphic anthers. It is also most unusual in this family for abscission of old flowers to be at the base of the peduncle instead of between peduncle and pedicel. The genus most like *Mezia* is *Jubelina*, which resembles *Mezia* in having umbels, large bracteoles, long narrow sepals, compressed or connate calyx glands, and large mascagnoid fruits. However, *Jubelina* has a well developed pedicel, the bracteoles do not enclose the bud, abscission of its flowers is at the peduncle-pedicel joint, and its samara has sterile cavities on each side of the fertile locule, which are not present in *Mezia*.

Mezia comprises several species in addition to the ones treated here, these occurring mostly in Brazil, as far south as Rio de Janeiro.

Key to the Species of *Mezia* in Guayana

1. Anthers all glabrous; peduncle in fruit 11–25 mm long.
2. Leaves moderately sericeous to glabrate below, often early glabrescent; lamina of larger leaves 13–20 cm long, 6–9.5 cm wide. 1. *M. includens*.
2. Leaves very densely and persistently sericeous below, the short appressed hairs completely concealing the lamina and producing a reddish- or ferruginous-metallic sheen; lamina of larger leaves 16–28 cm long, 10–17 cm wide. 2. *M. rufa*.
1. Anthers opposite the sepals densely tomentose, those opposite the petals glabrous or with a few apical hairs; peduncle in fruit 7–9 mm long. 3. *M. curranii*.

1. *Mezia includens* (Benth) Cuatrecasas, *Webbia* 13(2): 450. 1958.

Tetrapteryx includens Benth, London Jour. Bot. (Hooker) 7: 133. 1848.

Stenocalyx involutus Turczaninow, Bull. Soc. Nat. Mosc. 31: 394. 1858. Type. *Funck & Schlim* 518, Carabobo, Venezuela (holotype CW? isotype G).

Diplopteryx involuta (Turczaninow) Niedenzu, Arb. Bot. Inst. Lyc. Braunsberg 4: 17. 1912.

Diplopteryx includens (Benth) Niedenzu in Engler, Pflanzenreich IV. 141: 226. 1928.

Liana with the young stems often quadrangular, the older stems punctate and often fissured as well. Lamina of the larger leaves 13–20 cm long, 6–9.5 cm wide, elliptic, sometimes slightly ovate or obovate, rounded to cuneate or slightly attenuate at the base, usually abruptly short-acuminate at the apex with the acumen 5–15 mm long, glabrous above, moderately sericeous to glabrate below, bearing 2 large glands below at the base and a row of tiny impressed glands parallel to but set in from the margin, the lateral veins and reticulum prominulous above, prominent below; petiole 1.4–2.1(–2.5) cm long, sericeous to glabrate; stipules caducous, leaving interpetiolar scars ca 0.5 mm wide. Bracts 3(–5) mm long, concave; peduncle 7–16(–20) mm long in flower, 11–25 mm long and thickened in fruit; bracteoles 8–12 mm long, reddish-brown, eglandular; pedicel up to 2 mm long, thickened in fruit. Sepals 6.5–9.5 mm long beyond glands, 2–2.5 mm wide, reflexed and often revolute, the glands 2.5–3.5 mm long, 1–1.5 mm wide, obovate, compressed but distinct. Lateral petals with the claw 1.5–3 mm long, 0.3–0.5 mm wide, the limb 10–16 mm long, 9–14 mm wide, orbicular or broadly obovate, abaxially brown-sericeous in center, crumpled toward the margin, erose; posterior petal with the claw 3.5–4.5 mm long, 0.8–1.1 mm wide, constricted at the apex, the limb 5–7.5 mm long, 4–5.5 mm wide, rectangular, glabrous, glandular-fimbriate all around the margin. Filaments glabrous, 2–4 mm long, ca ½ connate; anthers all glabrous, those opposite the petals 1–2.4 mm long with the dark connective equalling (very rarely slightly exceeding) the locules, the anther opposite the posterior petal much smaller than the other 4, those opposite the sepals with the locules 1–1.5 mm long, exceeded at the apex by the ellipsoid connective by 0.4–1(–1.5) mm, the connective uniformly dark except for a yellow line or ridge over the apex, apparently a remnant of sterile locular tissue. Styles straight, terete or slightly flattened, proximally sericeous, acute or truncate at the apex, the anterior style 3–3.5 mm long, the posterior styles 4–5 mm long. Samara subcircular, 7–10 × 5–9 cm, the nut with an ovate areole 7–11 mm high, 3–5 mm wide, the lateral wing 3–4.5 cm wide, continuous at the base, incised to the nut at the apex, membranous, entire or repand at the margin, the central dorsal wing 7–10 mm wide, semicircular, with a shorter parallel winglet between the dorsal and lateral wings and sometimes with transverse crests or winglets.

Type. *Martin*, Cayenne [French Guiana] (K).

Distribution. Wet forests in northern South America, principally Venezuela, with a few collections from adjacent areas, one from Panama, and a few from French Guiana. Guayana collections seen: COLOMBIA. Amazonas-Vaupés: Río Apaporis (at mouth of Río Piraparaná) and vicinity, 0°15'S, 70°30'W, elev ca 210 m, *Schultes & Cabrera 15691* (A, NY, US). BRAZIL. Amazonas: Rio Castanho, trib. of Rio Padauri, upper Rio Negro basin, elev 100–140 m, *Cardona 1387* (US, VEN). VENEZUELA. Amazonas: Sierra Parima, 2°27'24"N, 63°56'W, 45 km

NW of headwaters of Río Orinoco, elev 1300 m, *Steyermark 106064* (NY). Bolívar: riparian climber, caño Avacapa, region Urimán, elev 400–500 m, *Bernardi 1469* (NY); region Ríos Icabaru & Hacha, *Bernardi s n*, 12/I/1956 (NY); Upata-San Felix, *Blanco 132* (US); El Dorado-La Gran Sabana, Km 114–124, *Bunting 3082* (F, MY); S of El Dorado, Km 42–65, elev 230 m, *Steyermark 86702* (NY, VEN); headwaters of Río Chicanán, Sierra Lema, 6°5'N, 62°W, elev 300–320 m, *Steyermark 89477* (F, NY, VEN) & *89645* (NY, US, VEN); El Dorado-Sta. Elena de Uairen, *Trujillo 3761* (MY). GUYANA. Mt. Ayanganna, upper Mazaruni River basin, elev 800–900 m, *Tillett et al 45136* (K, MICH, NY, US); Kako River, upper Mazaruni River basin, elev ca 500 m, *Tillett & Tillett 45538* (K, MICH, NY, US); Mazaruni Station, *Forest Dept. 4286* (NY).

Collected in flower and fruit from January to September.

The description given above is based only on the collections cited. These are rather variable in the size, shape, and vesture of the leaf, and in the winglets of the samara, but still seem to represent a reasonably coherent phenetic species.

2. *Mezia rufa* Anderson, sp nov

Fig 48a–g.

Liana internodiis vegetativis sericeis demum glabratis, quadrangularibus, veltustioribus fissuratis et 4-alulatis. Foliorum majorum lamina 16–28 cm longa, 10–17 cm lata, late elliptica vel parum ovata obovatave, basi rotundata vel breviter attenuata, apice abrupte acuminata acumine 1–2 cm longo, supra sericea mox vel demum glabrata, subtus densissime et pertinaciter metallo-sericea pilis rufis vel ferrugineis, sessilibus, rectis, usque 0.4 mm longis, subtus basi 2 glandulis magnis et utrinque sub margine praecipue versus apicem serie 5–10 glandularum parvarum impressarum instructa, reticulo et nervis lateralibus supra prominulis, subtus mediocriter prominentibus; petiolus 2–2.5 cm longus, sericeus vel demum glabratus, eglandulosus; stipulae non visae. Inflorescentia rufo-sericea, bracteis 4–6 mm longis, concavis, pedunculo (in flore) 11–15 mm longo, bracteolis 10–12 mm longis, rufis, eglandulosis, pedicello usque 1 mm longo. Sepala glandulas 6–7.5 mm superantia, 2–3 mm lata, reflexa et valde revoluta, glandulis 3–4 mm longis, 1.5 mm latis, ellipticis vel obovatis, compressis sed distinctis. Petala lateralialia ungue 2–3.5(–4) mm longo et 0.5–1(–1.5) mm lato, limbo (10–)12–15(–18) mm longo et 12–15(–18) mm lato, suborbiculari, abaxialiter in centro sericeo, corrugato versus marginem, margine eroso; petalum posticum ungue 4.5–5 mm longo et 1–1.5 mm lato, apice constricto, limbo 7–8 mm longo, 7–9 mm lato, suborbiculari, glabro, margine toto circuitu glanduloso-fimbriato vel distaliter eglanduloso. Filamenta glabra, 2.5–3.5 mm longa, ca ½ connata; antherae glabrae, illae petalis oppositae 1–1.8 mm longae, connectivo loculos non vel brevissime superanti, illae sepalis oppositae connectivo tumido loculos 1.3–1.5 mm longos 0.5–1 mm superanti. Styli recti, ± teretes vel parum complanati, sericei in dimidio proximali, apice dorsaliter truncati, anticus 3–3.8 mm longus, postici 3.5–4.5 mm longi. Samara immatura sicut in *M. includens*, i e ala laterali basi continua apice usque nucem incisa, ala dorsali centrali et utrinque alula intermedia parallelibus, et aliquot alulis transversis; samara matura ignota.

Type. *Silva & Brazão 60837*, forest between Missão Salesiana and Serra Pirapucú, Rio Maturaca, elev 50–400 m, Amazônia, Brazil, 15 Jan 1966 flr (holotype MG, isotypes MICH, NY, US).

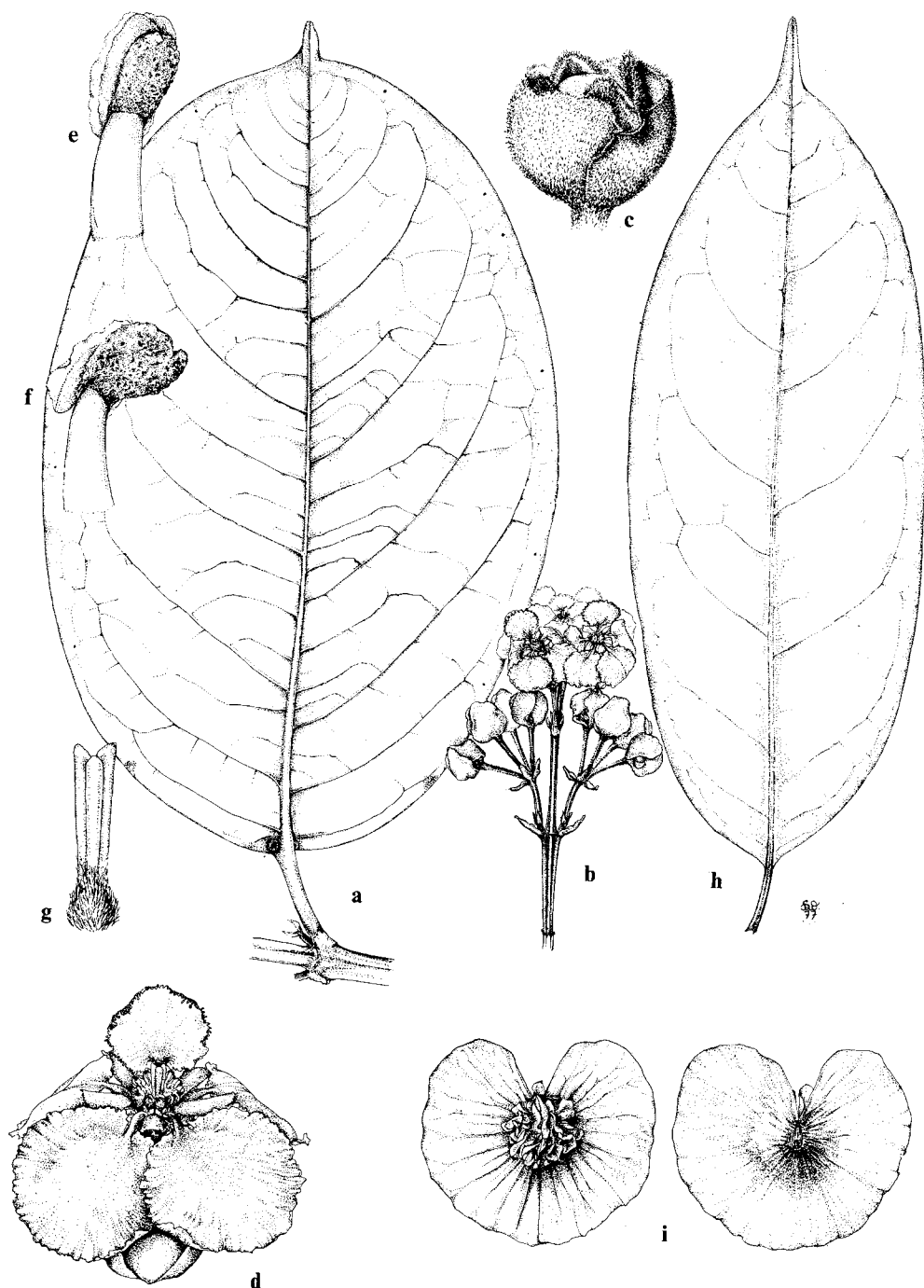


Fig 48. *Mezia rufa* and *M. curranii*. a–g, *M. rufa*: a) Leaf, $\times 0.5$; b) portion of inflorescence, $\times 0.5$; c) bud enclosed by bracteoles, $\times 2.5$; d) flower, $\times 1.5$; e) anther from stamen opposite petal, $\times 10$; f) anther from stamen opposite sepal, $\times 10$; g) gynoecium, $\times 5$. h–i, *M. curranii*: h) Leaf, $\times 0.5$; i) samara, abaxial side (left) and adaxial side (right), $\times 0.5$. Drawn by Karin Douthit, a–g from Silva & Brazão 60837, h–i from Curran 253.

Distribution.¹⁰ BRAZIL. Amazonas: São Gabriel, Rio Negro, Nov fr, *Ducke* [RB 35610] (MICH, RB); type, q v. PERU. Loreto: Gamitanococha, Río Mazán, elev 100–125 m, Feb fr, *Schunke* 245 (A, NY, US).

The epithet of this handsome species refers to its leaves, which have a rufous or ferruginous metallic sheen below due to the appressed, persistent hairs.

3. *Mezia curranii* Anderson, sp nov

Fig 48h, i.

Liana internodiis vegetativis sericeis mox glabratis, teretibus vel obscure angulatis, vetustioribus fissuratis non punctatis. Foliorum majorum lamina 12.5–23 cm longa, 4.5–8.3 cm lata, ca triplo longioris quam lata, elliptica vel anguste ovata, basi breviter attenuata, apice acuminata acumine 1.5–2 cm longo, supra glabra, subtus sparsissime sericea vel glabrata, subtus basi 2 glandulis magnis et utrinque sub margine serie 5–10 glandularum parvarum impressarum instructa, nervis lateralibus et reticulo utrinque praecipue subtus prominentibus; petiolus 1.2–1.7 cm longus, glabratus, eglandulosus; stipulae non visae. Inflorescentia atrobrunneo-sericea, demum glabrescentia, bracteis et bracteolis delapsis non visis, pedunculo (in fructu) 7–9 mm longo, laxe sericeo, pedicello (in fructu) usque 1.5 mm longo, flavido-tomentoso vel glabrato. Sepala glandulas 6–6.5 mm superantia, 1.5–1.8 mm lata, glandulis 2–2.5 mm longis et 1.1 mm latis, obovatis, decurrentibus, compressis sed distinctis. Petala delapsa non visa. Filamenta glabra, 2–2.7 mm longa, $\frac{1}{2}$ – $\frac{3}{4}$ connata; antherae petalis oppositae glabrae vel apice paucipiliferae, 1–1.6 mm longae, connectivo triangulari loculos lineares non superanti; antherae sepalis oppositae dense tomentosae, connectivo ellipsoideo loculos lineares 1–1.3 mm longos 0.5 mm superanti. Styli (in fructu) 2.3–3.5 mm longi, recti, $\pm$ teretes, sericei in dimidio proximali, apice dorsaliter truncati. Samara subcircularis 5.5–6.5 $\times$ 4–6 cm, nucis areola ventrali ovata, 4–6.5 mm alta, 2–2.6 mm lata; ala laterali 2–3 cm lata, basi continua, apice usque nucem incisa, membranacea, margine repanda; ala dorsali centrali ca 7 mm lata, 1.9–2.4 cm alta (e apice ad basin), semicirculari; alis dorsalibus intermediis utrinque 1 ad alam centralem paralleli 5–7 mm lata; alulis inter alam lateralem et alam dorsalem intermediam ca 5–10, 5–7 mm latis, undulatis, plerumque transversis.

Type. *H. M. Curran* 253, Culebra, Amazonas, Venezuela, “4/9/50” (holotype MICH, isotype NY).

This species is generally similar to *Mezia includens* in such important respects as having the filaments glabrous and half connate, the connective cylindrical, and the styles straight and truncate. However, in having the anthers opposite the sepals densely tomentose it is more like *M. araujei* of the coastal mountains near Rio de Janeiro, and it differs further from *M. includens* in having relatively narrow, long-acuminate leaves and in details of the fruit. It is known only from the type, which is in fruit, so description of its petals will have to await its re-collection. The specific epithet honors the collector of the type, H. M. Curran.

¹⁰ While this paper was in press I received from Dr. Otto Huber a collection (*Huber* 449) that seems to be referable to *Mezia rufa* and is the first collection from Venezuela. The leaves are quite small for this species (9 cm long and 4 cm wide, with the petiole 1 cm long), but otherwise the plants resemble the more southern populations; perhaps older stems bore larger leaves. VENEZUELA. Amazonas: Cuenca del Río Manapiare, entre el Cerro Morrocóy y la Serranía Colmena, 5°20'N, 66°10'W, selva de galería, elev 200–350 m, Jan fr/imm frt (MICH).

18. *Hiraea* Jacquin, Select. Stirp. Amer. Hist. 137. 1763.

Woody vines (or rarely small trees?) with decussate leaves usually bearing glands on the lamina or petiole or both, the tertiary nerves often strongly parallel, the stipules usually borne on the petiole (except *H. primaeva*), often at or above the middle, often long and subulate. Inflorescence axillary, basically 1–several compact panicles of several 4-flowered umbels, often reduced to a single umbel, the umbel many-flowered in some species; pedicel usually sessile (i.e. floriferous peduncle absent), subtended by a bract and 2 bracteoles, the bracts and bracteoles persistent and eglandular (except 1 bracteole glandular in *H. primaeva* & *H. adenophora*). Sepals not completely concealing the petals in bud, the lateral 4 biglandular or eglandular, the anterior eglandular. Petals usually (always?) yellow, usually glabrous, the posterior usually differentiated from the lateral 4. Stamens 10, all fertile, the anthers glabrous and more or less alike. Ovary of 3 nearly free carpels, 1 anterior and 2 posterior, all fertile; styles 3, each inserted low on the ventral face of a carpel, the apex with an internal stigma and dorsally rounded to prominently hooked. Fruit schizocarpic, breaking apart into 3 samaras (or fewer due to abortion), each samara having its largest wings lateral, usually 2 discrete wings (continuous at the base in *H. primaeva*); dorsal wing smaller, sometimes reduced to a crest or lost; intermediate winglets or slender projections rarely present; mericarps borne on a very low pyramidal torus. Embryo with 1 large and 1 very small cotyledon.

Type. *Hiraea reclinata* Jacquin.

This natural and difficult genus comprises at least 45 species, occurring throughout the Neotropics but most diverse in northern South America.

Key to the Species of *Hiraea* in Guayana

1. Individual umbels of 15–36 flowers. 1. *H. longipilifera*.
1. Individual umbels of 4(–6) flowers.
 2. Mature lamina densely velutinous below, the hairs erect, stalked, bifurcate.
 3. Lamina 23–26 cm long (excluding the caudate apex 8 mm long), 16–20 cm wide; petiole 21–28 mm long, 4–5 mm in diameter; pedicel (in fruit) 11–15 mm long, 0.8–1.5 mm in diameter (–2.5 mm at apex); 1 of each pair of bracteoles (4 per umbel) bearing a large abaxial gland. 2. *H. primaeva*.
 3. Lamina of the larger leaves 6.5–12.5 cm long, 4.5–8 cm wide; petiole 6–11 mm long, 1–2.5 mm in diameter; pedicel (in flower) 15–21 mm long, 0.5–0.7 mm in diameter (–1 mm at apex); bracteoles eglandular. 3. *H. bifurcata*.
 2. Mature lamina sericeous to glabrate below, the hairs (if any) nearly or quite sessile and ± appressed to the lamina.
 4. Lamina very densely and persistently sericeous below, the hairs completely concealing the lamina and producing a golden or silvery-metallic sheen; posterior petal glandular-fimbriate. 4. *H. faginea*.
 4. Lamina thinly sericeous or subtomentose below to glabrate; posterior petal dentate to fimbriate, eglandular (so far as known).
 5. Umbel with a globose or depressed-globose, often dark glandular cushion, 0.7–2 mm in diameter, in the center between the bracteoles.
 6. Lamina distinctly cordate at the base; limb of the lateral petals 6.5–8 mm long, 7.5–9 mm wide. 5. *H. fimbriata*.
 6. Lamina cuneate or rounded at the base; limb of the lateral petals 4–7 mm long, 4.5–7 mm wide.
 7. Lateral veins quite prominent below, hardly or not at all raised above; limb of the lateral petals 5–7 mm long and wide; nut of the samara 3–4 mm in diameter. 6. *H. apaporiensis*.

7. Lateral veins not or only slightly raised, about as prominulous above as below; limb of the lateral petals 4–5 mm long, 4.5–5 mm wide; nut of the samara ca 2 mm in diameter. 11. *H. tepuiensis*.
5. Umbel without a prominent central cushion, at most with a tiny obscure central body up to 0.3 mm in diameter.
8. Ovary and samara (both nut and wings) densely velutinous, most of the hairs erect, $\pm$ straight, basifixed or sub-basifixed; nut of the samara depressed-globose, 8–10 mm in diameter, bearing 15–20 parallel ribs, some of the ribs usually continuing as winglets on the underside of the lateral wings; lamina of the larger leaves 19–25 cm long, 6.5–9.5 cm wide. 7. *H. silvae*.
8. Ovary and samara sericeous or tomentose, many or all of the hairs (especially on the wings) medifixed and $\pm$ appressed; nut of the samara (where known) globose or cylindroidal, 2–5 mm in diameter, smooth-sided; lamina of the larger leaves 6–28 cm long, 3–12 cm wide.
9. Pedicel 16–22 mm long. 8. *H. celiana*.
9. Pedicel 7–15 mm long.
10. Lateral veins quite prominent below, hardly or not at all raised above; immature samara greenish or yellowish, the lateral wings 35–50 mm high and 18–30 mm wide.
11. Petiole 12–20 mm long; mature lamina glabrate below except for the sericeous midrib; pedicel brownish-tomentose. 9. *H. schultesii*.
11. Petiole 6–10 mm long; mature lamina bearing many fine white hairs below, 0.2–0.5 mm long, in addition to those of the often sericeous midrib; pedicel whitish-sericeous. 10. *H. affinis*.
10. Lateral veins not or only slightly raised, about as prominulous above as below; immature samara reddish, the lateral wings up to 18 mm high and 10 mm wide. 11. *H. tepuiensis*.

1. *Hiraea longipilifera* Anderson, sp nov

Fig 49.

Liana lignosa, ramis sericeis. Foliorum lamina 13–18 cm longa, 7.5–12 cm lata, late elliptica vel obovata, coriacea, basi cordata vel subcordata, margine revoluta et multis glandulis parvis instructa, apice obtusa saepe apiculata, supra primo subsericea pilis 1.1–1.4 mm longis brevistipitatis demum glabrata praeter costam, subtus dense et pertinaciter velutina pilis majoribus T-formibus pede usque 0.5 mm longo trabecula usque 1.1 mm longa, pilis minoribus Y-formibus, nervis lateralibus et venis tertiariis inter se valde parallelis supra impressis vel obscuris subtus prominentibus; petiolus 10–15 mm longus, 3–4 mm diametro, laxe sericeus, apice biglandulifer; stipulae 1.5–4 mm longae, subulatae, 2–5 mm supra basim petioli portatae. Inflorescentia axillaris, umbella 15–36-flora, pedunculo sericeo 3–6 cm longo, bracteis floriferis 2–3 mm longis, triangularibus, abaxialiter sericeis, adaxialiter glabris, eglandulosis, bracteolis similaribus sed minoribus. Pedicellus 24–26 mm longus, apice 2 mm diametro, brunneo-sericeus. Sepala 3–3.5 mm longa, 2–2.5 mm lata, triangularia, apice revoluta, abaxialiter dense sericea, adaxialiter glabra, omnia eglandulosa vel 4 lateralia 8 glandulis ellipticis 2.2–2.8 mm longis instructa. Petala lutea, 4 lateralia ungue 2–2.5 mm longo, limbo 6–8 mm longo, 6.5–9 mm lato, suborbiculari, concavo, margine subintegro vel dentato eglanduloso; posticum ungue 3.5 mm longo, limbo 5.5–6 mm longo, 6–6.5 mm lato, orbiculari, plano vel parum concavo, margine toto circuitu glanduloso-fimbriato glandulis 0.3–1 mm longis, digitiformibus. Filamenta glabra (vel adax-

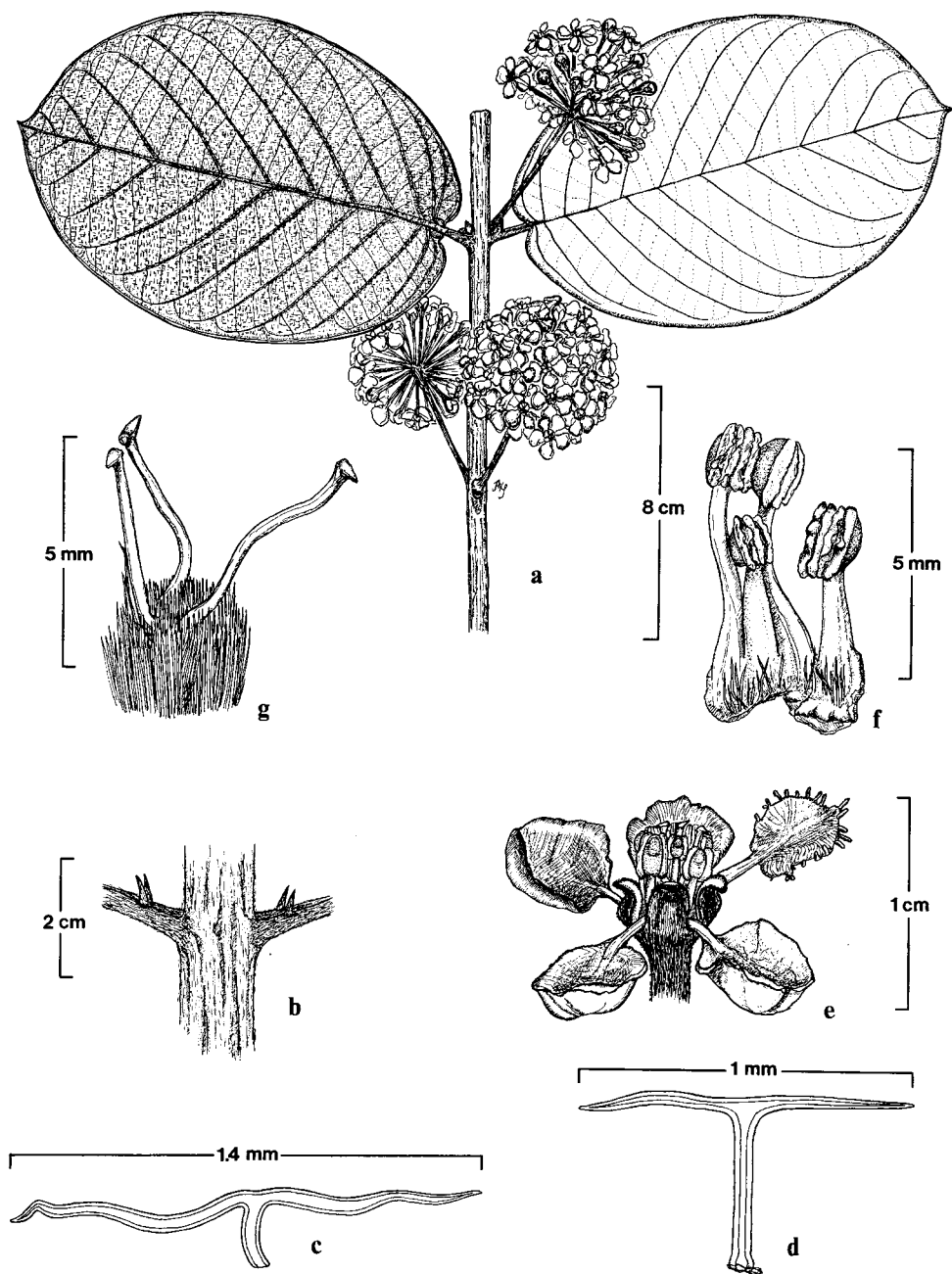


Fig 49. *Hiraeta longipilifera*. a) Flowering branch; b) stipules on petioles; c) hair from adaxial surface of leaf; d) hair from abaxial surface of leaf; e) flower; f) 4 stamens, the shortest that opposite the posterior petal; g) gynoecium, the anterior style to the left. Drawn from Tillett & Tillett 45281 by Annette Seidenschnur Mahler.

ialiter basi paucipilifera), basi breviter connata, illa sepalis opposita 3.5–4.2 mm longa, recta vel sigmoidea, illa petalis opposita 2.5–3 mm longa, recta; antherae 1–2 mm longae, illae petalis lateralibus oppositae longissimae, connectivo brunneo vel atrorubro, apice luteo-glanduloso. Ovarium 1.5 mm altum, dense atro-brunneo-hirsutum; styli ca 3.5–5 mm longi, glabri, arcuato-ascendentes vel demum torti, anticus parum brevior, apice dorsaliter brevi-uncinati unco acuto vel obtuso. Fructus ignotus.

Type. *Tillett & Tillett 45281*, Mora forest bordering Kukui River at Adaro River mouth, upper Mazaruni River Basin, Guyana, elev ca 500 m, 5 Sep 1960 flr (holotype MICH, isotypes K, NY, US).

This species is known only from the type. It belongs in section *Polyactinia* Niedenzu, and is distinguished from other species in that section by the long, stalked hairs on the leaves, the long, stout pedicels with dark brown hairs, the revolute sepals, the finger-shaped marginal glands of the posterior petal, and the distinctly hooked apex of the styles.

2. *Hiraea primaeva* Anderson, sp nov

Fig 50a–g.

