

THE MASCAGNIA CORDIFOLIA GROUP (MALPIGHIACEAE)

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ABSTRACT. A revision is provided for the *Mascagnia cordifolia* group, five South American species with basally biglandular petioles. The group comprises *M. aptera* W. R. Anderson, *M. cordifolia* (Adr. Juss. in A. St.-Hil.) Griseb. in Mart., and three new species: *M. aequatorialis* W. R. Anderson & C. Cav. Davis, *M. affinis* W. R. Anderson & C. Cav. Davis, and *M. glabrata* W. R. Anderson & C. Cav. Davis. The treatment includes a key, descriptions, specimens studied, notes, a distribution map, and illustrations of *M. aequatorialis*, *M. aptera*, and *M. cordifolia*.

Mascagnia (Bertero ex DC.) Colla, as treated by Niedenzu (1928) and other authors, is a diverse assemblage of about 100 species of wing-fruited Malpighiaceae. Anderson (e.g., 1990, p. 51) has suggested repeatedly that the genus in the broad traditional sense is possibly or probably polyphyletic, and recent molecular phylogenies (Cameron et al. 2001; Davis et al. 2001, 2002) have supported his opinion—they show that *Mascagnia* sens. lat. comprises at least six distinct clades. In a separate paper, now in preparation, W. R. Anderson will divide *Mascagnia* sens. lat. into several putatively monophyletic genera.

Mascagnia sens. str. is by far the largest clade within *Mascagnia* sens. lat. Most species of *Mascagnia* sens. str. can be recognized by the following combination of character-states (W. R. Anderson, unpublished data): vines with interpetiolar stipules, glands impressed in the abaxial surface of the lamina, glabrous petals exposed in the enlarging bud, orbicular membranous samaras with arching and anastomosing veins in the lateral wing, and a smooth three-lobed disciform structure subtending the fruit. The genus is easily subdivided: about 20 of the approximately 50 species have yellow petals, and the others have petals that are pink, lilac, or white. Among the latter, one group of five species is delineated by an easily observed character—a pair of large glands at the base of the petiole. Those species, which we are calling the *Mascagnia cordifolia* group, are the subject of this paper. Morphologically, the species of the *M. cordifolia* group are typical of *Mascagnia* sens. str., and plastid DNA sequences from *M. cordifolia* (C. C. Davis, unpublished data) nest it among other species of the genus. The group comprises *Mascagnia cordifolia* (Adr. Juss. in A. St.-Hil.) Griseb. in Mart., three species that are essentially sympatric with and morphologically very similar to *M. cordifolia* (*M. affinis* W. R. Anderson & C. Cav. Davis, *M. aptera* W. R. Anderson, and *M. glabrata* W. R. Anderson & C. Cav. Davis), and one species (*M. aequatorialis* W. R. Anderson & C. Cav. Davis) that is morphologically distinct and geographically isolated (Fig. 1). Basally biglandular petioles are otherwise unknown in *Mascagnia*, and are putatively synapomorphic for the *M. cordifolia* group. The five species treated here also have pink petals that are abaxially carinate or alulate and straight styles that are dorsally rounded or truncate at the apex. On the basis of overall morphological similarity it seems very likely that *M. cordifolia*, *M. aptera*, *M. affinis*, and *M. glabrata* are monophyletic. It will be interesting to test whether the monophyly of the whole group will be supported when we get better morphological

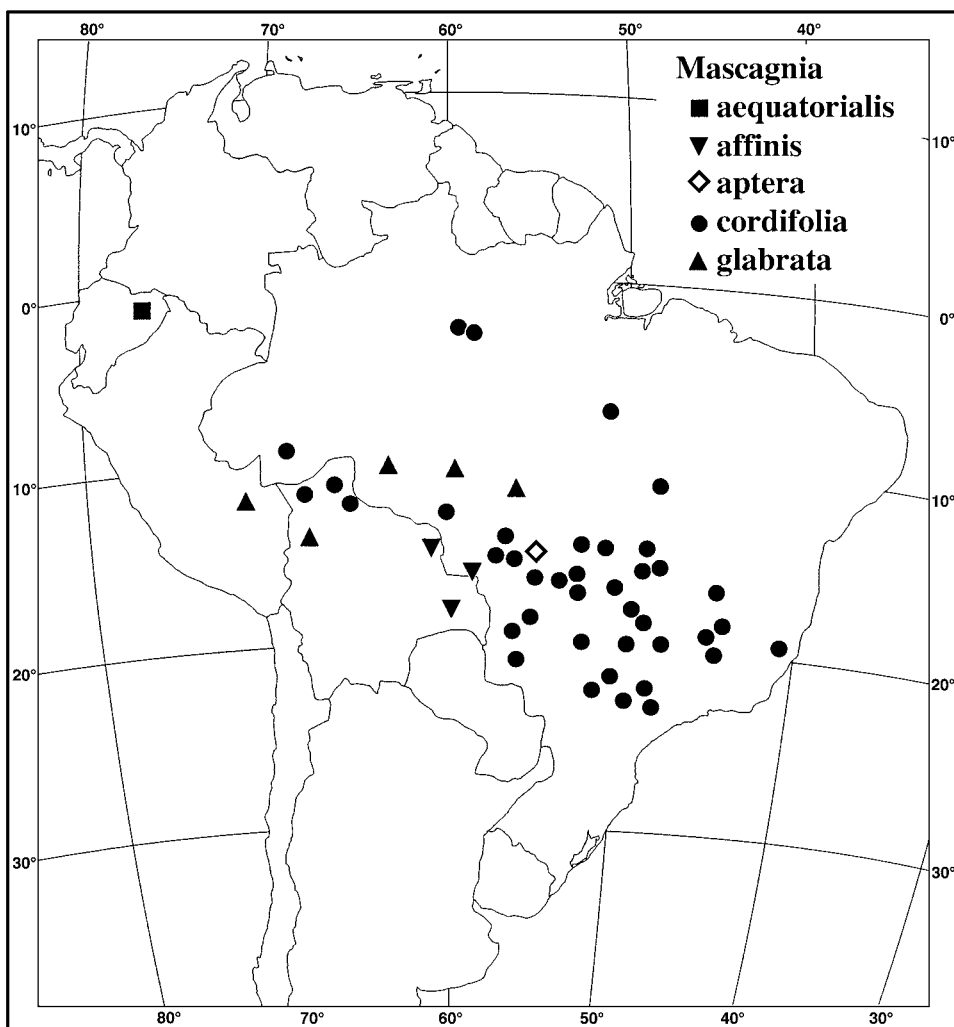


FIG. 1. Distribution of species in the *Mascagnia cordifolia* group.

information about *M. aequatorialis* and representative sequence data for members of the group and for other pink-flowered species of *Mascagnia* sens. str. See under *M. cordifolia* a discussion of *M. strigulosa* (Rusby) Nied. in Engl., a species that resembles *M. cordifolia* in some characters but lacks the petiole glands that we have used to circumscribe the group.

