

THE TAXONOMY OF JUBELINA (MALPIGHIACEAE)

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The Malpighiaceae are not as numerous or diverse in the Amazonian lowlands as in drier, more open habitats like the Planalto of central Brazil, but some genera are mostly or entirely Amazonian. One such is *Jubelina*, four of whose six species occur in the Amazonian drainage system, the other two being found in nearby areas whose floras have a strong Amazonian component (Fig. 1). My purpose in this little monograph is to bring together what is known about the genus, and to offer some suggestions about its evolutionary history.

Jubelina Adr. Juss. in Delessert, Icon. Sel. 3: 19, pl. 32. 1837 [1838].

Sprucina Nied., Arbeiten Bot. Inst. Königl. Lyceums Hosianum Braunsberg 3: 18. 1908.

Diplopterys subgenus *Jubelina* (Adr. Juss.) Nied., Arbeiten Bot. Inst. Königl. Lyceums Hosianum Braunsberg 4: 16. 1912.

Woody vines. Leaves opposite, the petiole eglandular, the lamina flat or very slightly revolute at margin, bearing impressed glands or rarely eglandular, the lateral veins prominent below and interconnected by \pm parallel “scalariform” tertiary veins; stipules small or minute, triangular, borne on base of petiole. Inflorescences axillary and terminal, decompound, thyriform, containing much-reduced bractlike 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 pedicel. Sepals 5, nearly distinct narrowly ovate, obovate, or oblong, spreading to expose outermost petal in enlarging bud, the anterior sepal eglandular, the lateral 4 usually bearing 1 large gland each, formed by \pm complete fusion of 2 (except in *J. uleana*, with 6–8 distinct glands), occasionally all sepals eglandular. Petals pink or yellow, 5, at least the anterior-lateral 2 abaxially sericeous, the lateral 4 spreading, the posterior erect. Receptacle glabrous. Stamens 10, glabrous; filaments very stout opposite posterior-lateral petals. Ovary of 3 carpels, 1 anterior and 2 posterior, all fertile, adaxially adnate to a common axis; styles 3, subterminal, the apex with a large internal stigma and dorsally truncate or short-hooked. Fruit breaking apart into 3 1-seeded samaras on a high pyramidal torus; samara with a narrowly elliptical or linear ventral areole 1–3 mm wide, a semicircular, entire or repand, central dorsal wing often extended forward at apex between lateral wings, and 2 large lateral wings usually confluent at base, each lateral wing with a complex structure comprising at least an outer membranous wing and a sterile cavity developed in its base, parallel to the fertile locule, during maturation of the fruit, and frequently bearing additional wings, winglets, crests, or irregular outgrowths between outer wing and central dorsal wing. Embryo with thick flat subequal cotyledons, 1 slightly longer than the other and bent back over it at the apex.

TYPE. *Jubelina riparia* Adr. Juss.

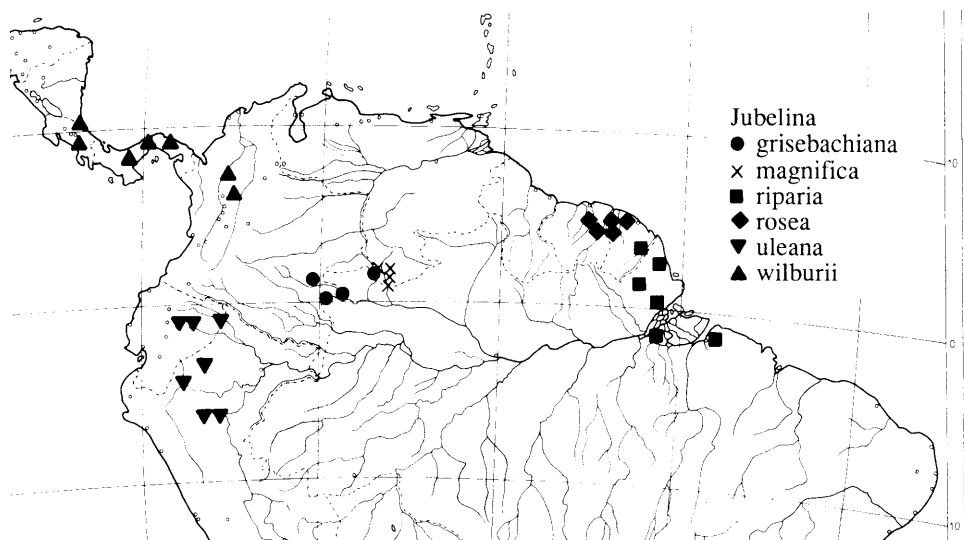


FIG. 1. Distribution of all species of *Jubelina*. Flora Neotropica base map no. 1, copyright the University of Utrecht.

NOTEWORTHY GENERIC CHARACTERS

Jubelina is one of the vining genera that have the principal wings of the samara lateral (see further discussion below under Extra- and Intrageneric Relationships). It is set off as a genus by the following combination of character-states: scalariform tertiary veins, large decompound terminal inflorescences with the flowers in umbels, large bracts and bracteoles, long narrow sepals, at least the two anterior-lateral petals abaxially sericeous, and the samaras with a high narrow ventral areole and complex lateral wings, each of which contains a sterile cavity parallel to the fertile locule and usually bears at least one crest or wing between the outer lateral wing and the central dorsal wing. In addition, five of the six species are notable for having the paired calyx glands (if present) connate to form one large gland in the center of the sepal.

The sterile cavities in the fruit are especially interesting, because they are unique in this genus. They seem likely to be an adaptation for dispersal by water, and suggest that even in species like *Jubelina uleana* and *J. grisebachiana*, which have among the largest samaras in the family, water may be an important factor in their dispersal. In *J. magnifica* there seems to have been a shift toward more dependence on water, reflected in reduced fruit wings, and in *J. riparia* this trend has culminated in samaras with minimal wings but very large inflated bladders. Another significant trend in the genus is for the reduced leaves, bracts, bracteoles, and sepals in the large inflorescence to become colored. These characteristics combine to produce a picture of plants well adapted to life in wet lowland forests. They are strong vines that can reach the tops of large trees. Their large inflorescences full of colored parts presumably attract pollinators from some distance, an important adaptation since individual plants are often far apart in such forests. And their fruits are well adapted for primary dispersal by wind followed by secondary dispersal by water.

EXTRA- AND INTRAGENERIC RELATIONSHIPS

Most neotropical genera of Malpighiaceae can be placed in one of two subfamilies. The one that has most of the less specialized character-states is the Byrsonimoideae, in which the pollen is tricolporate and the plants are trees or shrubs and bear unwinged fruits (Anderson 1978). The other large subfamily must be called the Malpighioideae, because it includes the genus *Malpighia*, which is atypical in bearing fleshy fruits but is descended from the wing-fruited genus *Mascagnia*. Most species in the Malpighioideae are vines and bear winged fruits, and the pollen is of several derived types. Within the Malpighioideae *Mascagnia* is central to a group of genera in which the principal wings of the samara are lateral, not dorsal. When one looks beyond the samaras, one finds the mascagnoid genera to be rather diverse. *Hiraea* and *Mascagnia* were separated long ago, and only recently Johnson (1986) has segregated *Callaeum* from *Mascagnia*, which still remains a probably unnatural assemblage. *Jubelina* is mascagnoid, but it is not very similar in most characters to other mascagnoid genera. Niedenzu (1928) included *Jubelina* with *Mezia* as a subgenus of his genus *Diplopterys*. Gates (1982) has shown that *Diplopterys sensu stricto* is a segregate from *Banisteriopsis*, not at all closely related to *Jubelina* and *Mezia*. The latter two certainly deserve to be recognized as separate genera, as was done by Cuatrecasas in 1958, but I agree with Niedenzu that *Mezia* is closely related to *Jubelina*. It has a similar inflorescence, long narrow sepals, and samaras whose lateral wings are basally confluent and often bear intermediate elaborations. However, *Mezia* is advanced in several characters (Anderson 1981) and can only be regarded as a sister genus to *Jubelina*; neither could reasonably be considered directly ancestral to the other. Moving further afield, one naturally looks to *Mascagnia* and its segregates for other outgroups with which to compare *Jubelina*. The best of these is probably *Callaeum* (Johnson 1986), which often has umbellate inflorescences and sericeous petals, and one species of which (*C. nicaraguense*) bears a complex structure between the lateral and dorsal wings of the samara. Within *Mascagnia* itself, the best group to which I can compare *Jubelina* is Niedenzu's section *Pleuropterys* (1928), which has hairy petals and sometimes bears intermediate elaborations on the lateral wings of the samara. However, the lateral wings are usually free at the base and the inflorescence is racemose, so the similarity is less than compelling.