Liana lignosa, ramis velutinis pilis usque 0.6 mm longis, erectis, fusiformibus, plerumque brevibifurcatis. Foliorum lamina (praeter apicem) 23–32 cm longa, 16–25 cm lata, late elliptica, basi rotundata vel subcordata, margine revoluta multis glandulis parvis instructa, aliter eglandulosa, apice abruptissime caudata apice 8 mm longo, utrinque pertinaciter velutina pilis erectis bifurcatisque, nervis lateralibus et venis tertiariis inter se valde parallelis supra impressis subtus prominentibus, etiam venulis inter se $\pm$ parallelis utrinque prominulis; petiolus 21–30 mm longus, 4–5 mm diametro, velutinus, prope vel supra medium biglandulifer; stipulae ca 1.5 mm longae, triangulares, basi petioli portatae (?) vel interpetiolares. Inflorescentia axillaris, usque 8 cm longa, cyma (?) 3–7 umbellarum 4-florarum, velutina, bracteis 3–4 mm longis instructa; umbella pedunculo 9–13 mm longo, bracteis floriferis 1.5–2 mm longis, triangularibus, abaxialiter subvelutinis, adaxialiter glabris, eglandulosis, bracteolis 1–1.5 mm longis, in quoque flore 1 bracteola uniglandulifera, glandulo versus centrum umbellae excentrico. Pedicellus (fructu) 11–15 mm longus, 0.8–1.5 mm diametro, apice tumidus usque 2.5 mm diametro, subvelutinus. Sepala 4 lateraliter 8 glandulas 2–2.5 mm diametro 3.5 mm superantia, usque 4 mm lata (fructu), anticum eglandulosum, omnia triangularia vel ovata, apice revoluta, abaxialiter velutina, adaxialiter glabra. Petala 4 limbo denticulato et eglanduloso, 1 (probabiliter posticum) limbo longe glanduloso-fimbriato. Filamenta 3–5 mm longa, glabra, recta, basi breviter connata; antherae 1–1.5 mm longae. Ovarium velutinum, stylis (fructu) 4.5–5.5 mm longis, rectis, basi sericeis, apice dorsaliter uncinatis. Samarae ala lateralis circularis vel transverse late elliptica, 5–6.5 cm lata, 4–5 cm alta, apice usque nucem incisa, basi continua, margine integra sinuata, membranacea, puberula; ala dorsalis 5–6 mm lata, 5–8 mm alta, dentata; nux 5 mm diametro, subglobosa, brevivelutina, areola ventrali circulari 1.5–2 mm diametro.

Type. *Nascimento, Pires & Coradin 135* [IAN 148246], S. Gabriel, Q. NA-19-ZC, Amazônia, Brazil, 12/04/1975 (holotype IAN, isotype MICH).

This most interesting species is known only from the type collection. It resembles other species of *Hiraea* in its inflorescence, styles, and the venation and

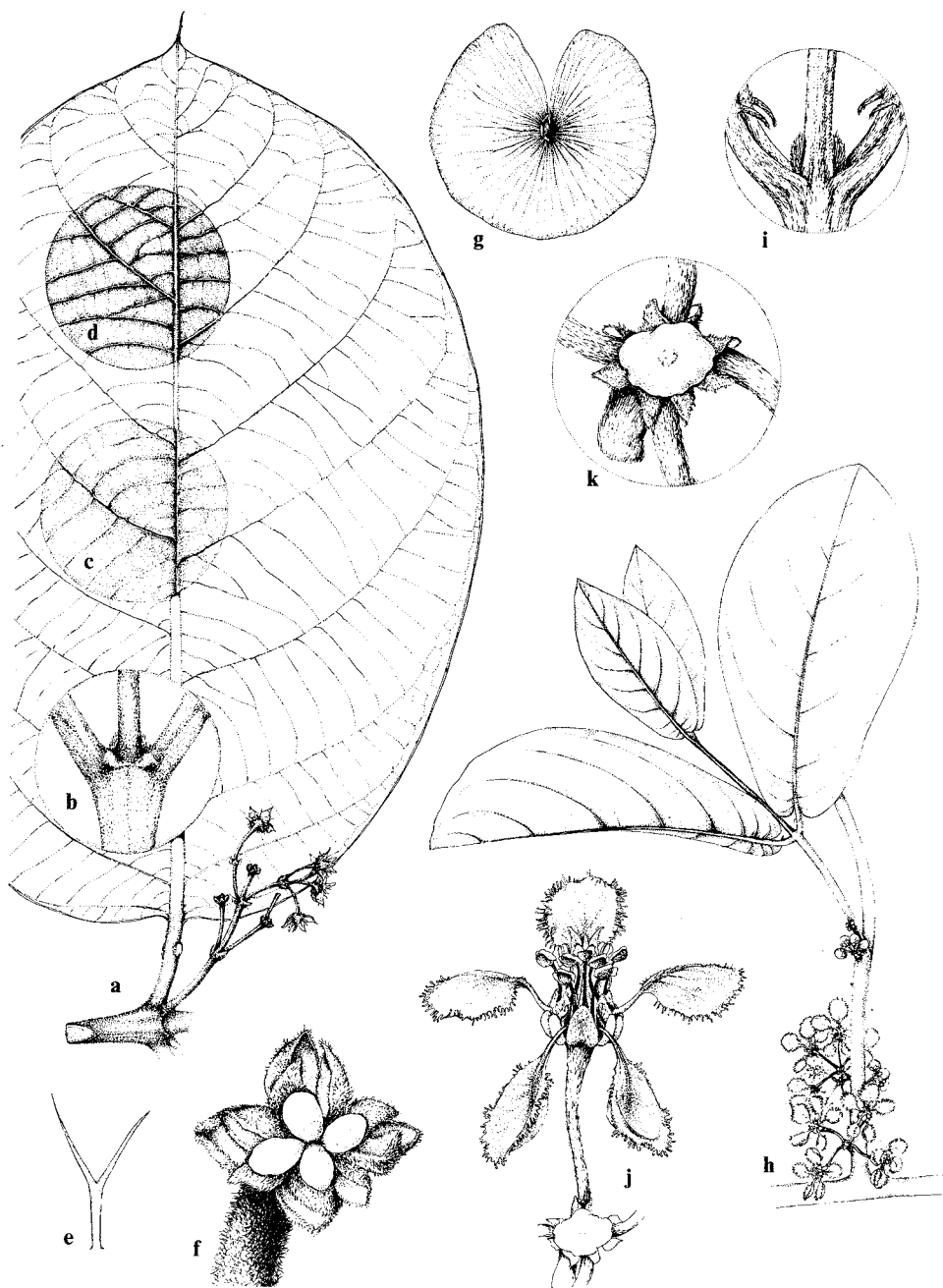


Fig 50. *Hiraeta primaeva* and *H. fimbriata*. a–g, *H. primaeva*: a) Leaf and old infructescence, $\times 0.5$; b) stipules, $\times 1$; c) detail of adaxial surface of lamina, minus hairs, $\times 0.5$; d) detail of abaxial surface of lamina, minus hairs, $\times 0.5$; e) hair from abaxial surface of lamina, $\times 50$; f) bracts and bracteoles of umbel, with glands on 4 bracteoles, $\times 7.5$; g) samara, abaxial view, $\times 0.5$. h–k, *H. fimbriata*: h) Flowering branch, $\times 0.5$; i) stipules, $\times 3$; j) flower, $\times 2.5$; k) glandular cushion in center of umbel, $\times 5$. Drawn by Karin Douthit from the types.

marginal glands of the leaves. It does not resemble the rest of the genus in having its stipules basal (interpétiole?) and the lateral wing of the samara continuous below, as in *Mascagnia* sect *Mascagnia*, rather than incised to the nut. It is admittedly anomalous in *Hiraea*, but would be just as anomalous in *Mascagnia*. I have named the species *Hiraea primaeva* to suggest that it may represent one of the intermediate steps by which some *Mascagnia*-like ancestor gave rise to *Hiraea*.¹¹

The type is in fruit, and retains only fragments of flower parts, so the above description is deficient in many respects and will have to be supplemented when a collection is made with flowers. The petals, while too shriveled to measure with any accuracy, had claws at least 3–4 mm long and limbs over 4 mm long, so the flowers should prove to be quite showy; the petals are probably yellow.

3. *Hiraea bifurcata* Anderson, sp. nov.

Fig 51.

Frutex scandens, ramis junioribus velutinis pilis brevis (usque 0.3 mm) bifurcatis, vetustioribus mox glabris. Folia opposita; foliorum majorum lamina 6.5–12.5 cm longa, 4.5–8 cm lata, obovata, basi rotundata, margine distaliter aliquot glandulis parvis instructa, apice rotundata vel emarginata et saepe apiculata, supra primo velutina interdum pilis effractis glabrescens, subtus pertinaciter velutina pilis bifurcatis (Y-formibus), usque 0.4 mm longis; petiolus 6–11 mm longus, 1–2.5 mm diametro, pertinaciter aureo-velutinus, inter medium et apicem biglandulifer; stipulae 1.7–2.5 mm longae, subulatae, prope vel subter medium petioli portatae. Inflorescentia axillaris, usque 3.5 cm longa, cyma umbellarum 4-florarum, simplex (1 umbella pedunculo usque 13 mm longo) vel prope basim ternata (3 umbellis) vel biternata (7 umbellis), tomentosa, umbella sine pulvino centrali, bracteis bracteolisque floriferis 1–1.5 mm longis, triangularibus, abaxialiter sericeis, adaxialiter glabris, eglandulosis. Pedicellus 15–21 mm longus, 0.5–0.7 mm diametro (–1 mm apice), appresso-tomentosus. Sepala 2–2.5 mm longa, 1.5–1.8 mm lata, ovata, apice obtusa, appressa post anthesin, abaxialiter laxe sericea, adaxialiter glabra, anticum eglandulosum, 4 lateralibus 8 glandulis ellipticis 1.5–1.8(–2) mm longis instructa. Petala lutea, parum concava, 4 lateralibus ungue 2.5–3 mm longo, limbo 5.5–6 mm longo, 6–6.5 mm lato, ovato vel orbiculari, margine eroso vel dentato, eglanduloso; posticum ungue 3–3.5 mm longo, limbo 5 mm longo latoque, margine toto circuitu glanduloso-fimbriato glandulis parvis capitellatis. Filamenta glabra, basi breviter connata, recta vel sigmoidea, illa sepalis opposita 3.5–4.5 mm longa, illa petalis opposita 2.5–3 mm longa; antherae 0.6–0.8 mm longae, ± aequales, loculis lateralibus in connectivo globoso pro parte maxima luteo-glanduloso. Ovarium 1.5 mm altum, hirsutum; styli ca 4–5 mm longi, glabri vel supra basim paucipiliferi, arcuati (2 posteriores valdius), apice dorsaliter uncinati. Fructus ignotus.

Type. *Maguire, Wurdack & Bunting 36155*, open granitic exposure, along trail from Sanariapo Road to Salto Carestia, Great Rapids of the Orinoco, Amazonas,

¹¹ Another member of the same series is *Hiraea adenophora* Sandwith, of Guyana. It has the stipules at the base of the petiole, the inflorescence an open axillary panicle of 4-flowered umbels, the pedicels raised on short peduncles, and one of each pair of bracteoles glandular.

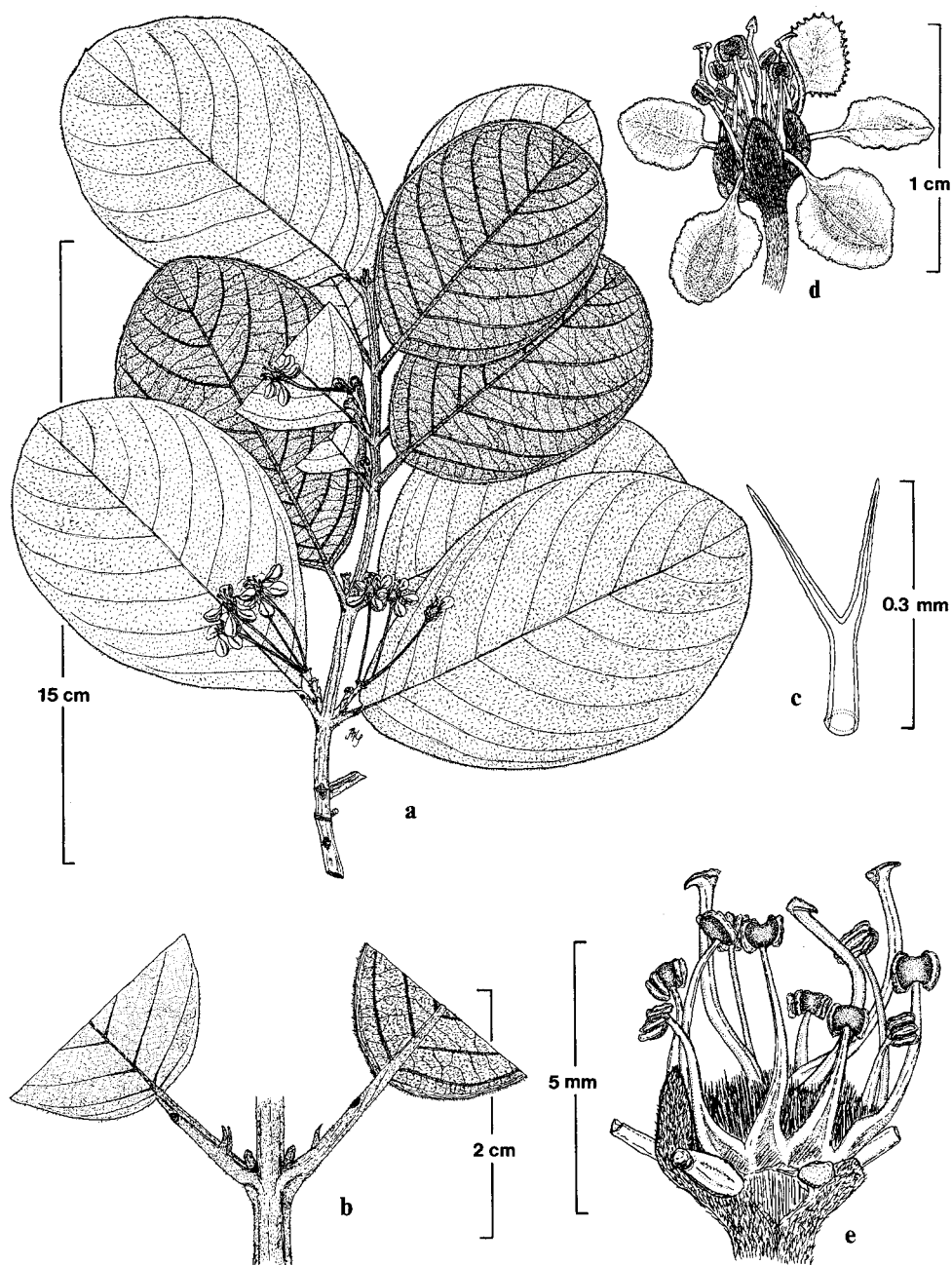


Fig 51. *Hiraea bifurcata*. a) Flowering branch; b) leaf-bases and stipules; c) hair from abaxial surface of lamina; d) flower; e) androecium and gynoecium, side view, with eglandular anterior sepal to left and stump of posterior petal to right. Drawn from the type by Annette Seidenschneur Mahler.

Venezuela, elev 100–120 m, 11 Nov 1953 (holotype NY, isotypes MICH, NY, VEN).

This species is known only from the type collection. The epithet refers to the Y-shaped hairs of the leaves. It is related to *H. velutina* Niedenzu (which Cuatrecasas included in *H. ternifolia* (H.B.K.) Adr. Jussieu), but the combination of characters found in this plant has not been found in the descriptions of those two species or in the specimens seen that have been referred to them.

4. *Hiraea faginea* (Swartz) Niedenzu, Verz. Vorles. Lyc. Hos. W.-S. 1906/7: 16. 1906.

Malpighia faginea Swartz, Prodr. 74. 1788.

Hiraea chrysophylla Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 258. 1840.

Hiraea fulgens Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 258. 1840.

Hiraea swartziana Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 258. 1840, nom superfl.

Woody vine; stems sericeous to soon glabrate. Lamina of the larger leaves (7–) 8.5–15(–18.5) cm long, 3–6(–7.5) cm wide, obovate or elliptical, rounded or subcordate at the base, acuminate at the apex, usually bearing several small glands distally on the margin and 2 large glands at the base by or on the midrib, glabrate above at maturity or thinly sericeous, especially on the midrib, densely and persistently sericeous below, the straight, appressed hairs giving the lamina a golden or silvery-metallic sheen; petiole 5–9(–11) mm long, abaxially sericeous, adaxially velutinous; stipules 2.5–5 mm long, subulate and distally flattened, borne between the middle and the apex of the petiole. Inflorescence axillary, a short ternate cyme of 3 4-flowered umbels, occasionally reduced to a single umbel; floriferous bracts and bracteoles 1–1.5 mm long, abaxially sericeous; umbel without a large central cushion, at most an inconspicuous nubbin. Pedicel (7–) 8–11(–15) mm long, sericeous. Sepals 1.5–2.5 mm long and wide, ovate, abaxially finely sericeous, adaxially glabrous, all eglandular or the lateral 4 bearing 8 elliptical, slightly detached glands 1.5–2 mm long. Petals yellow, apparently thick-textured, the lateral 4 with the claw 2–2.5 mm long and the limb 4.5–6 mm long, 5–7 mm wide, orbicular, flat or somewhat concave, dentate or lacinate, eglandular; posterior petal with the claw 3–4 mm long and the limb 3.5–4.5 mm long and wide, glandular-fimbriate all around the margin. Filaments 3–3.5 mm long opposite the sepals, 2–2.5 mm long opposite the petals, straight or sigmoid, glabrous, connate at the base; posterior 3 anthers 0.6–1 mm long, anterior 7 1–1.5 mm long, the largest often with the connective swollen and glandular. Ovary 1 mm high, finely sericeous; styles 3.5–4 mm long, glabrous, the posterior 2 strongly arcuate, the anterior nearly straight, all with a short, pointed, dorsal hook at the apex. Fruit with the lateral wings free at base and apex, 5–15 mm wide and high, trapezoidal or rectangular, entire or lobed or completely divided into 2 as in *Tetrapteryx*, often irregularly reduced, chartaceous or usually coriaceous, sericeous; central dorsal wing 1.5–5 mm wide, semi-circular to triangular; nut 4–6 mm in diameter, sericeous, with prominent longitudinal ribs; ventral areole 2 mm in diameter, circular.

Type. *Masson*, Grenada (BM!).

Distribution. Northern South America, Lesser Antilles, Panamá, and Nicara-

gua. Guayana collections: GUYANA. Puruni River, Mazaruni River, *Forest Dept.* 7716 (MICH); Kartabo, junction of Mazaruni and Cuyuni Rivers, *Hitchcock* 17196 (GH, US); Kauri Creek, Cuyuni River, *Tutin* 111 (US). BRAZIL. Terr. Roraima: vic. Uaicá airstrip, Rio Uraricoeira 3°33'N, 63°11'W, *Prance et al* 10690 & 10718 (MICH, NY). VENEZUELA. Bolívar: Caño Maurepá, Alto Paragua, *Cardona* 805 (US, VEN); Río Carapa, elev 300 m, Río Paragua, *Cardona* 914 (VEN) & 924 (US, VEN); Río Karún, Alto Río Paragua, elev 300 m, *Cardona* 1189 (US, VEN); Río Paragua, between Guaiquinima and Río Torono, elev 280 m, *Killip* 37528 (US, VEN); Hato La Vergareña, 6°45'N, 63°30'W, island in Río Aro 14 km below mouth of Caño Azul, elev 390 m, *Wurdack* 249 (MICH, NY, VEN). Amazonas: Río Orinoco between San Fernando de Atabapo and Tama-Tama, elev 150 m, *Level L-20* (MICH, NY, US, VEN); Alto Río Orinoco, Río Padamo, *Maguire & Wurdack* 34711 (MICH, NY, US, VEN); ad flumina Casiquiari, Vasiva et Pacimoni, *Spruce* 3210 (MG, NY); arriba de Tamatama, Alto Orinoco, elev 121 m, *Williams* 15266 (A, MICH, US, VEN); Capihuara, Casiquiare, elev 120 m, *Williams* 15605 (F, US, VEN).

Collected in flower in diverse months, most often from February to July.

I have been unable to discover any satisfactory basis for distinguishing *Hiraea chrysophylla* from *H. faginea*. Niedenzu's principal difference was whether the leaves are golden or silver below, but both conditions can be found on different leaves of the same plant and intermediates abound. I can only conclude that they are the same species and adopt the older name.

5. *Hiraea fimbriata* Anderson, sp nov

Fig 50h-k.

Liana lignosa, ramis junioribus dense et arcte sericeis, vetustioribus glabratiss. Foliorum majorum lamina 8–22 cm longa, 4–10.5 cm lata, obovata vel elliptica, basi cordata, margine eglandulosa, apice acuminata, acuta, vel obtusa, primo subtomentosa pilis rectis vel sinuatis 0.5–1 mm longis, adulta glabrata vel saepe costa utrinque basi sericea, costa subtus basi biglandulifera vel eglandulosa; petiolus 4–10 mm longus, pertinaciter aureo-sericeus, eglandulosus; stipulae 1–2.5 mm longae, subulatae, revolutae, inter medium et apicem petioli portatae. Inflorescentia axillaris, 1–4 umbellae 4-florae in quaque axilla, usque 2.5 cm longa, sericea, pedunculo bibracteolato 3–6 mm longo, umbella in centro pulvino glanduloso hemisphaerico instructa, bracteis bracteolisque floriferis 1–1.5 mm longis, triangularibus, abaxialiter sericeis, adaxialiter glabris, eglandulosis. Pedicellus 7–14 mm longus, 0.6–1 mm diametro, arcte sericeus. Sepala 2–3 mm longa, 2.5 mm lata, triangularia, appressa post anthesin, abaxialiter sericea, adaxialiter glabra, anticum eglandulosum, 4 lateralia 6–8 glandulis ellipticis 1.5–2 mm longis instructa (1–2 glandulis sepalorum antico-lateralium saepe absentibus). Petala lutea, omnia fimbriata et eglandulosa, 4 lateralia ungue 3–3.5 mm longo, limbo 6.5–8 mm longo, 7.5–9 mm lato, orbiculari, concavo vel plano; posticum ungue 4–4.5 mm longo, limbo 5–6 mm longo et lato, quadrangulati, saepe corrugati. Filamenta glabra, basi brevissime connata, 3–4 mm longa, recta vel (praecipue posteriora) arcuata, illa sepalis opposita quam illa petalis opposita longiora; antherae ca 1 mm longae, subaequales, connectivo globoso vel obovoideo, atrorubro, sub apice luteo-glanduloso. Ovarium 1.5 mm altum, dense atrobrunneo-hirsutum; styli 4–5

mm longi, glabri vel proximaliter sericei, valde arcuati (praecipue 2 posteriores), apice dorsaliter longi-uncinati, unco antico ca 0.9 mm longo, posterioribus ca 0.5 mm longis. Fructus immaturissimus 2 alis lateralibus instructus.

Type. *Wurdack & Monachino 39770*, edges of Río Pargueni 1–10 km above mouth, Bolívar, Venezuela, elev 90 m, 10 Dec 1955 (holotype MICH, isotypes NY, US, VEN).

Distribution. Tributaries of middle and upper Río Orinoco. VENEZUELA. Bolívar: Selva rebalsea de Guayapo, Bajo Caura, elev 100 m, May flr/imm frt, *Williams 12038* (F, VEN); type, q v. Amazonas: Isla Ratón, *Bossio* s.n. (MICH); Sipapo River near confluence with Orinoco River, inundated in rainy season, elev 90 m, Nov flr, *Breteler 4830* (US, VEN, WAG). COLOMBIA. Vichada: Río Meta, Caño de la Ceiba, riverbank, Oct flr, *Cuatrecasas 4089* (US).

Hiraea fimbriata is probably most closely related to *H. reclinata*, from which it can be distinguished by its shorter stipules borne near the apex of the short petiole, the eglandular margin of its lamina, its shorter, stouter, very tightly sericeous pedicels, the bulbous cushion in the middle of the umbel, and the large, fimbriate, eglandular petals with long claws. The epithet refers to the fimbriate petals.

6. *Hiraea apaporiensis* Cuatrecasas, Webbia 13(2): 404. 1958.

Woody vines, the stems sericeous to glabrate. Lamina of the larger leaves 6–16(–21) cm long, 3–6(–8) cm wide, elliptical or obovate, cuneate or rounded at the base, flat or slightly revolute and eglandular at the margin, acute, obtuse, or abruptly short-acuminate and often apiculate at the apex, glabrate above, thinly but persistently sericeous below, the hairs 0.2–0.4 mm long, white, straight, fine, sessile, the midrib and 7–10(–12) pairs of lateral veins obscure above, prominent below; petiole 6–10(–12) mm long, sericeous, bearing 2 large glands at the apex; stipules 0.5–1 mm long, borne between the middle and the apex of the petiole. Inflorescence axillary, up to 2.5 cm long, sericeous, single or up to 3 per axil, each bearing 1 4-flowered umbel, the peduncle of the umbel 5–10 mm long; bracts and bracteoles 0.5–1 mm long, abaxially sericeous; umbel with a dark, hemispherical or globose cushion in the center between the bracteoles. Pedicel 8–13 mm long, sericeous. Sepals 0.5–1.5 mm long beyond the glands, 1.5 mm wide, ovate, slightly revolute at the apex, abaxially sericeous, adaxially glabrous, the lateral 4 bearing 8 elliptical glands 1.7–2.5 mm long. Petals yellow, apparently thick-textured, sub-entire to distinctly fimbriate, all eglandular, the lateral 4 with the claw 1.5–2 mm long and the limb 5–7 mm long and wide, orbicular, flat, the posterior petal with a longer claw and smaller, often crumpled limb. Filaments 3.5–4.5 mm long opposite the sepals, 1.8–2.5 mm long opposite the petals, glabrous, straight or sigmoid, connate at the base; anthers 0.8–1.1 mm long, the locules borne laterally on a globose or hemispherical connective, dark red with a yellow glandular apex. Ovary 1 mm high, densely hirsute; styles ca 3–4 mm long, glabrous, the posterior 2 strongly arcuate, the anterior bowed, laterally flattened, the apex dorsally rounded or with a short bulbous or flattened and rounded projection. Samara with the lateral wings trapezoidal, 7–10 mm wide, (6–)11–15 mm high, entire or sinuate or coarsely and irregularly toothed, usually membranous, loosely sericeous with some spreading hairs; dorsal wing 1–2 mm

wide, 4 mm high, subentire; nut 3–4 mm in diameter, cylindroidal, softly white-hirsute, with the ventral areole 1–1.5 mm in diameter, orbicular or ovate.

Type. *Schultes & Cabrera 17022*, Río Apaporis, Jinogojé (near mouth of Río Piraparaná), Amazonas-Vaupés, Colombia, Aug flr/frt (holotype US!, isotypes NY! US!).

Illustration. *Schultes 1975*, p. 127.

Distribution. Ríos Orinoco, Uaupés/Vaupés, and Apaporis. VENEZUELA. Amazonas: trail between San Fernando de Atabapo and Río Orinoco, elev 125–150 m, May flr, *Wurdack & Adderley 42670* (NY, VEN). BRAZIL. Amazonas: Taracua, margem do R. Uaupés, Jun flr, *Pires & Silva 7931* (IAN); Rio Uaupés, acima de Sta. Rosa, May frt, *M. F. Silva et al 1550* (INPA). COLOMBIA. Amazonas-Vaupés: cuenca del Río Apaporis, Río Piraparaná, elev 250 m, Aug flr, *García-Barriga 14215* (NY, US); Río Apaporis, Raudal Yayacopi (La Playa) and vicinity, quartzite base, elev 240 m, Aug frt, *Schultes & Cabrera 16969* (US); type, q v. Vaupés: Inundated stream across from Mitú, May frt, *Zarucchi 1633* (MICH).

The leaves of *Zarucchi 1633* are 14–16 cm long and 5–7 cm wide, with the petiole 10–12 mm long, while most specimens have them 6–11 cm long and 3–5.5 cm wide, with petioles 6–10 mm long. Its fruits are also atypical (immature?), having coriaceous, coarsely toothed lateral wings only 6–8 mm high instead of the usual 11–15 mm. It may represent a taxon worth recognition, but on the other hand further collection may well expand the range of variation in *H. apaporiensis* to include this extreme, so I prefer not to name it at this time.

7. *Hiraea silvae* Anderson, sp nov

Fig 52f–i.

Liana lignosa, ramis sericeis permox glabratis. Foliorum majorum lamina 19–25 cm longa, 6.5–9.5 cm lata, obovata vel elliptica, basi cuneata, apice acuminata vel cuspidata, eglandulosa, adulta utrinque glabra, venis lateralibus 8–10 utroque latere, inter se distantibus, arcuato-ascendentibus, prope marginem anastomosantibus, subtus prominentibus; petiolus 10–15 mm longus, sericeus, inter medium et apicem biglandulifer; stipulae 2.5–3 mm longae, subulatae, super medium petioli portatae. Inflorescentia axillaris, 1–3 umbellae 4-florae superpositae, pedunculo umbellifero ca 1 cm longo, sericeo, prope basim bibracteato, umbella sine pulvino centrali, bracteis bracteolisque floriferis 1–1.5 mm longis, triangularibus, abaxialiter sericeis, adaxialiter glabris, eglandulosis. Pedicellus (in fructu) 14–17 mm longus, sericeus. Sepala (in fructu) 3 mm longa, 2.5 mm lata, triangularia, apice revoluta, abaxialiter sericea, adaxialiter glabra, anticum eglandulosum, 4 lateralialia 8 glandulis 2.5 mm longis, anguste ellipticis instructa. Petala ignota. Filamenta glabra, basi connata, demum torta; antherae (in floribus delapsis) 0.7–1 mm longae. Ovarium 1.5 mm altum, dense hirsutum; styli glabri, arcuati, apice dorsaliter uncinati. Samara (et nux et alae) dense velutina, pilis (praecipue in nuce) erectis, rectis, basifixis vel sub-basifixis; alae laterales inter se liberae, 15–20 mm latae, usque 25 mm altae, margine sinuatae; crista dorsalis centralis 1–2 mm lata, semicircularis; nux 8–10 mm diametro, depresso-globosa, 15–20-costata costis saepe in latere inferiore alae lateralis continuis, dorsaliter inter cristam centralem et alas laterales aliquot cristis dissectis parvis irregularibus instructa.