KEY TO THE SPECIES OF THE MASCAGNIA CORDIFOLIA GROUP

1. Lamina densely and persistently silver-metallic-sericeous below; Amazonian Ecuador.

M. aequatorialis

1. Lamina hairy to glabrate below, velutinous, tomentose, or loosely sericeous if hairy, never metallic-sericeous; Amazonian and southern Brazil and adjacent Peru and Bolivia.

2. Scandent subshrub; samara reduced to a nut with dorsal crest, the lateral wing completely absent.

M. aptera

2. Vigorously twining vine, often forming thickets or climbing high in trees; samara with a large membranous lateral wing (as in most species of the genus).
3. Lamina densely and persistently velutinous below, the hairs V-shaped. *M. cordifolia*
3. Lamina tomentose or loosely sericeous to glabrate below, the hairs (if present) straight to sinuous or twisted.
4. Lamina densely and persistently subsericeous to tomentose below, the hairs dense enough to touch each other over the whole surface. *M. affinis*
4. Lamina thinly sericeous to glabrate below, the hairs dense enough to touch each other only on midrib and lateral veins. *M. glabrata*

Mascagnia aequatorialis W. R. Anderson & C. Cav. Davis, sp. nov.—TYPE: ECUADOR. Napo: Estación Biológica Jatun Sacha, Río Napo, 8 km E of Misahuallí, 01°04'S, 77°36'W, 450 m, disturbed wet tropical forest, 22 Oct 1988 imm fl, Cerón M. & Iguago 5475 (holotype: MICH!; isotype: MO!). Fig. 2.

Liana; lamina foliorum majorum 11–16.5 cm longa, 7.5–14 cm lata, late ovata, abaxialiter dense et pertinaciter argenteosericea; petiolus 15–25 (–30) mm longus, basi biglandulosus; flores in pseudoracemis 25–70-floris portati, pedunculis 10–15 mm longis, pedicellis immaturis 3–5 mm longis; 1 bracteola cujusque paris eglandulosa, altera 1 glandula magna instructa; petala rosea, abaxialiter carinata; styli recti erectique, apice dorsaliter rotundati.

Liana, the stems brown-sericeous with the hairs persistent during first year of growth, the leafy flowering branches borne on old woody stems. Lamina of larger leaves 11–16.5 cm long, 7.5–14 cm wide, broadly ovate, broadly cuneate, rounded, or broadly cordate at base, abruptly short-acuminate at apex, persistently subsericeous above with the hairs sessile and nearly straight but the branches somewhat raised, densely and persistently silver-metallic-sericeous below with sessile, straight, $\pm$ appressed hairs, bearing an abaxial row of 4–5 impressed glands on each side between midrib and margin with the most proximal glands remote from base, the principal lateral veins 6–8 on each side; petiole 15–25 (–30) mm long, persistently sericeous, biglandular at base with the glands 1–2 mm in diameter; stipules 1–1.8 mm long, narrowly triangular, sericeous, borne on stem between petioles. Inflorescences axillary, 6–11 cm long, unbranched or branched near middle and then a panicle of 3 (–5) pseudoracemes, each pseudoraceme containing 25–70 or more crowded ascending flowers, the axes (including peduncles and pedicels) brown- or white-sericeous; bracts 1–2 mm long, triangular, abaxially white-sericeous, eglandular or the lowest pair biglandular; peduncle 10–15 mm long; bracteoles 0.8–1.1 mm long, borne 0.5–2 mm below apex of peduncle, abaxially white-sericeous, usually 1 of each pair eglandular and the other bearing 1 prominent discoid eccentric abaxial gland 0.6–1 mm in diameter, but sometimes 1 bracteole bearing 2 glands and rarely both bracteoles bearing glands; pedicel (in bud) 3–5 mm long, much shorter than peduncle. Flowers known only in bud. Sepals 0.5–1 mm long beyond glands, abaxially white-sericeous, all 5 apparently biglandular but glands on the anterior sepal smaller or connate with adjacent glands. Petals pink, glabrous, abaxially carinate with the keel 0.2–0.3 mm wide on lateral petals, narrower on posterior petal. Stamens glabrous; filaments longer opposite sepals than opposite petals; anthers alike, 1.3–1.5 mm long. Ovary densely sericeous; styles alike, straight and erect, dorsally rounded at apex. Fruit unknown.

The epithet of *Mascagnia aequatorialis* refers to the source of its type and only known collection, which came from just south of the equator in the country named for the equator (Fig. 1). In spite of the immaturity of the type and the lack of samaras, we have no doubt that it belongs in *Mascagnia* sens. str., because no other

