

DE MACROCARPAEAE GRISEBACH (EX GENTIANACEIS)
SPECIEBUS NOVIS IX: A SYNOPSIS OF THE GENUS IN BOLIVIA

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Abstract. A synopsis of the genus *Macrocarpaea* in Bolivia is presented. Four species are recognized including *M. bangiana* Gilg, *M. cinchonifolia* (Gilg) Weaver, *M. cochabambensis* Gilg-Ben., and *M. fuentessii* J.R. Grant, *sp. nov.* These are the four southernmost species of *Macrocarpaea* in the Andes.

Keywords: *Macrocarpaea*, Gentianaceae, Helieae, Andes, Bolivia

Four species of *Macrocarpaea* Gilg occur in Bolivia, representing the southernmost extension of the genus in the Andes. These species are not particularly closely related to each other but are in fact members of radiations from different species groups. Each is so distinctive that identification of material from

Bolivia is straightforward, compared to the large species complexes in Colombia, Ecuador, or Peru. This study is part of a series of papers that will eventually lead to a full monograph of the genus (Grant, 2003, 2004, 2005, 2007, 2008; Grant and Struwe, 2001, 2003; Grant and Weaver, 2003).

KEY TO THE SPECIES OF *MACROCARPAEA* IN BOLIVIA

- 1b. Calyx glabrous2a
 2a. Calyx 5–9 × 5–8 mm, concolor, lobes ovate *M. bangiana*
 2b. Calyx 18–22 × 14–21 mm, distinctly bicolored, lobes rotund, broadly ovate to reniform. *M. cinchonifolia*
1a. Calyx hispid3a
 3a. Calyx 10–13 × 7–11 mm, tube ecarinate, lobes broadly reniform. *M. cochabambensis*
 3b. Calyx 23–25 × 10–17 mm, tube carinate, lobes ovate to rotund. *M. fuentessii*

1. *Macrocarpaea bangiana* Gilg, Bot. Jahrb. Syst. 22: 335. 1896. TYPE: BOLIVIA. La Paz: *Bang*, *M.* 520 (type B? [destroyed]; Lectotype: NY [2 sheets], selected by Grant 2005: 46; Isolectotypes: BM, BR, E, G [3 sheets], GH [2 sheets], K, M, MANCH, MICH, MO, PH, US [2 sheets], W). Fig. 1G–H.

Shrub 1.5–4.5 m, glabrous to rarely spiculate hispid on stems, petioles, leaves (veins on the lower surface), inflorescences, and pedicels. Stems terete, solid to hollow, 4–7 mm diam. just below the inflorescence. Leaves oval, elliptic to ovate, petiolate, 9.5–(24–28) cm long. Petioles

10–(25–30) mm, slender with slight vagination to one quarter the length of the petiole; interpetiolar ridge 1–2 mm. Blades 8.5–(22–25.5) × 3–(7–13) cm, entire to slightly revolute, dark above and conspicuously lighter below, with slightly impressed veins above, and slightly raised veins below, glabrous above, glabrous to hyaline hispid to spiculate below, especially along veins, papery thin to thin coriaceous; base aequilateral, cuneate, to attenuate and decurrent on the petiole; apex acute, acuminate, to obtuse on larger leaves. Inflorescence a much branched open thyrse to 7–35 cm; branches