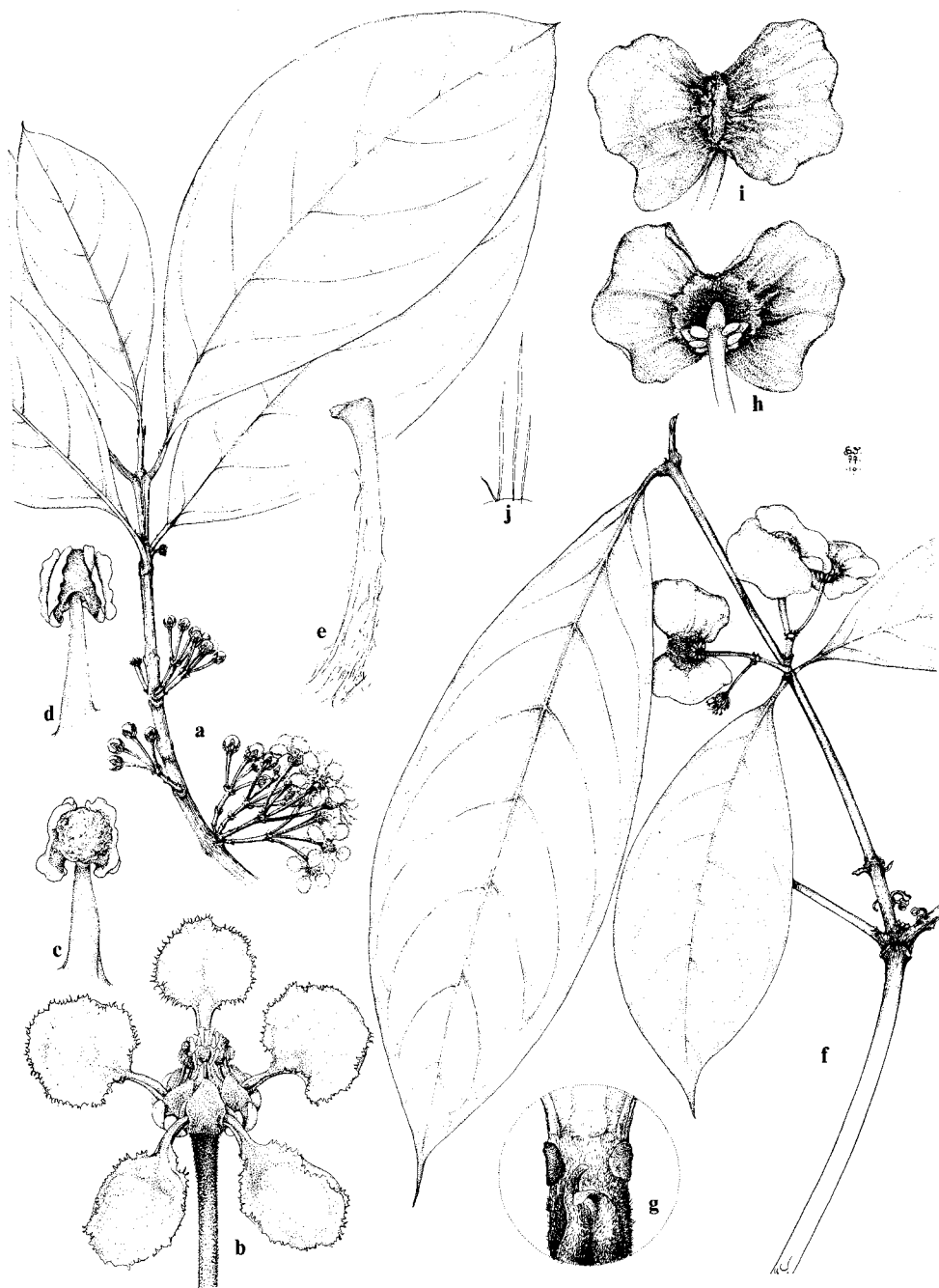


Fig 52. *Hiraea celiana* and *H. silvae*. a-e, *H. celiana*: a) Flowering branch, $\times 0.5$; b) flower, $\times 2.5$; c) stamen, abaxial view, $\times 10$; d) stamen, adaxial view, $\times 10$; e) style, $\times 10$. f-i, *H. silvae*: f) Fruiting branch, $\times 0.5$; g) stipules and petiolar glands, $\times 4$; h) samara, adaxial view, $\times 1$; i) samara, abaxial view, $\times 1$; j) hairs from fruit, $\times 35$. Drawn by Karin Douthit from the types.

Type. *Silva & Brazão 60964*, margin of Rio Cauaburi, in high forest on terra firma, between Maturacá and Rio Yá, Amazonas, Brazil, 3 Feb 1966 (holotype MG, isotypes MICH, NY, US).

This species is known only from the type, which is in fruit. It is quite distinctive because of its densely velutinous samara, with the straight, erect, basifixed or sub-basifixed hairs abundant on the wings as well as the nut. The samara is also interesting for its large, depressed-globose, ribbed nut, the ribs often continuing as winglets on the underside of the lateral wings. The distant, strongly arched veins suggest that this species is related to *H. schultesii*, from which it can be distinguished by its larger leaves and very different fruits.

The axillary inflorescence in *Hiraea silvae* seems to arise from one to three distinct axillary buds, judging from the vertical arrangement of the units in each axil. Each unit is a single umbel borne on an unbranched peduncle, obviously reduced from a cyme of umbels, with the bracts of the lateral branches retained but sterile.

Hiraea silvae is named in honor of Nilo T. Silva, Brazilian collector of Amazonian plants.

8. *Hiraea celiana* Anderson, sp nov

Fig 52a-e.

Liana lignosa, ramis junioribus sericeis, demum glabratiss. Foliorum majorum lamina 14–28 cm longa, 6–12 cm lata, coriacea, oblanceolata, basi acuta, margine eglandulosa, apice abrupte rotundata vel breviacuminata, adulta supra glabra subtus glabrata vel sparsissime sericea costa pertinaciter sericea; petiolus 13–18 mm longus, pertinaciter sericeus, apice biglandulosus; stipulae 1–1.5 mm longae, subulatae, inter medium et apicem petioli portatae. Inflorescentia axillaris, 1–4 umbellae 4(–5)-florae superpositae in quaque axilla, rufotomentosa, pedunculo umbellifero 2- vel 4-bracteolato 5–15 mm longo, umbella sine pulvino centrali, bracteis bracteolisque floriferis 1–1.5 mm longis, triangularibus, abaxialiter sericeis, adaxialiter glabris, eglandulosis. Pedicellus 16–22 mm longus, rufotomentosus pilis sinuosis et saepe patentibus. Sepala 3 mm longa, 2–2.4 mm lata, ovata, abaxialiter laxe sericea, adaxialiter glabra, anticum eglandulosum, 4 lateralia 8 glandulis ellipticis 1.5–2 mm longis non compressis instructa. Petala lutea, omnia eglandulosa et (praecipue posticum) fimbriata, 4 lateralia ungue 2.5–3.5 mm longo, interdum abaxialiter sericeo, limbo 5–6.5 mm longo, 6–7 mm lato, orbiculari, $\pm$ concavo; posticum ungue 3.5–4 mm longo, limbo 5–5.5 mm longo et lato, circulari, corrugato. Filamenta glabra, basi connata, illa sepalis opposita 3–3.7 mm longa, arcuata, illa petalis opposita 2.1–2.6 mm longa, recta; antherae 0.8–1.3 mm longae, subaequales, connectivo globoso, rubro demum nigrescenti, sub apice luteo-glanduloso. Ovarium 1 mm altum, dense tomentosum; styli 3.6 mm longi, pilis T-formibus 0.5–0.8 mm longis per totam longitudinem instructi, anticus rectus, posteriores valde arcuati, omnes apice dorsaliter rotundati vel triangulari-truncati. Fructus ignotus.

Type. *Maguire & Politi 28523*, mixed montane forest slopes above lower escarpment above Cañon Grande, Cerro Sipapo (Paráque), Amazonas, Venezuela, elev 1500 m, 21 Jan 1949 flr (holotype MICH, isotypes NY, US, VEN).

Distribution. Known only from the type collection and the following two paratypes from the same general locality: scrub savanna vicinity of Base Camp, elev

150 m, 25 Dec flr, *Maguire & Politi* 27965 (MICH, NY, US, VEN); mixed rain forest at 100 m elev, vicinity of Base Camp, Jan flr, *Maguire & Politi* 28295 (NY).

Hiraea celiana is named in honor of Celia K. Maguire, who, although not a professional botanist, has made a substantial contribution to the study of the plants of Guayana through her assistance to her husband, Bassett Maguire, both in the field and at The New York Botanical Garden. This species is distinguished from others in the genus by its large, coriaceous, oblanceolate leaves with the margin eglandular, the loose, reddish-brown tomentum of the inflorescence and pedicels, which are unusually long, the fimbriate, eglandular petals, and the sparsely sericeous styles, which are laterally flattened at the apex and triangular-truncate or bear a very short, blunt hook.

A Brazilian collection that is probably closely related to *H. celiana* is *Pires* 580 (IAN), from the Serra de São Gabriel on the Rio Negro in Amazonas. *Pires* 580 has slightly smaller leaves with shorter petioles, and shorter pedicels with the hairs stramineous instead of reddish-brown. The petals are similar, but they persist as the fruits enlarge in *Pires* 580, whereas they are deciduous before enlargement of the fruits in *H. celiana*. *Pires* 580 has a well-developed dorsal wing on the samara, 3–4 mm wide, which is sometimes a useful character in the taxonomy of *Hiraea*, but since the fruits of *H. celiana* are unknown they cannot be compared in this respect. *Pires* 580 may well be an undescribed species, but I would prefer to defer giving it formal recognition until more material of it is found, and until *H. celiana* is found in fruit.

9. *Hiraea schultesii* Cuatrecasas, Webbia 13(2): 403. 1958.

“Small tree,” the younger stems tightly sericeous. Lamina of the larger leaves 10–14.5 cm long, 5.5–8.5 cm wide, obovate or elliptical, cuneate or rounded at the base, abruptly short-acuminate at the apex, coriaceous, eglandular, glabrate except for the midrib sericeous below, the 5–7 pairs of distant lateral veins prominent below and obscure above; petiole 12–20 mm long, tightly sericeous, biglandular at the apex; stipules 1–1.5 mm long, borne above the middle of the petiole. Inflorescence an unbranched axillary umbel (1–2 per axil) of 4 flowers borne on a peduncle 5 mm long and bibracteate at or below the middle, the umbel without a prominent cushion between the bracteoles, the bracts and bracteoles of the umbel 1 mm long, triangular, abaxially sericeous. Pedicel (in fruit) 10–12 mm long, brownish-tomentose. Calyx bearing 8 glands on the 4 lateral sepals. Petals and stamens unknown. Samara appressed-tomentose with brown hairs, the nut ca 4 mm in diameter, globose or cylindroidal, smooth-sided, the lateral wings 35–50 mm high, 20–28 mm wide, “translucent white-green” (immature), membranous with prominent veins, the central dorsal wing none or a crest ca 0.5 mm wide, the ventral areole ca 1.5 mm in diameter. See the protologue for a more complete description.

Type. *Schultes & Cabrera* 15996, Río Apaporis, Raudal Yayacopi (La Playa) and vicinity, Amazonas-Vaupés, Colombia, quartzite base, elev ca 240 m, Mar frt (holotype US!, isotypes GH! NY!).

Distribution. Known only from the type.

10. *Hiraea affinis* Miquel, Linnaea 19: 133. 1847 [1846].

Woody vine, the stems sericeous to glabrate. Lamina of the larger leaves 13–19 cm long, 6–10 cm wide, elliptical, rounded or slightly cordate at the base, short-acuminate at the apex, glabrate above, sparsely sericeous below with straight white appressed hairs 0.2–0.5 mm long, eglandular, the lateral veins prominent below and obscure above; petiole 6–10 mm long, sericeous to glabrate, biglandular at the apex; stipules 1–2 mm long, borne above the middle of the petiole. Inflorescence an unbranched axillary umbel (up to 5 per axil) of 4 flowers borne on a bibracteate peduncle 3–6 mm long, in the axils of current leaves or more commonly at older leafless nodes, the umbel without a prominent cushion between the bracteoles, the bracts and bracteoles of the umbel 0.5–1 mm long, triangular, abaxially sericeous. Pedicel 13–15 mm long, whitish-sericeous. Sepals ovate, abaxially sericeous, eglandular or the 4 lateral sepals bearing 8 apically detached yellow glands. Petals light yellow, membranous, eglandular, the claw 2.2–3 mm long, the limb 4–5 mm long and wide, cuneate at the base, dentate or lacinate at the margin, the anterior-laterals concave, the other 3 $\pm$ flat. Filaments 3–3.5 mm long opposite the sepals, 1.7–2.3 mm long opposite the petals, basally connate, $\pm$ straight; anthers 0.7–1.2 mm long, with a globose, glandular connective. Ovary 0.6 mm high, sericeous; styles 3.5–4.5 mm long, sericeous, arcuate, with a rounded dorsal hook at the apex 0.4–0.6 mm long. Samara with the lateral wings 25–30 mm wide, 40–45 mm high, elliptical, membranous, sinuate at the margin, sparsely sericeous; dorsal wing none; nut 5 mm in diameter, sericeous.

Type. *Kappler 1709*, Karouany River, Surinam (U).

Distribution. French Guiana to Delta Amacuro, Venezuela. GUYANA. Fluvial forest along Kamarang River, Utschi River mouth, upper Mazaruni River basin, elev ca 550 m, Oct flr, *Tillett & Tillett 45732* (K, MICH, NY). VENEZUELA. Terr. Delta Amacuro: bosque pluvial, este de Río Grande, este-noreste de El Palmar, cerca de los límites del Estado Bolívar, Jun–Jul frt, *Blanco 152* (US).

I have not seen the type of *Hiraea affinis*, nor any specimens from Surinam or French Guiana, and cannot be certain that the specimens cited are correctly identified. However, they agree with Niedenzu's description and with that of Kostermans in most characters, including the size and glabrescence of the leaves, the eglandular leaf-margin, the inflorescence borne on old stems, the light-yellow, membranous, eglandular petals, the small anthers with globose, glandular connectives, the hooked styles, and the samara without a dorsal wing (Niedenzu does not mention the latter, but illustrates it). The only important characters in which there is disagreement is that in both of the cited collections the styles are sparsely sericeous, which is not mentioned by Niedenzu or Kostermans, and in *Tillett & Tillett 45732* the limb of the petals is smaller than the 5–6 mm of Niedenzu and not hastate at the base. The description given above is based only on the two collections cited.

11. *Hiraea tepuiensis* Steyermark, Fieldiana Bot. 28(2): 293. 1952.

Woody vine (or small tree? cf discussion); stems sericeous to eventually glabrescent. Lamina of the larger leaves 6–15 cm long, 3–6(–7) cm wide, ovate or

elliptical or occasionally obovate, cuneate or rounded at the base, acuminate at the apex, loosely sericeous or subtomentose to glabrescent on both sides except persistently sericeous on the midrib especially below at base, eglandular, the veins about as prominulous above as below; petiole 6–15 mm long, sericeous, biglandular on distal half; stipules 0.5–1 mm long, borne at or above the middle of the petiole. Inflorescence an unbranched axillary umbel (1–5 per axil) of 4 flowers borne on a bibracteate peduncle 5–15 mm long, the umbel without a prominent cushion between the bracteoles or rarely with a glandular knob up to 0.7 mm in diameter, the bracts and bracteoles of the umbel 0.7–1.5 mm long, triangular, abaxially sericeous. Pedicel 8–15 mm long, reddish- or brown-sericeous. Sepals triangular, abaxially sericeous, eglandular or the 4 lateral sepals bearing 8 circular or elliptical glands 1.5–2 mm long. Petals eglandular, lacinate, the laterals yellow, with the claw 1.5–2.5 mm long, the limb 4–5 mm long, 4.5–5 mm wide, $\pm$ concave; posterior petal “salmon,” with the claw 2.5–3 mm long, the limb 3 mm long, 3.5–4 mm wide, flat or crumpled. Filaments 2.5–3.5 mm long opposite the sepals, 1.5–2.5 mm long opposite the petals, basally connate, straight or slightly sinuous; anthers 0.7–1 mm long, with an apically glandular connective. Ovary ca 1 mm high, hirsute; styles 2.8–3.5 mm long, glabrous or with scattered hairs, the anterior shorter and nearly straight, the posterior 2 arcuate, with a short rounded dorsal hook at the apex. Samara with the lateral wings 6–10 mm wide, 13–18 mm high, reddish (immature), subcircular or elliptical or trapezoidal, sinuate at the margin, loosely sericeous; dorsal wing 0.5–1.5 mm wide, 2–2.5 mm high, triangular; nut ca 2 mm in diameter, loosely sericeous, the ventral areole ca 0.5 mm in diameter.

Type. *Pinkus* 90, SW slopes of Mt. Roraima, vicinity of Arabupu, Mt. Roraima District, Bolívar, Venezuela, elev 1380 m, 28 Dec 1939 (holotype F!, isotypes GH! NY!).

Distribution. Mountains of southern Venezuela, usually above 900 m. VENEZUELA. Bolívar: margen de la selva, Kavanayén, elev 1300 m, *Lasser* 1769 (F, NY, VEN); type, q v; Ptari-tepuí, SE-facing slopes, elev 1585–1600 m, *Steyermark* 60039 (VEN); lower portion of Quebrada O-paru-má, tributary of Río Pacairao, below Santa Teresita de Kavanayén, elev 915–1065 m, *Steyermark* 60568 (NY); Ptari-tepuí, dense forest at base of cerro along Río Karuai, elev 1220 m, *Steyermark* 60636 (NY); along Río Karuai, at base of Sororopán-tepuí, W of La Laja, elev 1220 m, *Steyermark* 60790 (F, NY, VEN); along Río Tirica (Río Aparurén) just above Techiné-merú, Chimantá Massif, elev 470 m, *Steyermark & Wurdack* 124 (MICH, NY, VEN), 134a (F); Cerro Venamo, bosque alto húmedo montañoso, elev 1220–1275, *Steyermark et al* 92717 (NY, VEN); selva húmeda, drenaje del Río Cuyuní, largo del Río Anawaray-parú, vec. Km 134 al sur de El Dorado, elev 1300–1350 m, *Steyermark et al* 104473 (NY, VEN); lower slope forest of Tirepon-tepuí, elev 1100 m, *Wurdack* 34029 (MICH, NY, US, VEN), elev 1200–1250 m, *Wurdack* 34051 (MICH, NY, US, VEN). Amazonas: talus forest, Cerro Parú, elev 1800 m, *Cowan & Wurdack* 31408 (MICH, NY, US, VEN).

Collected in flower mostly from November to January.

This is one of the few truly upland species of *Hiraea* in Guayana, most of the collections having come from above 1000 m. In most cases the plant is described as a liana, but four collections are said to have come from trees (small tree:

Cowan & Wurdack 31408, Lasser 1769; tree 8 m: Wurdack 34029; tree 12 m: Steyermark 60790). It seems unlikely that all of these experienced collectors were mistaken, but it would also be very suprising if a high-climbing species of *Hiraea* could also occur as a tree. Resolution of this problem must await further observations in the field.

19. *Tetrapteryx* Cavanilles, Diss. 9: 433. 1790.

Vines or occasionally shrubs, the leaves usually decussate, often bearing glands on the lamina or petiole or both; stipules small, usually interpetiolar, sometimes apparently absent. Flowers borne in umbels, corymbs, or pseudoracemes, these often grouped in a paniculate inflorescence; pedicel pedunculate, the peduncle subtended by a bract and bearing 2 apical or subapical bracteoles. Lateral 4 sepals usually biglandular, the anterior eglandular or biglandular. Petals yellow or pink, glabrous or abaxially sericeous (all yellow in Guayana). Stamens 10, all fertile, the anthers usually glabrous and more or less alike, the connective not exceeding the locules. Ovary of 3 centrally connate carpels, 1 anterior and 2 posterior, all fertile; styles 3, the apex with an internal to apical stigma and dorsally smooth to truncate or short-hooked. Fruit schizocarpic, breaking apart into 3 samaras (or fewer due to abortion) separating from a pyramidal torus, each samara having its largest wings lateral, usually 4 discrete wings; dorsal wing smaller, sometimes reduced to a crest or lost; intermediate winglets or projections sometimes present.

Type. *Tetrapteryx citrifolia* (Swartz) Persoon.

This is a difficult genus of about 90 species, all found in the New World. Not only does it need revision at the level of species; its limits as a genus are also somewhat vague, since some of its species are very like *Mascagnia*.

Key to the Species of *Tetrapteryx* in Guayana

1. Inflorescence an axillary pseudoraceme, usually unbranched, rarely basally ternate, the flowers sometimes reduced to 1 pair or crowded distally to form a few-flowered corymb or umbel; bracteoles larger than the floriferous bract (wider and at least as long), often bearing marginal or abaxial glands; calyx glands usually 10 (i.e. all 5 sepals biglandular).
Section *Macrophyllaris* Niedenzu.
2. Limb of the lateral petals denticulate or entire, usually less than 6 mm long (rarely to 7 mm) and 5 mm wide; filaments densely to sparsely sericeous or rarely glabrous; glands on the lamina marginal or none; nut of the samara usually bearing acuminate outgrowths between dorsal and lateral wings.
 3. Leaves persistently tomentose below, the hairs $\pm$ serpentine and loose; lamina of the largest leaves up to 3.6 cm long. 1. *T. aristeguietae*.
 3. Leaves thinly sericeous to glabrate below, the hairs (if any) straight and appressed; lamina of the larger leaves 3.5–15 cm long.
 4. Woody vine or robust shrub over 1 m tall, usually growing by rivers; lamina (2.5–)3.5–7 cm wide; calyx glands (2.5–)3–4 mm long; lateral wings of samara (7–)8–14 mm long, 4, subequal; anthers (1.3–)1.5–1.8 mm long; bracteoles 2–5 mm long. 2. *T. styloptera*.
 4. Wiry-stemmed shrub 0.2–0.6(–1) m tall, in savannas; lamina 0.7–2.8 cm wide; calyx glands 1.2–2 mm long; lateral wings of the samara 1.5–3(–5) mm long, variable in number, irregular and often unequal; anthers 0.9–1.1 (–1.5) mm long; bracteoles up to 2 mm long. 3. *T. gracilis*.
2. Limb of the lateral petals fimbriate, mostly 6–10 mm long and 5.5–9 mm wide; filaments glabrous; glands usually present on the lamina, borne between the midrib and the

margin; nut of the samara devoid of outgrowths between dorsal and lateral wings (all wings reduced to thick, irregular outgrowths in *T. oleifolia*).

5. Stems, inflorescence, and leaves very soon nearly or quite glabrate, except for golden-sericeous axillary buds; margin of the lamina notably thickened; veins usually obscure or invisible; virgate shrubs 0.2–2(–3) m tall. 4. *T. pusilla*.
5. Stems and usually the inflorescence densely and persistently sericeous; leaves sericeous to glabrate; margin of the lamina sometimes revolute but usually not or only slightly thickened; veins visible on one or both sides of the lamina; shrubs or vines.
 6. Leaves thinly sericeous to glabrate below, the glands and epidermis easily seen.
 7. Petiole 0–2 mm long. 5. *T. huachamacariensis*.
 7. Petiole over 3 mm long. 6. *T. fimbripetala*.
 6. Leaves persistently very densely sericeous below, the hairs nearly or completely concealing the epidermis and partly hiding the glands, if any.
 8. Lamina of the larger leaves over 2.5 cm wide, with a row of small impressed glands below between midrib and margin; lateral wings of the samara normal, ie all 4 well-developed, subequal, thin. 7. *T. rhodoptera*.
 8. Lamina up to 2.2 cm wide, eglandular or with minute marginal glands; lateral wings of the samara reduced to rounded crests or thick or aculeate, irregular outgrowths. 8. *T. oleifolia*.
1. Inflorescence simple or compound, terminating in umbels of 4(–6) flowers; bracteoles smaller than the floriferous bract or the same size, eglandular or abaxially callose; calyx glands 8 (the anterior sepal eglandular) or all rudimentary or absent.
9. Stipules distinct; styles slender, with small, discrete, nearly terminal stigmas; non-floriferous bracts of the inflorescence inconspicuous, 5 mm long or less, lanceolate; bracteoles longer than wide; calyx glands (if present) usually becoming stalked in older flowers and fruit. 9. *T. mucronata*.
9. Stipules connate in interpetiolar pairs, often caducous but then leaving a prominent interpetiolar scar; styles stout, with the stigmas apparently internal and decurrent; inflorescence containing conspicuous, often orbicular, foliaceous bracts 4–20 mm long, much smaller and thinner than vegetative leaves but much larger than floriferous bracts, these deciduous and usually absent from fruiting specimens; bracteoles about as wide as long or wider; calyx glands sessile. Section *Lophogynixa* Niedenzu.
10. Stems, petioles, and abaxial surface of lamina persistently velutinous, the hairs erect; samara with the dorsal wing absent, represented at most by a slight rib. 10. *T. chloroptera*.
10. Stems, petioles, and lamina thinly sericeous to glabrate, the hairs (if any) appressed; samara (where known) with a well-developed dorsal wing.
 11. Lateral petals with the limb 11–12 mm long and 10–12 mm wide; lamina of the leaf with two large elliptical basal glands 2–3 mm long; umbel subsessile, raised above the subtending foliaceous bracts on a peduncle 0.5–1.5 mm long; calyx glands 3.5–6 mm long, some or all asymmetrical, ear-shaped. 11. *T. megalantha*.
 11. Lateral petals with the limb up to 5.5 mm long and 4.5 mm wide; lamina eglandular at very base, all glands on the lamina circular, up to 0.4 mm in diameter; umbel raised on a peduncle 3–6 mm long; calyx glands 2–4 mm long, elliptical or obovate.
 12. Samara with winglets or aculeate outgrowths between dorsal and lateral wings, the upper lateral wings 12–18 mm long, the lower 4–9 mm long; stipule-pair 1–1.5 mm wide, the scar stretched to 2.5 mm at older nodes; lamina of the leaf 9–14 cm long, 4–6.5 cm wide; petiole 7–12 mm long. 12. *T. discolor*.
 12. Samara devoid of outgrowths between dorsal and lateral wings, the upper lateral wings 22–35 mm long, the lower 11–15(–20) mm long;

stipule-pair 2.5–4 mm wide, the scar stretched to 5.5 mm at older nodes; lamina of leaf (11–)13–20 cm long, (5–)6–10.5 cm wide; petiole (12–)14–20(–27) mm long.

13. *T. crispa*.

1. *Tetrapteryx aristeguietae* Anderson, sp nov

Fig 55d–g.

Frutex 1–2.5 m altus, ramis sericeis demum glabratis. Lamina foliorum majorum 2.5–3.6 cm longa, 1.3–2.2 cm lata, elliptica vel ovata, basi cuneata, apice plerumque obtusa vel rotundata, supra tomentosa mox glabrata, subtus pertinaciter tomentosa (vel subsericea) pilis $\pm$ patentibus et saepe serpentinis, eglandulosa vel margine aliquot glandulis minutis munita; petiolus 2.5–4 mm longus, tomentosus vel subsericeus vel glabratus, eglandulosus; stipulae nullae vel minutae, 0.1–0.2 mm altae, triangulares, interpetiolares. Inflorescentia pseudoracemus simplex vel ternatus axillaris 1–6 cm longus, floribus decussatis 2–26, bracteis 1.5–2.5 mm longis, ca 0.7 mm latis, abaxialiter sericeis, eglandulosus, pedunculo 2–6.5 mm longo, sericeo, bracteolis 2.5–4.5 mm longis, 1.2–2 mm latis, ellipticis, glabratis, membranaceis, venosis, eglandulosus, apice vel sub apice pedunculi portatis. Pedicellus (2.5–)4.5–6 mm longus, sericeus vel glabratus. Sepala abaxialiter sericea, adaxialiter glabra, appressa per anthesin, omnia biglandulifera, glandulis 1–2 mm longis. Petala lutea, abaxialiter sparsissime sericea, denticulata, 4 lateraliter patentia, ungue 0.8–1.4 mm longo, limbo 3–4 mm longo, 2 mm lato, obovato; petalum posticum $\pm$ erectum, ungue 1 mm longo, crasso, limbo 3 mm longo, 2 mm lato. Filamenta 1.2–1.4 mm longa, basi connata, sericea; antherae 0.8 mm longae, glabrae, connectivo rubro demum nigrescenti. Ovarium ca 0.7 mm altum, sericeum; styli 1.5 mm longi, $\pm$ aequales, glabri, apice interne vel subterminaliter stigmatifero dorsaliter rotundato vel truncato. Samarae alae laterales 4, glabratae, 5–8 mm longae, 2–5 mm latae, obovatae vel obtriangulares, inaequales et irregulares, 2 superiores saepe longiores, subintegrae vel irregulariter lobatae; ala dorsalis 1–2 mm lata, subintegra vel grosse dentata; nux tomentosa, inter alas laterales et alam dorsalem aliquot aculeis 1–4.5 mm longis munita.

Type. *Aristeguieta* 4867, bajíos de Ciudad Bolívar, desembocadura del río Maruanta, Bolívar, Venezuela, 19 Aug 1962 flr/frt (holotype VEN).

Paratype. VENEZUELA. Bolívar: savanna and rock outcrops 1–3 km E of Río Orinoco between mouth of Río Horeda and Cerro Gavilan (Cerro Carichona), elev 100 m, Dec flr, *Wurdack & Monachino* 39931 (NY).

This species is named in honor of Dr. Leandro Aristeguieta, collector of the type and student of Venezuelan Compositae. *Tetrapteryx aristeguietae* is probably most closely related to *T. vacciniifolia*, which was based by Adrien de Jussieu on a Plée collection from Maracaibo. Judging from Jussieu's description and a photograph of his type, I can advance the following distinctions between the two species:

1. Larger leaves 1.3–2.2 cm wide, up to twice as long as wide; lamina persistently tomentose or subsericeous below; samara with the upper lateral wings longer than or equal to the lower, and bearing several long narrow projections, often longer than the dorsal crest, between it and the lateral wings. *T. aristeguietae*.
1. Larger leaves ca 1 cm wide, about 3 times as long as wide; lamina bearing scattered minute hairs below; samara with the upper lateral wings 3 times shorter than the lower, and bearing no intermediate appendages. *T. vacciniifolia*.

2. *Tetrapteryx styloptera* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 262. 1840.

Bunchosia squarrosa Grisebach, Linnaea 22: 11. 1849. Type: Otto 962, Caroní, Bolívar, Venezuela, Nov flr (holotype GOET? isotype W).

Tetrapteryx squarrosa (Grisebach) Grisebach in Martius, Fl. Bras. 12(1): 87. 1858.

Tetrapteryx methystica Schultes, Bot. Mus. Leaf. 16: 202. 1954. Type: Schultes & López 10184, Ira-Igarapé, affl. Rio Tikié, Puerto Makus, Amazônas, Brazil (GH!).

Woody vines, rarely shrubs 1 m or taller, the stems sericeous to glabrate. Lamina of the larger leaves (5–)7.5–15 cm long, (2.5–)3.5–7 cm wide, ovate or rarely elliptical, obtuse or rounded at the base, acuminate or rarely acute at the apex, glabrate above, thinly sericeous to glabrate below, the hairs fine, white, strongly appressed, usually with several small impressed marginal glands, otherwise eglandular; petiole (3–)4–9(–11) mm long, sericeous to glabrate, eglandular or bearing 2–4 small glands; stipules none or minute, up to 0.2 mm long, interpetiolar, borne near base of petiole. Inflorescence an axillary pseudoraceme, usually shorter than vegetative leaves, sericeous to glabrate, the flowers decussate; bracts 1.5–3 mm long, 1–2 mm wide, straight or recurved, eglandular or with tiny basal glands; peduncle 1.5–6 mm long; bracteoles 2–5 mm long, (1–)1.5–3.5 mm wide, often recurved or revolute, apical or borne below apex of peduncle, very often bearing 1–2 abaxial glands. Pedicel (2.5–)3.5–6(–10) mm long. Sepals all biglandular, the glands (2.5–)3–4 mm long, narrow, compressed. Petals yellow, glabrous or abaxially sparsely sericeous, entire or, usually, denticulate, obovate, the lateral 4 with the claw 1–1.7 mm long, the limb 4–5.5(–7) mm long, 2.8–5 mm wide; posterior petal similar, the claw thicker and sometimes slightly longer, the limb narrower. Filaments (1.5–)2–2.3 mm long, broad, basally connate, usually sericeous; anthers (1.3–)1.5–1.8 mm long, glabrous or, usually, with a basal tuft of hairs, reflexed. Styles (1.8–)2.2–2.8 mm long, straight or diverging, glabrous except at base, the apex internally stigmatic and dorsally rounded, truncate, or very slightly hooked. Samara sericeous to glabrate on the nut and glabrate on the wings, the 4 lateral wings (7–)8–14 mm long, 2.5–5 mm wide, subequal, the upper 2 often slightly shorter and narrower; dorsal wing 2–4 mm wide, entire to coarsely dissected; nut with several slender outgrowths between dorsal and lateral wings, often exceeding the dorsal wing.

Type. *Mathews 1464*, Tarapoto, Peru (holotype P, isotype K).