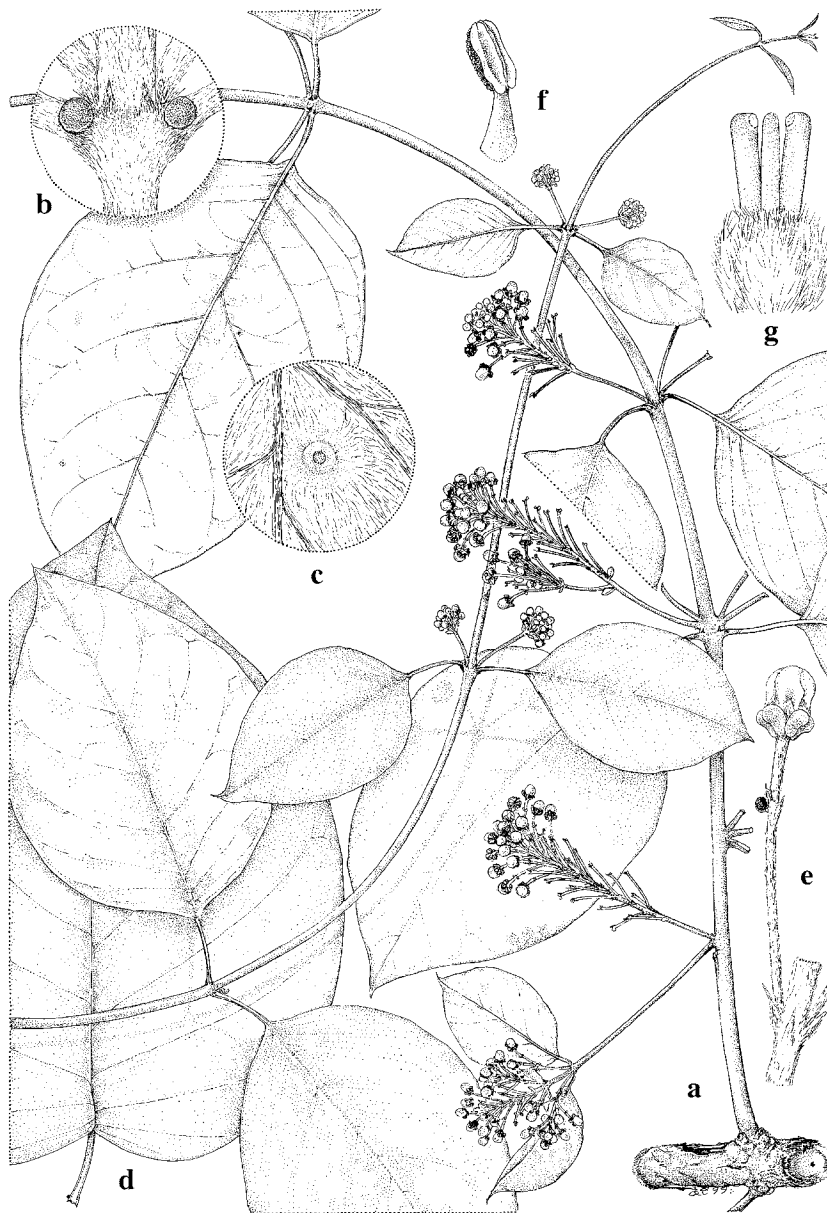


FIG. 2. *Mascagnia aequatorialis*. a. Flowering branch from old stem, crossed by younger stem, $\times 0.5$. b. Node showing stipules and petiolar glands, $\times 4$. c. Enlargement of abaxial surface of lamina showing gland and appressed vestiture, $\times 5$. d. Detached large leaf, $\times 0.5$. e. Flower bud and portion of inflorescence axis, $\times 2.5$. f. Stamen from bud, $\times 7.5$. g. Gynoecium from bud, $\times 7.5$. (Based on Cerón M. & Iguago 5475, MICH.)

genus shows this combination of interpetiolar stipules, basally biglandular petioles, impressed leaf glands, elongated many-flowered pseudoracemes, bracteoles with one of each pair bearing a large eccentric abaxial gland, and pink carinate petals. Within the *M. cordifolia* group, *M. aequatorialis* is immediately distinguished by its metallic-sericeous leaves, and its wet-forest habitat also sets it apart; it is far-disjunct from the other members of the group. The thick stems to which the leafy branches of the type are attached suggest that this plant is a large, woody liana.

Mascagnia affinis W. R. Anderson & C. Cav. Davis, sp. nov.—TYPE: BRAZIL. Mato Grosso: Rod. MT-265, Km 60–70 do trevo com a Rod. BR-174 (Mun. Porto Espiridião), cerrado, 27 Oct 1995 fl/imm fr, *Hatschbach 63949* (holotype: MBM!; isotype: MICH!).

Mascagniae cordifoliae affinis, sed laminis supra subsericeis et subtus dense et pertinaciter subsericeis vel tomentosus.

Woody vine, the stems persistently brown-velutinous or subsericeous. Lamina of larger leaves 5–17 cm long, 3.5–11 cm wide, elliptical or (mostly) ovate to rotund, sometimes wider than long, truncate, rounded, or cordate at base, acute or abruptly short-acuminate or apiculate to rounded at apex, subsericeous above with the very short hairs appressed to somewhat raised and often abraded in age, densely and persistently subsericeous to tomentose below with the hairs dense enough to touch over the whole surface, varying from nearly straight and appressed to raised and many hairs sinuous to twisted, bearing an abaxial row of 2–4 impressed glands on each side between midrib and margin with the most proximal glands remote from base, the principal lateral veins 4–7 on each side; petiole 7–35 mm long, persistently brown-velutinous or tomentose, biglandular at base with the glands 0.5–1.2 mm in diameter; stipules 1–1.5 mm long, narrowly triangular, loosely sericeous, borne on stem between petioles. Inflorescences axillary or terminal, 2–9 cm long, unbranched pseudoracemes containing 10–40 or more crowded to somewhat distant flowers, the axes (including peduncles) brown- or stramineous-velutinous or tomentose or subsericeous; bracts 1–2 mm long, narrowly triangular, eglandular or the lowest pair biglandular; peduncle 5–12 mm long; bracteoles 0.8–1.5 mm long, 1 or both borne up to 3 mm below apex of peduncle, 1 of each pair usually eglandular and symmetrically triangular, the other bearing 1 prominent eccentric discoid gland 0.5–1.1 mm in diameter and asymmetrically lanceolate or falcate, sometimes 1 bracteole bearing 2 glands or both bracteoles bearing 1 gland; bracts and bracteoles loosely sericeous; pedicel 4–8 mm long, loosely sericeous, the hairs white. Sepals 1 mm long beyond glands, triangular or ovate, rounded at apex, abaxially densely sericeous, adaxially glabrous, appressed in anthesis; glands 2–2.5 mm long, 8 on 4 lateral sepals, the anterior sepal eglandular. Petals pink, glabrous, abaxially carinate or alulate with the keel or winglet 0.2–0.5 mm wide; lateral petals spreading or reflexed, the limb 4.5–5.5 mm long, 3.5–4.5 mm wide, denticulate or erose at margin, the claw 1–1.5 mm long; posterior petal with claw erect and limb reflexed, the limb 4.5–5 mm long, 3 mm wide, corrugated, dentate or lacerate at margin, the claw 1.5 mm long. Stamens glabrous; filaments distinct, 1.5–2.5 mm long, longer opposite sepals than opposite petals; anthers 1.2–1.5 mm long, $\pm$ alike. Ovary 1.2 mm high, densely sericeous; styles glabrous, 2–2.5 mm long, alike, erect from base, straight or distally recurved, dorsally rounded or truncate at apex. Samara thinly sericeous on wing, tomentose on nut, orbicular or broadly ovate, the lateral wing membranous, 20–30 mm high and wide, continuous at base and apex, entire or shallowly emarginate at base, notched up to halfway to nut at apex; dorsal wing 9–12 mm high, 3–4 mm wide, triangular or rounded; ventral areole ca 4 mm high, 2–3 mm wide, ovate.

Phenology. Collected with flowers and fruits in October and November.

Distribution (Fig. 1). Southwestern Mato Grosso, Brazil, and adjacent Bolivia; cerrado and forest; 155–416 m.