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4–23 cm long, 5–9 flowered per branch. Bracts oval, elliptic, ovate, to lanceolate, sessile to petiolate, 10–50(–115) × 2–25(–34) mm; base aequilateral, cuneate, to attenuate and decurrent on the petiole; apex acute, acuminate to obtuse; bract petioles 0–17 mm. Flowers pedicellate, erect never nodding; pedicels 10–35 mm long; bracteoles linear, lanceolate, to obovate, 3–12 × 0.5–3.0 mm. Calyx campanulate, 5–9 × 5–8 mm, glabrous, smooth, green, ecarinate, ovate; calyx lobes 2–4 × 2–4 mm, obtuse, acute to rounded. Corolla funnel-shaped, 35–50 mm long, 20–30 mm wide at the apex of the tube, yellowish-green (*Beck 8699*, *Beck 8745*, *Solomon 9275*), smooth; corolla lobes ovate, 10–18 × 10–17 mm, apex obtuse to rounded. Stamens 40–48 mm long; filaments 35–42 mm long, filiform, flattened; anthers elliptic to oblong, 5–6 × 2.0–2.5 mm, sagittate, versatile; pollen glabra-type (sensu Nilsson 1968; Grant 2005). Pistil 40–54 mm long; ovary 5–7 × 2–4 mm; style 33–43 × 1.0–1.5 mm; stigma lobes spatulate to suborbicular, 2–4 × 1.5–3.0 mm. Capsules ovoid to ellipsoidal, 21–31 × 9–13 mm, smooth to rugose, chestnut to light brown, erect to slightly spreading but not nodding; style remnant 7–13 mm long. Seeds “Perimetrically winged type” (sensu Grant 2005), flattened, roughly 3–4 sided in outline, yet appearing as myriads of different puzzle pieces, 1.0–1.5 × 1.0–1.5, straw-colored, testa reticulate, wings ribbed.

Morphology and similarities: *Macrocarpaea bangiana* is distinct among the four species that occur in Bolivia in that it is a typical member of sect. *Choriophylla* known for slender to standard-sized *Macrocarpaea* flowers on a diffuse thyrse. While it is largely restricted to Bolivia, recently collected material from the Cuzco region of Peru has extended its range to southern Peru. According to the molecular studies (Struwe et al. 2009; Grant unpublished), *Macrocarpaea bangiana*, like *M. cochabambensis*, does not have any seemingly close relatives among the species sampled to date. It does however resemble several species from Peru such as *M. kayakifolia* J.R. Grant and *M. angustifolia* J.S. Pringle in their diffuse inflorescences and generally narrow leaves.

Distribution and habitat: Cloud forests of the Andes, 1500–2740 m, occurring in Cochabamba and La Paz provinces of Bolivia, and Cusco Province, Peru.

Eponymy: Named in honor of the collector of the type, Danish botanist Miguel Bang (1853–1936) who collected extensively in Bolivia.

Specimens examined: BOLIVIA. Cochabamba: Prov. Chapare, cordillera de Mosestenez, Territorio Indígena P.N. Isiboro-Secure, cresta arriba de la laguna Carachupa, 16°13'S, 66°24'W, 1600 m, 16 September 2003, *Macia, M. et al. 7497* (LPB, MA [not seen]). La Paz: Nor Yungas, La Paz hacia Coroico, 47 km desde la cumbre cerca Sacramento, 2525 m, 29 December 1983, *Beck, St.G. 8699* (LPB [not seen], MBM, NY, U); Sud Yungas, Huanacané 9 km hacia San Isidro (N de Chulumani), 2450 m, 1 January 1984, *Beck, St.G. 8745* (LPB [not seen], NY, U); Prov. Sud Yungas, Apa Apa 5 km al node de Chulumani, 16°21'S, 67°30'W, 2625 m, 31 October 1999, *Beck, St.G. 24649* (LPB [not seen], NY); Sud Yungas, Huanacané, 10 km hacia San Isidro, 5 August 2000, *Beck, St.G. 24867* (LPB [not seen], US); Bautista Saavedra, ANMI Apolobamba, Ininlaya, subienda de Siata por senda de inciensereros, 15°11'45"S, 68°38'46"W, 2275 m, 27 April 2005, *Fuentes, A. 7384* (LPB [not seen], MO, U); P.N. Madidi, Mojos, inciensial Tunculo, 4.4 km al SW de pueblo, parcela temporal 222, 14°34'40"S, 68°53'23"W, 2150 m, 9 May 2007, *Fuentes, A. 11807B* (LPB [not seen], NY); P.N. Madidi, entre Queara y Mojos, sector entre Chuncaní y Tocoaque, 14°37'52"S, 68°57'37"W, 2740 m, 28 February 2008, *Fuentes, A. 12123* (LPB [not seen], MO, NY); Franz Tamayo, Madidi, Pelechuco-Apolo, Coranara P.N. Madidi, sector Coranara, al lado del río Pelechoco, pajonal pasando arroyo mas allá de las ruinas de la hacienda, por el antiguo camino Pelechuco-Apolo, 14°46' 21"S, 68°59'09"W, 2300 m, 16 June 2008, *Fuentes, A. 13130* (LPB [not seen], MO, NY); P.N. Madidi, inciensial Polcobamba al frente del camino Pelechuco-Apolo, pasando el río, 14°44'32"S, 68°56'32"W, 1866 m, 18 June 2009, *Fuentes, A.F. et al. 14460* (MO); P.N. Madidi, inciensial Pilcobamba al frente del camino Pelechuco-Apolo, pasando el río, 14°44'32"S, 68°56'32"W, 1866 m, 18 June 2009, *Fuentes, A. 14405* (MO); Nor Yungas, 13.7 km NW of San Pedro on road through Incahuara-Mejillones and along trail to 12 de Octubre, 15°58'S, 67°37'W, 1500 m, 15 January 1993, *Solomon, J.C. 9275* (BOLV [not seen], MO, U); Franz Tamayo, Area Natural de Manejo Integrado