Distribution. Common along rivers in northern South America. Collections from Guayana: GUYANA. Potaro River, vic. of Kaieteur Falls, elev 420 m, *Cowan & Soderstrom 1794 & 2222* (NY), *Maguire & Fanshawe 23248 & 23302* (GH, NY); Karaurieng River, upper Mazaruni, elev 1250 m, *Maguire & Fanshawe 32300* (K, MICH, NY, US). VENEZUELA. Bolívar: Río Hacha, 6°15'N, 62°47'W, *Agostini 367* (VEN); Río Apácará, elev 400 m, *Bernardi 1573* (VEN); Río Ikabaru, elev 450 m, *Bernardi 6568 & 6666* (NY); Río Caroní, boca de Tirika, elev 400 m, *Cardona 1153* (US, VEN); Río Uaiparú, *Cardona 1904* (US, VEN); Alto Paragua, *Cardona 2462* (VEN); Río Cucurital, Auyan-tepuí, elev 800 m, *Cardona 2605* (NY, VEN); Salto Cama, Gran Sabana, elev 1000 m, *Davidse 4902* (MICH); Río Apácará, elev 415 m, *Steyermark 74673* (F, NY); Río Caroní just below Urimán, elev 394 m, *Steyermark & Wurdack 5* (NY, VEN); Río Caura, arriba del Salto Para, elev 250–300 m, *Steyermark et al 112962 & 113066* (MICH); Río Carrao, Canaima, *Trujillo 6071* (MY); Salto de Para, Medio Caura, elev 170

m, *Ll. Williams* 11477 (US, VEN); Río Villacoa, elev 80–110 m, *Wurdack & Monachino* 41145A (NY, VEN), 41167 (MICH, NY, US, VEN); Raudal Budare, Río Suapure 70 km from mouth, elev 100 m, *Wurdack & Monachino* 41256 (MICH, NY, US, VEN); Cerro Pijiguao, 70 km from mouth of Río Suapure, elev 110–520 m, *Wurdack & Monachino* 41306 (MICH, NY, US, VEN). Amazonas: Casiquiare, *Holt & Blake* 644 (A, NY, US); Yapacana Caño, *Maguire & Maguire* 34610 (MICH, NY, US, VEN); Río Siapa, *Maguire & Wurdack* 34853 (MICH, NY, US, VEN); Río Guayapo, trib. Río Sipapo, *Morillo & Ishikawa* 3465 (VEN); Río Pacimoni, *Steyermark & Bunting* 102485 (NY, VEN); Iguazú, Atabapo cerca Isla Zapo, *Vereschi & Jaffe* 8005 (VEN); San Carlos de Río Negro, *Ll. Williams* 14653 (VEN); Caño Pimichin, Guainía, *Ll. Williams* 14936 (VEN); Río Orinoco below mouth of Caño Yapacana, elev 125–150 m, *Wurdack & Adderley* 43032 (MICH, NY, US, VEN); Tama-Tama, *Wurdack & Adderley* 43132 (MICH, NY, VEN); Río Guainía below Banderita, *Wurdack & Adderley* 43196 (MICH, NY, US, VEN); Caño San Miguel, ca 70 km from mouth of Río Guainía, *Wurdack & Adderley* 43254 (MICH, NY, US, VEN). COLOMBIA. Vaupés: Pucará, Río Vaupés, elev 220 m, *Cuatrecasas* 7000 (US); Río Naquiení, vic. Cerro Monachí, *Schultes & Cabrera* 10116 (US); Mitú and vic., *Zarucchi* 1312, 1668, 1819, 1866, 1892 (MICH). Amazonas-Vaupés, Río Apaporis: *Schultes & Cabrera* 12597, 12880, 13573, 16591 pp, 16667, 16778, 16953, 16961, 17600 (all US). BRAZIL. Amazonas: Rio Negro, S. Gabriel, *Black* 48–2454 (IAN); Rio Uaupés, Igarapé Jurupari, *Fróes* 28231 (UB); Tapuruquara, *Pires* 237 (US); Vista Alegre, Alto Rio Negro, *Rodrigues* 813 (INPA); type of *T. methystica*, qv.

Collected in flower and fruit in all months.

This is an exceedingly variable species. Among the atypical collections included here, special mention should be made of *Wurdack & Adderley* 43196 and 43254. The former has unusually wide leaves, long open pseudoracemes, and very large bracteoles. The latter has long, narrow, reflexed leaves and small bracteoles.

3. *Tetrapteryx gracilis* Anderson, sp nov

Fig 53.

Frutex 0.2–0.6(–1) m altus, ramis gracilibus primum sericeis plerumque mox glabratis. Lamina foliorum majorum 3.5–6.5(–10) cm longa, 0.7–2.8 cm lata, ovata vel anguste ovata, basi cuneata vel obtusa, apice attenuata, acuminata, vel acuta, saepe reflexa, mox glabrata, margine aliquot glandulis impressis munita, reticulo subtus vel utrinque prominulo; petiolus 3–6(–9) mm longus, sparsim sericeus vel glabratus, eglandulosus vel 2–4 glandulis parvis munitus; stipulae nullae vel minutae, ca 0.1 mm altae, interpetiolares prope basim petioli. Inflorescentia pseudoracemus axillaris 1–3(–4.5) cm longus, floribus decussatis 4–12(–22), bracteis 0.7–1.2 mm longis, ca 0.5 mm latis, eglandulosis, pedunculo 1–4 mm longo, bracteolis 0.8–2 mm longis, 0.6–1.2 mm latis, apice vel sub apice pedunculi portatis, una vel ambabus saepe uniglanduliferis. Pedicellus 3.5–5.5(–7) mm longus, glabratus praeter apicem. Sepala omnia biglandulifera, glandulas 1.2–2 mm longas 0.7–1.2 mm superantia, 1.2–1.5 mm lata, obtusa, appressa, abaxialiter sericea vel subglabrata, adaxialiter glabra. Petala lutea, glabra vel abaxialiter sparsissime sericea, integra vel minute denticulata, 4 lateralia patentia, ungue 0.7–1 mm longo, limbo 3.5–5 mm longo, 2.5–4 mm lato, obovato; petalum posticum erectum, ungue 1–1.4 mm longo, crasso, limbo 3.5–5.5 mm longo, 2.5–4 mm lato, obovato. Filamenta

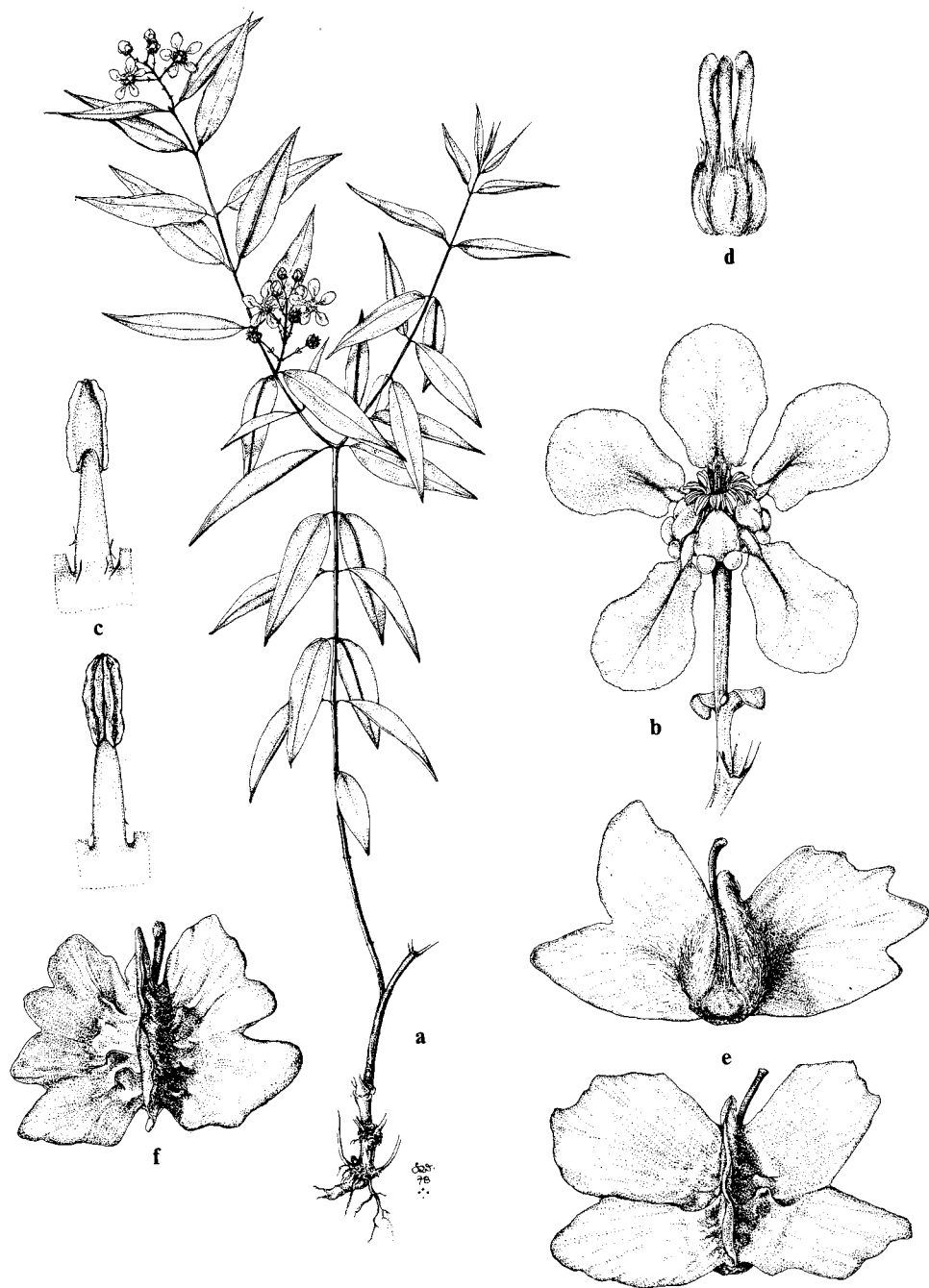


Fig 53. *Tetrapterys gracilis*. a) Habit, $\times 0.5$; b) flower, $\times 3.5$; c) stamens, $\times 10$; d) gynoecium, $\times 10$; e & f) samaras, $\times 7.5$. Drawn by Karin Douthit, a from Maguire *et al* 41442, b-e from Maguire *et al* 41514.

1.1–1.8 mm longa, basi connata, sericea vel subglabra; antherae 0.9–1.1(–1.5) mm longae, glabrae vel basi paucipiliferae, connectivo atrorubro. Ovarium ca 1 mm altum, $\pm$ sericeum; styli 1.4–1.9 mm longi, aequales vel anticus paulo brevior, recti, glabri, apice interne stigmatifero dorsaliter rotundato, truncato, vel brevissime uncinato. Samara sericea vel glabrata; alae laterales 1.5–3(–5) mm longae (e nuce ad marginem), in 4 divisae vel, saepius, irregulariter lobatae, in eadem planta valde variabiles; ala dorsalis 0.5–1(–1.5) mm lata, integra vel sinuata; nux inter alas laterales et alam dorsalem saepe rugosa vel aliquot aculeis munita.

Type. *Maguire, Wurdack & Keith 41514*, Yapacana savannas, NW base of Cerro Yapacana, Alto Río Orinoco, Amazonas, Venezuela, 16 Sep 1957 flr/imm frt (holotype MICH, isotypes NY, US, VEN).

Distribution. Savannas of Amazonas, Venezuela, and Vaupés, Colombia. VENEZUELA. Amazonas: NW base of Cerro Yapacana, elev 130 m, Jan flr, *Maguire et al 30568 & 30809* (both NY); Sabanita El Venado on left bank of Caño Pimichín above Pimichín, Río Guainía, elev 140 m, Nov flr/frt, *Maguire & Wurdack 36350* (NY); Pacimoni savanna on right bank of Río Pacimoni 50 km above mouth, elev 100–140 m, Feb flr/frt, *Maguire et al 37571* (NY); type, q v; cerro Yapacana, sabana grande, May flr, *Steyermark & Bunting 103256* (NY, VEN). COLOMBIA. Vaupés: Cacagual savanna, Río Atabapo between San Fernando de Atabapo and Caño Temí, Sep flr, *Maguire et al 41442* (COL, NY); Mitú and vicinity, lower Río Paraná-pichuna, savanna at major rapids, Sep flr, *Zarucchi 1962 & 1984* (both MICH).

This species is named for its slender, wiry stems, producing the habit of a small shrub. It is obviously derived from *Tetrapteryx styloptera*, but seems to be adequately distinguished from that species by its habitat, habit, small flowers, and small irregular samaras. One collection, *Maguire et al 37571*, shows some intermediacy in leaf-size to *T. styloptera*. It would be interesting to study these two species in areas where their habitats abut to look for more intermediates.

4. *Tetrapteryx pusilla* Steyermark, Fieldiana Bot. 28: 294. 1952. Fig 54d–f.

Virgate shrubs 0.2–2(–3) m tall, the stems at first thinly sericeous but very soon nearly or quite glabrate except for golden-sericeous axillary buds. Lamina of the larger leaves 3–6(–7) cm long, 1.3–3.5 cm wide, obovate or occasionally elliptical, cuneate at the base, thickened and often revolute at the margin, obtuse or rounded and often apiculate at the apex, glabrous or very soon glabrate, the veins usually invisible or the lateral veins prominulous above or below, with 2–8 impressed glands below in the proximal $\frac{1}{3}$ (– $\frac{1}{2}$) between midrib and margin and often 1–4 near the apex; petiole 2–3(–5) mm long, glabrate, eglandular; stipules not seen. Inflorescence an axillary pseudoraceme 4–9 cm long, of 4–6(–8) decussate flowers, often corymbose, thinly sericeous to glabrate; bracts 1–2 mm long, ca 0.7 mm wide, triangular, eglandular (lowest pair sometimes larger, rounded, biglandular); peduncle 6–14 mm long; bracteoles 1–2 mm long, 1–1.7 mm wide, elliptical or orbicular, subapical, bearing 2(–4) small abaxial glands. Pedicel 7.5–15 mm long, glabrate except for tumid apex. Sepals revolute in anthesis, abaxially sparsely sericeous to glabrate, ciliate on the margin, adaxially glabrous, all biglandular, the glands 1.1–2.5 mm long. Petals yellow or yellow with a central red blotch, glabrous, fimbriate, circular or obovate, the lateral 4 with the claw 2–3 mm long,

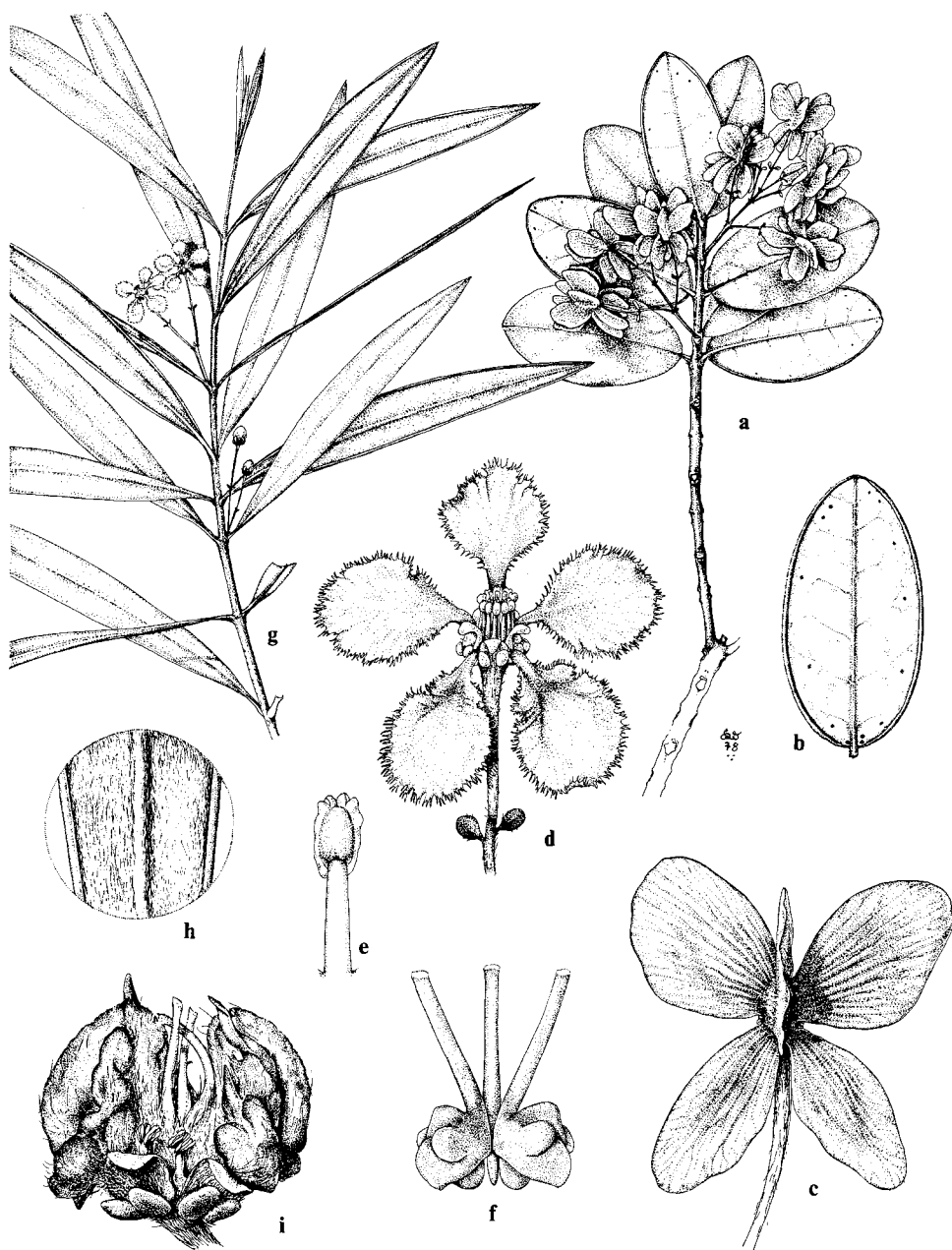


Fig 54. *Tetrapteryx* section *Macrophyllaris*. a–c, *T. huachamacariensis*: a) Fruiting branch, $\times 0.5$; b) leaf, abaxial side, $\times 0.75$; c) samara, $\times 2.5$. d–f, *T. pusilla*: d) Flower, $\times 2.2$; e) stamen, abaxial view, $\times 10$; f) gynoeceium, $\times 10$. g–i, *T. oleifolia*: g) Flowering branch, $\times 0.5$; h) leaf, abaxial side, $\times 2$; i) immature fruit, $\times 4$. Drawn by Karin Douthit, a–c from Maguire et al 30054, d–f from Tillett et al 45201, g–h from Steyermark & Nilsson 8, i from Steyermark et al 105495.

the limb 7.5–10 mm long, 7.5–9 mm wide; posterior petal with the claw 3–4 mm long, the limb 6–7 mm long, 5.5–6.5 mm wide. Filaments 1.8–2.3 mm long, slender (thicker opposite the petals), basally connate, straight, glabrous; anthers 0.6–1.2 mm long, glabrous. Ovary 1–1.3 mm high, glabrous, with winglets already evident; styles 2–2.5 mm long, subequal, straight, glabrous, the apex with the stigma internal to apparently terminal, dorsally truncate to rounded. Samara red to brown, glabrous, the 4 lateral wings 5–7 mm long, (2–)4–6 mm wide, subequal, flabellate or obovate; dorsal wing 1.5–2 mm wide, entire or coarsely dentate; nut devoid of outgrowths between dorsal and lateral wings.

Type. *Steyermark 59361*, between Mission of Santa Teresita de Kavanayén NW to Río Karuai, elev 1220 m, Oct flr (holotype F! isotype NY!).

Distribution. Moist sandy savannas, Gran Sabana of SE Venezuela and western Guyana. GUYANA. Imbaimadai, Upper Mazaruni River, elev 550 m, *Maguire 32201* (K, MICH, NY, US), *Maguire et al 40677* (NY); Partang Savanna, near mouth of Partang River, upper Mazaruni basin, elev 460 m, *Maguire et al 43806* (NY); Ayanganna Plateau, upper Mazaruni basin, elev 600–740 m, *Tillett et al 44870* (NY), *45201A* (K, MICH, NY, US). VENEZUELA. Bolívar: Ilu-tepuí, slopes below uppermost west-facing escarpment, elev 2400–2600 m, *Maguire 33569* (MICH, NY, VEN); Ilu-tepuí, Uarupata to Enemasic, elev 900 m, *Maguire 33558* (NY, VEN); Kavanayén, *Maguire 33668* (NY); Km 175 S of El Dorado on road to Santa Elena, elev 1200 m, *Steyermark 111298* (MICH); Km 145 S of El Dorado, elev 1350–1400 m, *Steyermark et al 104233* (NY); vicinity of Sta Elena de Uairén, *Trujillo 11522* (MY); Kavanayén, elev 1300 m, *Wurdack 33785* (NY, VEN).

Collected in flower and fruit in almost all months.

5. *Tetrapteryx huachamacariensis* Anderson, sp nov

Fig 54a–c.

Frutex usque 2 m altus, ramis pertinaciter aureo-sericeis. Lamina foliorum majorum 2.8–6.3 cm longa, 1.8–2.9 cm lata, elliptica, basi cuneata vel rotundata, margine valde revoluta et parum incrassata, apice obtusa vel rotundata, glabrata vel costa $\pm$ pertinaciter sericea, subtus utrinque serie 5–8 glandularum impressarum inter marginem et costam munita, nervis lateralibus plerumque visibilibus (in sicco) sed non prominentibus; petiolus 0–2 mm longus, sericeus, eglandulosus; stipulae minutae, ca 0.1 mm longae, interpetiolares prope basim petioli. Inflorescentia pseudoracemus axillaris 3–6 cm longus, pertinaciter aureo-sericeus, floribus decussatis 4–8, bracteis 1–1.5 mm longis (vel 2 inferioribus folioliformibus), pedunculo (2–)6–10 mm longo, bracteolis 2–4 mm longis, 1.5–3 mm latis, ellipticis vel obovatis, apice vel saepius sub apice pedunculi portatis, eglandulosus. Pedicellus 9–11 mm longus, sericeus vel glabrescens, apice tumidus. Sepala omnia biglandulifera. Petala ignota. Filamenta 1.5–2 mm longa, glabra; antherae ca 1 mm longae, glabrae. Ovarium glabrum; styli 2–2.5 mm longi, recti, glabri, apice interne stigmatifero dorsaliter rotundato vel truncato. Samara immatura rubra, glabra; alae laterales 7–10 mm longae, 3–7 mm latae, 2 superiores latiores; ala dorsalis 2.5–3.5 mm lata, ca 6–7 mm alta, sinuata vel subintegra; nux inter alas laterales et alam dorsalem nuda.

Type. *Maguire, Cowan & Wurdack 30054*, ridge summit, East Ridge No. 1,

Cerro Huachamacari, Río Cunucunuma, Amazonas, Venezuela, elev 1820 m, Dec frt (holotype NY, isotypes MICH, VEN).

Paratype. *Maguire et al 30164*, scrub savanna, SE Escarpment, Cerro Huachamacari, Amazonas, Venezuela, elev 1900 m, Dec frt (NY).

This species is intermediate between *Tetrapteryx pusilla* and *T. fimbripetala*. It has the small, subsessile, glabrate leaves of the former, and its shrubby habit, but the hairy stems and inflorescence of the latter.

6. *Tetrapteryx fimbripetala* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 263. 1840.

Woody vine, occasionally a shrub 1–2 m tall, the stems golden-sericeous, eventually glabrescent. Lamina of the larger leaves (4.5–)6–11(–15) cm long, (2–)3–5(–6) cm wide, elliptical or obovate, cuneate at the base, often slightly revolute but hardly or not thickened at the margin, gradually to abruptly acuminate at the apex, soon glabrate above, thinly sericeous to glabrate below, the lateral veins usually visible on both sides, with a row of 6–20 impressed glands below on each side from base to apex between margin and midrib; petiole 6–11 mm long, sericeous to glabrate; stipules minute, ca 0.1 mm long, interpetiolar at base of petiole. Inflorescence an axillary pseudoraceme 2–6 cm long, of 4–16 mostly decussate flowers, sericeous to glabrate; bracts 1–3 mm long, linear or narrowly triangular, eglandular; peduncle 4–9 mm long; bracteoles 1.5–4 mm long, 1–3 mm wide, elliptical, usually bearing 2–6 abaxial glands, borne at or below apex of peduncle. Pedicel 7–11 mm long, sericeous to glabrate. Sepals revolute in anthesis, abaxially sparsely sericeous, ciliate on the margin, adaxially glabrous, all biglandular, the glands 1.5–3 mm long. Petals yellow, glabrous, fimbriate, circular or obovate, the lateral 4 with the claw 2–2.5 mm long, the limb (4.5–)6–8.5 mm long, (4.5–) 5.5–8 mm wide, the posterior similar but with the claw 3–4 mm long and thicker. Filaments 2–2.8 mm long, nearly free, straight or slightly arched, glabrous; anthers 0.9–1.3 mm long, glabrous. Ovary sparsely sericeous, with winglets already evident; styles 3–4 mm long, usually somewhat arched, glabrous, the apex with the stigma internal to terminal, dorsally truncate to rounded. Samara red to brown, glabrous or the nut sparsely sericeous, the 4 lateral wings 12–20 mm long, 5–11 mm wide, obovate; dorsal wing 2–3 mm wide, $\pm$ entire; nut devoid of outgrowths between dorsal and lateral wings.

Type. French Guiana (K, BR?).

Distribution. Guianas, southern Venezuela, and adjacent Brazil. BRAZIL. Terr. Roraima, Serra dos Surucucús: savanna plateau, elev 1800 m, *Prance et al 9903* (MICH, NY); *Rosa 271* (MICH). VENEZUELA. Bolívar: orillas del Río Purpur, valle de Urimán, Alto Caroní, elev 600 m, *Cardona 2591* (VEN); woodland, Uarupata, Ilu-tepuí, elev 1800 m, *Maguire 33605* (MICH, NY, VEN); thickets along stream, Cerro Pitón, Cordillera Epicara, Alto Cuyuni, elev 400 m, *Maguire et al 53659* (NY); wet forest, Sierra de Lema, 6°5'N, 62°W, elev 700 m, *Steyermark 89429* (NY, VEN); Canaima, elev 400 m, *Steyermark 106432* (NY); wooded ridge of Fila de La Danta, between Luepa and Cerro Venamo, elev 1200 m, *Steyermark & Nilsson 199* (NY, VEN); cloud-forest between Lower Cumbre Camp and south-facing escarpment of Agparaman-tepuí, elev 1879–1955 m, *Steyermark & Wurdack 1137* (NY); Meseta del Jaua, Cerro Sarisariñama, elev 1320

m, *Steyermark et al 109037* (NY); Meseta del Jaua, Cerro Jaua, elev 1800–1880 m, *Steyermark et al 109549 & 109649* (both NY); bosque húmedo, Cerro Venamo, elev 950–1150 m, *Steyermark et al 92401* (VEN); Km 142, selva húmeda, drenaje del Río Cuyuní, S de El Dorado, elev 1300–1380 m, *Steyermark et al 104288* (NY, VEN); slopes and talus forest, Sarvén-tepuí, elev 1750–2000 m, *Wurdack 34091* (MICH, NY, US, VEN). Amazonas: montane forest, Cerro Sipapo, elev 600 m, *Maguire & Politi 28783* (MO, VEN); montane forest, Cerro Yutaje, elev 1000 m, *Maguire & Maguire 35054* (MICH, NY, US, VEN), 1400 m, *35099* (MICH, NY, US, VEN), 1500 m, *35346* (MICH, NY, US, VEN); Cerro de la Neblina, Río Yatua, escarpment slopes, *Maguire et al 42038* (NY).

Collected in flower and fruit in diverse months, most often from January to April.

This species is rather variable in size and hairiness of leaves. Some of this variation may eventually merit taxonomic recognition, especially *Maguire et al 42038* from Cerro de la Neblina, which has the lamina papillose below, and *Cardona 2591*, which has unusually large leaves and was reported by the collector to be a tree 10 m tall. The *Steyermark et al* collections from the Meseta del Jaua have small leaves similar to those of *T. pusilla*.

7. *Tetrapteryx rhodoptera* Oliver, Timehri 5: 190. 1886.

Tetrapteryx phylladenophora Maguire & Steyermark, Mem. New York Bot. Gard. 9: 481. 1957.

Type. *Phelps & Hitchcock 426*, Uaipán-tepuí, Bolívar, Venezuela, elev 1400 m (holotype NY!; isotype VEN!).

This species is essentially identical to *Tetrapteryx fimbripetala*, q v, except for the fact that the lamina is very densely and persistently sericeous below, the hairs nearly or completely concealing the epidermis and partly hiding the glands. The leaves are also on the average somewhat larger, although falling within the range of measurements for *T. fimbripetala*. *Tetrapteryx rhodoptera* is easily recognized and has a natural range, but whether it is best classified as a species or at some infraspecific rank is perhaps a matter for the attention of the next monographer of *Tetrapteryx*.

Type. *E. F. im Thurn 255*, Roraima, British Guiana [Guyana], 15 Dec 1884 frt (holotype K, isotype US!).

Distribution. Southeastern Venezuela and adjacent Guyana, east of the Río Caroní and south of Auyan-tepuí. GUYANA. Type, q v. VENEZUELA. Bolívar: El Dorado-Santa Elena de Uairén, Km 135–167, *Badillo & Holmquist 6208* (MY); playas arenosas, Río Ikabaru NE del pueblo, elev 450 m, *Bernardi 6680* (NY); cerca de los raudales Mureyema, Caroní, elev 740 m, *Cardona 1803* (US, VEN); Gran Sabana, road to Kavanayén, elev 1200–1250 m, *Gentry et al 10505* (MICH); above Salto Hacha, on plateau S of peak of Uaipán-tepuí, elev 1200 m, *Koyama & Agostini 7402* (MY); Kavanayén, *Lasser 1747* (F, NY, US, VEN), *1785* (F, NY, US, VEN), *1800* (NY, US, VEN), *1939* (NY, VEN); stream gallery woodland, San Raphael to Río Apongua, elev 1200 m, *Maguire 33611* (MICH, NY, VEN); Uaipán-tepuí, *Phelps & Hitchcock 418* (NY) & *426* (NY, VEN); Mount Roraima, vic. of Arabupu, elev 1260 m, *Pinkus 74 & 283* (both NY); Gran Sabana, between Mission of Santa Teresita de Kavanayén NW to Río Karuai, elev 1220 m, *Steyermark 59381* (F, NY, VEN); Salto de Iwaracarú-merú, W end of Soro-

ropán-tepuí, elev 1615 m, *Steiermark* 60205 (F, NY); 8 km NW of Kavanayén, elev 1220 m, *Steiermark* 60451 (US, VEN); Auyan-tepuí, faldas meridionales, elev 1500–1530 m, *Steiermark* 94122 (VEN); valley of Río Aponguao, Km 146, NE of Luepa, elev 1200 m, *Steiermark & Nilsson* 720 (NY, VEN); Río Tirica, Torono-tepuí, Chimantá Massif, elev 515 m, *Steiermark & Wurdack* 1376 (NY).

Collected in flower and fruit from October to June.

Fruiting specimens of *Mascagnia benthamiana* may key out to this species if the samaras are deeply enough dissected to mimic those of a *Tetrapteryx*. *Mascagnia benthamiana* can be readily distinguished on these bases, plus others (see description): Petiole bearing 2 large glands at or slightly above the base; stipules epipetiole; peduncle 0–4 mm long; pedicel 3–6 mm long; anterior sepal eglandular.

8. *Tetrapteryx oleifolia* (Bentham) Niedenzu, Verz. Vorles. Lyc. W.-S. 1909/10: 19. 1909.

Fig 54g–i.

Hiraea oleifolia Bentham, London Jour. Bot. (Hooker) 7: 136. 1848.

Heteropteryx oleifolia (Bentham) Grisebach, Linnæa 22: 19. 1849.