No help is to be obtained in this case from consideration of chromosome numbers or pollen. The only chromosome number known for *Jubelina* is my count of $n = 10$ in *J. magnifica*. Most wing-fruited Malpighiaceae I have counted have ten pairs of chromosomes or a multiple of that number, so that count simply confirms that *Jubelina* is correctly placed in the Malpighioideae. The pollen, as described by Lowrie (1982), is of a moderately specialized rugose type common among mascagnoid Malpighiaceae.

A believable phylogenetic analysis of *Jubelina* is made difficult by the lack of an obvious outgroup to guide the assessment of the polarity of characters. Nevertheless, I am including a simple analysis, based on rather few characters, in order to summarize some clear relationships between the species and present my best estimate of phyletic trends. The principal outgroup employed was *Mezia*, with secondary consideration given to *Callaeum* and *Mascagnia* section *Pleuropterys*. The characters and character-states used in the analysis are given below, with my reasons for assigning polarity as I did:

- a. Leaf hairs shifting from sessile (0) to stalked (1). Sessile hairs are common in all three outgroups and stalked hairs are rare, so it seems best to consider stalked hairs derived within *Jubelina*.

- b. Leaf glands shifting from uniseriate (0) to scattered (1). Having the leaf glands scattered is an unusual condition, apparently not found in any of the outgroups, so it is surely derived within *Jubelina*.
- c. Sepals uninflated (0) to distally inflated with aerenchyma (1). This condition is unknown in any of the outgroups, so it is probably derived within *Jubelina*.
- d. Calyx glands distinct (0) to connate (1). Almost all outgroup species (and indeed almost all neotropical Malpighiaceae) have distinct calyx glands, so connate glands are surely a derived condition.
- e. Lateral petals shifting from yellow (0) to pink (1). All species of all three outgroups have yellow petals, so that seems likely to be the ancestral color in *Jubelina*.
- f. Inner wing on lateral wing of samara well developed (0) to reduced or absent (1). Intermediate wings are present in *Mezia*, and were probably present in the common ancestor of the two genera; a residual crest or winglet is often formed in the two species of *Jubelina* that have experienced this loss.
- g. Transverse outgrowths of winglets on the lateral wings of the samara absent (0) to present (1). Elaborations like these have evolved repeatedly in mascagnoid lines, including *Mezia*. I consider them an adaptation for dispersal by water, because they increase the surface area of the fruit and probably retard wetting. This adaptive significance, added to the complete absence of even rudiments of such structures in half the species of *Jubelina*, leads me to consider them a derived feature. This decision is based primarily on intrageneric considerations, not on outgroup comparison.
- h. Lateral wings of the samara well developed (0) to partially reduced (1) to rudimentary (2). This step, too, seems likely to be part of a shift from dispersal by wind to dispersal by water, so polarity is assigned partly on the basis of intrageneric considerations. However, it is also true that almost all species in the outgroups have large, well-developed lateral wings on their samaras.

When the six species of *Jubelina* are scored for these eight characters, the result is the matrix shown in Table 1. From this I derive the diagram shown in Figure 2, which has ten steps, including a parallel loss of the inner wing on the lateral wing of the samara in *J. grisebachiana* and *J. wilburii*. One could construct a tree of the same length by postulating that that inner wing was lost in a step between *uleana* and the rest of the genus, then regained in the common ancestor of *rosea*, *riparia*, and *magnifica*. That would not change the branching pattern of the tree.

In several ways I find the tree in Figure 2 intuitively satisfying. *Jubelina uleana* and *J. wilburii* have many characteristics in common and surely belong close together in any phylogenetic analysis. Similarly, *J. rosea*, *J. riparia*, and *J. magnifica*

TABLE 1. Species/character matrix for *Jubelina*. See text for description and discussion of characters.

	a	b	c	d	e	f	g	h
grisebachiana	1	0	1	1	1	1	0	0
magnifica	1	1	1	1	1	0	1	1
riparia	1	0	1	1	1	0	1	2
rosea	1	0	1	1	1	0	1	0
uleana	0	0	0	0	0	0	0	0
wilburii	0	0	0	1	0	1	0	0

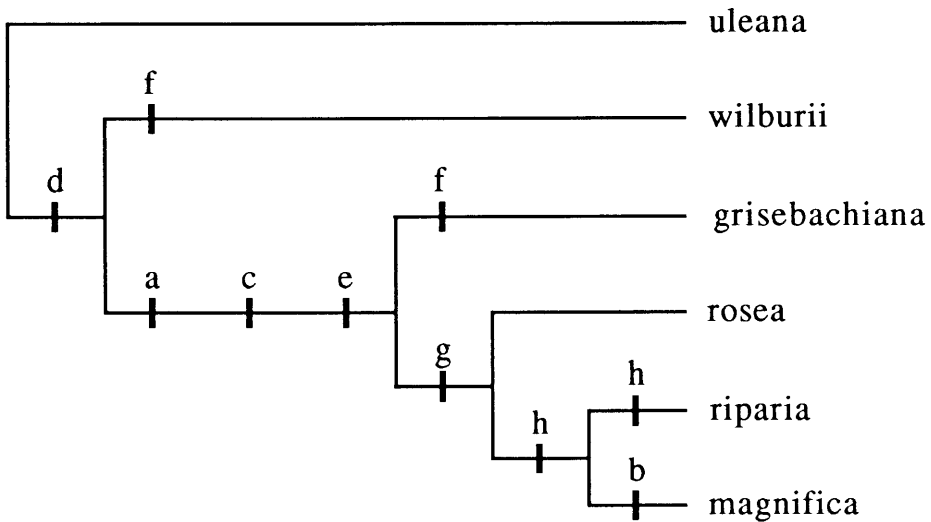


FIG. 2. Phylogeny of *Jubelina*. Crossbars indicate shifts from ancestral to derived character-states; letters above crossbars denote characters. See text for description of characters and Table 1 for distribution of character-states.

form a complex of obviously related species. And *J. grisebachiana*, while generally more like the *rosea* group than the two yellow-flowered species, is intermediate in its stem hairs and hooked styles, and probably deserves a somewhat intermediate place on the tree. On the other hand, I am not so confident about the orientation of the tree. Parallelism and reversal have been common in the evolution of the Malpighiaceae, and just a few changes in my analysis of characters would root the tree differently. For example, the distinct calyx glands of *J. uleana* could be a reversal, and the bright yellow petal pigments of *J. uleana* and *J. wilburii* may not be homologous with the darker pigments in *Mezia*, in which case the ancestral condition in *Jubelina* might actually be pink petals, which are common in *Mascagnia* section *Mascagnia*. Therefore, I urge the reader not to regard the tree in Figure 2 as a definitive phylogeny of *Jubelina*, but as a first attempt based on the information now at hand.

