

Excerpt from:

W. R. Anderson. 2006.

Eight Segregates from the Neotropical Genus *Mascagnia* (Malpighiaceae)

Novon 16: 168–204. [*Carolus* on pages 186–189]

V. *Carolus* W. R. Anderson, gen. nov. TYPE: *Carolus chlorocarpus* (A. Jussieu) W. R. Anderson.

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Heladena sect. *Hassleria* Niedenzu, Arbeiten Bot. Inst. Königl. Lyceum Hosianum Braunsberg 5: 15. 1914. TYPE: *Heladena hassleriana* Niedenzu in Chodat & Hassler [= *Carolus chlorocarpus* (A. Jussieu) W. R. Anderson].

The name of this section was spelled *Halleria* in the protologue. Niedenzu (1928: 582) said that was a typographical error and corrected the spelling to *Hassleria*.

Lianae lignosae; lamina eglandulosa vel margine 2–multis glandulis parvis instructa; stipulae interpetiolares; inflorescentia pseudoracemus, umbella, vel panícula, floribus plerumque decussatis; bractae bracteolaeque eglandulosae; sepalia petalis in alabastro breviora, appressa per anthesin; petala lutea, abaxialiter dense sericea; antherae inter se similes, glabrae vel paucipiliferae; styli stigmatibus introrsis; samara alis lateralibus apice basique usque ad nunc incis.

Woody vines. Leaves opposite; petiole eglandular or bearing 2–4(–6) small glands; lamina eglandular or bearing 2–many tiny glands on or embedded in margin; stipules very small, triangular, borne on stem between petioles or beside base of petiole, caducous or persistent. Inflorescence axillary or terminal, a pseudoraceme or umbel or a panicle of pseudoracemes or umbels, the flowers mostly decussate; bracts and bracteoles eglandular, persistent; floriferous peduncle often well developed, reduced or lacking in some populations. Sepals shorter than petals in bud and leaving petals exposed during enlargement of bud, appressed in anthesis, all 5 eglandular or the lateral 4 bearing large paired abaxial glands; corolla bilaterally symmetrical, the posterior petal erect and \pm different from the spreading lateral 4; petals yellow, abaxially densely sericeous on claw and limb except near margin, adaxially glabrous; stamens 10, all fertile; filaments connate in proximal 1/4–1/2, sometimes subequal but mostly of differing lengths, often longest opposite anterior sepal and shortest opposite posterior petal, the 2 opposite posterior-lateral petals often thicker than others; anthers alike

in age, borne on stem at base of petiole, persistent or deciduous. Flowers borne in pseudoracemes 4–20 cm long, containing 10–50 flowers with the flowers sometimes decussate and sometimes in no consistent arrangement, the pseudoracemes axillary or arrayed in lateral or terminal panicles, the axes velutinous; bracts and bracteoles persistent or deciduous late in anthesis or during enlargement of fruits; bracts 3–4(–6) \times 1.5–3 mm, lanceolate, ovate, or deltate and often narrowed at base to a short petiole, spreading, usually bearing 1 or 2 small inframarginal to marginal abaxial glands on each side near or below middle, velutinous or appressed-velutinous on both sides; peduncle 1–4 mm long, velutinous; bracteoles 2–2.5 \times 1–2 mm, like bracts but smaller and less consistently glanduliferous, borne at apex of peduncle; pedicel 3–5 mm long, velutinous. Sepals ca. 2 mm long and wide, rounded at apex, appressed in anthesis, abaxially densely appressed-velutinous, adaxially sericeous proximally, the abaxial glands 2–2.7 mm long; petals “yellow with an orange median stripe,” abaxially densely tomentose or velutinous on claw and limb, adaxially densely tomentose or velutinous on distal half of limb with hairs decurrent on midrib, the limb elliptical, truncate or slightly hastate at base (especially in lateral petals), entire; lateral petals with claw 1–1.5 mm long, limb 3.5–5 \times 2.5–3.5 mm; posterior petal with claw 2–2.7 mm long, limb 3–4 \times 2.3–3.5 mm; filaments 1.5–2 mm long, connate at base, glabrous; anthers 1.1–1.4 mm long, each half with a basal tuft of hairs, the connective dark red; ovary 1–1.5 mm high, densely appressed-velutinous; styles 1.3–1.7 mm long, cylindrical, initially erect but soon recurved, rounded or truncate dorsally and somewhat flattened laterally at apex, the anterior slenderer and shorter than the posterior 2. Samara (slightly immature?) ca. 2.5 cm wide, butterfly-shaped with the flabellate lateral wings distinct at apex and base, velutinous on nut, loosely sericeous on wings; lateral wings 12–14 mm high, 10 mm wide, entire; dorsal wing 6–7 mm high, 3–4 mm wide, coarsely dentate; ventral areole broadly ovate, ca. 5.5 \times 3–3.5 mm.