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** SANTA CRUZ: Roboré, *Cárdenas 2974* (F); Prov. Velasco: Serrania de Huanchaca, P. N. Noel Kempff, 14°37'S, 60°42'W, *Foster 13721* (F); P. N. Noel Kempff, 14°33'19"S, 60°55'55"W, *Gerlach et al. 17/01 & 19/01* (MICH); Campamento El Refugio, 14°33'30"S, 60°45'41"W, *Guillén & Salvatierra 2307* (MICH); P. N. Noel Kempff, 25 km de Los Fierros, 14°33'30"S,

60°49'12"W, Killeen *et al.* 5841 (MICH). **Brazil.** MATO GROSSO: Mun. Cáceres a 45 km S da cidade de Pontes e Lacerda, 15–16°S, 59–60°W, *Cid Ferreira* 6573 (MICH, NY).

This species is similar in most characters to *Mascagnia cordifolia*, which is why we chose an epithet meaning “near.” However, while the many collections of *M. cordifolia* studied consistently have the lamina velutinous on both sides with V-shaped hairs, the plants treated here as *M. affinis* have the lamina subsericeous above and subsericeous to tomentose below. One collection not cited above merits comment. *Guillén & Roca* 2495 (MICH), from Velasco, Santa Cruz, Bolivia, at 14°22'S, 61°09'W, is intermediate in its leaf vesture between *M. affinis*, which is known from the same general area, and *M. cordifolia*, which has not been collected in Santa Cruz. It may be that the two closely related species both occur in Velasco and hybridize there.

Mascagnia aptera W. R. Anderson, Contr. Univ. Michigan Herb. 14: 17. 1980.—TYPE: BRAZIL. Mato Grosso: Chapada dos Guimarães, 22 Oct 1973 fl/fr, *Prance et al.* 19274 (holotype: INPA!; isotypes: MICH! NY! US!). Fig. 3.

Scandent subshrub, the stems velutinous to glabrate. Lamina of leaves 2.5–5.8 cm long, 1.8–5 cm wide, broadly elliptical or suborbicular, cordate at base, rounded and apiculate at apex, rugose above and persistently velutinous with the hairs sessile and V-shaped or short-stalked and Y-shaped, densely and persistently white-lanate below with the hairs sessile, long and soft, substraight or twisted, appressed or somewhat spreading, with 3–4 impressed glands on each side of abaxial surface in a row between margin and midrib, the most proximal glands remote from base; petiole 2–5 mm long, velutinous, bearing 2 large glands at or just above base; stipules 0.4 mm long, triangular, borne on stem between petioles. Inflorescences axillary and terminal, unbranched pseudoracemes 2–3.5 cm long, containing 6–14 flowers crowded in distal half, the axis velutinous or loosely sericeous; bracts 1–2 (–3) mm long, narrowly triangular or subulate, eglandular or the lowest pair biglandular; peduncle 4–5.5 mm long, velutinous; bracteoles borne slightly below apex of peduncle, 1 of each pair 1–1.5 mm long, eglandular, narrowly linear or subulate, the other 1.5–2 mm long, bearing 1 large eccentric abaxial gland, falcate; bracts and bracteoles velutinous; pedicel 2.5–5.5 mm long, pilose-sericeous. Sepals 0.5–1 mm long beyond glands, ovate or triangular, obtuse or rounded at apex, abaxially densely pilose-sericeous, adaxially glabrous, appressed in anthesis; glands ca 2 mm long, 8 on 4 lateral sepals, the anterior sepal eglandular. Petals reddish pink, glabrous; lateral petals spreading or reflexed, the limb 4.8–5 mm long, 3–3.5 mm wide, erose or denticulate at margin, abaxially alulate with the winglet 0.4 mm wide, the claw 1–1.2 mm long; posterior petal erect, the limb 5.5 mm long, 3 mm wide, flat or corrugated, proximally denticulate and distally fimbriate at margin, abaxially carinate, the claw 1–1.2 mm long. Stamens glabrous; filaments connate at base, 2.1–2.5 mm long, longer opposite sepals than opposite petals; anthers 1.3–1.5 mm long, ± alike. Ovary 1.2 mm high, loosely pilose-sericeous; styles glabrous, 2.5 mm long, ± alike, straight and erect or diverging distally, dorsally rounded at apex. Samara pilose, reduced to a nut 3.5–4 mm long bearing a dorsal crest 0.5–1.5 mm wide, the lateral wing completely absent; ventral areole 3.5 mm high, ovate.

This peculiar species is still known only from the type, which was collected among sandstone rocks at 720 m in October. Its samara has lost the large membranous lateral wing found in almost all other species of *Mascagnia* sens. str. In that loss *M. aptera* is unique; unlike most of the larger samara-bearing genera, *Mascagnia* sens. str. has not experienced the repeated loss of wings discussed by Anderson (2001, pp. 84–85). Indeed, the samaras of *Mascagnia* are so conserved as to make them of