GEOGRAPHICAL DISTRIBUTION

The distribution of all six species of *Jubelina* is mapped in Figure 1. Several features of that distribution merit comment. Only *J. grisebachiana* and *J. magnifica* have been found in the same vicinity, near San Carlos de Río Negro, and I do not know that they are actually sympatric there. Two species are extra-Amazonian, but in both cases there are strong ties between their floras and the Amazonian flora. *Jubelina rosea* occurs only in the Atlantic drainage of French Guiana and Suriname, where the lowland forest is continuous with that of adjacent Amazonia. *Jubelina wilburii* is known mostly from Central America, but it has also been collected at Anorí in Colombia, home of disjuncts from western Amazonia like *Dicella julianii* (Anderson 1975) and *Ectopopterys soejartoi* (Anderson 1980). One related pair, *J. uleana* and *J. wilburii*, share the western part of the genus's range, and another close pair, *J. rosea* and *J. riparia*, share the east.

KEY TO THE SPECIES OF JUBELINA

1. Leaves sparsely sericeous to nearly glabrate, the hairs sessile, \pm straight, strongly appressed; lateral 4 petals yellow, the posterior yellow or pink and white; all 5 petals abaxially sericeous; hairs on samara 0.2–0.4 mm long.
 2. Petiole of larger leaves 20–40 mm long; floriferous bracts 7.5–10.5 mm long, 5–6 mm wide, with white vesture; sepals tomentose on both sides, the anterior eglandular, the lateral 4 each bearing 2 glands or 1 or both of the glands adjacent to the anterior sepal much reduced or absent; apex of styles with an obvious dorsal hook 0.2–0.5 mm long; lateral wing of samara bearing a well-developed inner wing parallel to central dorsal wing, 7–14 mm wide; Amazonian Ecuador and Peru. 1. *J. uleana*.
 2. Petiole of larger leaves 11–20 (–25) mm long; floriferous bracts 2–4 (–6) mm long, 1–2 (–3) mm wide, with yellow or brown vesture; sepals abaxially tomentellous, adaxially glabrous or sparsely pilose near apex, the anterior eglandular, the lateral 4 all eglandular or all bearing 1 large central gland; apex of styles dorsally truncate or with a rounded hook up to 0.1 mm long; lateral wing of samara bearing an inner crest or winglet parallel to dorsal wing, up to 5 mm wide, this occasionally absent; Costa Rica, Panama, and northern Colombia. 2. *J. wilburii*.
1. Leaves persistently velutinous or tomentose, the hairs stalked, their arms varying from suberect to parallel to the lamina and straight to serpentine; lateral 4 petals pink, the posterior pink or pink and white; lateral 4 petals abaxially sericeous or the posterior-lateral 2 glabrous, the posterior glabrous; longest hairs on samara 1–2.7 mm long.
 3. Samara without wings or winglets between dorsal and lateral wings, at most only a crest 1 mm wide parallel to dorsal wing; stems subsericeous or appressed-tomentose, the limb of hairs at right angles to the stalk; calyx glands revolute at apex; posterior-lateral 2 petals eglandular-dentate or -fimbriate; northwestern Brazil and Amazonian Colombia and Venezuela. 3. *J. grisebachiana*.
 3. Samara with well-developed wings and winglets between central dorsal and outer lateral wings; stems velutinous, the hairs mostly erect; calyx glands attached at apex; posterior-lateral 2 petals often glandular-fimbriate.
 4. Lamina of larger leaves 10–21 cm long, 5–14 cm wide, rounded or abruptly short-acuminate at apex with the acumen up to 5 (–10) mm long, bearing below on each side 0–3 glands near base and up to 4 glands in a single row distally; central dorsal wing of samara as wide as to (usually) wider than parallel inner wings borne on lateral wings.
 5. Lateral wing of samara with its outer membranous wing 22–36 mm wide; bracts and bracteoles 1.4–2.5 (–3) mm wide; lamina usually without glands near base, occasionally 1; Suriname and French Guiana. 4. *J. rosea*.
 5. Lateral wing of samara with its outer membranous wing 5–7 mm wide; bracts and bracteoles 4–5 mm wide; lamina bearing (0–) 1–2 (–3) glands near base on each side of midrib; northeastern Brazil and French Guiana. 5. *J. riparia*.
 4. Lamina of larger leaves 18–28 cm long, 10–18 cm wide, acuminate at apex with the acumen often up to 20 (–25) mm long, bearing (4–) 5–15 scattered glands below on each side; central dorsal wing of samara narrower than and hidden by parallel inner wings borne on lateral wings; Amazonian Venezuela. 6. *J. magnifica*.

The terminology used here follows that of my 1981 treatment of the Malpighiaceae of the Guayana Highland. See pp. 24–26 of that paper for definitions of vesture types, bract, peduncle, bracteole, and pedicel, and for an explanation of the floral symmetry in the family. Here, as there, I have described all wings of the samara such that width is measured at right angles to the ventral areole and height is measured parallel to it.

1. *Jubelina uleana* (Nied.) Cuatr., Webbia 13: 445. 1958.

Diplopterys uleana Nied., Arbeiten Bot. Inst. Königl. Lyceums Hosianum Braunsberg 4: 18. 1912.

Stems sericeous to glabrate, the hairs white or pale yellowish, sessile, straight and mostly strongly appressed, very short. Lamina of larger leaves 14–24 cm long,

8–17 cm wide, broadly elliptical or somewhat ovate or obovate, obtuse or rounded at base, usually abruptly acuminate at apex with the acumen 5–20 mm long, bearing 2–5 glands below on each side in a row set in from margin, sparsely sericeous to nearly glabrate on both sides, the hairs sessile, straight, strongly appressed, 0.2–0.4 mm long; petiole 20–40 mm long, sericeous to glabrate. Inflorescence proximally sericeous, distally tomentose or velutinous; bracts and bracteoles reddish, densely white-tomentellous or velutinous, 7.5–10.5 mm long, 5–6 mm wide, broadly ovate, obtuse, the bracteoles somewhat falcate; peduncle 2.5–4.5 mm long; pedicel 6–9.5 mm long, short-velutinous. Sepals reddish, 4.5–7 mm long, 1.5–2 mm wide, narrowly oblong, acute or obtuse at apex, reflexed, apparently not inflated with aerenchyma, tomentose on both sides, the anterior eglandular, the lateral 4 each bearing 2 elliptical or ovate glands 1.6–2 mm long and 0.8–1.5 mm wide, or 1 or both of the glands adjacent to anterior sepal much reduced or absent. Lateral 4 petals yellow, orange in age, abaxially sericeous except glabrous near margin, the claw 2–3.5 mm long, the limb 3.5–6.3 mm long, 3.5–6 mm wide, rotund, concave, subentire or erose, the anterior-lateral 2 notably larger than the posterior-lateral 2; posterior petal white with red veins, abaxially sericeous only in center, the claw 2.8–4.3 mm long, the limb 2.6–3.5 mm long and wide, flat, ovate or nearly square, bearing small sessile or short-stalked glands all around margin. Filament opposite posterior petal notably shorter than others, 1.5–2 mm long, the rest 2.3–4 mm long, longest opposite anterior sepal, connate up to 1 mm; anthers 0.8–1.3 mm long, the connectives flat or somewhat enlarged opposite sepals. Ovary velutinous; styles glabrous or piliferous, 3–3.7 mm long, subequal or the anterior shorter, the anterior nearly straight or somewhat sigmoid or arcuate, the posterior 2 arcuate- or sigmoid-ascending, the apex of all 3 with a protuberant internal stigma and an obvious dorsal hook 0.2–0.5 mm long. Samara elliptical, 80–100 × 30–40 mm, minutely velutinous or (on the wings) subsericeous, the hairs 0.1–0.4 mm long, V-shaped or ± straight and subappressed; fertile locule ca 5 mm in diameter; ventral arcole 11–16 mm high; central dorsal wing 9–15 mm wide, 20–28 mm high; lateral wings continuous at base, free at apex, each 40–50 mm wide, 30–40 mm high, flat, entire or repand, containing an open or chambered sterile cavity in the base 2–4.5 × 6–7 mm across and bearing an inner wing parallel to and almost as large as the central dorsal wing, 7–14 mm wide, 16–22 mm high, repand or coarsely dentate.