Phenology. Collected with flowers and fruits in March and April.

Ecology and distribution. Known only from two collections from Minas Gerais, Brazil; in neither case did the collectors record the elevation or habitat.

Etymology. The epithet of this species refers to the persistently velutinous stems and leaves, which immediately distinguish it from the other species in the *Amorimia rigida* complex; those have the stems and leaves sericeous to soon glabrate, or the lamina

has some appressed hairs persistent on the abaxial surface. It also differs in the samara; in *A. rigida* the nut is sericeous, the wings are thinly sericeous to glabrate, and the ventral areole is narrower, usually at least 2.2 times as long as wide.

Paratype. BRAZIL. **Minas Gerais:** Entre Itaobim e Jequitinhonha, *Shepherd et al.* 4409 (NY).

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or subequal, glabrous or sparsely hairy; carpels connate their whole length in ovary; styles erect and straight or somewhat bowed or spreading, alike, dorsally rounded to short-apiculate or short-hooked and laterally compressed or terete at apex, the stigma internal. Fruit dry, breaking apart into samaras separating from a high pyramidal torus; samara butterfly-shaped with lateral wings dominant, chartaceous with many fine parallel veins, cleft to nut at base and apex, the margin sinuate to coarsely dentate; dorsal wing(s) lacking or, if developed, small, distinct at base and apex; ventral areole ovate to linear; samara reduced or highly modified in some populations of *Carolus sinemariensis*.

I am happy to name this genus in honor of my friend and colleague, Charles Cavender Davis (b. 1974), whose molecular studies have already made a substantial contribution to our understanding of the systematics of the Malpighiaceae.

Carolus is distinguished by its interpetiolar stipules, marginal leaf glands, densely sericeous yellow petals, and butterfly-shaped samaras. Because they both have interpetiolar stipules and hairy yellow petals, this genus can be confused with *Amorimia*, but that genus differs in having its leaf glands usually on the abaxial surface between the midrib and the margin, and in its large spreading gland-bearing bracts. *Aenigmatanthera* is readily distinguished from *Carolus* by its epipetiolar stipules, glabrous or subglabrous petals, and anthers densely sericeous on the connective. In previously published molecular studies (Cameron et al., 2001; Davis et al., 2001, 2002), *Carolus* was represented by *C. chasei* (W. R. Anderson) W. R. Anderson (as *Mascagnia chasei* W. R. Anderson). The best-resolved of those trees is that in Davis et al. (2002) in which *C. chasei* was placed in a clade comprising *Dicella* Grisebach, *Tricomaria* Hooker & Arnott, *Heteropterys*, *Hiptage* Gaertner, and *Niedenzuella* (as *Mascagnia stannea* (Grisebach) Niedenzu). That clade had no bootstrap support, nor did the position of *Carolus* in it. The only one of those genera that has butterfly-shaped samaras is *Niedenzuella*, which has long, imbricated sepals that conceal the petals in the enlarging bud.

Carolus comprises six species of Mexico, Central America, the Lesser Antilles, and South America.

KEY TO THE SPECIES OF *CAROLUS*

- 1a. Lamina abaxially densely and persistently sericeous at maturity.
 - 2a. Flowers borne ultimately in \pm elongated pseudoracemes of 4–20, with internodes developed between pairs of flowers and the pairs \pm evenly distributed; eastern Brazil.