Apolobamba, Pelechuco, Coranara II, ladera de las ruinas de la ex Aduana de Coranara, 14°46'32"S, 68°59'21"W, 2419 m, 25 October 2008, *Villalobos, M. et al.* 152 (MO, NY); Santa Bárbara, 29 August 1902, *Williams, R.S.* 1561 (NY ["type" of "*M. peduncularis* Rusby" ined] [2 sheets], UC, US).

2. *Macrocarpaea cinchonifolia* (Gilg) Weaver, *J. Arnold Arbor.* 55(2): 300. 1974. *Rusbyanthus cinchonifolius* Gilg, in Engl. & Prantl, *Nat. Pflanzenfam.* 4(2): 95. 1895. TYPE: BOLIVIA. La Paz: *Rusby 1173* (type B? [destroyed]); Lectotype: NY, selected by Weaver 1974: 300; Isolectotypes: BM, E, G, K, P, PH, S, US, WIS). Fig. 11–J.

Shrub 2–5 m, glabrous throughout. Stems terete to slightly quadrangular above, hollow, 5–10 mm in diam. just below the inflorescence. Leaves broadly elliptic, ovate to oblong, petiolate, 20–59 cm long. Petioles 20–120 variable, slender to robust with broad open vagination one quarter to the entire length of the petiole; interpetiolar ridge 3–5 mm. Blades 18–47 × 9–16(–22) cm, entire, not revolute, dark green, with slightly impressed veins above, and slightly raised veins below, glabrous above and below, papery thin; base aequilateral to slightly oblique, cuneate, rounded to attenuate and decurrent on the petiole; apex acute to acuminate. Inflorescence a much branched open thyrse, 20–45+ cm; branches 10–20 cm long, 5–9 flowered per branch. Bracts widely varying in shape and size depending on position in the inflorescence, generally large, leaf-like, elliptic, ovate, lanceolate to oblanceolate, sessile to petiolate, 20–120 × 4–90 mm; base aequilateral to oblique, cuneate, to short-attenuate and decurrent on the petiole; apex acute, acuminate to obtuse, bract petioles 0–5 mm. Flowers pedicellate, erect to spreading; pedicels 15–35 mm, appearing to lengthen after anthesis; bracteoles inconspicuous and scabrous, linear, or triangular to ovate, lanceolate to oblanceolate, 2–10 × 0.5–3.0 mm. Calyx broadly campanulate, 18–22 × 14–21 mm, glabrous, smooth, when fresh certainly green, but when dried fairly distinctly bicolored, with the base being tan and the calyx lobes distinctly darker brown, ecarinate, broadly ovate to reniform; calyx lobes 10–16 × 8–10 mm, rounded to obtuse. Corolla broadly funnel-shaped, 60–65 mm long, 35–40 mm wide at the apex of the tube, white (*Solomon 9501*), yellow