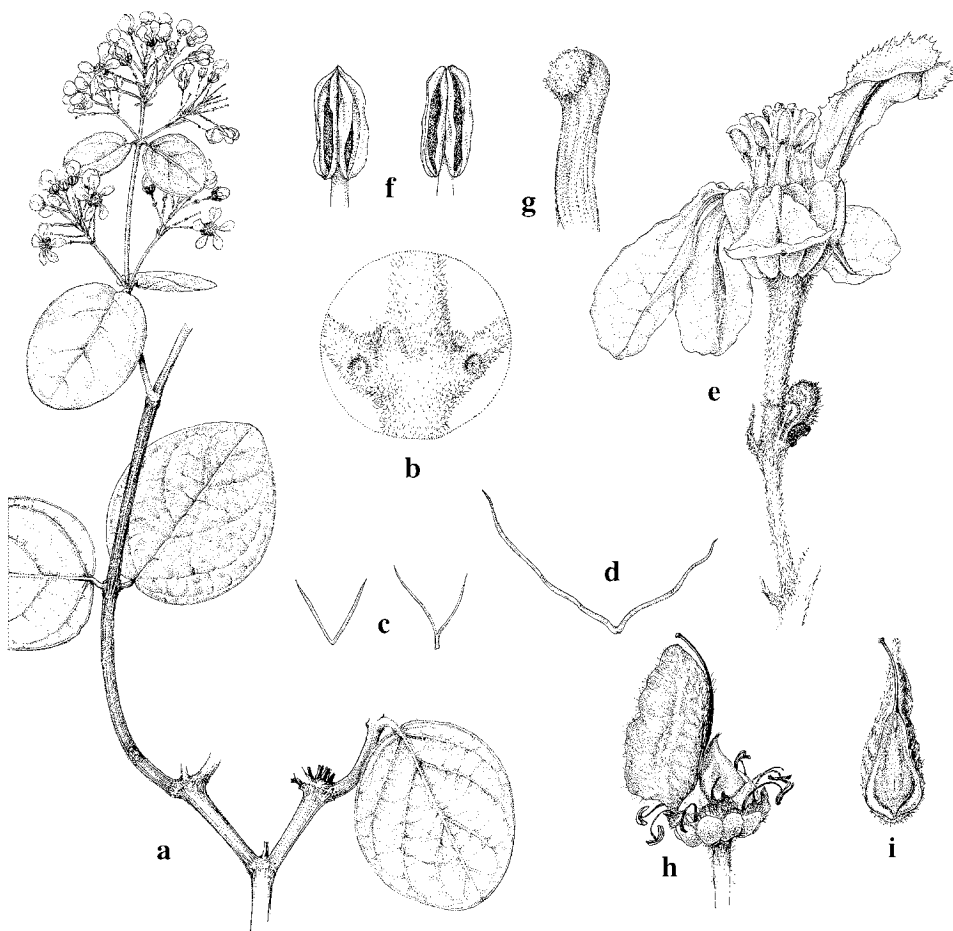


FIG. 3. *Mascagnia aptera*. a. Flowering branch, $\times 0.5$. b. Node showing stipules and petiolar glands, $\times 5$. c. Hairs from adaxial surface of lamina, $\times 35$. d. Hair from abaxial surface of lamina, $\times 35$. e. Flower, $\times 5$. f. Anthers, left opposite petal, right opposite sepal, $\times 12.5$. g. Distal portion of style, $\times 30$. h. Fruit with 2 samaras removed, $\times 4$. i. Samara, adaxial view, $\times 4$. (Based on *Prance et al.* 19274, MICH.)

limited taxonomic value in most cases. Aside from that difference, *M. aptera* strongly resembles *M. cordifolia*, which is a vigorously twining woody vine with larger leaves that are densely velutinous on both surfaces; its stipules are also longer.

Mascagnia cordifolia (Adr. Juss. in A. St.-Hil.) Griseb. in Mart., Fl. Bras. 12(1): 95. 1858. *Hiraea cordifolia* Adr. Juss. in A. St.-Hil., Fl. Bras. Merid. 3: 19, pl. 164. 1833 ["1832"].—TYPE: BRAZIL. Near Curumatahy [=Curimataí, Minas Gerais?], A. St.-Hilaire (lectotype, designated by W. R. Anderson, 1993: P!; isoelectotypes: P!).

Fig. 4.

Hiraea cordifolia var. *mollifolia* Adr. Juss. in A. St.-Hil., Fl. Bras. Merid. 3: 19. 1833 ["1832"].—TYPE: BRAZIL. Goiás: "Mato Grosso," A. St.-Hilaire Cat. *CI* no. 840 (lectotype, here designated: P!, the sheet shown in WRA negative 81-21-16 [MICH]; isoelectotypes: P!).

Mascagnia rubra Griseb. in Mart., Fl. Bras. 12(1): 90. 1858.—TYPE: BRAZIL. Tocantins ["Goiás"]: Natividade, *Gardner 3067* (isotype: K!).

- Mascagnia cordifolia* var. *cornifolia* Griseb., Vidensk. Meddel. Dansk. Naturhist. Foren. Kjøbenhavn 1875: 147. 1875.—TYPE: BRAZIL. Minas Gerais: Lagoa Santa [fide Grisebach] (holotype: B-W 8862, microfiche!).
- Hiraea volubilis* S. Moore, Trans. Linn. Soc. London, Ser. 2, Bot., 4: 328. 1895.—TYPE: BRAZIL. Mato Grosso: “Santa Cruz,” Oct–Nov 1891 fl, *Moore 647* (lectotype, here designated: BM!; isolectotypes: K! NY! P!).
- Mascagnia cordifolia* var. *cinerascens* Skottsbl., Kongl. Svenska Vetenskapsakad. Handl. 35(6): 4. 1901.—TYPE: BRAZIL. Mato Grosso: Cuiabá, *Malme 1364* p.p. (7/2/1894 fl/fr) (holotype: S!; isotypes: S!).
- Mascagnia cordifolia* var. *fusca* Suess., Repert. Spec. Nov. Regni Veg. 42: 46. 1937.—TYPE: BRAZIL. Acre: Rio Macauhan, 4 Sep 1933 fl, *Krukoff 5781* (holotype: M; isotypes: F! G! K! MICH! MO! NY! U!).

Woody vine, often forming thickets, the stems persistently brown-velutinous. Lamina of larger leaves 6–15 (–20) cm long, 5–10 (–12) cm wide, broadly elliptical or (mostly) ovate to rotund, broadly cuneate, rounded, or cordate at base, abruptly short-acuminate or apiculate to rounded at apex, persistently velutinous above (or the hairs abraded in age) with the hairs V-shaped from a swollen base, densely and persistently velutinous below with the hairs V-shaped, bearing an abaxial row of 2–7 impressed glands on each side between midrib and margin with the most proximal glands remote from base, the principal lateral veins 5–6 on each side and connected by scalariform cross-veins; petiole 7–25 (–30) mm long, persistently brown-velutinous, biglandular at base with the glands 1–2 mm in diameter; stipules 1–3 mm long, narrowly triangular, loosely sericeous, borne on stem between petioles. Inflorescences axillary, 2–22 cm long, unbranched or sometimes branched near middle and then a panicle of 3 (–5) pseudoracemes, each pseudoraceme containing 10–50 crowded to distant flowers, the axis (including peduncles) brown- (rarely white- or stramineous-) velutinous; bracts 1–3.5 mm long, narrowly triangular or subulate, eglandular (very rarely bearing 2 tiny marginal glands at base); peduncle 4–10 mm long; bracteoles 1–2 mm long, borne at apex of peduncle or up to 2 mm below, usually 1 of each pair eglandular and symmetrically triangular, the other bearing 1 prominent eccentric discoid gland 0.7–1.5 mm in diameter and asymmetrically lanceolate or falcate, sometimes 1 bracteole bearing 2 glands or both bracteoles bearing 1 gland; bracts and bracteoles abaxially velutinous or subsericeous; pedicel 4–9 mm long, velutinous to loosely sericeous, the hairs white. Sepals 1–1.5 mm long beyond glands, ovate or triangular, obtuse or rounded at apex, abaxially densely sericeous, ciliate on margin, adaxially glabrous, appressed in anthesis; glands 1.5–3 mm long, 8 on 4 lateral sepals, the anterior sepal eglandular (?) or its glands connate with adjacent glands. Petals pink or pink and white, glabrous; lateral petals spreading or reflexed, the limb 4–6 mm long, 3–5 mm wide, entire or denticulate at margin, abaxially ± prominently alulate with the winglet 0.3–0.6 mm wide, the claw 1–1.6 mm long; posterior petal erect, the limb 5–6 mm long, 3.5–4 mm wide, corrugated, dentate or short-fimbriate at margin, abaxially proximally carinate or alulate with the keel 0.2–0.3 mm wide, the claw 1.5 mm long. Stamens glabrous; filaments connate at very base, 1.5–2 mm long, longer opposite sepals than opposite petals; anthers 1.3–1.8 mm long, ± alike. Ovary 1.5 mm high, densely pilose; styles glabrous, 1.5–2.5 mm long, alike or the anterior slightly shorter and slenderer than the posterior 2, erect from base, straight or distally recurved, dorsally rounded or truncate (to rarely apiculate) at apex. Samara thinly sericeous on wing, tomentose on nut, orbicular or wider than high, the lateral wing membranous, (16–) 20–35 mm high, (20–) 25–40 mm wide, continuous at base and