- 3a. Lamina up to 7×3.5 cm, mostly smaller; inflorescence an unbranched axillary pseudoraceme; samara smooth between lateral wings, the dorsal winglet completely lacking or represented at most by a rounded hump at apex; anthers glabrous, the connective brownish 2. *C. chasei*
- 3b. Lamina of larger leaves mostly at least 9×4 cm, often larger; inflorescence usually compound, an axillary or terminal panicle of pseudoracemes; samara bearing between lateral wings ca. 5 parallel \pm dissected winglets 1–2.5 mm wide; anthers bearing a few hairs on locules, the connective black. 5. *C. renidens*
- 2b. Flowers borne ultimately in umbels of 4(–6); Panama and Pacific South America.
 - 4a. Samara with a well-developed rectangular or triangular dorsal wing between lateral wings, (2–)3–7 mm wide; styles dorsally short-apiculate at apex; peduncles 1–2.5 mm long; Pacific Ecuador and Peru 1. *C. anderssonii*
 - 4b. Samara nearly smooth between lateral wings, the dorsal wing represented only by a longitudinal rib and a triangular winglet up to 1.5 mm high and wide at apex; styles with a dorsal hook at apex; peduncles mostly lacking, occasionally up to 0.5 mm long; Panama 4. *C. dukei*
- 1b. Lamina abaxially glabrous or glabrate at maturity, rarely thinly sericeous or appressed-tomentose with the hairs never dense enough to completely hide epidermis.
 - 5a. Flowers borne in \pm elongated pseudoracemes of 6–14(–20), with internodes between pairs of flowers longer than peduncles and the pairs \pm evenly distributed; South America south of the Amazon, from Bolivia and Paraguay to southeastern Brazil 3. *C. chlorocarpus*
 - 5b. Flowers crowded distally in umbels, corymbs, or dense pseudoracemes of 4–8(–12) with internodes between pairs of flowers lacking or very short, mostly shorter than peduncles; Mexico to South America north of 4°S, and Lesser Antilles 6. *C. sinemariensis*

1. *Carolus anderssonii* (W. R. Anderson) W. R. Anderson, comb. nov. Basionym: *Mascagnia anderssonii* W. R. Anderson, Contr. Univ. Michigan Herb. 22: 15. 1999. TYPE: Ecuador. Loja: near Malacatos, *G. Harling* & *L. Andersson* 21477 (holotype, GB; isotype, US).

This species is known from Pacific Ecuador and Peru (Anderson, 1999: 16).

2. *Carolus chasei* (W. R. Anderson) W. R. Anderson, comb. nov. Basionym: *Mascagnia chasei* W. R. Anderson, Contr. Univ. Michigan Herb. 19: 378. 1993. TYPE: Brazil. Bahia: S of Maracás, *T. S. dos Santos et al.* 3480 (holotype, CEPEC; isotypes, MICH, NY).

3. *Carolus chlorocarpus* (A. Jussieu) W. R. Anderson, comb. nov. Basionym: *Hiraea chlorocarpa* A. Jussieu, Ann. Sci. Nat. Bot., Sér. 2, 13: 259. 1840. *Mascagnia chlorocarpa* (A. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 93. 1858. TYPE: Brazil. Region of Rio de Janeiro, *Vauthier* [21] (lectotype, designated by Anderson (1993: 379), P [F neg. 35628]; duplicates, G, K, P).

Heladena hassleriana Niedenzu in Chodat & Hassler, Bull. Herb. Boissier, Sér. 2, 7: 294. 1907. TYPE: Paraguay. Río Apa, *E. Hassler* 7837 (lectotype, designated here, G; isotypes, A, BM, G, K, LIL, MICH, MO, NY, P).

The sole type collection was *Hassler* 7837, but because the holotype in B was destroyed it is necessary to designate one of the many isotypes as lectotype. I have selected one of the six sheets at G, the one annotated by Niedenzu in 1907; four of the others were not annotated by Niedenzu, and the fifth was not annotated by him until 1910.

Carolus chlorocarpus is known from Bolivia (*Gentry et al.* 73882, MICH) and Paraguay to southeastern Brazil.

4. *Carolus dukei* (Cuatrecasas & Croat) W. R. Anderson, comb. nov. Basionym: *Mascagnia dukei* Cuatrecasas & Croat, Ann. Missouri Bot. Gard. 67: 908. 1980 [1981]. TYPE: Panama. Panamá: between Cañasas and Sabalo, *J. Duke* 14468 (holotype, US; isotypes, MO, PMA not seen).

5. *Carolus renidens* (A. Jussieu) W. R. Anderson, comb. nov. Basionym: *Hiraea renidens* A. Jussieu, Ann. Sci. Nat. Bot., Sér. 2, 13: 260. 1840. *Tetrapteryx renidens* (A. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 68. 1858. *Mascagnia renidens* (A. Jussieu) W. R. Anderson, Contr. Univ. Michigan Herb. 15: 136. 1982. TYPE: Brazil. Sebastianópolis [Rio de Janeiro], *Vauthier* 450 (lectotype, designated here, P [MICH, WRA negs. 81-22-30 & 31]; isotypes, G, L, P).