“Sprawling shrub,” the stems densely and persistently golden-sericeous. Lamina of the larger leaves 5.5–10 cm long, 1.2–2.1 cm wide, narrowly elliptical or slightly obovate, gradually narrowed to obtuse at the base and apex, slightly revolute at the margin, very densely golden-sericeous on both sides, eventually glabrate above, persistently sericeous below with the hairs turning gray, the lateral veins usually visible above, with 1(–2) pairs of impressed glands below near the base; petiole 4–13 mm long, sericeous, eglandular; stipules minute, interpetiole. Inflorescence an axillary pseudoraceme 2–4 cm long, with 2–6 decussate flowers, sometimes corymbose, sericeous; bracts 0.5–1 mm long, triangular, eglandular; peduncle 7–11 mm long; bracteoles 1.5–2 mm long, 1–2 mm wide, elliptical, usually bearing several tiny abaxial glands, apical or subapical. Pedicel up to 11 mm long, sericeous. Sepals 1.5 mm long beyond the glands, 2–2.5 mm wide, broadly triangular or ovate, abaxially densely sericeous, adaxially glabrous, all biglandular, the glands 1.3–2 mm long. Petals yellow or yellow with a red blotch, glabrous, fimbriate, the lateral 4 with the claw 2 mm long, the limb sub-circular, 7.5 mm long, 5.5–7 mm wide, the posterior with the claw 2.3 mm long, the limb elliptical, 5.5 mm long, 4 mm wide. Filaments 1.5–2.5 mm long, nearly free, straight, glabrous; anthers ca 1 mm long, glabrous, the connective dark red. Styles 3 mm long, nearly straight, glabrous, the apex with the stigma internal and dorsally truncate. Immature fruit red, sparsely sericeous, the mericarps ca 6 mm high, each bearing a dorsal crest up to 2 mm wide and several short, rounded or aculeate lateral outgrowths, the remnants of undeveloped lateral wings.

Type. *Robert Schomburgk II* 650/*Richard Schomburgk* 998, Roraima, “British Guiana” [Bolívar, Venezuela] (holotype K, isotype NY! [998]).

Distribution. VENEZUELA. Bolívar: Along rocks of stream, Cerro La Danta, NW of Cerro Venamo, elev 1040–1060 m, Apr flr, *Steiermark & Nilsson* 8 (VEN); open outcrops along rocky stream, Km 201.9 (“189–190”), carretera El Dorado–Santa Elena de Uairén, elev 1200–1400 m, Feb frt, *Steiermark et al* 105495 (NY).

The peculiar fruit of this rare species is known only from *Steiermark et al*.

105495. More collections in fruit will have to be found before we can have any confidence that this condition is typical for the species.

9. *Tetrapteryx mucronata* Cavanilles, Diss. 9: 434, tab. 262. 1790.

Tetrapteryx silvatica Cuatrecasas, Webbia 13(2): 425. 1958. Type: Río Apaporis, Amazonas-Vaupés, Colombia, *Schultes & Cabrera 16960* (US! holotype, GH! NY! isotypes).

Woody vine, rarely described as a shrub or small tree, the stems glabrous or thinly sericeous to glabrate. Lamina of the larger leaves 6–15 cm long, 3–8 cm wide, ovate or elliptical, cuneate or rounded at the base, slightly thickened and revolute at the margin, acuminate to obtuse at the apex, glabrous above, glabrous or very thinly sericeous to glabrate below, the reticulum prominulous on both sides, with 2 impressed glands below at the base and usually a row of few to many smaller glands distally between margin and midrib; petiole 5–14 mm long, glabrous or sparsely sericeous to glabrate, eglandular; stipules minute, interpetiolar, distinct. Inflorescence an axillary panicle 2–5 cm long, rarely simple, the branches terminating in umbels of 4–6 flowers, thinly sericeous to glabrate, the non-floriferous bracts inconspicuous, 5 mm long or less, the floriferous bracts 0.6–1.5 mm long, eglandular, narrowly triangular, the peduncle 1–6 mm long, the bracteoles like the bracts but 0.5–1 mm long, apical or subapical. Pedicel 5–10 mm long. Sepals appressed in anthesis, abaxially glabrous or thinly sericeous, adaxially glabrous, rounded, all eglandular or the lateral 4 biglandular, the glands circular, ca 2 mm in diameter, becoming prominently stalked and often auriculate in age. Petals yellow, often with reddish flecks, glabrous, entire or denticulate, the lateral 4 with the claw 1.5–3 mm long, the limb 4–6.5 mm long, 3.5–5 mm wide; posterior petal with a very thick claw 2.6–3 mm long, the limb 3.5–4.5 mm long, 3–4.5 mm wide. Filaments 1.5–3 mm long, longest opposite the anterior 3 sepals, shortest opposite the posterior petal, connate at the base, straight, glabrous; anthers 1–2.3 mm long, glabrous, the connective reddish. Ovary sparsely hirsute, with winglets already evident; styles 2.5–3.5 mm long, subequal or the anterior longer, straight, glabrous, slender and tapered distally, the apex with the small, discrete stigma internal or nearly terminal, dorsally rounded. Samara red to brown, glabrous or the nut sparsely sericeous, the upper lateral wings 10–20 mm long and 4–8 mm wide, the lower 5–11 mm long and 2.5–5 mm wide; dorsal wing 2–4 mm wide, coarsely dentate; nut usually bearing several aculeate outgrowths between dorsal and lateral wings.

Type. French Guiana, Herb. Stoupy (P).

Distribution. Brazil and Bolivia north to Panama and the lesser Antilles. Guayana collections: VENEZUELA. Bolívar: Tumeremo to Anacoco, 61 km from Guyana frontier, elev 140–200 m, *Gentry et al 10666* (MICH); along rocky cascades of Río Upata, W of Upata, elev 500 m, *Steyermark 57556* (NY); between Las Nieves and Cerro Pichacho, elev 100–300 m, *Steyermark 89274* (MICH); Salto Para, Río Caura, elev 230–280 m, *Steyermark et al 113042* (MICH); Temblador, Medio Caura, elev 100 m, *Ll. Williams 11605* (A, MICH, US, VEN); flood plain, E bank of Río Orinoco opposite head of Isla El Gallo, elev 100–200 m, *Wurdack & Monachino 39986* (MICH, NY, VEN); Río Parguaza, between El Carmen and Raudal Maraca, elev 110–115 m, *Wurdack & Monachino 41061-A*

(MICH, NY, US, VEN); edges of savanna near Pilon, NE of mouth of Río Parguaza, elev 100 m, *Wurdack & Monachino 41119* (MICH, NY, US, VEN); 1–4 km above Salto de Humito, Río Villacoa, elev 80–110 m, *Wurdack & Monachino 41155* (MICH, NY, US, VEN); Río Suapure, 55–70 km from mouth, elev 110 m, *Wurdack & Monachino 41275* (MICH, NY, US, VEN). Amazonas: Caño Asisa, Río Ventuari, *Cowan & Wurdack 31532* (MICH, NY, US, VEN); San Fernando de Atabapo, *Curran 95* (NY); Alto Río Atacavi, *Foldats 3762* (VEN); Río Orinoco between mouth of Río Atabapo and mouth of Río Ventuari, elev 150 m, *Level L-130* (MICH, NY, VEN); Río Cuao, elev 125 m, *Maguire & Politi 28392* (MICH, NY, VEN), *28415* (MICH, NY, VEN), *28435* (MICH, NY, US, VEN); Camani, elev 200 m, *Maguire 31791* (NY, VEN); Río Manapiare, Cerro Yutaje, *Maguire & Maguire 35048* (MICH, NY, US, VEN); Río Yatua between mouth of Río Yaciba and Piedra Araucaua, elev 100–140 m, *Maguire et al 37406* (MICH, NY, US, VEN); Río Casiquiare just above Piedra Guanare, elev 100–130 m, *Wurdack & Adderley 43176* (MICH, NY, US, VEN). BRAZIL. Amazonas: S. Gabriel da Cachoeira, *Cordeiro 260* (IAN, MICH) & *370* (MICH); Río Cauaburí, vic. base of Cachoeira Caranguejo, *Maguire et al 60100* (MG, NY); S. Gabriel da Cachoeira, *Pires & Marinho 15682* & *15755* (MICH); S. Gabriel, *Ribeiro* [IAN 15319] (IAN); Río Dimití, *Schultes & López 9928* (NY, US); São Gabriel da Cachoeira, *Spruce 2394* (MG); Río Cauaburí between Cachoeira Manajos & C. Tomaz, *N. T. Silva & Brazão 60980* (MG, MICH, NY, US). COLOMBIA. Vaupés: Río Macu, *Allen 3022* (US); bocas del Carurú, elev 230 m, *Cuatrecasas 7046* (US); Río Atabapo between San Fernando de Atabapo and Cacagual, elev 130 m, *Maguire et al 36252* (COL, MICH, NY); Río Kananarí, *Schultes 12107* (GH, US), *Schultes & Cabrera 13146* (US); Río Kubiýú, Mitú & vicinity, *Zarucchi 2205* (MICH). Amazonas-Vaupés, Río Apaporis, all *Schultes & Cabrera*: Soratama, *12554* (GH, US); mouth of Río Pacoa, *12559* (GH, NY, US); Jinogojé, at mouth of Río Piraparaná and vicinity, *16771* (GH, NY, US); Raudal Yayacopi (La Playa) and vicinity, *16960* (GH, NY, US).

Collected in flower and fruit in almost all months, but most commonly from January to March.

Cuatrecasas segregated *Tetrapterys silvatica* from *T. mucronata* principally on the basis of its sericeous pedicels and sepals and a tendency for the leaves to be obtuse rather than acuminate. In addition to his type, six of the above collections would fit his definition of *T. silvatica*: *Cowan & Wurdack 31532*, *Level L-130*, *Maguire & Politi 28415*, *Maguire 31791*, *Maguire & Maguire 35048*, and *Zarucchi 2205*. However, other collections from the same area (upper Orinoco, upper Río Negro, and Río Uaupés/Vaupés) are intermediate between the typically glabrous condition and the sericeous condition. These are *Allen 3022*, *Cordeiro 260*, *Maguire et al 37406*, *Ribeiro s n*, and *Schultes & López 9928*. The lack of morphological discontinuity between these forms and their geographical sympatry make recognition of *T. silvatica* difficult and cast doubt on its biological significance, so I have reduced it to synonymy.

Several other collections are worth comment in lieu of formal taxonomic recognition. Two of these are *Maguire et al 36252* and *Wurdack & Adderley 43176*; in both, the fruit wings are only 1–2 mm wide and less than 1 cm long. Also noteworthy are *Gentry et al 10666* and *Steyermark 57556*, *89274*, and *113042*. In

these the hairs of the vegetative stems are borne on short pegs, which persist after the hairs fall and make the stem tuberculate.

10. *Tetrapterys chloroptera* Cuatrecasas, Webbia **13**(2): 436. 1958.

Woody vine, the stems persistently velutinous. Lamina of the larger leaves 13–17.5 cm long, 6.5–12.5 cm wide, ovate, rounded or subcordate at the base, abruptly short-acuminate at the apex, tomentose to glabrate above, persistently velutinous below, with a row of small, impressed glands below parallel to but set in from the margin; petiole 13–15 mm long, eglandular, persistently velutinous; stipules connate in interpetiolar pairs, caducous, leaving a prominent scar extending completely across the node from petiole to petiole. Inflorescence a terminal and axillary panicle, the branches terminating in umbels of 4 flowers, velutinous, the non-floriferous bracts 7–20 mm long, thin, deciduous, the floriferous bracts ca 1.5 mm long, 1 mm wide, eglandular, the peduncle 3–4 mm long, the bracteoles like the bracts but shorter, apical. Pedicel 5–6 mm long, loosely sericeous. Anterior sepal eglandular, lateral 4 biglandular, the glands somewhat decurrent. Petals yellow, entire or slightly scalloped at the margin, the lateral 4 with the claw 1.5 mm long, the limb 4.5–5 mm long, 4–4.5 mm wide; posterior petal similar but the claw 2.2 mm long. Filaments ca 1.7 mm long, glabrous, straight, ca $\frac{1}{2}$ connate; anthers ca 1.2 mm long, glabrous. Styles ca 1.7 mm long, subequal, glabrous, stout (the anterior slimmer), with the stigmas apparently internal and decurrent. Samara with the upper lateral wings 24–28 mm long and 7–9 mm wide, the lower 9 mm long and 4–5 mm wide; dorsal wing reduced to a minimal rib; nut smooth or bearing a few short rounded projections between dorsal rib and lateral wings. For more detail, see the protologue.

Type. *Cuatrecasas* 7462, San José del Guaviare, margen del Río Guaviare, Vaupés, Colombia, elev 240 m, Nov flr (holotype US! isotypes COL, F, NY!).

Paratype. *Cuatrecasas* 7501, Río Guayabero, Vaupés, Colombia, elev 240 m, Nov frt (US!).

This interesting and distinctive species is known only from the two collections cited.

11. *Tetrapterys megalantha* Anderson, sp nov

Fig 55a–c.

Liana lignosa, ramis vegetativis sparsim sericeis demum glabratiss. Lamina foliorum majorum 11–13 cm longa, 5–7 cm lata, elliptica, basi cuneata vel obtusa et subauriculata, apice abrupte brevi-acuminata, utrinque sparsim sericea mox glabrata, reticulo subtus prominulo, subtus basi 2 glandulis ellipticis 2–3 mm longis et in dimidio distali aliquot glandulis parvis in serie sub margine munita; petiolus 11–16 mm longus, sericeus vel glabratus, eglandulosus; stipulae in paribus interpetiolaribus connatae, pari triangulari, usque 7 mm longo, 6 mm lato, caduco. Inflorescentia cymosa vel paniculata, sericea, floribus in umbellis 4-floris, umbella subsessili (in pedunculo 0.5–1.5 mm longo portata), bracteis non-floriferis 10–20 mm longis, tenuis, bracteis floriferis ca 1.5 mm longis latisque, eglandulosis, pedunculo ca 5 mm longo, bracteolis 1–1.5 mm longis latisque, apicalibus, abaxialiter callosis. Pedicellus 8–10 mm longus, apice tumidus, sericeus mox glabratus. Sepala 2–3 mm lata, rotundata, utrinque glabra praeter marginem minute ciliatam,

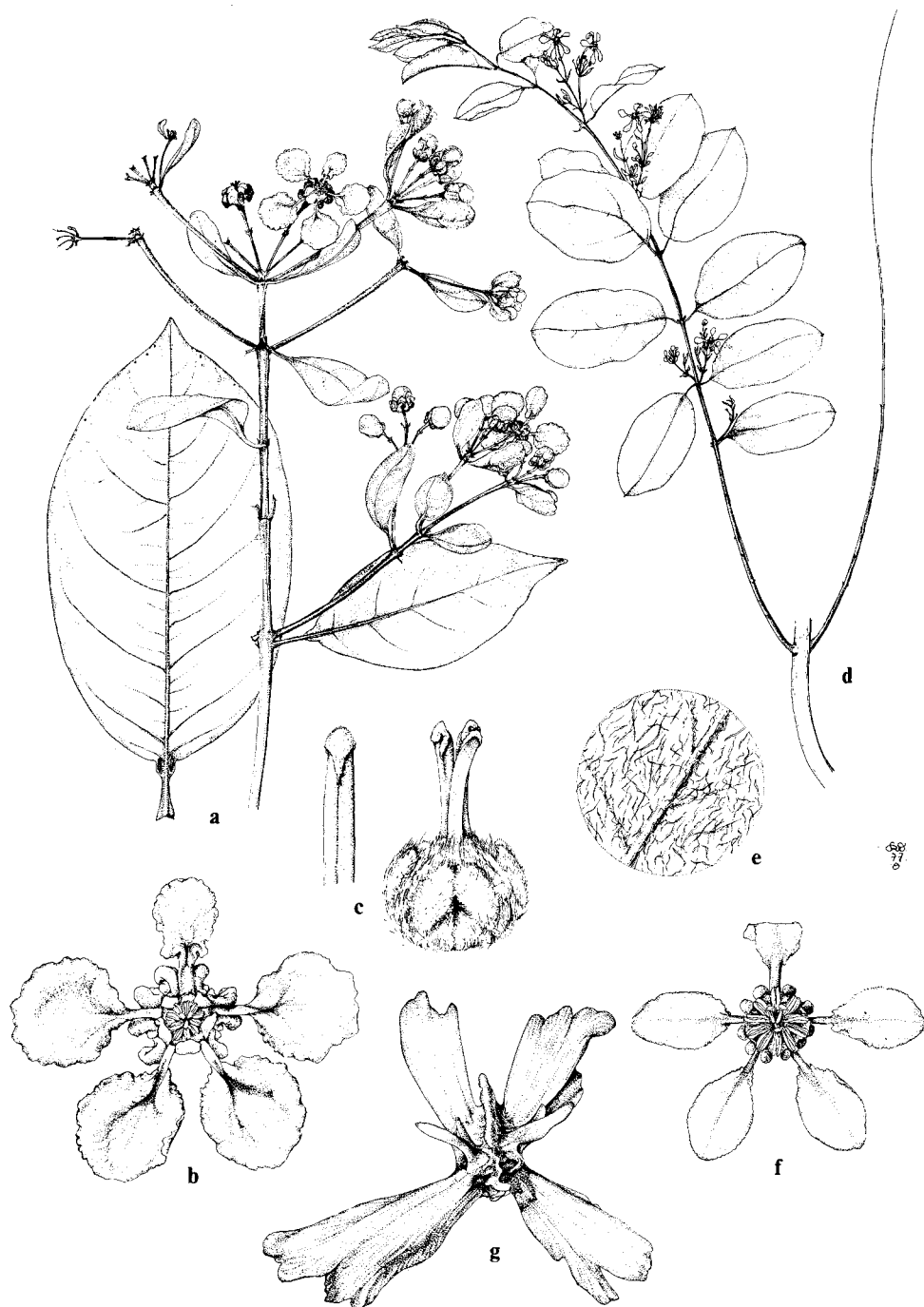


Fig 55. *Tetrapteryx megalantha* and *T. aristeguietae*. a–c, *T. megalantha*: a) Flowering branch and large leaf, $\times 0.5$; b) flower, $\times 1.3$; c) gynoecium (right, $\times 6$) and style-tip (left, $\times 10$). d–g, *T. aristeguietae*: d) Flowering branch, $\times 0.5$; e) underside of lamina, $\times 5$; f) flower, $\times 4$; g) samara, $\times 3.5$. Drawn from the types by Karin Douthit.

per anthesin appressa, 4 lateralialia biglandulifera, glandulis 3.5–6 mm longis, auriformibus. Petala lutea (praeter unguem rubrum), glabra, erosa, 4 lateralialia ungue 4–5 mm longo, limbo 11–12 mm longo, 10–12 mm lato, orbiculari; petalum posticum ungue 3.5–4 mm longo, crasso, limbo 7–8 mm longo, 6–7 mm lato, obovato. Filamenta 3 mm longa, glabra, recta, ca $\frac{2}{3}$ connata; antherae 1.4–1.8 mm longae, glabrae, subaequales. Ovarium 2 mm altum, dense sericeum; styli ca 2.5 mm longi, subaequales, antico graciliore et paulo brevior, glabri, recti, stigmatibus ut videtur internis et decurrentibus. Fructus ignotus.

Type. *Tillett & Tillett 45871*, mixed-evergreen forest with indefinite fluvial forest along river, W bank, below Utschi mouth, Kamarang River, upper Mazaruni River basin, elev 550 m, Oct flr (holotype MICH, isotypes K, NY, US).

This species is known only from the type. It is notable for its large stipules, large glands at base of lamina, sessile or subsessile umbels, tumid pedicels, asymmetrical non-decurrent calyx glands, and very large lateral petals. Its closest relative is a species of southwestern Amazonia that has smaller flowers and uninflated pedicels; representatives of that species are *Klug 2636*, San Martín, Peru (NY); *Klug 3154*, Loreto, Peru (NY, US); *Schunke V. 7437*, San Martín, Peru (MICH); *Ll. Williams 6422*, San Martín, Peru (NY); *Prance 5215 & 7015*, Rondônia, Brazil (MICH); and *Bang 1531*, Mapiri, Bolivia (MICH, NY). Probably also referable to that species is *Ule 6348*, Loreto, Peru, type (?) of *T. discolor* var *andina* Niedenzu, not seen. Most of these collections have been called *Tetrapteryx peruviana* Morton ex Macbride by Macbride or Cuatrecasas, but they do not compare well with *Klug 3662* (US!), the type, from San Martín, Peru. It lacks large basal glands on the lamina and has symmetrical decurrent calyx glands and samaras without outgrowths between the lateral and dorsal wings. As far as I can determine, the collections cited (except *Klug 3662*) represent a natural species without a name. It will be described later as part of a revision of *Tetrapteryx*.

12. *Tetrapteryx discolor* (G. F. W. Meyer) de Candolle, Prodr. 1: 587. 1824.

Triopteryx discolor G. F. W. Meyer, Prim. Fl. Esseq. 182. 1818.

Woody vine, the stems sericeous to glabrate. Lamina of the larger leaves 9–14 cm long, 4–6.5 cm wide, elliptical, rounded or cuneate at the base, acuminate at the apex, thinly sericeous to very soon glabrate, usually bearing below several to many impressed circular glands 0.2–0.4 mm in diameter in a row about midway between midrib and margin, with no glands at very base of lamina; petiole 7–12 mm long, sericeous to glabrate, eglandular; stipules connate in interpetiolar pairs, the pair triangular, 2–2.5 mm long, 1–1.5 mm wide, persistent or, usually, deciduous, the scar stretched to 2.5 mm wide at older nodes. Inflorescence sericeous to glabrate, cymose-paniculate, the branches terminating in umbels of 4 flowers, the umbel raised on a peduncle 3–6 mm long, the non-floriferous bracts 4–12 mm long, often deciduous in fruit, the floriferous bracts 0.8–1.5 mm long and 0.7–1 mm wide, the peduncle 2.5–6 mm long, the bracteoles 0.5–1.3 mm long and wide, eglandular or abaxially callose, apical. Pedicel 2–4 mm long, loosely sericeous to glabrate. Sepals ca 1.5 mm wide, rounded, glabrous or ciliolate on the margin, appressed in anthesis, the lateral 4 biglandular, the glands 2–4 mm long, elliptical

or obovate. Petals yellow, glabrous, entire, obovate and slightly sagittate at the base, the lateral 4 reflexed, the claw 1.2–1.6 mm long, the limb 3.7–4.5 mm long, 2.7–3.5 mm wide; posterior petal erect, the claw 2 mm long, thick, the limb 3–4 mm long, 2.8–3.2 mm wide. Filaments ca 2 mm long, glabrous, straight, ca $\frac{1}{2}$ connate; anthers 1.1–1.4 mm long, sparsely sericeous especially at base of locules, alike. Ovary 1.5 mm high, sericeous; styles ca 2 mm long, the anterior slenderer, glabrous, straight or eventually recurved, the stigmas apparently internal and decurrent. Samara appressed-tomentose, the upper lateral wings 12–18 mm long and 4–8 mm wide, the lower lateral wings 4–9 mm long and 3–4 mm wide; central dorsal wing 2–3 mm wide, entire; nut bearing several narrow winglets or aculeate outgrowths on each side between dorsal and lateral wings.

Type. Essequibo, British Guiana [Guyana], *Meyer 101* (GOET?).

Distribution. Along rivers from Bolivia and Amazonian Brazil to Guatemala and the West Indies, according to Niedenzu. Collections from Guayana and nearby: GUYANA. Essequibo, *Rob. Schomburgk I 197* (US); Kamarang River, Upper Mazaruni River Basin, elev 480 m, *Tillett & Tillett 45689* (K, MICH, NY, US). VENEZUELA. Bolívar: Marivaca, 17 km S de Los Castillos, *Bernardi 7888* (VEN); Río Merevari, elev 620 m, *Cardona 355* (US); Río Karum, Paragua, *Cardona 1186* (VEN); Río Uonán, afl. del Ikabarú, Caroní, elev 435 m, *Cardona 1697* (NY, US, VEN); Guayapo, Bajo Caura, elev 100 m, *Ll. Williams 11862* (US, VEN); Río Aro 6–14 km below mouth of Caño Azul, Hato La Vergareña, 6°45'N, 63°30'W, elev 390 m, *Wurdack 227* (MICH, NY, US, VEN); Cerro Bolívar, RR right-of-way sections 42–52, elev 500 m, *Wurdack 34380* (MICH, NY, US, VEN); Río Suapure, between Raudal Amajero and Raudal Budare (55–70 km from river mouth), elev 110 m, *Wurdack & Monachino 41280* (MICH, NY, US, VEN). BRAZIL. Terr. Roraima: Igarapé Agua Boa, Rio Mucajá between Pratinha and Rio Apiaú, *Prance et al 4047* (MICH); Rio Auáris, near Auáris, elev 760 m, 4°3'N, 64°22'W, *Prance et al 9767* (MICH, NY).

Collected in flower and fruit from October to April.

13. *Tetrapterys crispa* Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 265. 1840.

Woody vine, the stems sericeous to soon glabrate. Lamina of the larger leaves (11–)13–20 cm long, (5–)6–10.5 cm wide, elliptical or slightly ovate or obovate, cuneate to rounded, rarely subcordate, at the base, short-acuminate at the apex, sericeous to glabrate, with some hairs often persisting below especially on the midrib, bearing a row of tiny (ca 0.2 mm in diameter) circular impressed glands below set in from the margin, and with the tertiary veins strongly parallel; petiole (12–)14–20(–27) mm long, sericeous to glabrate, eglandular; stipules connate in interpetiolar pairs, the pair triangular, caducous, leaving a scar 2.5–4 mm wide, stretched to 5.5 mm wide at older nodes. Inflorescence sericeous to glabrate, paniculate, the branches terminating in umbels of 4 flowers, the umbel raised on a peduncle 3–6 mm long, the thin non-floriferous bracts 8–12 mm long, short-petiolate, suborbicular, subcordate, the floriferous bracts 1–1.5 mm long, the peduncle 3–7.5 mm long, the bracteoles 1 mm long and wide, eglandular or abaxially callose, nearly or quite apical. Pedicel 5–10 mm long, sericeous to glabrate. Sepals 1.5–2 mm wide, rounded, glabrous except for the ciliolate margin, appressed in anthesis, the lateral 4 biglandular, the glands 2.5–4 mm long, elliptical

or obovate, often decurrent. Petals yellow, glabrous, entire or sinuate, the lateral 4 with the claw 1.5 mm long, the limb 4.5–5.5 mm long, 4–4.5 mm wide; posterior petal similar, the claw up to 2 mm long and thicker. Filaments 1.5–2 mm long, glabrous, straight, ca $\frac{1}{3}$ connate; anthers 1.2–1.5 mm long, glabrous. Ovary 1.5 mm high, sericeous; styles ca 2 mm long, the anterior slenderer, glabrous, straight, the stigmas apparently internal and decurrent. Samara sericeous to glabrate, the upper lateral wings 22–35 mm long and 9–13 mm wide, the lower lateral wings 11–15(–20) mm long and 6–10 mm wide; dorsal wing up to 3–6 mm wide, entire or lobed; nut smooth between dorsal and lateral wings.

Type. *Richard*, Kourou River, French Guiana (P).

Distribution. Northern South America. Collections from Guayana and nearby: GUYANA. Wabuwak, Kanuku Mts, Nov frt, *Forest Dept.* 5887 (NY); Utschi Mouth, Kamarang River, upper Mazaruni River basin, elev 1700 m, Oct frt/frt, *Tillett & Tillett* 45782 (NY). VENEZUELA. Terr. Delta Amacuro: downstream from San Victor, Río Amacuro, Nov frt, *Steyermark* 87295 (NY); Río Cuyubini, Cerro La Paloma, elev 100–200 m, Nov frt, *Steyermark* 87632 (MICH, NY). Bolívar: cloud forest, vicinity of Deborah, 45 km N of Tumeremo, elev 600–650 m, Feb frt, *Steyermark* 89086 (MICH, NY). BRAZIL. Terr. Amapá: Near Crique Jacques, Savane de Crique Jacques, 10 km W of Mana Pegase Formation, Dec frt, *Cowan* 38905 (MG, MICH, NY, US).

It seems likely that several species have been confused under this name. However, I cannot revise the group here, as it is mostly extra-Guayanian. The description given above is based only on the collections cited.

The photograph of the type distributed by Field Museum (negative 35597) shows two specimens posed together. The specimen on the left fits the original description perfectly and is very probably the type. The right-hand third of the photo, including the samaras, is a specimen of *Tetrapterys mucronata*. There is no reason to believe that Jussieu confused these species or based *T. crispa* on both of these collections. The error was probably the fault of whoever posed the two specimens for the photograph, presumably Francis Macbride.

20. *Lophopterys* Adr. Jussieu in Delessert, *Icon. Sel.* 3: 18, *tab.* 29. 1837 [1838].

Dolichopterys Kostermans, *Recueil Trav. Bot. Néerl.* 32: 279. 1935.

Woody vine (or small trees?). Leaves opposite, densely and persistently sericeous below, the stipules minute or absent. Inflorescence paniculate, rarely simple, the flowers ultimately borne in pseudoracemes. Sepals abaxially sericeous, adaxially glabrous, the anterior sepal eglandular, the 4 lateral sepals each bearing a single, very large, circular or elliptical, radially lineate gland. Petals yellow, glabrous. Receptacle glabrous. Stamens 10, the anthers alike. Ovary of 3 free carpels, 1 anterior and 2 posterior, all fertile, borne on a short pyramidal torus; styles 3, stout, with large internal stigmas. Fruit schizocarpic, comprising 3 (or less by abortion) 1-seeded samaras, each samara bearing a relatively short, flabellate or trapezoidal dorsal wing and 2 much longer, narrow, forward-pointing lateral wings 3 or more times as long as wide (except *L. splendens*, which has a very short dorsal crest and the lateral wings reduced to ridges or lost).

Type. *Lophopterys splendens* Adr. Jussieu.

At present this genus comprises only three described species, all from the wet lowlands from Delta Amacuro of Venezuela to French Guiana. In the near future I shall publish elsewhere a synopsis of the genus, with several new species from inland Amazonia. The only species that even approaches the Guyana Highland as defined here is the one treated below, and it is included only for the sake of floristic completeness.

Lophopterys euryptera Sandwith, Kew Bull. 1951: 34. 1951.

Fig 56.

Lophopterys splendens Adr. Jussieu var. *obovata* Niedenzu in Engler, Pflanzenreich 4. 141: 385. 1928.

Woody liana to 35 m long; younger branches densely sericeous. Lamina of the larger leaves 16–35 cm long, 10–23 cm wide, obovate, truncate or short-attenuate and often unequal at the base, plane at the margin, very broadly truncate and often apiculate at the apex, eglandular, loosely sericeous to glabrate above, persistently silvery-sericeous below with very tightly appressed hairs, the lateral veins parallel and prominent below, interconnected by prominulous parallel veinlets; petiole 2–6 cm long, sericeous, eglandular; stipules apparently absent. Inflorescence tightly to loosely sericeous, 10–30 cm long, terminal or axillary, a simple or ternate panicle, the flowers borne in mostly decussate pseudoracemes 5–15 cm long of 10–50 flowers each; bracts and bracteoles persistent, even after fall of the fruits and pedicels, triangular, abaxially sericeous to glabrate, adaxially glabrous, the bracts 2–3 mm long, the bracteoles 1.5–2.5 mm long; peduncle none or up to 1 mm long in fruit, obscure. Pedicel 3–8 mm long, 2–2.5 mm in diameter at the apex, sericeous. Sepals triangular, 3–3.5 mm long, 2.5–3 mm wide, acute or obtuse at the apex, strongly appressed after anthesis, the glands 2–3 mm in diameter, one of the sepals adjacent to the anterior sepal also eglandular in some flowers. Petals strongly dimorphic, the 4 lateral petals reflexed between the sepals, ca 10 mm long, 7–9 mm wide, the concave limb decurrent and weakly differentiated from the claw, erose and eglandular at the margin; posterior petal with an erect claw 3 mm long, constricted at the apex, the rectangular limb ca 3.5 mm long and wide, flat and reflexed, fimbriate, the proximal fimbriae broadly glandular, the distal fimbriae finer and decreasingly glandular to eglandular. Stamens with the filaments ca 2.5 mm long, connate for the proximal 0.5–1 mm, glabrous; anthers ca 1.6 mm long, glabrous, reflexed, the locules parallel, linear, membranous along the inner edges, the connective unenlarged. Ovary 1.5 mm high, sericeous, each carpel bearing 3 longitudinal ridges; styles basally sericeous, glabrous beyond the ovary, unequal, the anterior 1 ca 2 mm long beyond the ovary, straight or very slightly reflexed at the apex, the 2 posterior styles 2.5–3 mm long beyond the ovary, strongly reflexed distally, all with the stigmas much wider than high (ca 0.6–0.8 mm wide, 0.2–0.3 mm high) and dorsally truncate or apiculate. Samara with the nut spheroid, ca 9–11 mm in diameter, sericeous, the hairs white and quite persistent; lateral wings 4.5–6.2 cm long, 1–1.7 cm wide, linear, sericeous to glabrate; dorsal wing trapezoidal-flabellate, encircling much of the nut and widest toward base of nut, 1.2–1.9 cm high, 1.9–2.5 cm long, sericeous.