to yellowish-green (*Beck 17210*), smooth; corolla lobes ovate to reniform, 20–27 × 17–35 mm, obtuse to rounded. Stamens 42–48 mm long; filaments 35–40 mm long, filiform, flattened; anthers elliptic to sagittate, 7–8 × 3–4 mm, sagittate, versatile; pollen corymbosa-type (sensu Nilsson 1968; Grant 2005). Pistil 45–50 mm long; ovary 5–6 × 2–3 mm; style 37–41 × 1.0–1.5; stigma lobes spatulate, 3–5 × 3–5 mm. Capsules ellipsoidal to oblong, 30–35 × 10–12 mm, shiny smooth to pustulate, chestnut to light brown, erect, spreading to slightly nodding; style remnant 5–14 mm long. Seeds "Winged type" (sensu Grant 2005), flattened, prominently winged on both ends, 1.8–2.2 × 0.2–0.6 mm, straw-colored, testa reticulate, wings ribbed.

Morphology and similarities: According to the molecular studies (Struwe et al. 2009; Grant unpublished), *Macrocarpaea cinchonifolia* belongs to a small group that shares two important and unique characters, namely winged seeds and corymbosa type pollen. This solid group comprises at least five species with robust inflorescences and flowers from Peru including *M. cinchonifolia*, *M. normae* J.R. Grant, and *M. ostentans* J.R. Grant. *M. robin-fosteri* J.R. Grant, and *M. tahuantinsuyuana* J.R. Grant.

Distribution and habitat: Cloud forests of the Andes, (850)1200–3100 m, endemic to Cochabamba and La Paz provinces of Bolivia

Etymology: Named for the similarities of its leaves to those of the quinine-producing genus *Cinchona* (Rubiaceae).

Specimens examined: Bolivia. 1 January 1890, *Bang, M. s.n.* (NY [2 sheets]). Cochabamba: Prov. Chapare, Incachaca, 2300 m, 30 January 1929, *Steinbach, J.*, 8992b (F, G, GH, K) [This provenance of this collection is somewhat suspicious since it is the only collection of *M. cinchonifolia* from Cochabamba, so I annotated the "b" numbers on 4 sheets to differentiate these specimens from 'standard' *Steinbach 8992* which is the type of *Macrocarpaea cochabambensis*]; La Paz: Franz Tamayo, P.N. Madidi, quebrada Jatun Chiriuno, 31 km en línea recta al este de Apolo por el camino a San José de Uchupiamonas, 1850–1900 m, 24 June 2002, *Araujo Murakami, A. et al.* 68 (MO, U); Franz Tamayo, P.N. Madidi, Pinalito, 29 km al este de Apolo por el camino a San José de Uchupiamonas, 1900–2496 m, 16 July 2002, *Araujo, A. et al.* 283 (MO); Nor Yungas, Puerto Linares