TYPE. PERU. San Martín: Near Tarapoto, 1855–6, fr. *Spruce 4950* (lectotype, here designated: C, photo at MICH! F neg. 23018).

Habitat and Phenology. Tropical wet forest, at elevations of 180–450 m; collected in flower and fruit from September to January.

Distribution. Amazonian Ecuador and Peru; see Fig. 1.

ADDITIONAL SPECIMENS EXAMINED. ECUADOR. Napo: Auca Oil Field, 60 km S of Coca, *Besse et al.* 055 (MICH, SEL); Reserva Biológica Jatun Sacha, Río Napo, 8 km from Puerto Misahuallí, *Cerón* 2158 (MICH, MO); Parque Nacional Yasuní, *Cerón & Coello* 3220, *Palacios* 2352, 2413 (all MICH & MO).—PERU. Amazonas: Río Santiago, Caterpiza, *Huashikat* 1199 (MICH, MO); Quebrada Huampami, monte al lado de Huampami [ca 4°30'S, 78°15'W, fide A. Gentry, pers. comm.], *Kayap* 258 (MO). San Martín: Tarapoto, *Spruce* 4607 (syntype, BM, F, GH, K, NY); Pongo de Cainarachi, *Ule* 6347 (syntype, photo at MICH of sheet formerly at B); Tarapoto, *Ll. Williams* 6603 (F). Loreto: Washintsa and vicinity, Río Huasaga, 3°20'S, 76°20'W, *Lewis et al.* 11827 (MO); Previsto, ravine of Yurac River, *Woytkowski* 7551 (F, MICH).

I have selected as lectotype the sheet of *Spruce 4950* at C because Niedenzu presumably saw and annotated it.

2. *Jubelina wilburii* W. R. Anderson, Brittonia 28: 410. 1976.

Fig. 3.

Stems sericeous or eventually glabrescent, the hairs golden fading to white, sessile, straight and strongly appressed, very short. Lamina of larger leaves 11–21 cm long, 6–11.5 (–14) cm wide, elliptical, ovate, or rotund, obtuse or rounded at base, acuminate or obtuse at apex, bearing (0–) 1–3 (–5) glands below on each side between midrib and margin, sparsely sericeous to eventually glabrate on both sides, the hairs sessile, \pm straight, strongly appressed, 0.2–0.4 mm long; petiole 11–20 (–25) mm long, sericeous. Inflorescence proximally sericeous, distally short-tomentose; floriferous bracts 2–4 (–6) mm long, 1–2 (–3) mm wide, ovate or elliptical, rounded at apex, yellow- or brown-tomentellous; peduncle 1–3.5 mm long; bracteoles like bracts but somewhat smaller; pedicel 2–5 mm long, tomentellous. Sepals 2.5–3.5 mm long, 1–1.8 mm wide, narrowly ovate, acute or obtuse and revolute at apex, not inflated with aerenchyma, abaxially tomentellous, adaxially glabrous or sparsely pilose near apex, the anterior eglandular, the lateral 4 all eglandular or all bearing 1 large gland ca 1.5 mm long and wide, ovate, acute and revolute at apex. Petals greenish yellow, abaxially sericeous except glabrous toward margin; lateral 4 petals with the claw 1.5–2.5 mm long, the limb 3–4.5 mm long, 2.5–4 mm wide, rotund or very broadly obovate, erose at margin or the posterior-lateral 2 bearing a few glands; posterior petal with the claw 2–2.4 mm long, the limb 2.5–2.8 mm long, 1.5–2.5 mm wide, flat, elliptical or obovate, bearing glands all around margin. Filaments 1.8–3 mm long, longest opposite anterior sepal, connate up to 1 mm; anthers 0.8–1 mm long, the connectives glandular-swollen. Ovary tomentellous; styles 2–2.5 mm long, glabrous or piliferous, the anterior straight and inclined toward posterior petal, the posterior 2 arcuate-ascending, the apex of all 3 dorsally truncate or with a rounded hook up to 0.1 mm long. Samara elliptical, 48–80 \times 20–35 mm, thinly sericeous, the hairs 0.2–0.4 mm long, straight and appressed or slightly raised; fertile locule 3–4.5 mm in diameter; ventral areole 9–14 mm high; dorsal wing 6–13 mm wide, 14–27 mm high; lateral wings continuous at base, free at apex, each 22–40 mm wide, 20–35 mm high, flat, entire or repand, containing a small sterile cavity 1–2 \times 1–3 mm across in the base, this empty or partly filled with aerenchyma, and bearing an inner crest or winglet parallel to dorsal wing, up to 5 mm wide, this occasionally absent.

TYPE. PANAMA. Veraguas: Road beyond Escuela Agrícola Alta Piedra, above Santa Fé, Pacific watershed, 800–1000 m, 1 Jan 1975, fl/fr, *Luteyn & Wilbur 4574* (holotype: DUKE!).

Habitat and Phenology. Wet forest at elevations of 100–1000 m; collected in flower from December to March, and in July and September, and with fruits from January to April.

Distribution. Northern Colombia to Costa Rica; to be expected also in the Atlantic lowlands of Nicaragua; see Fig. 1.

ADDITIONAL SPECIMENS EXAMINED: COLOMBIA. Antioquia: Mpio San Luis, autopista Medellín-Bogotá, vereda La Josefina, Cañón de la quebrada La Salada, *Hoyos & Hernández 757* (MO); Anorí, between Providencia and Alhibe, *Soejarto et al. 4521* (MICH).—PANAMA. Colón: Santa Rita Ridge, *Duke 15300* (MO), *Dwyer & Gentry 9544* (MICH, MO), *Lewis et al. 5281* (MICH, MO). San Blas: El Llano-Cartí road, Km 27, *Nevers & Charnley 5089* (MICH).—COSTA RICA. San José: vicinity of El General, *Skutch 4038* (A, MO, NY). Heredia: Finca La Selva, Río Puerto Viejo just E of its junction with the Río Sarapiquí, *Chacón G. 1048* (MICH), *D. Smith 239* (DUKE).