Type. *Richard Schomburgk 1536*, Barama River, Guyana (K).

Distribution. Southeastern Venezuela and northwestern Guyana. VENEZUE-

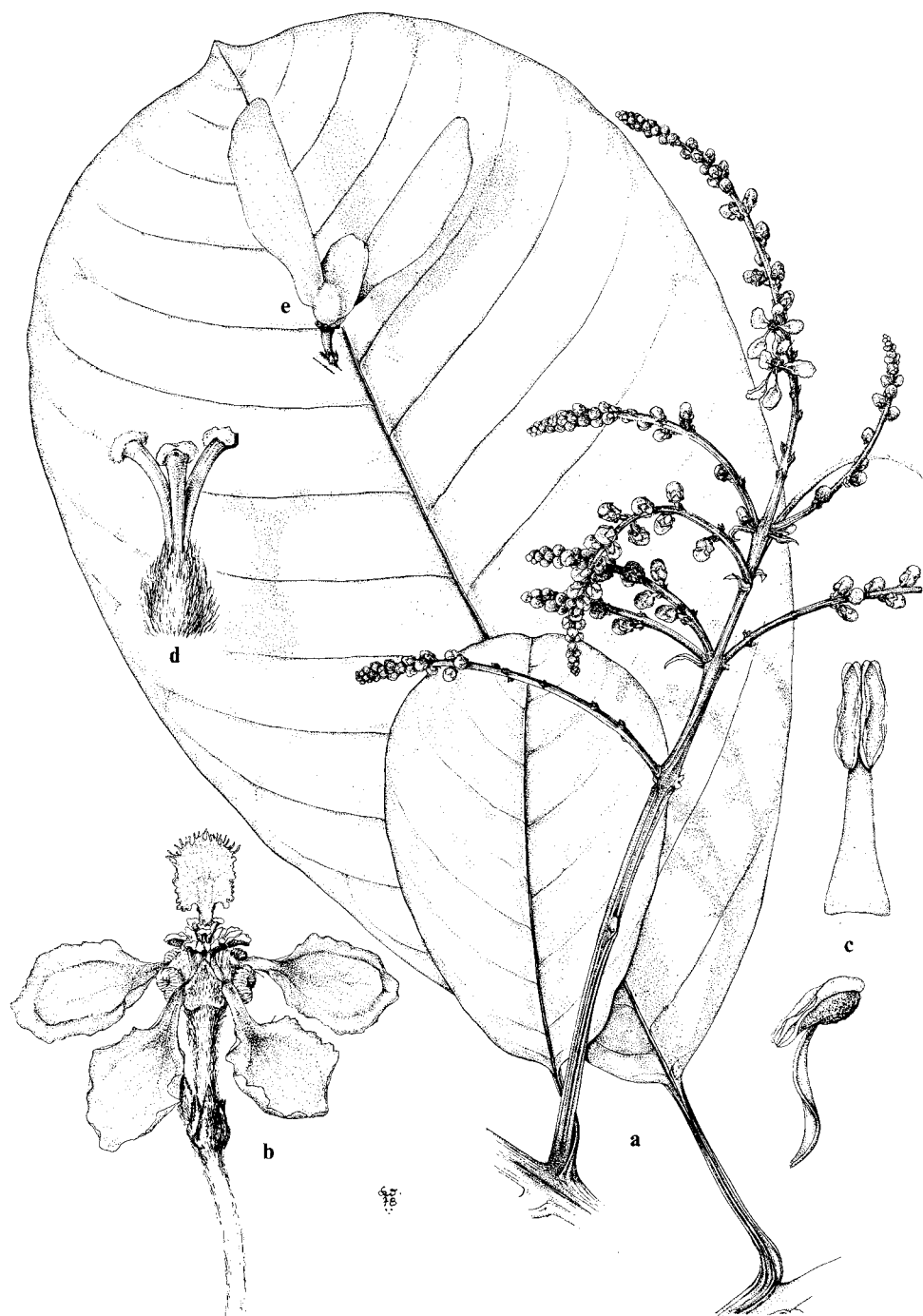


Fig 56. *Lophopterys euryptera*. a) Leaf and inflorescence, $\times 0.5$; b) flower, $\times 2.5$; c) stamens, $\times 10$; d) gynoecium, the middle style anterior, $\times 7.5$; e) samara, $\times 0.5$. Drawn by Karin Douthit, a–d from Breteler 3752, e from Maguire et al 46977.

LA. Terr. Delta Amacuro: near Delta Amacuro-Bolívar border, ca 61°44'W, 8°4'N, low primary forest, elev 375 m, Apr flr, *Breteler 3752* (NY, US); E of Río Grande, directly E of El Palmar, swampy mature forest, Jul frt, *Gentry & Berry 14942* (MICH); rain forest, between La Margarita and Puerto Miranda, Río Acure, elev 80–100 m, Nov frt, *Steyermark 87776* (NY); E of Río Grande, 37 km ENE of El Palmar, elev 320 m, Feb frt, *Steyermark 93148* (NY). Bolívar: Alto Río Cuyuni, Río Uiri-yuk, Aug frt, *Maguire et al 46977* (MICH, MY, NY, US, VEN). GUYANA. Barima River, Mar flr, *Jenman 6994* (NY).

In his discussion following the original description of this species, Sandwith gives a brief summary (p. 36) of the characters that distinguish it from *Lophopterys surinamensis* (Kostermans) Sandwith. Through the kindness of the authorities at Utrecht I have been able to borrow *Stahel 223*, the type and only known collection of *L. surinamensis*. After comparison of it with the cited specimens of *L. euryptera* I agree with Sandwith that they are distinct species. The lateral wing of the fruit is not consistently wider in *L. euryptera*, but in compensation several other characters support the separation. The most useful distinctions are summarized in the following couplet:

1. Bracts and bracteoles persistent, even after fall of the fruits and pedicels; lamina of the larger leaves 16–35 cm long, 10–23 cm wide, silvery-sericeous below with very tightly appressed hairs; petiole 2–6 cm long; inflorescence tightly to loosely sericeous; nut of the samara sericeous, the hairs white and quite persistent. *L. euryptera.*
1. Bracts and bracteoles deciduous with the fruits and pedicels or before; lamina of the leaves 15–20 cm long, 8–10 cm wide, golden-sericeous below with somewhat looser hairs; petiole ca 1.5 cm long; inflorescence velutinous or appressed-velutinous; nut of the samara velutinous, the hairs brown and readily abraded. *L. surinamensis.*

21. *Bunchosia* Richard ex Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 153 (4° ed.). 1821 [1822].

Trees or shrubs; leaves decussate, usually bearing impressed glands below in the lamina, the stipules small, free from each other, borne on the base of the petiole. Inflorescence an axillary pseudoraceme, simple or rarely ternate, without vegetative leaves, or in a few species terminating a short lateral branch with a pair of vegetative leaves; bracts and bracteoles persistent, the bracts eglandular, 1 or both bracteoles usually bearing 1(–2) abaxial glands. Calyx bearing 8–10 long, decurrent glands. Petals yellow or whitish, glabrous, the lateral 4 recurved, the posterior erect. Stamens 10, glabrous, all fertile, the anthers ± alike; pollen polyforate. Receptacle glabrous on both sides of the stamens. Ovary of 2–3 quite connate carpels, the locules 2–3, each fertile; styles free or partially to completely connate, stout, the large terminal stigmas subpeltate or apparently capitate. Fruit an edible drupe with 2–3 1-seeded pyrenes (or 1 due to abortion) in a common fleshy exocarp, yellow, orange, or red at maturity, the pyrenes elongated, round or elliptical in cross section, free from each other at maturity, with a smooth, brittle, cartilaginous wall.

Type. *Bunchosia odorata* (Jacquin) Humboldt, Bonpland & Kunth.

Bunchosia is a genus of about 55 species, ranging from Mexico and the West Indies to Paraguay and southern Brazil. The edible fruits of various species are called “ciruela,” “ciruela de fraile,” and “ciruela de montaña” in Venezuela and Colombia and “marmelo” in Brazil.

Key to the Species of *Bunchosia* in Guayana

1. Inflorescence terminating a short lateral branch bearing a pair of sterile vegetative leaves; leaves persistently velutinous or tomentose below, the hairs with a basally stellate stalk; ovary nearly or quite glabrous, 2–3-carpellate. 1. *B. mollis*.
1. Inflorescence axillary, with small bracts only, every bract subtending 1 uniflorous peduncle (or sometimes 2 in *B. glandulifera*); leaves glabrate or sparsely to densely sericeous, the hairs sessile or subsessile, the stalk (if developed) without basal projections; ovary sericeous, 2-carpellate.
2. Styles free.
 3. Leaves persistently very densely silvery- or golden-sericeous below, the lamina completely concealed by the hairs; styles 1.5 mm long; connective brown to red. 2. *B. argentea*.
 3. Leaves sparsely sericeous to apparently glabrate; styles 2–2.5 mm long; connective dark red, purplish, or black. 3. *B. armeniaca*.
2. Styles connate, the stigmas free or connate.
 4. Leaves thinly but persistently sericeous below, undulate and crispate at the margin; pseudoracemes bearing 10–20 flowers, often 2 in the axil of 1 bract; peduncle 2.5–5 mm long; style sericeous; dried fruit 20–28 mm long, 15–20 mm in diameter, the wall smooth. 4. *B. glandulifera*.
 4. Leaves nearly or quite glabrate, plane or slightly revolute at the margin, entire or slightly indented near glands; pseudoracemes usually bearing 20–40 flowers, 1 per bract; peduncle 1–2 mm long; style glabrous; dried fruit up to 15 mm long, 15 mm in diameter, the wall granulate. 5. *B. decussiflora*.

1. *Bunchosia mollis* Bentham, London Jour. Bot. (Hooker) 7: 127. 1848.

Bunchosia rhombifolia Turczaninow, Bull. Soc. Nat. Mosc. 36: 582. 1863.

Bunchosia schomburgkiana Niedenzu, Arb. Bot. Inst. Ak. Braunsberg 5: 45. 1914. Type. "Taioto" (Taiaba?) River, British Guiana [Guyana], *Richard Schomburgk 544* (NY! fragment of holotype).

Shrubs or small trees 1.5–4 m tall (occasionally described as a woody climber); stems velutinous to glabrate. Lamina of the larger leaves 6–17 cm long, 3–12 cm wide, elliptical, ovate, or rhomboid, cuneate to rounded at the base, obtuse or short-acuminate at the apex, usually bearing 2 glands near the base and several distally in a submarginal row, velutinous to glabrate above, persistently velutinous or tomentose below, the hairs T-shaped or Y-shaped, with a basally stellate stalk, much less dense on larger, more expanded leaves than on smaller leaves; petiole 3–4(–6) mm long, velutinous, eglandular; stipules 0.5–1.5 mm long, borne on the base of the petiole. Inflorescence terminating a lateral shoot with a pair of vegetative leaves, 4–11 cm long beyond the leaves, velutinous, the 10–30 flowers decussate or distally in no regular order; bracts 1.5–3(–5) mm long; peduncle 0.5–3 mm long (–6 mm in fruit); bracteoles apical or subapical, 1–1.5 mm long, 1 bearing an abaxial gland. Pedicel (2.5–)4–10 mm long, velutinous or eventually glabrate. Sepals 1.5 mm long beyond the glands, 2 mm wide, rounded, sparsely to densely hispid abaxially, the glands 8–9, 2.5–3.5 mm long, free at the apex. Petals yellow, the laterals with the claw 3–4 mm long, the limb 6–9 mm long, 6–10 mm wide, concave to flat, eglandular-dentate or the posterior pair with a few small glands proximally, the posterior petal with a thick claw 3–4.5 mm long, constricted at the apex, the limb 5.5–7 mm long, 5–8 mm wide, flat or crumpled, bearing marginal glands on the proximal half. Filaments 2–3.5 mm long, up to ½ connate; anthers 1–1.5 mm long, the connective light brown, swol-

len at the apex with the swelling retrorse, the locules long-pendulous at the base. Ovary 1.5 mm high, ovoid or globose, 2–3-carpellate, glabrous or bearing a very few hairs; styles 2 or 3, (2–)2.5–3 mm long, free or up to $\frac{1}{2}$ connate, glabrous, the stigmas reniform-peltate. Fruit orange to red, 6–11 mm in diameter (dried), globose, glabrous, the wall granulate.

Type. *Robert Schomburgk I 742*, Pirarara, British Guiana [Guyana] (holotype K, isotypes GH! NY!).

Distribution. Eastern Venezuela and adjacent Guyana and Brazil. Collections from near Guayana: VENEZUELA. Bolívar: Pto. Ordaz-San Félix, *Aristeguieta 5324 & 5329* (VEN); Upata-San Félix, *Blanco 115 & 223* (VEN); Ciudad Bolívar, elev 35 m, *Holt & Gehriger 86* (US); 40 km S of Tumeremo, 29 km N of El Dorado, elev 220 m, *Steiermark 86575* (NY, VEN); forest near Río Caroní, Parque Caroní, near Puerto Ordaz, elev 20 m, *Steiermark 94252* (VEN); Upata, *Trujillo 2424* (MY); El Palmar, elev 100 m, *Williams 12876* (F, VEN); Caicara, elev 90 m, *Williams 13248* (US, VEN); Upata, elev 100 m, *Williams 13471* (F, VEN). GUYANA. Types of *B. mollis* and *B. schomburgkiana*, q v; savana between Takutu River and Kanuku Mountains, *Smith 3212* (NY). BRAZIL. Terr. Roraima: 3 km de Bôa Vista, *Black 51–12705* (IAN); beira do Rio Branco, perto de Bôa Vista, *Black & Magalhães 51–12989* (IAN); Bôa Vista, *Ducke* [IAN 43426] (IAN); Porto Alegre, Rio Amajary, *Frôes 23070* (IAN); próximo à boca do Igarapé Iguapirã, afl. do R. Surumú, *Pires et al 14631* (IAN, RB); 20 km N do Bôa Vista, *Prance et al 9546* (MICH, NY).

Collected in flower and fruit mostly from February to August.

2. *Bunchosia argentea* (Jacquin) de Candolle, Prodr. 1: 582. 1824.

Malpighia argentea Jacquin, Fragm. Bot. 186, tab. 83. 1800–1809.

Trees 4–15 m tall; stems persistently sericeous, the older woody stems glabrate. Lamina of the larger leaves (10–)13–18 cm long, (5–)7–9.5 cm wide, elliptical, cuneate or truncate at the base, abruptly acuminate at the apex, bearing 2 large glands near the base and sometimes several small submarginal glands near the apex, glabrate above, densely and persistently silvery- or golden-sericeous below, completely covered by the short, straight, sessile hairs; petiole (7–)9–13 mm long, sericeous, eglandular; stipules ca 0.5 mm long, borne on the base of the petiole. Inflorescence 7–11 cm long, without vegetative leaves, sericeous, the 15–35(–50) flowers proximally decussate, distally mostly in no regular order; bracts 1–2.5 mm long, triangular; peduncle 1–3 mm long (–5 mm in fruit); bracteoles apical, 1 mm long, 1 or both bearing an abaxial gland or subtended by a gland on the peduncle. Pedicel 3–7 mm long, loosely sericeous. Sepals 1–1.5 mm long beyond the glands, 1–1.5 mm wide, rounded, ciliate on the margin and otherwise glabrous, the glands 8–9, 2–3.5 mm long. Petals yellow, eglandular or the posterior and some laterals glandular-dentate proximally. Filaments 2–2.5 mm long, ca $\frac{1}{3}$ connate; anthers 1–1.5 mm long, the connective brown to red, glandular, broad and flat, the locules somewhat pendulous at base. Ovary 1.5 mm high, ovoid, bicarpellate, very densely sericeous; styles 2, free, 1.5 mm long, glabrous except at very base, the stigmas capitate. Fruit 15–25 mm long, 15–20 mm in diameter, ovoid, orange to red-orange, $\pm$ persistently sericeous.

Type. *Jacquin*, Caracas, Venezuela.

Distribution. Venezuela and Colombia. The only Guayana collection seen is the following: VENEZUELA. Bolívar: selva siempre verde al lado Río Nichare (afluente de Río Caura), 6°15'N, 65°5'W, elev 200–250 m, 25 Apr flr, *Steyermark & Gibson 95727* (NY, VEN).

It is surprising to find this northern species in Bolívar, but I have no reason to doubt the identification, except that the petals of the Guayana collection were glandular-dentate, versus eglandular in the northern collections. The description given above is based on the collection cited, plus others from northern Venezuela. Steyermark and Gibson described their plant as “vining,” but it is more likely to have been a tree.

3. *Bunchosia armeniaca* (Cavanilles) de Candolle, Prodr. 1: 582. 1824.

Malpighia armeniaca Cavanilles, Diss. 8: 410, tab. 238. 1789.

Trees 5–12 m tall; stems persistently sericeous, the older woody stems glabrate. Lamina of the larger leaves 11–21 cm long, 6–10 cm wide, elliptical or ovate, cuneate or truncate at the base, thin and slightly revolute at the margin, acuminate at the apex, bearing (1–)2 large glands near the base and often several smaller glands distally near the margin, sparsely sericeous to nearly glabrate (some hairs usually persistent, especially below), the hairs short, straight, sessile, the reticulum prominent on both sides; petiole 10–13 mm long, persistently sericeous, eglandular; stipules 0.5–2 mm long, borne on the base of the petiole. Inflorescence 6–16 cm long, without vegetative leaves, sericeous or eventually glabrescent, the 20–50 flowers proximally decussate but distally inserted in no regular order; bracts 1–2 mm long, triangular; peduncle 2–4 mm long; bracteoles apical, ca 1 mm long, 1 bearing an abaxial gland or subtended by a gland on the peduncle. Pedicel 3–8 mm long, sericeous to glabrate. Sepals 1–2.5 mm long beyond the glands, 1.5–2 mm wide, rounded, ciliate on the margin and otherwise glabrous, the glands 8–10, 3–4 mm long, free or some partly connate in pairs, pilose to glabrate. Petals yellow, the claw 2–3(–3.5) mm long, the limb 4–6 mm long, 3–6 mm wide, the outermost deeply concave and eglandular, the posterior flat and glandular-dentate all around the limb or eglandular at the very apex, the other 3 intermediate, flat or slightly concave, eglandular to glandular-dentate all around. Filaments 2.5–3 mm long, up to 1/3 connate; anthers 1–1.4 mm long, the connective dark red to almost black, glandular, semiglobose, the locules somewhat pendulous at base. Ovary 1.5 mm high, ovoid, bicarpellate, very densely sericeous; styles 2, free, 2–2.5 mm long, glabrous or proximally sericeous, the stigmas pel-tate. Immature fruit 1 cm long and 1 cm in diameter, densely and persistently golden-sericeous; mature drupe “subsericea ovoidea 2½ cm longa 2 cm diametro” (Niedenzu, 1928).

Type. *Dombey*, Chanca, Peru (MA?).

Distribution. Widespread in northern and western South America. Guayana collections: VENEZUELA. Bolívar: forests south of El Dorado, Aug flr, *Blanco 553* (VEN), Aug flr/frt, *Meijeraan 9* (WAG) & *13* (MICH, WAG), Jul flr, *Steyermark 86635* (NY, VEN); vec. Salto Para, Río Caura, elev 230–280 m, Jan flr, *Steyermark et al 113144* (MICH). BRAZIL. Terr. Roraima: forest on terra firme, Posto Mucajaí, Rio Mucajaí, *Prance et al 10932* (MICH, NY).

The identification of this material as *Bunchosia armeniaca* is based on its

agreement in most respects with the descriptions of Niedenzu (1928) and Cuatrecasas (1958). The description is based entirely on the collections cited, except where noted.

4. ***Bunchosia glandulifera*** (Jacquin) Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 5: 154 (4^o ed.). 1821 [1822].

Malpighia glandulifera Jacquin, Collect. 4: 207. 1790 [1791] & 5: tab. 5, fig. 3. 1796 [1797].

Shrubs or small trees 2–8 m tall; stems loosely sericeous to glabrate. Lamina of the larger leaves 11–18 cm long, 7–10(–12) cm wide, elliptical or ovate, rounded and often slightly attenuate at the base, undulate and crispate at the margin, acuminate and often cuspidate at the apex, bearing 0–2 glands near the base by the midrib and several distally in 1–3 rows, sparsely sericeous to glabrate above, persistently sericeous below, the hairs short, straight, sessile or subsessile, abundant but not so dense as to completely conceal the lamina; petiole 6–8 mm long, sericeous to glabrate, eglandular; stipules 1–1.5 mm long, borne on the base of the petiole. Inflorescence 5–11 cm long, without vegetative leaves, loosely sericeous to glabrate, the flowers 10–20, often paired (1 above the other) in the axil of the same bract; bracts decussate $\pm$ the whole length of the inflorescence, 2–3 mm long; peduncle 2.5–5 mm long; bracteoles apical, 1–1.5 mm long, 1 bearing an often cylindrical abaxial gland. Pedicel 2–4.5 mm long (–6 mm in fruit), sericeous to glabrate. Sepals 1.5–2 mm long and wide beyond the glands, rounded, ciliate on the margin and abaxially thinly sericeous, the glands 10, 4–6.5 mm long, free and recurved at the apex, some partly connate in pairs with glands from adjacent sepals. Petals yellow, the lateral 4 with the claw 2–2.5 mm long, the limb 5–7(–8) mm long and wide, larger and more concave in the anterior pair, eglandular-dentate, the posterior petal with the claw 2.5–3 mm long, the limb 4–5 mm long and wide, flat, glandular-dentate, at least proximally. Filaments 2.5–3.5 mm long, up to $\frac{1}{2}$ connate; anthers 1–1.8 mm long, the connective yellow or light brown, the locules pendulous at base. Ovary 2–2.5 mm high, ovoid, bicarpellate, sericeous; style (formed by 2 connate) 3–3.5 mm long, sericeous, the stigmas nearly free, reniform-peltate. Fruit orange to red, 20–28 mm long, 15–20 mm in diameter, globose or ellipsoid, very sparsely sericeous to glabrate, the wall smooth.

Type. *Jacquin*, “In sylvis ad Caracas,” Venezuela.

Distribution. West Indies and northern South America; widely cultivated in Brazil and elsewhere for the edible fruits. Guayana collections: VENEZUELA. Amazonas: border of forest, Pimichin, elev 100 m, *Steyermark & Bunting 102850* (NY, VEN). BRAZIL. Amazônia: upper Rio Negro, *Weiss & Schmidt 1* (NY). COLOMBIA. Vaupés: Raudal Macucú, Río Vaupés, *Romero Castañeda 3483* (COL); entre Yútica y Ñandú, Río Vaupés, *Romero Castañeda 3567* (COL); Mitú and vicinity, cultivated, *Zarucchi 1655 & 2172* (MICH), *Zarucchi et al 1124* (MICH).

Collected in flower and fruit in diverse months, most often in flower from September to December.

This species has been widely distributed through cultivation, probably formerly by the indigenous peoples as well as more recently by Europeans. I do not know

where it originated, but some of the collections from Amazonian Colombia cited by Cuatrecasas (1958) make no mention of its being a cultivated plant, so perhaps it is native there.

5. *Bunchosia decussiflora* Anderson, sp nov

Fig 57.

Arbor 5–20 m alta vel frutex, ramis vegetativis sericeis et complanatis mox glabratis et teretibus. Lamina foliorum majorum 14–17.5 cm longa, 4.5–7.5 cm lata, elliptica vel paulo ovata obovatave, saepe parum falcata, basi cuneata, margine plana vel paulo revoluta, integra vel prope glandulas parum indentata, apice acuminata, matura glabrata, subtus prope basin 2 glandulis grandibus et distaliter sub margine aliquot glandulis minoribus instructa; petiolus 8–15 mm longus, sericeus vel glabratus, eglandulosus; stipulae epipetiolares, triangulares, 0.5–1.5 mm longae. Inflorescentia 8–15 cm longa, sine foliis vegetativis, sericea demum glabrata, 20–40 floribus decussatis, bracteis 1–2 mm longis, triangularibus, basi callosis, pedunculo 1–2 mm longo, apice bibracteolato, bracteolis 1–1.5 mm longis, ovatis, 1 (interdum ambabus) glandula abaxiali excentrica instructa. Pedicellus 4–7 mm longus, sericeus vel glabratus. Sepala glandulas 1–2.5 mm superantia, 1.3–2 mm lata, triangularia vel rotundata, margine ciliata aliter utrinque glabra, glandulis 8, 2.5–3 mm longis, obovatis, compressis sed distinctis, glabris. Petala flava, extimum ungue 1.5 mm longo, limbo 5 mm longo, 6 mm lato, profunde concavo, dentato et eglanduloso, cetera 3 lateralia ungue 1.5–2 mm longo, limbo 3.5–4.5 mm longo, 2.5–3.5 mm lato, plano vel parum concavo, erosa vel margine aliquot glandulis instructo, posticum ungue 2 mm longo, limbo 4 mm longo, 2.5 mm lato, plano, margine toto circuitu glanduloso-dentato vel apice eglanduloso. Filamenta 1.5–2.5 mm longa, usque $\frac{1}{2}$ connata; antherae 0.8–1.3 mm longae, connectivo semigloboso, brunneo vel rubello, loculis basi pendentibus. Ovarium 1.5 mm altum, globosum, bicarpellatum, sericeum; stylus (ex 2 stylis connatis) 1.5 mm longus, glaber, stigmatibus bilobis. Fructus aurantiacus vel rubellus, siccus 9–15 mm longus, 9–15 mm diametro, granulatus.

Type. *Silva & Brazão 60612*, high forest from Igarapé Anta up slopes to Pico da Neblina, Amazonas, Brazil, elev 1350–2000 m, 14 Dec 1965 flr (holotype MG, isotypes MICH, NY, UB, US).

Distribution. VENEZUELA. Amazonas, Alto Orinoco: water's edge, Raudal de los Guaharibos, Jul frt, *Croizat 356* (F); by river, Ugueto, Oct flr, *Croizat 809* (F); sine loc, *Croizat 944* (F). BRAZIL. Amazonas: type, q v; forest on terra firma, between Maloca and Rio Cauaburi, elev 50–100 m, Dec frt, *Silva & Brazão 60764* (MG, MICH, NY, US). Terr. Roraima: Serra dos Surucucús, 2°42'–47'N, 63°33'–36'W, forest on terra firme, Feb frt, *Prance et al 10145* (MICH, NY); trail from Surucucú to Uaicá, 3°20'N, 63°24'W, forest by river, Feb frt, *Prance et al 10522* (MICH, NY).

The Brazilian collections cited were described as trees 5–20 m tall, while Croizat described his Venezuelan collections as a coarse, clambering shrub (356) or a vine (809), probably actually a weak shrub.

Bunchosia decussiflora is similar to the Peruvian plants that Niedenzu called *Bunchosia hookeriana* (he apparently did not see the type, a Mathews collection in Herb. Hooker, nor have I). I have studied the specimens cited by Niedenzu



Fig 57. *Bunchosia decussiflora*. a) Flowering branch; b) flower; c) stamens; d) gynoecium; e) fruit. Drawn by Melissa Marshall, a–d from Silva & Brazão 60612, e from Silva & Brazão 60764.

(Spruce 4542, GH, and Ule 6532, MG, both from Tarapoto), as well as others from Amazonian Peru that are probably the same species (Klug 2759 and 3770, both GH, and Tina *et al* 2438, US). *Bunchosia decussiflora* differs from the Peruvian material in having the flowers strictly decussate; in *B. hookeriana* the initially decussate arrangement soon breaks down to an irregular grouping of flowers. In addition, *B. decussiflora* has longer inflorescences with more flowers than does *B. hookeriana*, and its connectives are lighter in color.

22. *Dicella* Grisebach, *Linnaea* 13: 249. 1839.

Woody vines. Leaves with small interpetiolar stipules. Inflorescence a decom-pound panicle, the flowers ultimately borne in short pseudoracemes with decus-sate bracts, each bract subtending a 1-flowered peduncle with apical bracteoles. Sepals abaxially sericeous, adaxially glabrous, pressed in against the androecium after anthesis, the anterior sepal eglandular, the 4 lateral sepals biglandular. Petals yellow, abaxially densely sericeous, adaxially glabrous or tomentose. Stamens 10, the anthers $\pm$ alike; pollen polyforate. Ovary densely velutinous or sericeous, formed from 3 connate carpels, the 2 posterior locules full-sized and fertile, the anterior carpel rudimentary and empty; 2(–3) styles free, straight and stout, glabrous, obliquely truncate or short-hooked at the apex and with large internal stigmas. Fruit composed of a dry, hard, indehiscent, nut-like structure with a thick, fibrous wall, containing 1–2 seeds, most often only 1, subtended by 5 dry wings formed by enlargement of the sepals; seeds large, containing a small embryo and abundant perisperm.

Type. *Dicella bracteosa* (Adr. Jussieu) Grisebach.

Dicella is a genus of six species, four of which occur in Amazônia. One of those is included in this treatment because it occurs on the middle Rio Negro, the lower slopes of the Serra da Neblina, and Río Apaporis.

***Dicella julianii* (Macbride) Anderson, *Acta Amazônica* 5: 279. 1975. Fig 58.**

Tetrapterys julianii Macbride, Field Mus. Nat. Hist., Bot. Ser. 13 (pt. 3): 805. 1950.

Dicella amazonica Pires, Bol. Técn. Inst. Agron. N. 38: 27. 1960. Type. *Fróes* 23797, Rio Soli-mões, Amazonas, Brazil, Dec frt (IAN! holotype & isotype).