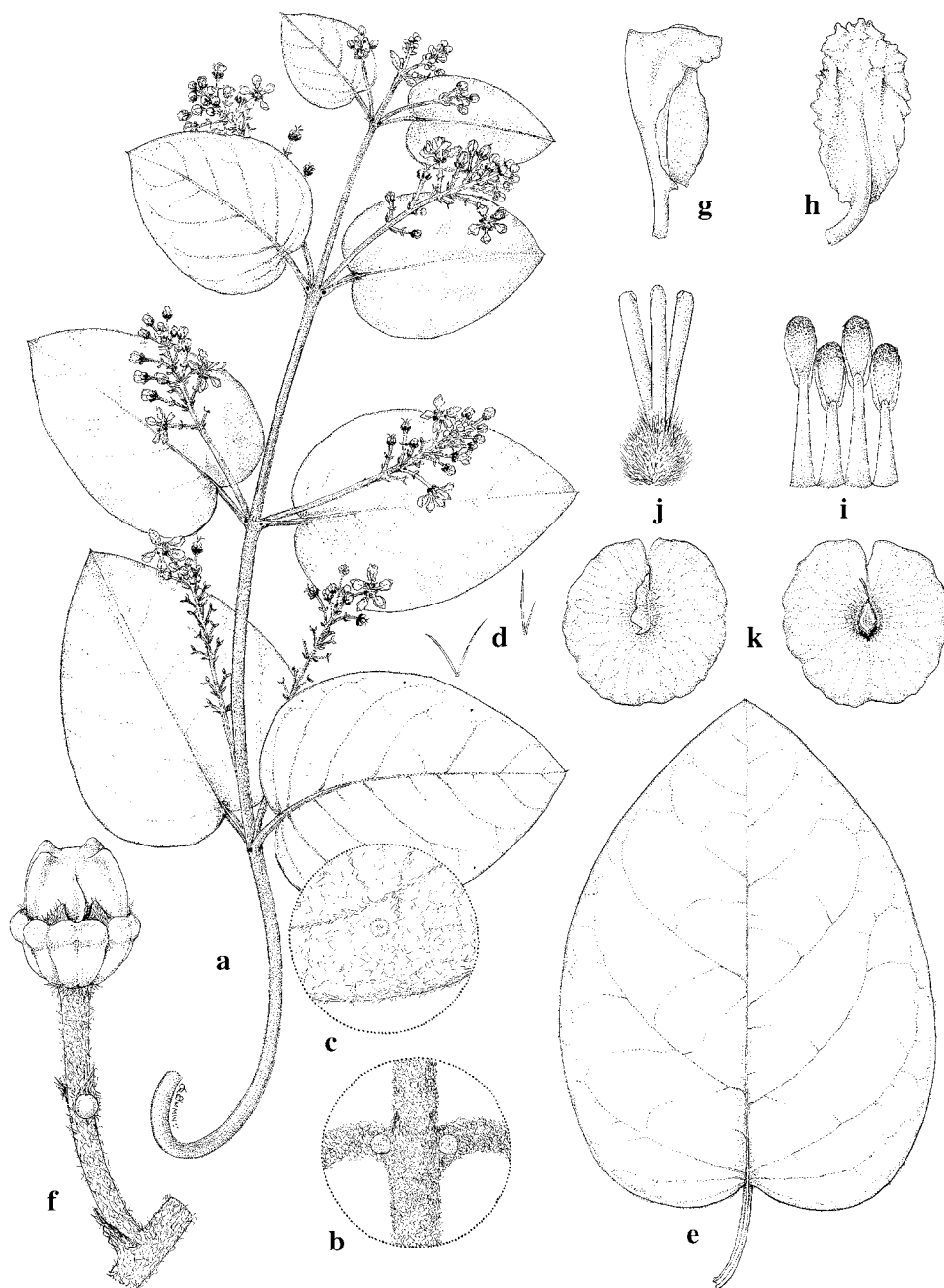


FIG. 4. *Mascagnia cordifolia*. a. Flowering branch, $\times 0.5$. b. Node showing stipules and glands at base of petioles, $\times 2.5$. c. Enlarged portion of abaxial surface of lamina, showing vestiture and gland, $\times 2.5$. d. Hairs from abaxial surface of lamina (left) and adaxial surface (right), $\times 15$. e. Large leaf, adaxial view, $\times 0.5$. f. Flower bud and portion of inflorescence axis, $\times 3.5$. g. Lateral petal, side view, $\times 5$. h. Posterior petal, abaxial view, $\times 5$. i. Abaxial view of four stamens, those with longer filaments opposite sepals, $\times 7.5$. j. Gynoecium, $\times 7.5$. k. Samaras, abaxial view (left) and adaxial view (right), $\times 0.75$. (Based on: a–d, *Schiavini* 69, MICH; e, *Hatschbach* 49588, MICH; f–j, *Silva et al.* 2314, MICH; k, *Anderson* 11311, MICH.)

apex, notched up to halfway to nut at apex; dorsal wing 8–16 mm high, 2–5 mm wide, triangular and widest at base or irregular in shape; ventral areole 3–4 mm high, 2 mm wide, ovate.

Phenology. Collected with flowers and fruits in all months, but most commonly from August through December.

Distribution (Fig. 1). Southern Brazil from about 10°S to about 24°S (except Bahia) and adjacent Bolivia, with outlier populations farther north in Amazonas and Pará; most often in cerrado but also in campo, thickets, secondary forest, and at the edge of wet forest; 230–1400 m.