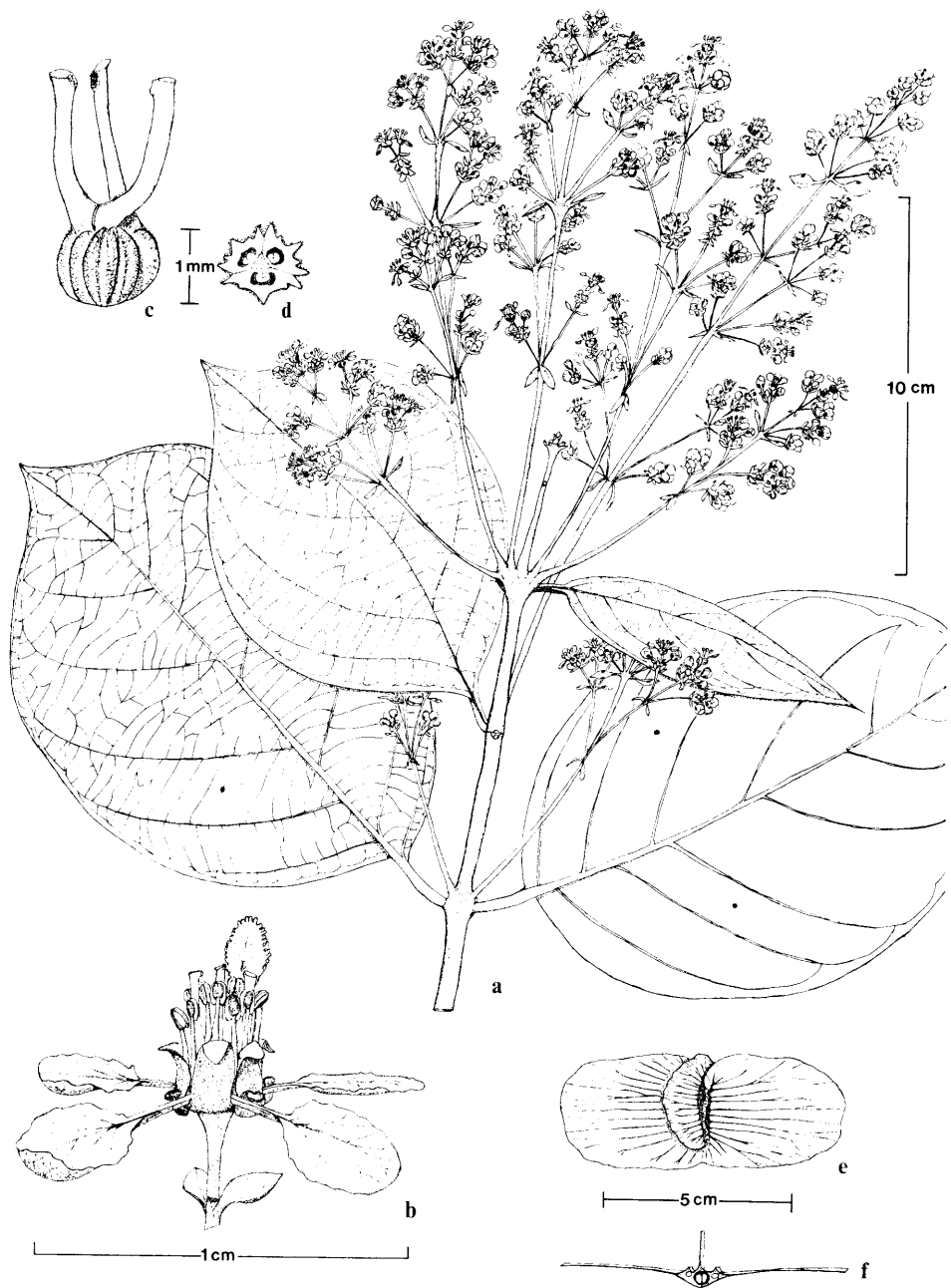


FIG. 3. *Jubelina wilburii*: a, flowering branch; b, flower; c, gynoeceum, with anterior style in center; d, ovary, cross section; e, samara, abaxial view; f, samara, cross section. a–d drawn from *Skutch* 4038, e–f from *Luteyn & Wilbur* 4574.

3. *Jubelina grisebachiana* W. R. Anderson, sp. nov.

Jubelina bracteosa sensu auctt., non *Mascagnia bracteosa* Grisebach in Martius, Fl. Bras. 12(1): 97. 1858.

Liana ramis subsericeis vel appresso-tomentosis; folia utrinque velutina vel tomentosa; 4 sepala lateraliter omnia glandula magna centrali apice revoluta munita; petala rosea, 4 lateraliter abaxialiter sericea, 2 postico-lateraliter eglandulosa, posticum glabrum; samarae alae laterales 25–30 mm latae, 25–43 mm altae, sine ala vel alulis intermediis, vel tantum crista ca 1 mm lata ala centrali dorsali parallela munita.

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 larger leaves 13–18 cm long, 7–12 cm wide, broadly elliptical, cuneate or rounded at base, rounded or more often abruptly short-acuminate at apex with the acumen 2–13 (–20) mm long, bearing below on each side 1–2 (–3) glands at base and 1–4 in a single row distally, persistently velutinous to tomentose on both sides, more densely so below, sometimes glabrescent above, the hairs with arms longer than stalk and suberect to parallel to lamina and becoming serpentine; petiole 14–23 mm long, subsericeous. Inflorescence tomentose or subsericeous; bracts and bracteoles pink, 4–6.5 mm long, 1.5–2 (–2.5) mm wide, narrowly obovate or spatulate, obtuse or rounded at apex, appressed-tomentose or subsericeous; peduncle 0–1.5 mm long; pedicel 5–7 mm long, subvelutinous, thickened in fruit. Sepals 4.5–6.5 mm long, 1–1.5 mm wide, narrowly obovate, acute or obtuse at apex, reflexed, distally somewhat inflated with aerenchyma, appressed-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 or emarginate and revolute at apex, often emarginate at base. Petals pink; lateral 4 petals sparsely to densely sericeous abaxially, eglandular, the claw 2.5–3.5 mm long, the limb 4.5–6.5 mm long, 5–7.5 mm wide, rotund, the anterior-lateral 2 deeply concave and entire to erose, the posterior-lateral 2 shallowly concave and dentate to fimbriate; posterior petal glabrous, the claw 2.5–4 mm long, the limb 3–5 mm long, 2.5–4.5 mm wide, \pm flat and rectangular, glandular-fimbriate all around margin. Filaments 2–3.3 mm long, longest opposite anterior sepal, up to $\frac{1}{3}$ connate; anthers 0.9–1.4 mm long, those opposite sepals with enlarged globose connectives. Ovary hispid; styles glabrous, the anterior 1.9–2.5 mm long, straight, the posterior 2 2–2.8 mm long, arcuate-ascending, the apex of all 3 with a rounded dorsal hook 0.1–0.2 mm long. Samara elliptical, 60–80 \times 25–43 mm, sericeous to glabrescent, the longest hairs (on the nut) 1–1.5 mm long, straight, appressed; fertile locule ca 4 mm in diameter; ventral areole 10–12 mm high; dorsal wing 10–12 mm wide, 24–30 mm high; lateral wings continuous at base, free at apex, each 25–30 mm wide, 25–43 mm high, flat, entire or repand, containing a chambered sterile cavity in the base 2–3 \times 2–5 mm across and bearing no intermediate wing or winglets, or at most only a crest ca 1 mm wide, parallel to dorsal wing.

TYPE. VENEZUELA. Terr. Fed. Amazonas: IVIC study site 4 km NE of San Carlos de Río Negro, 120 m, 1°56'N, 67°03'W, 4 Apr 1979, fl. *Liesner 6114* (holotype: MICH!; isotypes: MO! VEN).

Habitat and Phenology. Open areas and secondary forest, at elevations of 100–200 m; collected in flower in April and May and from October to December, and with fruits in May and November.

Distribution. Rio Uaupés/Vaupés and upper Rio Negro, Amazonian Brazil, Venezuela, and Colombia; see Fig. 1.

ADDITIONAL SPECIMENS EXAMINED. BRAZIL. Amazonas: Pari Cachoeira, Rio Tiquié [0°15'N, 69°45'W], *Coelho & Francisco* 274 (INPA); Rio Papury, Vaupés, Rio Negro, *Froés* 21173 (IAN, NY); Panuré, Rio Uaupés, *Spruce* 2853, syntype of *Mascagnia bracteosa* Griseb. (BM, G, K, NY).—VENEZUELA. Terr. Fed. Amazonas: Vicinity of San Carlos de Río Negro, *Aymard et al.* 3538 (MICH), *Croat* 59637, *Liesner* 3696, 6963, 7523 (all MICH & MO), 7555 (MO); Carretera San Carlos–Solano, 2–6 km SW of Solano, *Morillo et al.* 3980 (MICH); San Simón de Cocuy, 1–2 km NW of the Piedra de Cocuy, *Morillo et al.* 4141 (VEN).—COLOMBIA. Vaupés: Mitú, *Cuatrecasas* 7255 (US); Piracuará, *Romero Castañeda* 3753 (COL).