Liana climbing to 30 m, the younger stems and inflorescence golden- or brown-ish-sericeous. Leaves with the petiole 1.3–2.4 cm long, sericeous, eglandular or bearing 2 small glands above middle on adaxial edges; lamina 10–16 cm long, 5–9 cm wide, elliptic, acute or rounded at the base, abruptly narrowed to an acu-minate apex, with the reticulum prominent below and usually prominent above, eglandular or bearing several minute marginal glands, persistently sericeous below, glabrate above. Bracts (4–)5–7 mm long, 3–5 mm wide, elliptic, acute or obtuse at the apex, usually revolute, eglandular, abaxially sericeous, adaxially glabrous except pilose at the apex; peduncle 5–7 mm long, sericeous; bracteoles 3–5 mm long, 2–4 mm wide, obovate or orbicular and broadly rounded at the apex, otherwise like the bracts; bracts and bracteoles deciduous in fruit. Pedicel 5–7 mm long in flower, up to 20 mm long in fruit, sericeous. Sepals 2 mm wide, obtuse or rounded at the apex, exceeding the glands by 2 mm, the glands 2.5–4 mm long. Petals with the abaxial hairs finer and whiter on the limb than on the claw, adaxially glabrous; 4 lateral petals with the claw 1.5–2 mm long, the limb 7–9 mm long, 5–6.5 mm wide, obovate or orbicular, truncate or subauriculate at the base, erose or denticulate at the margin, the anterior pair larger than the posterior pair; posterior petal with a stout claw 3.5–4.5 mm long, the limb 4–6 mm long, 3–5 mm wide, broadly elliptic, cuneate at the base, with marginal glands on the proximal half of the limb. Stamens with the filaments 2–2.5 mm long, connate for 1.5 mm or more, abaxially sericeous, adaxially glabrous; anthers 1.5–2.5 mm long, strongly reflexed after anthesis, the 2 opposite the anterior petals

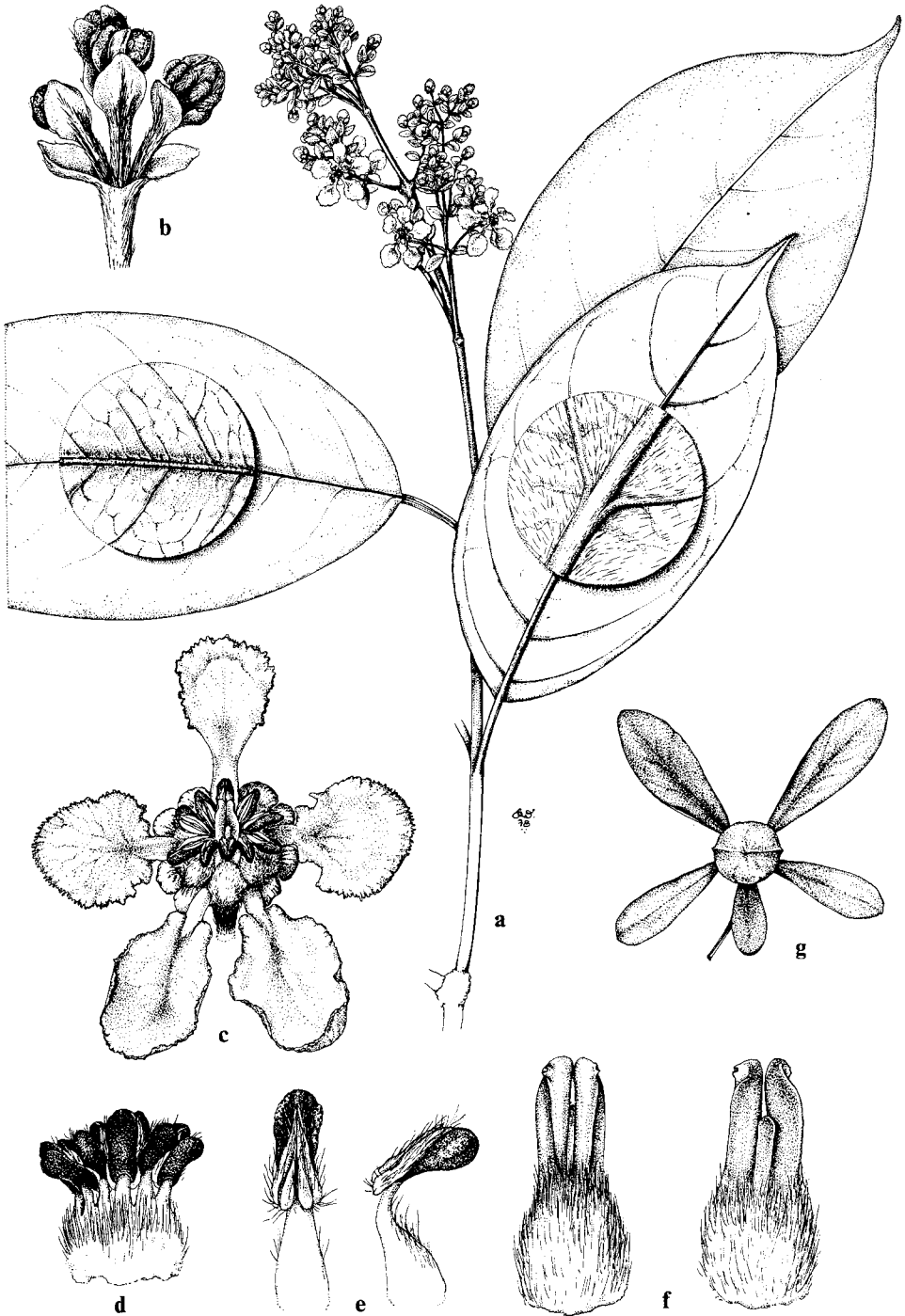


Fig 58. *Dicella julianii*. a) Flowering branch, $\times 0.5$ (circles $\times 2.5$); b) decussate flower buds, $\times 2$; c) flower, $\times 2.5$; d) androecium, $\times 5$; e) stamens, $\times 7.5$; f) gynoecium, viewed from behind (left) and in front (right), $\times 7.5$; g) fruit, $\times 0.5$. Drawn by Karin Douthit, a–f from Klug 347, g from Fróes 23797.

smaller than the others; locules 1–1.7 mm long, pendulous up to 0.5 mm below insertion of the filament, tapered distally, densely pilose-sericeous; connective dark red, cylindrical or slightly swollen distally, elongated and exceeding the locules by up to 1 mm. Ovary 2 mm high, sericeous, only the 2 posterior locules developed and fertile; styles 2, 2 mm long, the stigmas twisted toward the posterior petal; anterior style often present as a short, slender rudiment between the other 2 and opposite the anterior sepal. Fruit with the nut spherical, 1.3–1.8 cm in diameter, sericeous to glabrate; wings formed by enlargement of the sepals 2–5.5 cm long, 0.7–2 cm wide, narrowly elliptic or obovate, unequal, the posterior-lateral pair longest, the anterior-lateral pair intermediate, and the anterior (eglandular) one smallest.

Type. *Klug 347*, Mishuyacu, near Iquitos, Loreto, Peru, Oct–Nov flr (holotype US! isotype NY!).

Distribution. Western Amazonia and Antioquia, Colombia. Guayana collections seen: BRAZIL. Amazônas: basin of Rio Negro, Tapuruquara, island in river, forest on terra firme, Oct frt, *Prance et al 15737* (INPA, MICH, NY); Rio Negro, Rio Cauaburi, Rio Maturacá, between Camp Tatú and Camp III, elev 400–200 m, Dec flr/imm frt, *Silva & Brazão 60722* (IAN, MICH, NY, UB, US). COLOMBIA. Amazonas/Vaupés: on sandstone of rapids, quartzite base, in shade, Raudal Jirijirimo (below mouth of Kananari), Río Apaporis, 0°5'N, 70°40'W, elev 270 m, Jan frt, *Schultes & Cabrera 14937* (MICH).

For citation of other specimens seen, as well as notes to use in distinguishing this species from its closest relatives, *D. conwayi* and *D. macroptera*, see the Acta Amazônica paper where the combination was published.

Acknowledgments

I salute Bassett Maguire for his vision and persistence in the exploration of Guayana and the subsequent publication of this series of papers on one of the world's most remarkable floras. My own travels in South America have been made possible, in large part, by grants GB-37314 and GF-42557 from the National Science Foundation to The New York Botanical Garden. Preparation of many of the plates was made possible by a Faculty Research Grant from the Rackham School of Graduate Studies of the University of Michigan. Julian Steyermark has helped in several problems concerning rare species, and I have made much good use of José Cuatrecasas' *Prima Flora Colombiana*, although all descriptions given here are entirely mine, based on original observations and measurements except where noted otherwise. Bronwen Gates kindly allowed me to use her unpublished monograph of *Banisteriopsis* and *Diplopterys* as the basis for my treatments of those genera in Guayana. The principal artists were Karin Douthit and Annette Seidenschnur Mahler, whose skill has greatly improved this paper. Several plates were drawn by Melissa Marshall.

The major sources of specimens studied were the herbaria of The New York Botanical Garden, the Instituto Botánico in Caracas, the University of Michigan, the U.S. National Museum, IAN in Belém, and INPA in Manaus. In addition, smaller loans from the following herbaria were very helpful: A, ECON, and GH (Harvard); COL (Bogotá); F (Chicago); GOET (Göttingen); MG (Belém); MO (St. Louis); MY (Maracay); R and RB (Rio de Janeiro); SP (São Paulo); U

(Utrecht); UB (Brasília); WAG (Wageningen). To the curators of all these herbaria I express my gratitude for their cooperation and patience.

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1863 *Byrsonima arthropoda*
- Eggers, H. F. A.
13518 *Mascagnia eggersiana*
- Egler, W. A.
576 *Byrsonima chrysophylla*
1040 *Blepharandra cachimbensis*
- Fanshawe, D. B.
531 *Heteropterys multiflora*
- Fariñas, M. et al
284 *Blepharandra hypoleuca*
295 *Lophanthera longifolia*
325 *Byrsonima chrysophylla*
352 *Blepharandra hypoleuca*
499 *Heteropterys oblongifolia*
531 *Blepharandra hypoleuca*
547 *Blepharandra hypoleuca*
665 *Byrsonima coniophylla*
666 *Byrsonima coniophylla*
- Fernández, Alvaro
2028 *Byrsonima fernandezii*
2074 *Diacidia galphimoides*
2202 *Clonodia racemosa*
2215 *Byrsonima japurensis*
- Fernández, Antonio
1072 *Stigmaphyllon hypoleucum*
1108 *Byrsonima stipulacea*
1120 *Banisteriopsis pulcherrima*
1598 *Byrsonima crassifolia*
1643 *Byrsonima schomburgkiana*
- Fernández, Antonio
1714 *Byrsonima verbascifolia*
1719 *Stigmaphyllon hypoleucum*
- Ferrari, G.
1021 *Banisteriopsis martiniana* var *martiniana*
1042 *Byrsonima crassifolia*
1268 *Heteropterys macradena*
- Foldats, E.
108A *Stigmaphyllon brachiatum*
2602 *Blepharandra hypoleuca*
3583 *Byrsonima nitidissima*
3621 *Byrsonima chrysophylla*
3658 *Blepharandra angustifolia*
3762 *Tetrapteryx mucronata*
3797 *Heteropterys atabapensis*
3873 *Byrsonima coniophylla*
3882 *Byrsonima cowanii*
7067 *Byrsonima concinna*
7195 *Blepharandra hypoleuca*
- Forest Department, British Guiana
1004 *Byrsonima christianeae*
1436 *Byrsonima incarnata*
2387 *Byrsonima eugeniifolia*
2737 *Byrsonima incarnata*
2793 *Byrsonima incarnata*
2971 *Stigmaphyllon puberum*
2974 *Heteropterys nervosa*
3644 *Mascagnia guianensis*
3769 *Heteropterys oligantha*
3865 *Heteropterys oligantha*
4176 *Heteropterys nervosa*
4286 *Mezia includens*
4528 *Heteropterys lasseri*
4935 *Stigmaphyllon puberum*
5484 *Byrsonima gymnocalcina*
5635 *Byrsonima schomburgkiana*
5651 *Byrsonima schomburgkiana*
5887 *Tetrapteryx crispa*
6116 *Burdachia sphaerocarpa* var *glandifera*
6146 *Byrsonima gymnocalcina*
7716 *Hiraea faginea*
7724 *Spachea elegans*
7815 *Byrsonima schomburgkiana*
7842 *Blepharandra hypoleuca*
7849 *Banisteriopsis pulcherrima*
7979 *Byrsonima concinna*
7980 *Blepharandra hypoleuca*
- Fróes, R. L.
12388/147 *Diacidia galphimoides*
12548/242 *Lophanthera spruceana*
20846 *Lophanthera longifolia*
21095 *Burdachia prismatocarpa* var *prismatocarpa*
21173 *Jubelina bracteosa*
21200 *Mascagnia dissimilis*

Fróes, R. L.

- 21385 *Byrsonima cuprea*
 21413 *Burdachia sphaerocarpa* var *sphaerocarpa*
 21500 *Lophanthera longifolia*
 21509 *Glandonia williamsii*
 22233 *Glandonia williamsii*
 22280 *Glandonia williamsii*
 22350 *Byrsonima coniophylla*
 22584 *Byrsonima japurensis*
 22701 *Clonodia racemosa*
 22736 *Byrsonima punctulata*
 22882 *Byrsonima punctulata*
 22913 *Byrsonima verbascifolia*
 23070 *Bunchosia mollis*
 23113 *Byrsonima schomburgkiana*
 23797 *Dicella julianii*
 25043 *Byrsonima punctulata*
 25113 *Blepharandra heteropetala*
 25260 *Blepharandra heteropetala*
 25322 *Byrsonima punctulata*
 25430 *Lophanthera longifolia*
 25504 *Byrsonima leucophlebia*
 27897 *Blepharandra angustifolia*
 27901 *Byrsonima bronweniana*
 27909 *Glandonia williamsii*
 28217 *Byrsonima bronweniana*
 28231 *Tetrapteryx styloptera*
 28439 *Lophanthera longifolia*
 28746 *Lophanthera pendula*
 33742 *Byrsonima leucophlebia*
 33748 *Lophanthera longifolia*
 34541 *Byrsonima leucophlebia*

Fróes, R. L. & Addison, G.

- 29009 *Byrsonima japurensis*
 29064 *Byrsonima punctulata*
 29255 *Heteropteryx cristata*
 29263 *Byrsonima japurensis*
 29280 *Blepharandea heteropetala*

García-Barriga, H.

- 3661 *Byrsonima arthropoda*
 4942 *Heteropteryx riparia*
 13659 *Burdachia prismatocarpa* var *prismatocarpa*
 13706 *Banisteriopsis martiniana* var *subenervia*
 13769 *Byrsonima garcibarrigae*
 13835 *Byrsonima garcibarrigae*
 14020 *Burdachia prismatocarpa* var *prismatocarpa*
 14082 *Burdachia prismatocarpa* var *prismatocarpa*
 14089 *Mascagnia poeppigiana*
 14107 *Byrsonima garcibarrigae*
 14108 *Byrsonima arthropoda*
 14215 *Hiraea apaporiensis*

García-Barriga, H.

- 14321 *Byrsonima japurensis*
 14415 *Banisteriopsis caapi*
 15043 *Byrsonima amoena*
 15089 *Diacidia parvifolia*
 20846 *Byrsonima coniophylla*
 20889 *Byrsonima coniophylla*

García-Barriga, H. et al

- 18684 *Diplopteryx cabrerana*

Gentry, A. & Berry, P.

- 14536 *Byrsonima nitidissima*
 14719 *Byrsonima nitidissima*
 14942 *Lophopteryx euryptera*

Gentry, A. & Ramos, J.

- 12891 *Burdachia sphaerocarpa* var *sphaerocarpa*
 12895 *Byrsonima punctulata*

Gentry, A. & Revilla, J.

- 20349 *Byrsonima arthropoda*
 20940 *Byrsonima arthropoda*

Gentry, A. et al

- 9141 *Mascagnia dissimilis*
 10504 *Byrsonima laurifolia*
 10505 *Tetrapteryx rhodoptera*
 10563 *Byrsonima chalcophylla* var *carraoana*
 10666 *Tetrapteryx mucronata*
 10685 *Stigmaphyllon hypoleucum*
 21306 *Mascagnia schunkei*

Gleason, H. A.

- 66 *Stigmaphyllon hypoleucum*
 353 *Heteropteryx cristata*
 357 *Byrsonima gymnocalycina*
 392 *Byrsonima gymnocalycina*
 393 *Byrsonima gymnocalycina*
 437 *Stigmaphyllon hypoleucum*
 753 *Mascagnia guianensis*
 825 *Mascagnia guianensis*

Goodland, R.

- 908 *Byrsonima eugeniifolia*

Gutiérrez V., G. & Schultes, R. E.

- 648 *Byrsonima japurensis*
 700 *Mascagnia macrodisca*
 819 *Stigmaphyllon brachiatum*
 846 *Burdachia prismatocarpa* var *prismatocarpa*
 848 *Byrsonima japurensis*
 886 *Byrsonima japurensis*

Hagen, W.

- 141 *Diplopteryx cabrerana*

Harley, R. M.

- 15348 *Verrucularia glaucophylla*
 16027 *Verrucularia glaucophylla*
 18671 *Verrucularia glaucophylla*
 19193 *Verrucularia glaucophylla*
 20076 *Verrucularia glaucophylla*

- Hatschbach, G.
 39692 *Verrucularia glaucophylla*
 39705 *Verrucularia glaucophylla*
- Haught, O.
 2837 *Clonodia complicata*
- Hermann, F. J.
 11115 *Banisteriopsis pubipetala*
- Hertel, H. et al
 15212 *Byrsonima leucophlebia*
- Hitchcock, A. S.
 17196 *Hiraea faginea*
 17289 *Mascagnia guianensis*
- Holt, E. G. & Blake, E. R.
 644 *Tetrapterys styloptera*
 689 *Banisteriopsis lucida*
 707 *Diacidia hypoleuca*
 776 *Byrsonima nitidissima*
 841 *Clonodia complicata*
 852 *Clonodia complicata*
- Holt, E. G. & Gehriger, W.
 86 *Bunchosia mollis*
 221 *Stigmaphyllon brachiatum*
 277 *Stigmaphyllon hypoleucum*
 411 *Byrsonima crassifolia*
- Hoyos, J. & Morillo, G.
 38 *Heteropterys cuatrecasasii*
 64 *Diacidia ferruginea*
 97 *Diacidia ferruginea*
- Huber, O.
 449 *Mezia rufa*
 1204 *Byrsonima amoena*
- Hugh-Jones, S.
 2 *Diplopterys cabrerana*
 3 *Banisteriopsis caapi*
 4 *Banisteriopsis caapi*
 6 *Banisteriopsis caapi*
- Humbert, H. & Schultes, R. E.
 27365 *Byrsonima amoena*
- IAN, Centro de Pesquisa Agropecuario do Tropicó Úmido, Belém
 15319 *Tetrapterys mucronata*
 43426 *Bunchosia mollis*
- Idrobo, J. M. & Schultes, R. E.
 628 *Diacidia parvifolia*
 649 *Diacidia parvifolia*
 1329 *Banisteriopsis pubipetala*
- INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus
 262 *Byrsonima schomburgkiana*
 1177 *Burdachia duckei*
 2934 *Glandonia macrocarpa*
 3000 *Mascagnia heterocarpa*
 3078 *Mascagnia heterocarpa*
 3103 *Burdachia sphaerocarpa* var *sphaerocarpa*
 3118 *Glandonia macrocarpa*
 3175 *Mascagnia heterocarpa*
- INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus
 3230 *Glandonia macrocarpa*
 3504 *Glandonia macrocarpa*
 4009 *Pterandra arborea*
 6740 *Mascagnia heterocarpa*
 8411 *Byrsonima amoena*
 35770 *Byrsonima rodriguesii*
 60468 *Blepharandra aff heteropetala*
 60667 *Blepharandra aff heteropetala*
 60670 *Blepharandra aff heteropetala*
 60696 *Blepharandra aff heteropetala*
- Irwin, H. S. et al
 32437 *Verrucularia glaucophylla*
- Jaramillo M., R. et al
 440 *Byrsonima crispa*
 1028 *Byrsonima japurensis*
- Jenman, E.
 243 *Banisteriopsis pulcherrima*
- Jenman, G. S.
 3779 *Burdachia sphaerocarpa* var *glandifera*
 4087 *Mascagnia guianensis*
 5370 *Mascagnia microcarpa*
 5371 *Byrsonima stipulacea*
 6413 *Burdachia sphaerocarpa* var *glandifera*
 6994 *Lophopterys euryptera*
 7127 *Spachea elegans*
- Kappler, A.
 1709 *Hiraea affinis*
 1807 *Jubelina rosea*
- Killip, E. P.
 37232 *Byrsonima aff verbascifolia*
 37279 *Byrsonima crassifolia*
 37528 *Hiraea faginea*
 37535 *Clonodia complicata*
- Klug, G.
 347 *Dicella julianii*
 429 *Burdachia prismatocarpa* var *loretoënsis*
 692 *Byrsonima poeppigiana*
 1971 *Diplopterys cabrerana*
 2759 *Bunchosia hookeriana*
 3770 *Bunchosia hookeriana*
- Koyama, T. & Agostini, G.
 7257 *Mascagnia sepium*
 7358 *Byrsonima concinna*
 7402 *Tetrapterys rhodoptera*
- Kramer, K. U. & Hekking, W. H. A.
 2902 *Byrsonima eugeniifolia*
- Krukoff, B. A.
 1546 *Lophanthera longifolia*
 6269 *Lophanthera longifolia*
 6700 *Clonodia racemosa*
 6702 *Clonodia racemosa*
 8971 *Diplopterys cabrerana*
- Kubitzki, K. et al
 P21729 *Burdachia duckei*
- Kuhlmann, J. G.
 732 *Banisteriopsis muricata*

Kunhardt, Jr., H. R.

- 2 *Banisteriopsis pulcherrima*
- 18 *Byrsonima leucophlebia*
- 21 *Banisteriopsis pulcherrima*

Lasser, T.

- 1281 *Byrsonima crassifolia*
- 1747 *Tetrapteryx rhodoptera*
- 1753 *Byrsonima crassifolia*
- 1769 *Hiraea tepuiensis*
- 1785 *Tetrapteryx rhodoptera*
- 1800 *Tetrapteryx rhodoptera*
- 1807 *Blepharandra hypoleuca*
- 1902 *Byrsonima verbascifolia*
- 1928 *Heteropteryx lasserii*
- 1939 *Tetrapteryx rhodoptera*

Lawrance, A. E.

- 546 *Mascagnia dissimilis*

Lehmann, F. C.

- 8766 *Clonodia complicata*

Level, J. S.

- L-7 *Blepharandra heteropetala*
- L-20 *Hiraea faginea*
- L-25 *Lophanthera longifolia*
- L-58 *Diacidia galphimoides*
- L-99 *Byrsonima coniophylla*
- L-119 *Byrsonima japurensis*
- L-130 *Tetrapteryx mucronata*

Liesner, R.

- 3685 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 7375 *Banisteriopsis krukoffii*

Little, E. L.

- 17586 *Byrsonima spicata*

Lizot, J.

- 77 *Banisteriopsis lucida*

Luetzelburg, P. von

- 20660 *Banisteriopsis cinerascens*
- 22128 *Banisteriopsis martiniana* var *subenervia*
- 22330 *Diacidia galphimoides*
- 22873 *Diacidia galphimoides*

Maguire, B.

- 24724 *Byrsonima spicata*
- 31791 *Tetrapteryx mucronata*
- 31802 *Stigmaphyllon brachiatum*
- 32187 *Byrsonima concinna*
- 32191 *Blepharandra hypoleuca*
- 32201 *Tetrapteryx pusilla*
- 32715 *Pterandra sericea*
- 32729 *Blepharandra fimbriata*
- 32850 *Banisteriopsis maguirei*
- 32955 *Blepharandra fimbriata*
- 32981 *Blepharandra hypoleuca*
- 33002 *Blepharandra fimbriata*
- 33042 *Blepharandra hypoleuca*
- 33215 *Byrsonima concinna*
- 33268 *Blepharandra hypoleuca*

Maguire, B.

- 33321 *Byrsonima pachypoda*
- 33354 *Blepharandra hypoleuca*
- 33377 *Byrsonima pachypoda*
- 33396 *Byrsonima pachypoda*
- 33483 *Byrsonima chalcophylla* var *chalcophylla*
- 33558 *Tetrapteryx pusilla*
- 33569 *Tetrapteryx pusilla*
- 33605 *Tetrapteryx fimbripetala*
- 33611 *Tetrapteryx rhodoptera*
- 33668 *Tetrapteryx pusilla*
- 33709 *Byrsonima crassifolia*

Maguire, B. & Fanshawe, D. B.

- 22973 *Stigmaphyllon hypoleucum*
- 23125 *Banisteriopsis pulcherrima*
- 23248 *Tetrapteryx styloptera*
- 23260 *Byrsonima crassifolia*
- 23270 *Byrsonima fanshawei*
- 23302 *Tetrapteryx styloptera*
- 23354 *Banisteriopsis lucida*
- 23535 *Byrsonima christianeae*
- 32300 *Tetrapteryx styloptera*
- 32485 *Blepharandra hypoleuca*
- 32499 *Banisteriopsis martiniana* var *martiniana*
- 32561 *Blepharandra hypoleuca*

Maguire, B. & Maguire, B., Jr.

- 29069 *Byrsonima bracteolaris*

Maguire, B. & Maguire, C. K.

- 29088 *Blepharandra hypoleuca*
- 34501 *Blepharandra angustifolia*
- 34610 *Tetrapteryx styloptera*
- 34721 *Banisteriopsis lucida*
- 34748 *Banisteriopsis lucida*
- 34853 *Tetrapteryx styloptera*
- 35048 *Tetrapteryx mucronata*
- 35054 *Tetrapteryx fimbripetala*
- 35099 *Tetrapteryx fimbripetala*
- 35163 *Banisteriopsis maguirei*
- 35187 *Byrsonima concinna*
- 35285 *Banisteriopsis maguirei*
- 35312 *Byrsonima concinna*
- 35346 *Tetrapteryx fimbripetala*
- 35495 *Banisteriopsis maguirei*
- 35522 *Burdachia prismatocarpa* var *prismatocarpa*
- 35536 *Burdachia prismatocarpa* var *prismatocarpa*
- 40052 *Byrsonima crassifolia*
- 40363 *Byrsonima schomburgkiana*

Maguire, B. & Politi, L.

- 27321 *Lophanthera longifolia*
- 27399 *Byrsonima cowanii*
- 27524 *Heteropteryx steyermarkii*
- 27626 *Byrsonima kariniana*
- 27647 *Byrsonima kariniana*

Maguire, B. & Politi, L.

- 27672 *Diacidia kunhardtii*
- 27677 *Diacidia kunhardtii*
- 27692 *Pterandra flavescens*
- 27692A *Pterandra flavescens*
- 27694 *Heteropterys steyermarkii*
- 27851 *Byrsonima cuprea*
- 27946 *Pterandra flavescens*
- 27965 *Hiraea celiana*
- 27986 *Heteropterys atabapensis*
- 28021 *Byrsonima kariniana*
- 28104 *Pterandra flavescens*
- 28105 *Diacidia kunhardtii*
- 28139 *Byrsonima kariniana*
- 28273 *Byrsonima kariniana*
- 28287 *Byrsonima bracteolaris*
- 28295 *Hiraea celiana*
- 28323 *Banisteriopsis maguirei*
- 28361 *Byrsonima concinna*
- 28392 *Tetrapteryx mucronata*
- 28415 *Tetrapteryx mucronata*
- 28435 *Tetrapteryx mucronata*
- 28523 *Hiraea celiana*
- 28601 *Byrsonima cowanii*
- 28673 *Heteropterys steyermarkii*
- 28728 *Byrsonima cowanii*
- 28783 *Tetrapteryx fimbripetala*
- 28822 *Heteropterys atabapensis*
- 28969 *Byrsonima verbascifolia*

Maguire, B. & Wurdack, J. J.