REPRESENTATIVE SPECIMENS. **Bolivia.** BENI, Prov. Vaca Díez: Riberalta 53 km hacia el S, *Beck 20464* (MICH); E side of Riberalta, 11°00'S, 66°05'W, *Solomon 6259* (MICH, MO, NY).—PANDO: Prov. Manuripi, 30 km al N de Puerto América, 11°35'39"S, 68°02'52"W, *Jardim et al. 2432* (MICH). **Brazil.** AMAZONAS: Estrada Manaus–Itacoatiara Km 104, *Coelho et al. s.n.* [INPA 21231] (US); Manaus–Itacoatiara road Km 214, *Prance et al. 4889* (NY).—DISTRITO FEDERAL: Catetinho, 15 km SW of Brasília, *Irwin & Soderstrom 6150* (MO, NY); Córrego Jeriva, 10 km E of Brasília, *Irwin et al. 8351* (MO, NY); Fazenda Água Limpa, 15°58'25"S, 47°54'37"W, *Pereira Neto & Alvarenga 368* (MICH).—ESPÍRITO SANTO: Reserva Natural da CVRD, Linhares, estrada Santa Terezinha, *Folli 3809* (MICH).—GOIÁS: Chapada dos Veadeiros, E of Alto Paraíso on road to Nova Roma, *Anderson 6583* (NY); Chapada dos Veadeiros, 7 km de Colinas/Cavalcante, *Silva et al. 2314* (MICH); Mun. Niquelândia, 4 km de Niquelândia, 14°26'38"S, 48°26'13"W, *Fonseca et al. 1151* (MICH); Mun. Caldas Novas, 9 km NW of Caldas Novas, 17°43'S, 48°42'W, *Heringer & Eiten 14225* (MICH, MO); Serra do Caiapó, 50 km S of Caiapônia on road to Jataí, *Irwin & Soderstrom 7341* (MICH, MO, NY); 70 km SE of Aragarças on road to Piranhas, *Irwin et al. 17650* (MICH, NY); Mozarlândia, *Pereira 364* (MICH).—MATO GROSSO DO SUL: Mun. Rio Verde, near Rio Verde, *Anderson 11246* (MBM, MICH, MO, NY); Pantanal do Rio Negro, 19°30'S, 56°10'W, *Dubs 355* (MICH); Mun. Bataguáçu, Porto XV, *Hatschbach 24993* (NY); Mun. Nioaque, *Hatschbach 52433* (MICH, MO); Mun. Aquidauana, Serra de Maracaju, *Hatschbach 63403* (MICH).—MATO GROSSO: 1 km S of Rondonópolis, *Anderson 11311* (MBM, MICH, MO, NY); Ribeirão Claro, NW of Alto Araguaia, *Anderson 11398* (MBM, MICH, NY); Mun. Alto Paraguay, road Curupira–Arenápolis, 14°57'S, 56°51'W, *Dubs 1706* (MICH); Mun. Barra do Garças, Vale do Sonho, *Hatschbach 40129* (MICH); Mun. Chapada dos Guimarães, Água Fria, *Hatschbach 66852* (MICH); 2 km S of Xavantina, 14°40'S, 52°20'W, *Irwin & Soderstrom 6299* (MICH, NY); 50 km N of Barra do Garças on road to Xavantina, *Irwin & Soderstrom 6893* (MICH, MO, NY); 200 km NW of Cuiabá, *Maguire et al. 56857* (MICH, NY).—MINAS GERAIS: entre Pirapora e Montes Claros, *Castellanos 24213* (NY); Triângulo region, *Goodland 840* (MICH, NY); Mun. Oliveira, Córrego Dias, *Hatschbach 49588* (MICH); 12 km W de Itapagipe, *Krapovickas & Cristóbal 42763* (MICH); Campina Verde, *Macedo 5583* (MICH); Mun. Santana do Riacho, Distr. Cardeal Mota, *Martins 3* (MICH); Mun. Uberlândia, Est. Ecol. do Panga, *Schiavini 69* (MICH); Mun. Belo Horizonte, Morro das Pedras, *Williams & Assis 7460* (MO).—PARÁ: Serra dos Carajás, Serraria km 12, *Silva & Ribeiro 3653* (MICH).—RONDÔNIA: 13 km de Vilhena, estrada para Chapada dos Parecis, 12°45'S, 60°10'W, mata alta, *Vieira et al. 903* (MICH, MO, NY).—SÃO PAULO: Mun. São Carlos, São Carlos, *Campos 41* (MO); Mun. Rancharia, *Hatschbach 34810* (MICH); Mun. Avaré, Represa Jurumirim, *Hatschbach 45643* (MICH); Mun. Pirassununga, *Pickel s.n.* [SPSF-727] (MICH).

This common and widespread species is morphologically rather uniform throughout most of its range. The disjunct populations in Amazonas and Pará (see Fig. 1) that are assigned here to *M. cordifolia* agree in most or all respects with the populations of the Planalto cerrados. The single collection known from Espírito Santo is atypical in several characters. Its lamina is not as densely velutinous as in most populations, the petiole and bracteole glands are small, the stem and inflorescence hairs are not as erect as usual, and the petals are only carinate, not alulate. Yet, in a qualitative sense the plant of Espírito Santo agrees reasonably well with *M. cordifolia*, and there is no other described species that could accommodate it, so for the present it is best left in this species with its closest relatives.

Not treated here is the following collection: BRAZIL. PARÁ: Approx. 70 km from Tucuruí, 65 km SSW on old BR422, then 5 km NW on new logging road, 04°11'S, 49°44'W, forest on terra firme, Nov fr, *Daly et al. 1436* (MICH, MO, NY). This plant

resembles *M. cordifolia* in most characters, including large glands at the base of the petiole. However, the collectors did not give a petal color and we can find no old petals that would tell us whether or not they were alulate. The lamina is short-velutinous above and subsericeous below, such that these specimens are somewhat intermediate between *M. affinis* and *M. cordifolia* in their vesture. As Fig. 1 shows, the only other collection from near this locality is the single one we have cited from Pará, from the Serra dos Carajás. The best disposition of *Daly et al. 1436* will have to await further study of *Mascagnia* sens. str., which may be aided by additional collections from Pará when they become available.

There is another species of *Mascagnia* in the Amazon, *M. strigulosa* (Rusby) Nied. in Engl., that resembles *M. cordifolia*, because it has pink (or lilac) petals, leaves that are persistently velutinous on both sides, axillary pseudoracemes, a large gland on one of each pair of bracteoles, and erect to divergent styles. *Mascagnia strigulosa* is easily excluded from this group of species because its petioles are always eglandular. It further differs from *M. cordifolia* in having 2–4 large glands (1–2 mm in diameter) at the abaxial base of the lamina, and its lateral petals are only carinate, with a narrow keel ca 0.1 mm wide.