When Grisebach published *Mascagnia bracteosa* he cited two syntypes, *Spruce* [1093] from near Manaus and *Spruce* [2853] from near Panuré [=Ipanoré]. These represent different species. In 1912 Niedenzu selected *Spruce* 2853 as lectotype when he transferred the epithet *bracteosa* to *Diplopterys*; that choice was followed by Cuatrecasas in 1958, when he transferred the species to *Jubelina*, and by me in 1981. Unfortunately I now find, after careful study of the original description, that Niedenzu's choice of a lectotype was inappropriate and cannot stand. A point-by-point comparison of Grisebach's description with *Spruce* 1093 and 2853 shows almost perfect agreement with 1093 and very extensive disagreement with 2853. This pattern holds true for size and vesture of the lamina, length of the petiole, length of the peduncle and pedicel, vesture of the bracteoles, shape and vesture of the sepals, number of calyx glands, and shape of the style apex. The only evidence that Grisebach consulted 2853 at all in drawing up the description comes from the bracteoles, for which he gave a length closer to that of 2853 than 1093. I cannot avoid the conclusion that Grisebach based his description almost entirely on 1093, which should be the lectotype according to Article 8.1 and Recommendation 7B.3 of the International Code of Botanical Nomenclature. Therefore, I here designate the sheet of *Spruce* 1093 at M the lectotype of *Mascagnia bracteosa* Grisebach, which becomes the correct name for the species I named *Mascagnia heterocarpa* in 1981. That leaves "*Jubelina bracteosa*" without a name, so I am naming it here in honor of A. H. R. Grisebach.

4. *Jubelina rosea* (Miq.) Nied. in Pulle, Enum. Pl. Surinam 472. 1906.

Hiraea rosea Miq., Stirp. Surin. Sel. in Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem ser. 2. 7: 84: 1851.

Jubelina riparia var. *hiraoides* Sagot, Ann. Sci. Nat. Bot. 6° Sér. 12: 187. 1881.—TYPE. FRENCH GUIANA. *Mélinon* [94] in 1862 (lectotype, here designated: P!; isolectotype: P!).

Diplopterys rosea (Miq.) Nied., Arbeiten Bot. Inst. Königl. Lyceums Hosianum Braunsberg 4: 20. 1912.

Stems velutinous to eventually glabrate, the hairs up to 0.6 mm long, mostly erect and \pm Y-shaped. Lamina of larger leaves 10–20 cm long, 5–13 cm wide, obovate or broadly elliptical to almost rotund, cuneate or truncate at base, rounded or abruptly short-acuminate at apex with the acumen up to 5 (–10) mm long, bearing below on each side 0 (–1) gland near base and 2–4 glands in a single row distally, persistently velutinous on both sides, more densely so below, the hairs above Y-shaped or simple due to suppression of 1 branch, Y-shaped below; petiole 7–21 mm long, velutinous. Inflorescence velutinous; bracts and bracteoles pink, 6–9 mm long, 1.4–2.5 (–3) mm wide, oblanceolate, acute, appressed-tomentose; peduncle 1–3 mm long; pedicel 6–12 mm long, tomentose, somewhat thickened in fruit. Sepals pink, 5–8.5 mm long, 1.2–1.7 mm wide, narrowly oblong or obovate,

obtuse or acute at apex, reflexed, distally inflated with aerenchyma, loosely subsericeous on both sides, the anterior eglandular, the lateral 4 all bearing 1 large pink gland 2–2.5 mm long, 1.5–2 mm wide, rounded or emarginate and non-revolute at its apex. Petals pink; anterior-lateral 2 petals with the claw 2–3 mm long, the limb 4–6 mm long, 4.5–6 mm wide, deeply concave, erose and eglandular at the margin, abaxially sericeous; posterior-lateral 2 petals with the claw 2–2.5 mm long, the limb 3.5–5 mm long and wide, moderately concave, short-fimbriate all around margin with the fimbriae mostly glandular to mostly eglandular, abaxially glabrous to sericeous in center; posterior petal glabrous, the claw 3–3.5 mm long, the limb 3–4 mm long, 2.5–4 mm wide, rotund or quadrate, nearly flat, glandular-fimbriate all around margin. Filaments 1.5–2.5 mm long, longer opposite sepals than petals, up to $\frac{1}{2}$ connate; anthers 0.7–1.2 mm long, largest opposite posterior-lateral petals, the connectives moderately glandular-swollen. Ovary hispid; styles glabrous or hispid at base, 1.5–2 mm long, equal or the anterior slightly shorter than posterior 2, the anterior straight, the posterior 2 arcuate at base and then straight, the apex of all 3 truncate dorsally or with an apiculum up to 0.1 mm long. Samara roughly elliptical in outline, 55–80 \times 35–60 mm, sericeous to glabrescent, the longest hairs (on the nut) 2–2.7 mm long, straight, appressed; fertile locule 2.5–4 mm in diameter; ventral areole 5.5–8.5 mm high; central dorsal wing 10–18 mm wide, 20–30 mm high; lateral wings confluent but often deeply emarginate at base, free at apex, each consisting of: 1) an outer membranous semicircular wing 22–36 mm wide, 35–60 mm high, flat or slightly corrugated, entire or repand; 2) an inner corrugated and deeply lobed wing 5–11 mm wide, parallel to the central wing and narrower than it; and 3) a sterile cavity between the outer and inner wings, 2–3 \times 3–5 mm across, chambered, covered externally by 5–8 irregular parallel transverse winglets up to 2–7 mm wide, these confluent with the inner wing.

TYPE. SURINAME. Upper Marowijne River, *Kappler 1807* (holotype: U!; isotypes: LE! P!). Field Museum negative 12717 (MICH!) shows two specimens formerly at B. The one with leaves and flowers was an isotype of *Hiraea rosea*, but the other, comprising only fruits from *Mélinon* in 1864, from French Guiana, was not a type.)

Habitat and Phenology. Primary and secondary forests on *terra firma* (always?) from near sea level to 700 m; collected in flower from August to October and once in March, in fruit from August to November.

Distribution. Suriname and northwestern French Guiana; see Fig. 1.

ADDITIONAL SPECIMENS EXAMINED. SURINAME. Brownsberg Nature Park, 90 km S of Paramaribo, Mazaroni Plateau, *Mori & Bolten 8399* (MICH, NY); Lely Mts, 175 km SSE of Paramaribo, *Mori & Bolten 8551* (MICH, NY); Brownsberg, distr. Brokopondo, *Sang LBB-14814* (U); Tapanahoni River, *Versteeg 720* (U).—FRENCH GUIANA. Itany and Marouini, *BAFOG Service Forestier 7965* (U); St. Laurent toward Paul Isnard, Km 40, *Billiet & Jardin 1704* (MICH); region of Paul Isnard, between Citron and Mont Décou Décou, *Crémers 8211* (MICH); edge of the Mana [River], *Mélinon* [97] in 1854 (P); sine loc., *Mélinon* in 1864 (F, GH, NY, P); sine loc., *Mélinon* in 1865 (P); Maroni, St. Laurent, *Mélinon* [112] in 1876 (P); Sinnamary, road from St. Elie, "parcelle ARBOCEL," *Prévost 720 & 819* (both MICH), *Riera 562* (CAY), *Sastre 6057* (CAY, MICH), *Sastre 6154* (CAY, P); St. Laurent, *Soubirou* in 1896 (P).

5. *Jubelina riparia* Adr. Juss. in Delessert, *Icon. Sel. Pl.* 3: 19, pl. 32. 1837 [1838].

Diplopterys riparia (Adr. Juss.) Nied., *Arbeiten Bot. Inst. Königl. Lyceums Hosianum Braunsberg* 4: 20. 1912.