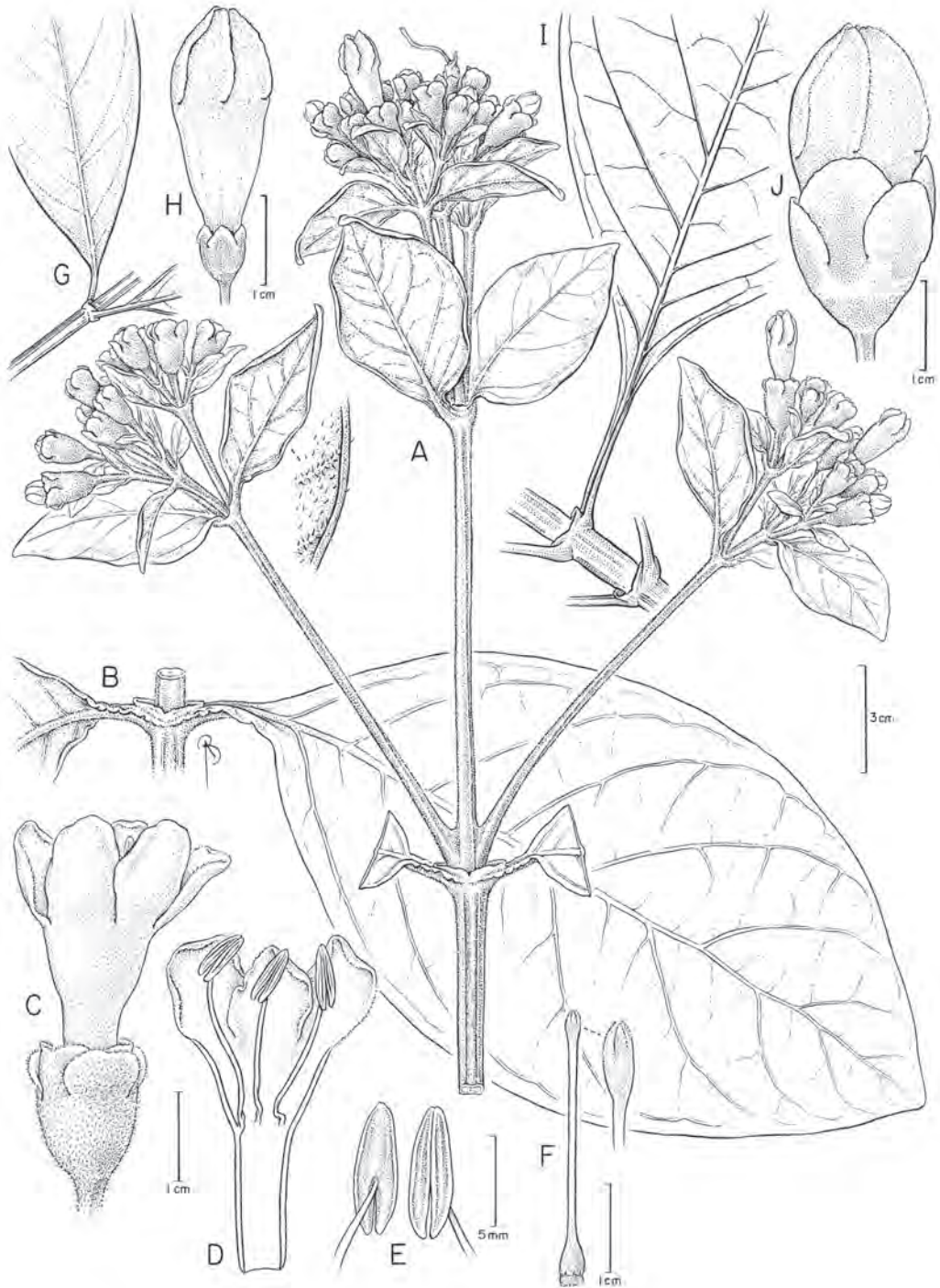


FIGURE 1. Three species of Bolivian *Macroparpaea*. A–F, *M. cochabambensis* Gilg-Ben.; G–H, *M. bangiana* Gilg; I–J, *M. cinchonifolia* (Gilg) Weaver. A–F, drawn from *Gentry 44200*; G–H, from *Beck 8699* (NY); and I–J *Solomon 9501* (MO) by Bobbi Angell.