Mascagnia glabrata W. R. Anderson & C. Cav. Davis, sp. nov.—TYPE: BRAZIL. Rondônia: Mineração Taboca, 10°15'S, 63°20'W, capoeira, solo pedregoso, 11 Oct 1979 fl/imm fr, *Vieira, Zarucchi, Silva, Mota & Ramos 390* (holotype: INPA!; isotypes: MICH! NY!).

Mascagniae cordifoliae affinis, sed laminis supra sparsim velutinis vel glabratiss et subtus sparsim sericeis vel glabratiss.

Woody vine, the stems persistently brown-velutinous or subsericeous or glabrescent in age. Lamina of larger leaves 8–16 cm long, 6–10.5 cm wide, ovate, rounded or cordate at base, acuminate to rounded and apiculate at apex, thinly velutinous to glabrate above, the V- or Y-shaped hairs dense enough to touch only on midrib and lateral veins, thinly sericeous to glabrate below, the mostly ± straight, sessile or short-stalked hairs dense enough to touch only on midrib and lateral veins, bearing an abaxial row of 2–5 impressed glands on each side between midrib and margin with the most proximal glands remote from base, the principal lateral veins 5–7 on each side and connected by scalariform cross-veins; petiole 10–30 mm long, brown- or whitish velutinous or tomentose or subsericeous, biglandular at base with the glands 1–2 mm in diameter; stipules 1–2 mm long, narrowly triangular, loosely sericeous, borne on stem between petioles. Inflorescences axillary or terminal, 4–16 cm long, unbranched or sometimes branched near middle and then a panicle of 3 pseudoracemes, each pseudoraceme containing 15–65 flowers, the axis (including peduncles) brown-velutinous or subsericeous; bract 1.3–2 mm long, narrowly triangular, eglandular; peduncle 8–14 mm long; bracteoles 0.7–2 mm long, borne at apex of peduncle or up to 2 mm below, 1 of each pair eglandular and symmetrically triangular, the other bearing 1 prominent eccentric discoid gland 0.8–1.1 mm in diameter and ± asymmetrically lanceolate or falcate; bracts and bracteoles loosely sericeous; pedicel 4–6 mm long, sericeous or subsericeous, the hairs white. Sepals ca 1 mm long beyond glands, triangular or ovate, obtuse or rounded at apex, abaxially densely sericeous or distally glabrous, adaxially glabrous, appressed in anthesis; glands 2–3 mm long, 8 on 4 lateral sepals, the anterior sepal eglandular. Petals pink, glabrous; lateral petals spreading or reflexed, the limb 4.5–6 mm long, 3–6 mm wide, denticulate or erose at margin, abaxially carinate or alulate with the keel or winglet 0.2–0.5 mm wide, the

claw 1–1.5 mm long; posterior petal erect, the limb 4.5–5 mm long, 4 mm wide, corrugated, dentate or short-fimbriate at margin, abaxially carinate with the keel 0.1–0.3 mm wide, the claw 1.5 mm long. Stamens glabrous; filaments connate at base, 1.7–2 mm long, wider opposite petals than opposite sepals, slightly longer opposite sepals than opposite petals; anthers 1.3–1.6 mm long, $\pm$ alike. Ovary 1–1.5 mm high, densely sericeous; styles glabrous or sericeous at base, 2–2.5 mm long, alike or the anterior slightly shorter than the posterior 2, erect from base, straight or distally recurved, dorsally rounded or truncate at apex. Immature samara thinly sericeous on wing, tomentose on nut, orbicular, the lateral wing membranous, 25–30 mm high and wide, continuous at base and apex, entire at base, notched 1/2–3/4 to nut at apex; dorsal wing 10 mm high, 4 mm wide, triangular; ventral areole ca 4 mm high, 3 mm wide, ovate.

Phenology. Collected with flowers from September to November, and with fruits in October.

Distribution (Fig. 1). Western Brazil, northern Bolivia, and southeastern Peru between about 10°S and 15°S; in thickets and high wet forest; 270–580 m.

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** LA PAZ: Prov. Abel Iturralde, Parque Nacional Madidi, bosque tropical lluvioso primario, *Macia et al.* 4644 (580 m, May ster, MICH) & 6929 (320 m, Mar ster, MICH). **Brazil.** MATO GROSSO: Aripuanã, near Humboldt Centre on road to Rio Juruena, 10°12'S, 59°21'W, forest on terra firme, Oct fl, *Lleras & Lima P18256* (MICH); Mun. Porto dos Gaúchos, 59.5 km W of Rio Teles Pires on road to Porto dos Gaúchos, 11°40'S, 56°17'W, Sep fl, *Thomas et al.* 3986 (MICH). **Peru.** MADRE DE DIOS: Prov. Manu, Parque Nacional Manu, Río Manu, 11°56'S, 71°16'W, 350 m, high forest on low floodplain, Sep fl, *Foster 13254* (MICH); Prov. Tambopata, Distr. Puerto Maldonado, Cusco Amazónico, 13°08'S, 69°36'W, 270–300 m, bosque primario, Nov fl, *Valenzuela & Huamantupa 1015* (MICH).

Like *Mascagnia affinis*, *Mascagnia glabrata* is a segregate from *M. cordifolia*, differing from it in the vestiture of the leaves, which are thinly velutinous to glabrate above and thinly sericeous to glabrate below.

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LITERATURE CITED

- Anderson, W. R. 1990. Notes on neotropical Malpighiaceae—III. Contr. Univ. Michigan Herb. 17: 39–54.
———. 1993. Notes on neotropical Malpighiaceae—IV. Contr. Univ. Michigan Herb. 19: 355–392.
———. 2001. Malpighiaceae. In *Flora of the Venezuelan Guayana*, ed. P. E. Berry, K. Yatskievych, and B. K. Holst, 6: 82–185. St. Louis: Missouri Botanical Garden Press.
Cameron, K. M., M. W. Chase, W. R. Anderson, and H. G. Hills. 2001. Molecular systematics of Malpighiaceae: Evidence from plastid *rbcL* and *matK* sequences. Amer. J. Bot. 88: 1847–1862.
Davis, C. C., W. R. Anderson, and M. J. Donoghue. 2001. Phylogeny of Malpighiaceae: Evidence from chloroplast *ndhF* and *trnL-F* nucleotide sequences. Amer. J. Bot. 88: 1830–1846.
Davis, C. C., C. D. Bell, S. Mathews, and M. J. Donoghue. 2002. Laurasian migration explains Gondwanan disjunctions: Evidence from Malpighiaceae. Proc. Natl. Acad. U.S.A. 99: 6833–6837.
Niedenau, F. 1928. Malpighiaceae. In *Das Pflanzenreich*, ed. A. Engler, IV. 141: 1–870. Leipzig: Wilhelm Engelmann.