Vauthier 450 was the single type collection. It is represented at P by three sheets, of which I have selected as lectotype the best, most representative specimen, which was annotated by Jussieu.

Hiraea cinerea Bunbury, Proc. Linn. Soc. London 1: 109. 1841. TYPE: Brazil. Rio de Janeiro, Corcovado, *C. Bunbury* s.n. (holotype, CGE not seen; isotypes, BR not seen, K not seen).

The name *Mascagnia metallicolor* Niedenzu, Arbeiten Bot. Inst. Königl. Lyceum Hosianum Brauns-

berg 3: 20. 1908, has been widely used for this plant (Niedenzu, 1928: 111). It is a superfluous synonym for *Hiraea cinerea*, because Niedenzu cited Bunbury's collection as his type.

Hiraea heteropetala A. Jussieu, Arch. Mus. Hist. Nat. 3: 557. 1843. *Tetrapteryx heteropetala* (A. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 88. 1858. TYPE: Brazil. *P. Claussen* 33 (lectotype, designated here, P [F neg. 35603]).

As syntypes Jussieu cited Clausen and Sellow collections from Brazil, without numbers or detailed localities. In B there was a Sellow collection annotated by Jussieu (F. neg. 12731). In P there are two Clausen sheets, 33 and 77, both representing this species. Only *Clausen* 33 was annotated by Jussieu, for which reason that specimen is designated lectotype.

Banisteria riedeliana Regel, Index Sem. Horti Bot. Petropol. 17. 1855. *Mascagnia riedeliana* (Regel) W. R. Anderson, Contr. Univ. Michigan Herb. 14: 21. 1980. TYPE: Cultivated in Hort. Petropol. from seeds sent by L. Riedel, from the base of Corcovado, Rio de Janeiro, Brazil (holotype, LE).

6. *Carolus sinemariensis* (Aublet) W. R. Anderson, comb. nov. Basionym: *Banisteria sinemariensis* Aublet, Hist. Pl. Guiane 1: 462. 1775. *Mascagnia sinemariensis* (Aublet) Grisebach in Martius, Fl. Bras. 12(1): 93. 1858. TYPE: French Guiana. *J. Aublet* s.n. (holotype, BM). Figure 7.

Malpighia volubilis Sims, Bot. Mag. 21: 809. 1805. *Byrsonima volubilis* (Sims) DC., Prodr. 1: 581. 1824. *Banisteria volubilis* (Sims) Endlicher, Cat. Horti Vindob. 2: 375. 1842. *Mascagnia volubilis* (Sims) Niedenzu, Arbeiten Bot. Inst. Königl. Lyceum Hosianum Braunsberg 3: 22. 1908. TYPE: Cultivated, from West Indies (holotype, K).

Hiraea schizoptera Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 36: 584. 1863. *Mascagnia schizoptera* (Turczaninow) Cuatrecasas, Webbia 13: 373. 1958. TYPE: St. Vincent. *G. Caley* s.n. (holotype, KW not seen; isotype, G).

Diplopteryx microcarpa Sandwith, Kew Bull. 1931: 183. 1931. *Mascagnia microcarpa* (Sandwith) W. R. Anderson, Mem. New York Bot. Gard. 32: 220. 1981. TYPE: Guyana. Essequibo: Moraballi Creek near Bartica, *N. Sandwith* 289 (holotype, K; isotype, NY).

Mascagnia hondensis C. V. Morton, Proc. Biol. Soc. Wash. 45: 52. 1932. TYPE: Colombia. Tolima: Honda, *Bro. Ariste Joseph* A371 (holotype, US).

This species is interpreted very broadly here. In that sense, it is known from Mexico (*Wilbur & Wilbur* 2394, MICH) to South America north of 4°S, and the Lesser Antilles.