Stems velutinous to eventually glabrate, the hairs up to 0.8 mm long, mostly erect and \pm Y-shaped. Lamina of larger leaves 11–21 cm long, 8–14 cm wide,

broadly elliptical or obovate to rotund, cuneate, truncate, or rounded at base, rounded or abruptly short-acuminate at apex with the acumen up to 5 (–10) mm long, bearing below on each side (0–) 1–2 (–3) glands near base and (0–) 1–2 (–3) in a single row distally, persistently velutinous on both sides, more densely so below, the hairs Y-shaped; petiole 8–17 mm long, velutinous. Inflorescence velutinous; bracts and bracteoles pink, 6–8.5 mm long, 4–5 mm wide, obovate, rounded at apex, appressed-tomentose; peduncle 2 mm long; pedicel 8–12 mm long, velutinous, thickened in fruit. Sepals pink, 5–7 mm long, 1.5–2 mm wide, narrowly obovate, obtuse at apex, reflexed, distally inflated with aerenchyma, appressed-tomentose on both sides, the anterior eglandular, the lateral 4 all bearing 1 large pink gland 2–2.5 mm long, 2–2.2 mm wide, rounded and non-revolute at its apex. Petals pink; anterior-lateral 2 petals with the claw 3–4 mm long, the limb 6–8 mm long, 5–6 mm wide, deeply concave, erose and eglandular at margin, abaxially densely sericeous; posterior-lateral 2 petals with the claw 2.5–3 mm long, the limb 4.5–5.5 mm long, 4–4.5 mm wide, flat or somewhat concave, glandular-fimbriate all around margin or only on distal ½, abaxially glabrous or sparsely to moderately sericeous in center; posterior petal glabrous, the claw 3–4 mm long, the limb 4.2–5 mm long, 4–4.5 mm wide, ovate or quadrate, flat, glandular-fimbriate all around margin. Filaments 2.5–3.3 mm long, mostly longer opposite sepals than petals, up to ½ connate; anthers 0.8–1.3 mm long, largest opposite posterior-lateral petals, the connectives moderately glandular-swollen. Ovary hispid; styles glabrous or hispid at base, 2–2.5 mm long, straight or the posterior 2 slightly arcuate, subequal with the anterior slightly shorter than the posterior 2, the apex truncate dorsally or with an apiculum less than 0.1 mm long. Samara roughly circular in outline, 21–29 mm in diameter, sericeous to glabrescent, the longest hairs (on the nut) 1.5–2 mm long, straight, appressed; fertile locule 3–5 × 5–8 mm across; ventral areole 8–10 mm high; central dorsal wing 8–10 mm wide, 23–26 mm high; lateral wings confluent at base, free at apex, each consisting of: 1) an outer membranous semicircular wing 5–7 mm wide, 20–25 mm high, flat or corrugated and repand or coarsely dentate at margin; 2) an inner repand or coarsely dentate wing 5–9 mm wide, parallel to the central dorsal wing and narrower than it to just as wide; and 3) a greatly inflated sterile cavity between outer and inner wings, 7–10 mm across, open or chambered, covered externally by many irregular outgrowths up to 6 mm long, these scattered or confluent into lobed, generally transverse winglets.

TYPE. FRENCH GUIANA. Oiapock and Oyes Rivers, *Leprieur* in 1832 (holotype: P-JU!; isotypes: F! G, P!).

Habitat and Phenology. Várzea and riverine forests at low elevations; collected in flower in September, November, February, and March, in fruit in December and March.

Distribution. Amapá, Brazil, and adjacent Pará and French Guiana; see Fig. 1.

ADDITIONAL SPECIMENS EXAMINED. FRENCH GUIANA. Sine loc., *Mélinon* (P).—BRAZIL. Amapá: Rio Amapari, above Serra do Navio, *Cowan 38591* (MICH, NY); Mpio Oiapoque, Rio Caçaporé 134 km SSE of Oiapoque, 2°53'N, 51°27'W, *Mori & Souza 17320* (MICH); Rio Araguari, 1°11'N, 52°8'W, *Pires et al. 51345* (NY); Rio Matapi, between road from Matapi and mouth of river, Macapá, *Rabelo et al. 1834* (NY). Pará: Ananindéua, várzea of the Aurá, *Pires 4744* (US); road between Gurupá and serraria Xingú, *Silva & Rosário 5019* (NY); Belém, EMBRAPA reserve, Aurá, *Vilhena 117* (MICH).

As noted above in the discussion of generic characters and trends, the fruit of *Jubelina riparia* seems to represent the culmination of an evolutionary shift from wind dispersal to water dispersal. Its membranous wings are much reduced, the

sterile cavities are enlarged, and there are many irregular outgrowths on the samara. The samara seems most unlikely to fly far, but it should float quite well, buoyed by the large air-filled cavities, and the extra outgrowths of the lateral wings should retard wetting. The embryo is significantly larger in this species than in *J. rosea*; note that the fertile locule is $3-5 \times 5-8$ mm across here, 2.5–4 mm across there. Christiane Anderson (pers. comm.) has found that the embryo is always much larger in species of *Stigmaphyllon* that have shifted from wind to water dispersal, and I have seen the same tendency in other groups of Malpighiaceae. I interpret this to be an evolutionary response to release from the constraint on the weight of the embryo imposed by wind dispersal. Natural selection could be expected to favor a larger, heavier embryo with more stored reserves if that change did not decrease the efficacy of dispersal.

6. *Jubelina magnifica* W. R. Anderson, Mem. New York Bot. Gard. 32: 228. 1981. Fig. 4.

Stems velutinous to eventually glabrate, the hairs up to 1 mm long, erect, fusiform, distally bifurcate with the short branches \pm erect and often unequal. Lamina of larger leaves 18–28 cm long, 10–18 cm wide, broadly ovate or elliptical, rounded at base, abruptly acuminate at apex with the acumen often up to 20 (–25) mm long, bearing (4–) 5–15 scattered glands below on each side, persistently velutinous on both sides, more densely so below, the hairs Y-shaped; petiole 9–20 (–25) mm long, velutinous. Inflorescence velutinous; bracts and bracteoles pink, 6–8 mm long, 3–4 mm wide, obovate or elliptical, broadly obtuse or rounded at apex, appressed-tomentose or subsericeous; peduncle 0–2.5 mm long; pedicel 8–15 mm long, velutinous or tomentose, much thickened in fruit. Sepals pink, 6.5–7 mm long, 1.8–2.5 mm wide, narrowly obovate or oblong, rounded at apex, reflexed, distally much inflated with aerenchyma, tomentose on both sides, the anterior eglandular, the lateral 4 all bearing 1 large white gland 2–3.5 mm long, 1.5–3 mm wide, rounded and non-revolute at its apex. Lateral 4 petals pink, abaxially sericeous, the anterior-lateral 2 with the claw 2.5–3.5 mm long, the limb 6–7 mm long, 7–9 mm wide, deeply concave, erose at margin and eglandular or bearing a few glands at base; posterior-lateral 2 petals with the claw 1.7–3 mm long, the limb 6–7 mm long, 5–6.5 mm wide, flat or somewhat concave, fimbriate or glandular-fimbriate all around margin; posterior petal white with pink tints, glabrous, the claw 2.5–3.5 mm long, the limb 5–7.5 mm long, 3–4.5 mm wide, ovate, elliptical, or obovate, flat, glandular-fimbriate all around margin. Filaments 1.8–3 mm long, longer opposite sepals than petals, up to $\frac{1}{2}$ connate; anthers 0.9–1.8 mm long, longest opposite posterior-lateral petals, the connectives moderately glandular-swollen, especially opposite sepals. Ovary hispid; styles glabrous, 2–3 mm long, straight or the posterior 2 arcuate, subequal, the apex truncate dorsally or with a hook up to 0.1 (–0.3) mm long. Samara subcircular, 40–50 (–75) mm in diameter, sericeous to glabrescent, the longest hairs (on the nut) 1–2 mm long, straight, appressed; fertile locule 7–8 mm in diameter; ventral areole 11–17 mm high; central dorsal wing 5–10 (–15) mm wide, 25–30 (–35) mm high; lateral wings free at base or confluent but deeply emarginate, free at apex, each consisting of: 1) an outer membranous semicircular wing 10–15 (–30) mm wide, 40–45 (–60) mm high, corrugated and repand at margin; 2) an inner, strongly plicate or corrugated, coarsely dentate wing ca 8–12 (–17) mm wide, parallel to and hiding the central dorsal wing; and 3) an inflated sterile cavity between outer and inner wings, 4–11