- 33888 *Banisteriopsis martiniana* var *martiniana*
- 33920 *Blepharandra hypoleuca*
- 34480 *Blepharandra angustifolia*
- 34487 *Glandonia williamsii*
- 34540 *Byrsonima coniophylla*
- 34610 *Glandonia williamsii*
- 34698 *Heteropterys oblongifolia*
- 34711 *Hiraea faginea*
- 34838 *Byrsonima japurensis*
- 34888 *Burdachia williamsii*
- 34921 *Diacidia galphimoides*
- 34939 *Heteropterys orinocensis*
- 34943 *Diacidia galphimoides*
- 34953 *Diacidia galphimoides*
- 35569 *Heteropterys atabapensis*
- 35575 *Heteropterys atabapensis*
- 35588 *Heteropterys nervosa*
- 35645 *Byrsonima coniophylla*
- 35701 *Heteropterys oblongifolia*
- 35771 *Byrsonima coccolobifolia*
- 35772 *Byrsonima coccolobifolia*
- 36327 *Byrsonima chrysophylla*
- 36350 *Tetrapteryx gracilis*
- 36362 *Byrsonima coniophylla*
- 36406 *Byrsonima wurdackii*

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- 29423 *Byrsonima chrysophylla*
- 29679 *Byrsonima bracteolaris*
- 29742 *Blepharandra hypoleuca*
- 29806 *Diacidia vestita*
- 29807 *Banisteriopsis maguirei*
- 29858 *Diacidia vestita*
- 29869 *Diacidia vestita*
- 30010 *Banisteriopsis maguirei*
- 30054 *Tetrapteryx huachamacariensis*
- 30091 *Diacidia vestita*
- 30096 *Banisteriopsis maguirei*
- 30111 *Diacidia vestita*
- 30164 *Tetrapteryx huachamacariensis*
- 30196 *Heteropterys cuatrecasasii*
- 30221 *Diacidia vestita*
- 30244 *Banisteriopsis maguirei*
- 30252 *Diacidia vestita*
- 30395 *Heteropterys siderosa*
- 30522 *Heteropterys oblongifolia*
- 30535 *Heteropterys oblongifolia*
- 30551 *Heteropterys oblongifolia*
- 30568 *Tetrapteryx gracilis*
- 30593 *Byrsonima luetzelburgii*
- 30635 *Diacidia hypoleuca*
- 30672 *Diacidia hypoleuca*
- 30704 *Diacidia hypoleuca*
- 30708 *Diacidia hypoleuca*
- 30710 *Diacidia hypoleuca*
- 30775 *Burdachia williamsii*
- 30779 *Blepharandra angustifolia*
- 30792 *Burdachia williamsii*
- 30803 *Heteropterys oblongifolia*
- 30809 *Tetrapteryx gracilis*
- 30814 *Byrsonima chrysophylla*
- 30833 *Byrsonima cuprea*
- 30837 *Byrsonima crassifolia*
- 30872 *Byrsonima crassifolia*
- 31025 *Burdachia prismatocarpa* var *prismatocarpa*
- 31618 *Heteropterys beecheyana* var *alata*
- 31699 *Banisteriopsis maguirei*
- 32043 *Heteropterys macradena*
- 32045 *Byrsonima aff. verbascifolia*
- 32050 *Byrsonima crassifolia*
- 32077 *Lophanthera longifolia*
- 33996 *Byrsonima crassifolia*
- 34550 *Heteropterys oblongifolia*
- 34612A *Byrsonima bronweniana*
- 35945 *Byrsonima crassifolia*
- 35965 *Banisteriopsis muricata*
- 36069 *Byrsonima nitidissima*
- 36071 *Heteropterys beecheyana* var *alata*
- 36086 *Byrsonima crassifolia*
- 36146 *Heteropterys beecheyana* var *alata*
- 36155 *Hiraea bifurcata*

Maguire, B. et al

- 36185 *Byrsonima nitidissima*
- 36201 *Byrsonima nitidissima*
- 36217 *Byrsonima punctulata*
- 36252 *Tetrapteryx mucronata*
- 36282 *Heteropteryx atabapensis*
- 36284 *Byrsonima coniophylla*
- 36493 *Glandonia williamsii*
- 36579 *Heteropteryx oblongifolia*
- 36604 *Lophanthera longifolia*
- 36648 *Byrsonima coniophylla*
- 36656 *Byrsonima cuprea*
- 36665 *Heteropteryx oblongifolia*
- 36678 *Byrsonima coniophylla*
- 36678A *Heteropteryx oblongifolia*
- 36694 *Jubelina magnifica*
- 36694-A *Jubelina magnifica*
- 36748 *Jubelina magnifica*
- 36821 *Diacidia glaucifolia*
- 36917 *Diacidia rufa*
- 36968 *Diacidia glaucifolia*
- 36991 *Diacidia rufa*
- 37034 *Diacidia rufa*
- 37152 *Diacidia rufa*
- 37207 *Heteropteryx neblinensis*
- 37320 *Diacidia cordata*
- 37348 *Diacidia rufa*
- 37362 *Diacidia glaucifolia*
- 37378 *Diacidia rufa*
- 37387 *Heteropteryx siderosa*
- 37406 *Tetrapteryx mucronata*
- 37550 *Byrsonima cuprea*
- 37554 *Glandonia williamsii*
- 37557 *Heteropteryx oblongifolia*
- 37571 *Tetrapteryx gracilis*
- 37576 *Blepharandra angustifolia*
- 37585 *Heteropteryx oblongifolia*
- 37616 *Heteropteryx oblongifolia*
- 37683 *Lophanthera longifolia*
- 37698 *Byrsonima punctulata*
- 40677 *Tetrapteryx pusilla*
- 41433 *Byrsonima coniophylla*
- 41441 *Heteropteryx atabapensis*
- 41442 *Tetrapteryx gracilis*
- 41484 *Blepharandra angustifolia*
- 41514 *Tetrapteryx gracilis*
- 41638 *Banisteriopsis martiniana* var *subener-*
via
- 41671 *Byrsonima coniophylla*
- 41822 *Byrsonima coniophylla*
- 42036 *Diacidia rufa*
- 42038 *Tetrapteryx fimbripetala*
- 42057 *Diacidia glaucifolia*
- 42057A *Diacidia glaucifolia*
- 42057B *Diacidia glaucifolia*
- 42111 *Heteropteryx neblinensis*

Maguire, B. et al

- 42216 *Diacidia glaucifolia*
 - 42303 *Byrsonima maguirei*
 - 42304 *Byrsonima maguirei*
 - 42312 *Byrsonima maguirei*
 - 42445 *Byrsonima maguirei*
 - 42461 *Diacidia rufa*
 - 42464 *Heteropteryx neblinensis*
 - 42506 *Byrsonima concinna*
 - 42537B *Heteropteryx neblinensis*
 - 42537D *Diacidia cordata*
 - 42601 *Jubelina magnifica*
 - 43806 *Tetrapteryx pusilla*
 - 43886 *Blepharandra hypoleuca*
 - 43887 *Blepharandra hypoleuca*
 - 43889 *Banisteriopsis pulcherrima*
 - 44091 *Diacidia galphimoides*
 - 44100 *Diacidia galphimoides*
 - 44142 *Stigmaphyllon hypoleucum*
 - 44154 *Byrsonima amoena*
 - 46099A *Byrsonima concinna*
 - 46235 *Banisteriopsis lucida*
 - 46882 *Byrsonima stipulacea*
 - 46977 *Lophopteryx euryptera*
 - 53524 *Banisteriopsis martiniana* var *martin-*
iana
 - 53532 *Byrsonima concinna*
 - 53561 *Banisteriopsis pulcherrima*
 - 53605 *Byrsonima concinna*
 - 53659 *Tetrapteryx fimbripetala*
 - 53661 *Banisteriopsis martiniana* var *martin-*
iana
 - 53669 *Banisteriopsis pulcherrima*
 - 53704 *Banisteriopsis martiniana* var *martin-*
iana
 - 53708 *Byrsonima concinna*
 - 56081 *Mascagnia schunkei*
 - 60100 *Tetrapteryx mucronata*
 - 60426 *Mascagnia glandulifera*
- Martius, K. F. P. von
1921 *Verrucularia glaucophylla*
- Mathias, M. E. & Taylor, D.
3883 *Diplopteryx cabrerana*
5260 *Diplopteryx cabrerana*
- Medina, E.
384 *Banisteriopsis lucida*
545 *Byrsonima coniophylla*
- Meijeraan, J. W.
9 *Bunchosia armeniaca*
13 *Bunchosia armeniaca*
- Mélinon, —
116 *Mascagnia guianensis*
258 *Mascagnia guianensis*
- Meyer, G. F. W.
332 *Diplopteryx pauciflora*

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- 3719 *Lophanthera longifolia*
- 3737 *Byrsonima leucophlebia*
- 6903 *Byrsonima leucophlebia*
- 6921 *Lophanthera longifolia*
- 7893 *Lophanthera longifolia*
- 7963 *Lophanthera longifolia*
- 8473 *Byrsonima leucophlebia*
- 10840 *Byrsonima leucophlebia*
- 11793 *Byrsonima leucophlebia*
- 11970 *Byrsonima leucophlebia*
- 12195 *Byrsonima amoena*
- 12420 *Byrsonima punctulata*
- 30278 *Blepharandra heteropetala*
- 30279 *Blepharandra heteropetala*

Mori, S. & Bolten, A.

- 8289 *Byrsonima eugeniifolia*
- 8399 *Jubelina rosea*
- 8551 *Jubelina rosea*

Mori, S. et al

- 8030 *Byrsonima eugeniifolia*
- 9053 *Burdachia prismatocarpa* var *loretoënsis*
- 9231 *Burdachia prismatocarpa* var *loretoënsis*

Morillo, G.

- 3174 *Stigmaphyllon brachiatum*

Morillo, G. & Ishikawa, M.

- 3465 *Tetrapteryx styloptera*
- 3470 *Diacidia galphimimoides*
- 3513 *Diacidia galphimimoides*
- 3538 *Heteropteryx orinocensis*
- 3541 *Heteropteryx orinocensis*

Morillo, G. et al

- 2932 *Stigmaphyllon hypoleucum*
- 3980 *Jubelina bracteosa*
- 4120 *Heteropteryx orinocensis*
- 4141 *Jubelina bracteosa*
- 4206 *Mascagnia glandulifera*

Naranjo, C.

- 9 *Diplopteryx cabrerana*

Nascimento, O. C. et al

- 27 *Byrsonima chrysophylla*
- 121 *Diacidia galphimimoides*
- 135 *Hiraea primaeva*

Nelson, B. W. & Lima, J. F.

- P21058 *Blepharandra heteropetala*

Occhioni, P.

- 3563 *Lophanthera lactescens*

Oliveira, E.

- 43 *Byrsonima leucophlebia*
- 1203 *Lophanthera longifolia*
- 2165 *Byrsonima chrysophylla*
- 2948 *Lophanthera longifolia*
- 3501 *Banisteriopsis lyrata*

Pannier, F.

- 829a *Heteropteryx macradena*

Pena, B. S.

- 328 *Blepharandra cachimbensis*
- 446 *Byrsonima punctulata*
- 573 *Lophanthera longifolia*

Pennington, T. D. et al

- P22759 *Byrsonima garcibarrigae*

Pereira, E.

- 1777 *Blepharandra cachimbensis*

Pérez Arbeláez, E. & Cuatrecasas, J.

- 6756 *Heteropteryx nervosa*

Persaud, A. C.

- 31 *Burdachia sphaerocarpa* var *glandifera*
- 53 *Burdachia sphaerocarpa* var *glandifera*
- 61 *Byrsonima gymnocalycina*
- 167 *Byrsonima gymnocalycina*
- 177 *Burdachia sphaerocarpa* var *glandifera*

Phelps, K. D. & Hitchcock, C. B.

- 361 *Byrsonima concinna*
- 418 *Tetrapteryx rhodoptera*
- 426 *Tetrapteryx rhodoptera*
- 452 *Byrsonima crassifolia*
- 471 *Diacidia stipularis*
- 516 *Diacidia ferruginea*

Philipson, W. R. et al

- 1719 *Banisteriopsis pubipetala*
- 2211 *Byrsonima crispa*

Pinkus, A. S.

- 18 *Byrsonima crassifolia*
- 28 *Blepharandra hypoleuca*
- 67 *Byrsonima crassifolia*
- 72 *Byrsonima spicata*
- 74 *Tetrapteryx rhodoptera*
- 90 *Hiraea tepuiensis*
- 95 *Byrsonima spicata*
- 211 *Blepharandra hypoleuca*
- 283 *Tetrapteryx rhodoptera*

Pinto E., P. & Sastre, C.

- 938 *Stigmaphyllon brachiatum*

Pires, J. M.

- 37 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 80 *Lophanthera longifolia*
- 89 *Byrsonima leucophlebia*
- 237 *Tetrapteryx styloptera*
- 250 *Lophanthera pendula*
- 261 *Byrsonima japurensis*
- 362 *Byrsonima chrysophylla*
- 580 *Hiraea aff celiana*
- 969 *Burdachia prismatocarpa* var *prismatocarpa*
- 1052 *Lophanthera spruceana*
- 1070 *Lophanthera spruceana*
- 1080 *Lophanthera spruceana*
- 1107 *Byrsonima frondosa*
- 1413 *Lophanthera longifolia*
- 4744 *Jubelina riparia*
- 4747 *Diplopteryx cabrerana*

Pires, J. M.

- 6597a *Clonodia racemosa*
- 14993 *Diacidia aracaënsis*
- 15040 *Verrucularia piresii*

Pires, J. M. & Leite, P.

- 14536 *Blepharandra heteropetala*
- 14840 *Blepharandra intermedia*
- 14844 *Byrsonima eugeniifolia*

Pires, J. M. & Marinho, L. R.

- 15682 *Tetrapteryx mucronata*
- 15755 *Tetrapteryx mucronata*

Pires, J. M. & Silva, N. T.

- 4357 *Byrsonima leucophlebia*
- 7931 *Hiraea apaporienis*
- 7950 *Lophanthera spruceana*
- 7970 *Glandonia williamsii*
- 8042 *Byrsonima chrysophylla*

Pires, J. M. et al

- 6112 *Blepharandra cachimbensis*
- 13921 *Burdachia duckei*
- 13940 *Byrsonima coniophylla*
- 13967 *Byrsonima punctulata*
- 13986 *Byrsonima coniophylla*
- 14020 *Byrsonima coniophylla*
- 14058 *Byrsonima punctulata*
- 14173 *Byrsonima punctulata*
- 14187 *Byrsonima eugeniifolia*
- 14191 *Byrsonima eugeniifolia*
- 14226 *Byrsonima eugeniifolia*
- 14334 *Spachea elegans*
- 14340 *Heteropteryx catoptera*
- 14377 *Byrsonima schomburgkiana*
- 14413 *Spachea elegans*
- 14446 *Heteropteryx murcapiresii*
- 14453 *Blepharandra intermedia*
- 14456 *Heteropteryx murcapiresii*
- 14483 *Blepharandra intermedia*
- 14485 *Byrsonima schomburgkiana*
- 14486 *Byrsonima eugeniifolia*
- 14493 *Blepharandra intermedia*
- 14501 *Spachea elegans*
- 14631 *Bunchosia mollis*
- 51345 *Jubelina riparia*

Plowman, T.

- 2034 *Diplopteryx cabrerana*
- 2159 *Diplopteryx cabrerana*
- 2177 *Diplopteryx cabrerana*
- 6040 *Diplopteryx cabrerana*

Plowman, T. et al

- 4246 *Byrsonima crispa*
- 6998 *Heteropteryx riparia*

Poeppig, E. F.

- 2214 *Byrsonima arthropoda*
- 2690 *Byrsonima poeppigiana*
- 2799 *Mascagnia poeppigiana*
- 2911 *Burdachia prismatocarpa* var *prismatocarpa*

Prance, G. T.

- 21031 *Blepharandra heteropetala*

Prance, G. T. & Lleras, E.

- 23741 *Burdachia duckei*

Prance, G. T. et al

- 2122 *Pterandra arborea*
- 2790 *Byrsonima arthropoda*
- 3311 *Byrsonima leucophlebia*
- 3363 *Glandonia prancei*
- 3680 *Burdachia duckei*
- 3690 *Byrsonima leucophlebia*
- 3964 *Stigmaphyllon hypoleucum*
- 3984 *Byrsonima japurensis*
- 4047 *Tetrapteryx discolor*
- 4226 *Byrsonima schomburgkiana*
- 4234 *Heteropteryx macradena*
- 4292 *Byrsonima crassifolia*
- 4437 *Stigmaphyllon hypoleucum*
- 4735 *Burdachia duckei*
- 6960 *Banisteriopsis lyrata*
- 8058 *Glandonia prancei*
- 8595 *Byrsonima leucophlebia*
- 9091 *Clonodia racemosa*
- 9138 *Byrsonima coccolobifolia*
- 9289 *Byrsonima spicata*
- 9546 *Bunchosia mollis*
- 9767 *Tetrapteryx discolor*
- 9903 *Tetrapteryx fimbripetala*
- 9921 *Byrsonima concinna*
- 10071 *Byrsonima stipulacea*
- 10145 *Bunchosia decussiflora*
- 10522 *Bunchosia decussiflora*
- 10690 *Hiraea faginea*
- 10718 *Hiraea faginea*
- 10740 *Banisteriopsis lucida*
- 10909 *Stigmaphyllon hypoleucum*
- 10932 *Bunchosia armeniaca*
- 11548 *Burdachia prismatocarpa* var *prismatocarpa*
- 13577 *Byrsonima stipulacea*
- 14710 *Mascagnia schunkei*
- 14828 *Byrsonima amoena*
- 14882 *Byrsonima punctulata*
- 14893 *Burdachia duckei*
- 14996 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 15136 *Lophanthera longifolia*
- 15138 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 15223 *Clonodia racemosa*
- 15440 *Byrsonima coniophylla*
- 15516 *Glandonia williamsii*
- 15536 *Byrsonima coniophylla*
- 15589 *Byrsonima laevis*
- 15619 *Byrsonima chrysophylla*
- 15737 *Dicella julianii*
- 15927 *Mascagnia leucanthele*

Prance, G. T. et al

- 16171 *Byrsonima coniphylla*
- 17718 *Byrsonima amoena*
- 17728 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 17867 *Burdachia duckei*
- 17868 *Byrsonima punctulata*
- 18022 *Byrsonima punctulata*
- 20557 *Glandonia prancei*
- 23486 *Byrsonima amoena*
- 25236 *Blepharandra cachimbensis*

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- 14189 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 17698 *Lophanthera lactescens*
- 23646 *Glandonia macrocarpa*
- 23649 *Pterandra arborea*
- 24164 *Lophanthera pendula*
- 25231 *Byrsonima cuprea*
- 25233 *Blepharandra angustifolia*
- 29041 *Lophanthera pendula*
- 35600 *Byrsonima chrysophylla*
- 35608 *Byrsonima coniphylla*
- 35610 *Mezia rufa*
- 35611 *Byrsonima wurdackii*
- 90557 *Blepharandra cachimbensis*

Revilla, J.

- 188 *Byrsonima arthropoda*
- 294 *Byrsonima arthropoda*
- 309 *Byrsonima poeppigiana*
- 1748 *Mascagnia glandulifera*
- 1838 *Byrsonima poeppigiana*
- 2351 *Mascagnia dissimilis*

Ribeiro, B. G. S.

- 371 *Blepharandra cachimbensis*
- 411 *Byrsonima eugeniifolia*
- 459 *Byrsonima eugeniifolia*
- 944 *Byrsonima chrysophylla*
- 995 *Lophanthera spruceana*
- 1096 *Blepharandra cachimbensis*

Robertson, K. R. & Austin, D. F.

- 278 *Mascagnia guianensis*

Rodrigues, W.

- 259 *Lophanthera longifolia*
- 299 *Byrsonima punctulata*
- 308 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 813 *Tetrapteryx styloptera*
- 984 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 6727 *Burdachia duckei*
- 7244 *Pterandra arborea*
- 7260 *Blepharandra heteropetala*
- 7577 *Pterandra arborea*
- 8799 *Byrsonima rodriguesii*

Rodrigues, W. & Aubreville, A.

- 659 *Byrsonima coccolobifolia*

Rodrigues, W. & Aubreville, A.

- 660 *Byrsonima crassifolia*
- 668 *Byrsonima verbascifolia*

Rodrigues, W. & Coelho, D.

- 1397 *Byrsonima arthropoda*
- 2087 *Burdachia sphaerocarpa* var *sphaerocarpa*
- 4875 *Byrsonima punctulata*

Rodrigues, W. & Jaccoud, S. R.

- 8886 *Burdachia sphaerocarpa* var *sphaerocarpa*

Rodrigues, W. & Lima, J.

- 2254 *Burdachia duckei*

Rodrigues, W. & Loureiro, A.

- 7058 *Pterandra arborea*

Rodrigues, W. & Mello, F.

- 4350 *Byrsonima schomburgkiana*

Rodrigues, W. et al

- 2843 *Byrsonima rodriguesii*

Romero Castañeda, R.

- 1217 *Byrsonima chrysophylla*
- 1236 *Clonodia complicata*
- 3483 *Bunchosia glandulifera*
- 3567 *Bunchosia glandulifera*
- 3650 *Byrsonima chrysophylla*
- 3753 *Jubelina bracteosa*

Rosa, N. A.

- 58 *Byrsonima eugeniifolia*
- 271 *Tetrapteryx fimbripetala*
- 292 *Byrsonima stipulacea*

Rusby, H. H. & Squires, R. W.

- 166 *Clonodia complicata*

Rutkis, E.

- 209 *Banisteriopsis caapi*
- 232 *Byrsonima chrysophylla*

Rutkis, E. & Foldats, E.

- 502 *Byrsonima verbascifolia*
- 507 *Byrsonima coccolobifolia*

Sagot, P.

- 102 *Byrsonima aerugo*

Samuels, J. A.

- 254 *Mascagnia guianensis*

Sandwith, N. Y.

- 206 *Byrsonima gymnocalycina*
- 289 *Mascagnia microcarpa*
- 484 *Mascagnia guianensis*
- 529 *Mascagnia guianensis*
- 1145 *Byrsonima incarnata*
- 1297 *Byrsonima eugeniifolia*
- 1430 *Banisteriopsis pulcherrima*
- 1441 *Banisteriopsis martiniana* var *martiniana*

Schomburgk, Richard

- 328 *Heteropteryx cristata*
- 544 *Bunchosia mollis*
- 773 *Banisteriopsis cinerascens*
- 777 *Byrsonima schomburgkiana*

Schomburgk, Richard

- 912 *Byrsonima concinna*
- 999 *Banisteriopsis martiniana* var *martiniana*
- 1043 *Blepharandra hypoleuca*
- 1379 *Byrsonima stipulacea*
- 1536 *Lophopterys euryptera*
- 1603 *Byrsonima stipulacea*

Schomburgk, Robert

- I 197 *Tetrapteryx discolor*
- I 279 *Heteropterys cristata*
- I 525 *Byrsonima gymnocalycina*
- I 742 *Bunchosia mollis*
- I 786 *Byrsonima schomburgkiana*
- I 844 *Banisteriopsis muricata*
- I 909 *Byrsonima japurensis*
- II 488 *Banisteriopsis cinerascens*
- II 587 *Byrsonima concinna*
- II 651 *Banisteriopsis martiniana* var *martiniana*
- II 677 *Blepharandra hypoleuca*
- II 743 *Byrsonima spicata*
- II 811 *Byrsonima aerugo*
- II 870 *Byrsonima stipulacea*

Schultes, R. E.

- 3827a *Mascagnia benthamiana*
- 3836 *Banisteriopsis martiniana* var *subenergia*
- 4029 *Heteropterys riparia*
- 5371 *Heteropterys macradena*
- 5646 *Heteropterys siderosa*
- 6228 *Mascagnia poeppigiana*
- 6229 *Mascagnia poeppigiana*
- 12107 *Tetrapteryx mucronata*
- 24531 *Burdachia duckei*

Schultes, R. E. & Black, G. A.

- 8400b *Burdachia prismatocarpa* var *loretensis*
- 8435 *Byrsonima japurensis*
- 8523 *Burdachia prismatocarpa* var *loretensis*

Schultes, R. E. & Cabrera, I.

- 10116 *Tetrapteryx styloptera*
- 12428 *Heteropterys riparia*
- 12554 *Tetrapteryx mucronata*
- 12559 *Tetrapteryx mucronata*
- 12562 *Byrsonima arthropoda*
- 12597 *Tetrapteryx styloptera*
- 12622 *Burdachia prismatocarpa* var *prismatocarpa*
- 12654 *Heteropterys riparia*
- 12820a *Byrsonima arthropoda*
- 12880 *Tetrapteryx styloptera*
- 13133 *Banisteriopsis caapi*
- 13134 *Diplopteryx cabrerana*
- 13146 *Tetrapteryx mucronata*
- 13156a *Banisteriopsis caapi*
- 13208 *Mascagnia glandulifera*

Schultes, R. E. & Cabrera, I.

- 13533 *Heteropteryx macrostachya*
- 13534 *Byrsonima japurensis*
- 13573 *Tetrapteryx styloptera*
- 13594 *Mascagnia glandulifera*
- 13595 *Banisteriopsis martiniana* var *subenergia*
- 13615 *Banisteriopsis martiniana* var *subenergia*
- 13736 *Burdachia prismatocarpa* var *prismatocarpa*
- 13767 *Byrsonima japurensis*
- 13770 *Heteropteryx nervosa*
- 14217 *Byrsonima amoena*
- 14355 *Diacidia parvifolia*
- 14543 *Burdachia prismatocarpa* var *prismatocarpa*
- 14569 *Banisteriopsis martiniana* var *subenergia*
- 14591 *Heteropteryx olivacea*
- 14683 *Byrsonima garcibarrigae*
- 14937 *Dicella julianii*
- 15002 *Byrsonima arthropoda*
- 15507 *Byrsonima japurensis*
- 15691 *Mezia includens*
- 15944 *Heteropteryx macradena*
- 15996 *Hiraea schultesii*
- 16387 *Banisteriopsis martiniana* var *subenergia*
- 16951 pp *Heteropteryx riparia*
- 16591 pp *Tetrapteryx styloptera*
- 16594 *Byrsonima japurensis*
- 16665 *Heteropteryx riparia*
- 16667 *Tetrapteryx styloptera*
- 16771 *Tetrapteryx mucronata*
- 16778 *Tetrapteryx styloptera*
- 16953 *Tetrapteryx styloptera*
- 16960 *Tetrapteryx mucronata*
- 16961 *Tetrapteryx styloptera*
- 16969 *Hiraea apaporiensis*
- 17022 *Hiraea apaporiensis*
- 17209 *Banisteriopsis caapi*
- 17297 *Diplopteryx cabrerana*
- 17459 *Diplopteryx cabrerana*
- 17539 *Byrsonima amoena*
- 17548 *Byrsonima amoena*
- 17600 *Tetrapteryx styloptera*
- 17604 *Byrsonima japurensis*
- 17896 *Clonodia racemosa*
- 18307 *Diacidia parvifolia*
- 18331 *Diacidia parvifolia*
- 18381 *Byrsonima amoena*
- 18395 *Diacidia parvifolia*
- 19138 *Byrsonima amoena*
- 19170 *Diacidia galphimoides*
- 19198 *Burdachia prismatocarpa* var *prismatocarpa*

- Schultes, R. E. & Cabrera, I.
 19314 *Diacidia galphimoides*
 19318 *Diacidia galphimoides*
 19585 *Byrsonima arthropoda*
 19694 *Byrsonima amoena*
 19743 *Byrsonima amoena*
 19815 *Byrsonima arthropoda*
 19817 *Byrsonima japurensis*
 19850 *Byrsonima arthropoda*
 19867 *Byrsonima japurensis*
- Schultes, R. E. & López, F.
 8769 *Byrsonima chrysophylla*
 8882 *Byrsonima japurensis*
 8893 *Byrsonima coniophylla*
 9208 *Heteropterys orinocensis*
 9370 *Byrsonima wurdackii*
 9379 *Byrsonima chrysophylla*
 9455 *Diacidia galphimoides*
 9558 *Byrsonima chrysophylla*
 9565 *Glandonia williamsii*
 9600 *Lophanthera pendula*
 9601 *Lophanthera pendula*
 9684 *Burdachia prismatocarpa* var *prismatocarpa*
 9891 *Diacidia galphimoides*
 9928 *Tetrapteryx mucronata*
 10014 *Mascagnia castanea*
 10184 *Tetrapteryx styloptera*
 10400e *Byrsonima arthropoda*
- Schultes, R. E. & Pires, J. M.
 9090 *Lophanthera spruceana*
 9137 *Byrsonima chrysophylla*
 9142 *Mascagnia sepium*
- Schultes, R. E. et al
 18096 *Diacidia galphimoides*
 18123 *Diacidia galphimoides*
 18220 *Heteropteryx nervosa*
 20049 *Diacidia parvifolia*
 24260 *Byrsonima japurensis*
 24282 *Byrsonima amoena*
 24363 *Byrsonima japurensis*
- Schunke Vigo, J.
 245 *Mezia rufa*
 6195 *Mascagnia schunkei*
 6401 *Byrsonima arthropoda*
 7877 *Mascagnia schunkei*
- Schwacke, C. A. W.
 III 266 *Burdachia sphaerocarpa* var *sphaerocarpa*
 III 505 *Clonodia racemosa*
- Sick, H.
 B. 621 *Blepharandra cachimbensis*
- Silva, M.
 43 *Byrsonima verbascifolia*
 2187 *Byrsonima arthropoda*
 2193 *Byrsonima arthropoda*
- Silva, M. F. et al
 1550 *Hiraea apaporiensis*
- Silva, N. T.
 459 *Byrsonima leucophlebia*
 982 *Lophanthera longifolia*
 1112 *Lophanthera longifolia*
 2859 *Banisteriopsis lyrata*
 3672 *Blepharandra cachimbensis*
 4494 *Byrsonima leucophlebia*
 59708 *Heteropteryx multiflora*
- Silva, N. T. & Brazão, U.
 60610 *Heteropteryx dichromocalyx*
 60612 *Bunchosia decussiflora*
 60722 *Dicella julianii*
 60764 *Bunchosia decussiflora*
 60825 *Pterandra arborea*
 60837 *Mezia rufa*
 60867 *Diacidia glaucifolia*
 60913 *Byrsonima aff laevis*
 60930 *Diacidia rufa*
 60964 *Hiraea silvae*
 60980 *Tetrapteryx mucronata*
 61000 *Heteropteryx macrostachya*
- Smith, A. C.
 2224 *Byrsonima schomburgkiana*
 2266 *Byrsonima schomburgkiana*
 2352 *Spachea elegans*
 2450 *Byrsonima schomburgkiana*
 3212 *Bunchosia mollis*
 3350 *Byrsonima spicata*
- Soejarto, D. D. et al
 3928 *Mascagnia dissimilis*
- Spruce, R.
 246 *Burdachia prismatocarpa* var *prismatocarpa*
 247 *Heteropteryx orinocensis*
 764 *Byrsonima leucophlebia*
 1012 *Banisteriopsis caapi*
 1090 *Glandonia macrocarpa*
 1093 *Mascagnia heterocarpa*
 1094 *Clonodia racemosa*
 1545 *Clonodia racemosa*
 1628 *Byrsonima japurensis*
 1659 *Burdachia duckei*
 1911 *Byrsonima japurensis*
 1919 *Byrsonima arthropoda*
 2070 *Mascagnia leucanthele*
 2073 *Byrsonima cuprea*
 2092 *Burdachia prismatocarpa* var *prismatocarpa*
 2394 *Tetrapteryx mucronata*
 2518/2632 *Lophanthera spruceana*
 2853 *Jubelina bracteosa*
 2966 *Diacidia galphimoides*
 3210 *Hiraea faginea*
 3276 *Banisteriopsis lucida*

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- 3277 *Stigmaphyllon brachiatum*
- 3315 *Byrsonima japurensis*
- 3332 *Byrsonima cuprea*
- 3425 *Burdachia williamsii*
- 3638 *Byrsonima nitidissima*
- 3754 *Byrsonima laevis*
- 4542 *Bunchosia hookeriana*
- 4958 *Mascagnia tenuifolia*

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- 223 *Lophopterys surinamensis*

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- P20250 *Blepharandra heteropetala*

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- 57556 *Tetrapteryx mucronata*
- 57751 *Byrsonima crassifolia*
- 57841 *Heteropteryx oblongifolia*
- 58112 *Byrsonima bracteolaris*
- 58122 *Diacidia vestita*
- 58126 *Blepharandra hypoleuca*
- 58191 *Blepharandra hypoleuca*
- 58418 *Byrsonima chrysophylla*
- 58419 *Byrsonima chrysophylla*
- 58462 *Byrsonima nitidissima*
- 58559 *Banisteriopsis martiniana* var *martiniana*
- 58689 *Banisteriopsis pulcherrima*
- 59180 *Banisteriopsis martiniana* var *martiniana*
- 59361 *Tetrapteryx pusilla*
- 59381 *Tetrapteryx rhodoptera*
- 59385 *Byrsonima verbascifolia*
- 59623 *Blepharandra hypoleuca*
- 59710 *Banisteriopsis martiniana* var *martiniana*
- 60039 *Hiraea tepuiensis*
- 60205 *Tetrapteryx rhodoptera*
- 60272 *Byrsonima chalcophylla* var *carraoana*
- 60278 *Byrsonima concinna*
- 60310 *Blepharandra hypoleuca*
- 60431 *Byrsonima stipulacea*
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- 60636 *Hiraea tepuiensis*
- 60716 *Byrsonima concinna*
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- 60790 *Hiraea tepuiensis*
- 60807 *Banisteriopsis martiniana* var *martiniana*
- 60883 *Byrsonima chalcophylla* var *carraoana*
- 60935 *Byrsonima spicata*
- 74673 *Tetrapteryx styloptera*
- 74677 *Pterandra sericea*
- 75175 *Byrsonima chalcophylla* var *carraoana*
- 75697 *Blepharandra hypoleuca*
- 75741 *Byrsonima chalcophylla* var *carraoana*

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- 86265 *Byrsonima coccolobifolia*
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- 86575 *Bunchosia mollis*
- 86635 *Bunchosia armeniaca*
- 86669 *Byrsonima stipulacea*
- 86702 *Mezia includens*
- 86801 *Byrsonima spicata*
- 86985 *Byrsonima spicata*
- 87154 *Spachea elegans*
- 87295 *Tetrapteryx crispa*
- 87415 *Banisteriopsis martiniana* var *martiniana*
- 87498 *Heteropteryx multiflora*
- 87632 *Tetrapteryx crispa*
- 87775 *Stigmaphyllon puberum*
- 87776 *Lophopteryx euryptera*
- 87917 *Stigmaphyllon hypoleucum*
- 88289 *Byrsonima spicata*
- 88663 *Mascagnia sepium*
- 89086 *Tetrapteryx crispa*
- 89094 *Byrsonima stipulacea*
- 89274 *Tetrapteryx mucronata*
- 89315 *Mascagnia macrodisca*
- 89429 *Tetrapteryx fimbripetala*
- 89477 *Mezia includens*
- 89510 *Banisteriopsis lucida*
- 89645 *Mezia includens*
- 90809 *Heteropteryx macrostachya*
- 90825 *Byrsonima concinna*
- 90829 *Byrsonima concinna*
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- 98016 *Diacidia steyermarkii*
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- 106064 *Mezia includens*
- 106148 *Heteropteryx macradena*
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- 106378 *Byrsonima leucophlebia*
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- 106978 *Byrsonima chrysophylla*
- 107027-A *Heteropteryx macradena*
- 107209 *Heteropteryx macradena*

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- 107499 *Diacidia vestita*
- 109030 *Diacidia steyermarkii*
- 109158 *Diacidia steyermarkii*
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- 109576 *Diacidia steyermarkii*
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- 111290 *Banisteriopsis pulcherrima*
- 111298 *Tetrapterys pusilla*
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- 102485 *Tetrapterys styloptera*
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- 102850 *Bunchosia glandulifera*
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- 95727 *Bunchosia argentea*
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- 662 *Byrsonima crassifolia*
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