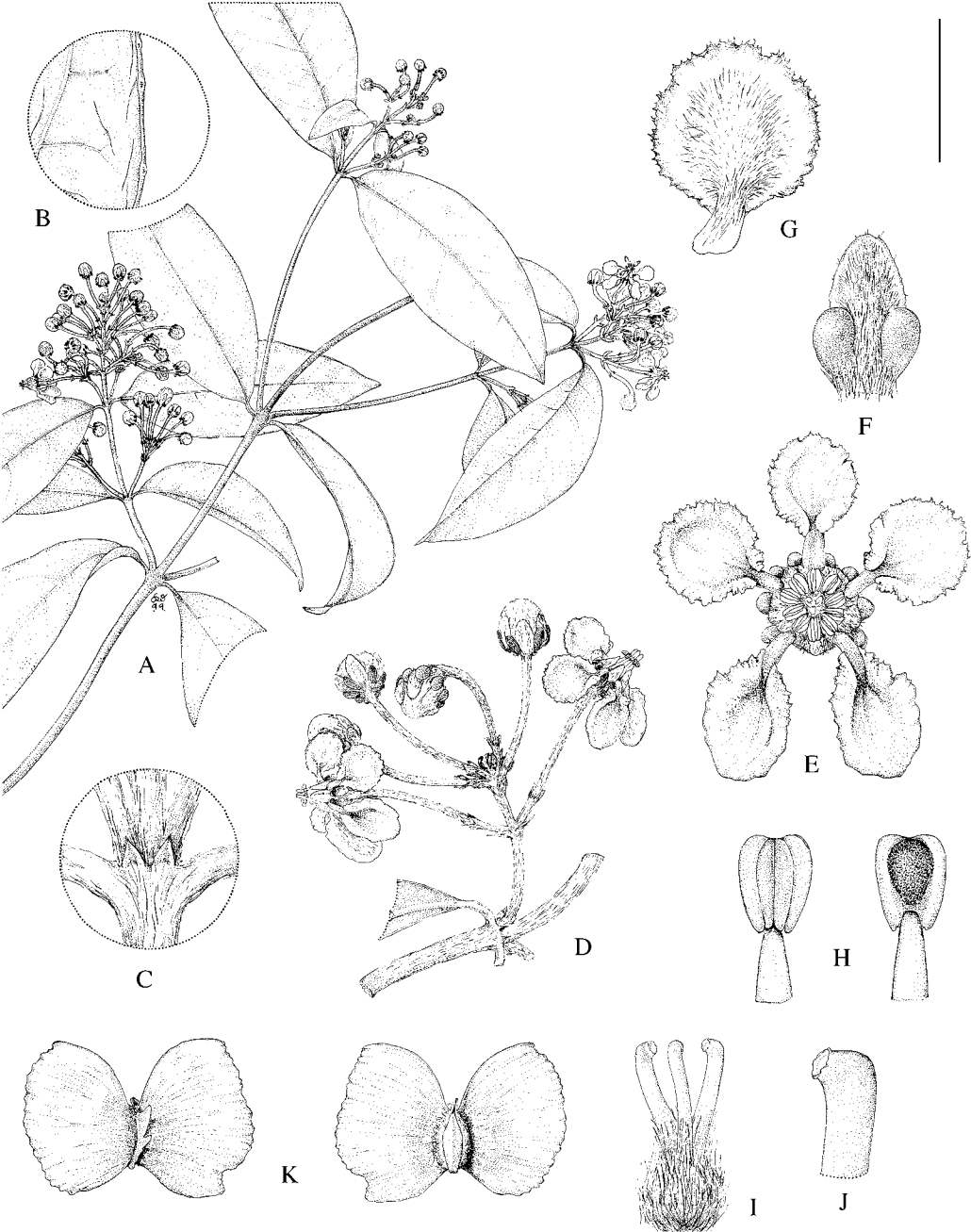


Figure 7. *Carolus sinemariensis* (Aublet) W. R. Anderson. —A. Flowering branch. —B. Abaxial margin of lamina. —C. Node with stipules. —D. Axillary inflorescence. —E. Flower, posterior petal uppermost. —F. Lateral sepal, abaxial view. —G. Lateral petal, abaxial view. —H. Anther, adaxial view (left) and abaxial view (right). —I. Gynoeceum. —J. Apex of style. —K. Samara, abaxial view (left) and adaxial view (right). Scale bar equivalents: A, 4 cm; B & C, 4 mm; D, 1.3 cm; E, 7 mm; F, 2.7 mm; G, 4 mm; H, 2 mm; I, 2.7 mm; J, 1.3 mm; K, 2 cm. A–J, *Wilbur & Wilbur 2394* (MICH); K, *Cochrane et al. 12331* (MICH).