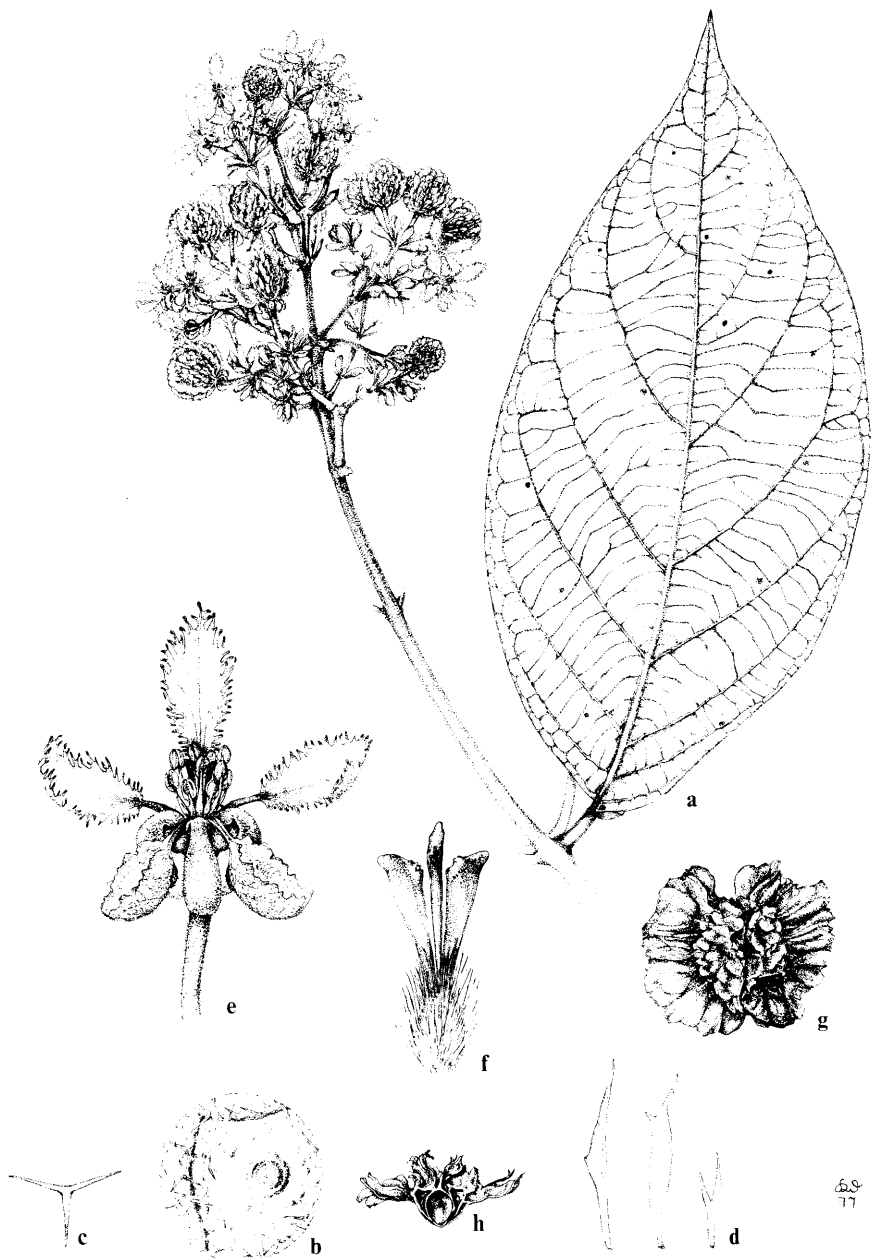


FIG. 4. *Jubelina magnifica*: a, flowering branch, $\times 0.5$; b, detail, abaxial surface of leaf, $\times 10$; c, hair from abaxial surface of leaf, $\times 25$; d, stem hairs, $\times 25$; e, flower, $\times 2.5$; f, gynoeceum, $\times 10$; g, samara, abaxial view, $\times 0.5$; h, samara, cross section, $\times 0.5$. Drawn by Karin Douthit, a–f from Maguire *et al.* 36748, g and h from Wurdack & Adderley 43579.

mm across, chambered, covered externally by 7–10 irregular, often lobed, generally transverse winglets 3–7 (–11) mm wide. Chromosome number: $n = 10$ (counted in *Anderson 13361*).

TYPE. VENEZUELA. Terr. Fed. Amazonas: Río Yaciba, Ríos Pacimoni-Yatua, Casiquiare, *Maguire et al. 36748* (holotype: NY!; isotypes: MICH! NY! US! VEN!).

Habitat and Phenology. Climbing in trees on *terra firma* but near lowland rivers, at elevations of 100–150 m; collected in flower and fruit from November to June.

Distribution. Known only from Amazonas, Venezuela; see Fig. 1.

ADDITIONAL SPECIMENS EXAMINED. VENEZUELA. Terr. Fed. Amazonas: Depto. Río Negro, Río Mawarinuma, Neblina Base Camp. 0°49'50"N, 66°9'40"W, *Anderson 13361* (MICH, VEN), *Liesner 15809* (MICH), 17459 (MO); between Río Mawarinuma and headwaters of Río Baria, 0°52'N, 66°15'W, *Gentry & Stein 47223* (MICH); 8 km NE of San Carlos de Río Negro, *Liesner 8842* (MICH, MO); from Los Tambores of Comisión de Límite to Caño Erubichi on Río Baria, 1°02'N, 66°20'W, *Liesner 17117* (MICH); type locality, *Maguire et al. 36694* (MICH, NY, US, VEN), 36694-A (NY), 36743 (MICH, NY, US, VEN); uppermost Río Yatua, *Maguire et al. 42601* (NY); Río Siapa between Raudal Gallineta and Salto Gallineta, *Wurdack & Adderley 43579* (MICH, NY, US, VEN).

The sole collection from near San Carlos de Río Negro, *Liesner 8842*, differs qualitatively and quantitatively from all other known collections of this species. The generally velutinous vesture of its stems has an understory of appressed hairs. The leaves bear rather few glands below, perhaps only three on each side. The posterior styles are arcuate, and all three styles bear well-developed dorsal hooks at the apex. The samara is larger in almost all dimensions than is typical, these extremes being given above in parentheses. *Liesner 8842* does not seem to be sufficiently distinct to merit taxonomic recognition, but it does suggest that the description given above may have to be expanded significantly as this species becomes better known. Another possibility is that *Liesner 8842* resulted from hybridization between *Jubelina magnifica* and *J. grisebachiana*, which grows near where 8842 was found. Genetic influence from *J. grisebachiana* could account for all the unusual features noted above, except perhaps the size of the apical-dorsal hooks on the styles. Further fieldwork in the vicinity of San Carlos de Río Negro may clarify the status of this anomalous plant.

Jubelina magnifica seems to have begun the evolutionary shift toward dispersal by water, but not to have gone nearly as far in reduction of the samara wings as has *J. riparia*. Like the latter species, this one also has an enlarged embryo. See the discussion under *J. riparia*.

EXCLUDED SPECIES

Jubelina nicaraguensis Grisebach, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1853: 48–49. 1854.—The correct name for this plant is *Callaeum nicaraguense* (Grisebach) Small, N. Amer. Flora 25: 128. 1910. See Johnson's recent revision of *Callaeum* (1986).

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