39 kms hacia Caranavi, despues de la cumbre, 1410 m, 10 March 1979, *Beck, St.G. 416* (LPB, MO, U); Nor Yungas, Coroico 39 km hacia La Paz, 3100 m, 13 March 1979, *Beck, St.G. 579* (LPB [not seen], MO, NY); Nor Yungas, Caranavi hacia Alto Beni, de Carrasco 23 km hacia Bella Vista, 1200 m, 5 May 1989, *Beck, St.G. 17210* (LPB [not seen], NY, U); Franz Tamayo, Apolo 52 km hacia Charazani, pasando Correo, Campamento Calabatea, 1550 m, 7 June 1990, *Beck, St.G. & Foster 18579* (LPB [not seen], NY); Sud Yungas, de Chulumani unos 5 km hacia Irupana, entrando hacia Apa Apa, 16°21'S, 67°30'W, 2000 m, 20 March 2000, *Beck, St.G. et al. 24780* (LPB [not seen], NY); Mapiri Region, San Carolos, an einem Waldwege, 850 m, 1 April 1927, *Buchtien 1186* (US ["*Macrocarpaea buchtienii* Gilg" ined] [2 sheets]); Hacienda Simaco sobre el camino a Tipuani, 1400 m, 1 February 1920, *Buchtien 5639* (GH, NY ["*Macrocarpaea buchtienii* Gilg", ined], US); P.N. Madidi, Mojos, campamento Fuertecillo, sobre la senda a Queara, 14°35'41"S, 68°55'29"W, 1777 m, 28 April 2007, *Cayola, L. et al. 2681* (NY); P.N. Madidi, Mojos, campamento Fuertecillo, sobre la senda a Queara, 14°36'10"W, 68°56'22"W, 1935 m, 5 May 2007, *Cayola, L. et al. 2831* (NY); P.N. Madidi, entre Mojos y Queara sector entre Tocoaque y Fuertecillo, 14°36'12"S, 68°56'19"W, 2016 m, 1 March 2008, *Fuentes, A. & J. Quisbert 12215* (LPB [not seen], MO, NY); Franz Tamayo, P.N. Madidi, quebrada Jatun Chiriuno, 31 km en linea recta al este de Apolo por el camino a San José de Uchupiamonas, 1850–1900 m, 4 July 2002, *Fuentes, A. & R. Alvares 4816* (LPB [not seen], MO, U); Franz Tamayo, Correo, primeras manchas de bosque primario con *Dictyocaryum* por la carretera a Charanzani, 1500 m, 29 April 2005, *Fuentes, A. et al. 7600* (LPB [not seen], MO); Franz Tamayo, P.N. Madidi, entre Chunkani y Tokoake, 2673 m, 25 June 2005, *Fuentes, A. et al. 8761* (LPB [not seen], MO); Franz Tamayo, P.N. Madidi, Lagunillas, entre Tokoake y Carjata, 2097 m, 28 June 2005, *Fuentes, A. et al. 8936* (LPB [not seen], MO); P.N. Madidi, Mojos, sector Lagunillas, por el camino a Quara, parcela temporal 217, 14°36'45"S, 68°56'37"W, 2015 m, 28 April 2007, *Fuentes, A. et al. 11496* (LPB [not seen], NY); P.N. Madidi, Mojos, sector Lagunillas, por el camino a Queara, parcela temporal 217, 14°36'45"S, 68°56'37"W, 2015 m, 28 April 2007, *Fuentes, A. et al. 11511* (LPB [not seen], NY); P.N. Madidi,

entre Mojos y Queara sector entre Lagunillas y Fuertecillo, 14°36'12"S, 68°56'19"W, 2016 m, 3 March 2008, *Fuentes, A. et al. 12277* (LPB [not seen] MO, NY); Nor Yungas, 4 km NE (above) Incahuara, 13.5 km above San Pedro, trail to 12 de Octubre; steep cloud forest with distinct dry season (bp-ST sensu Holdridge), Transect # 4., 15°55'S, 67°35'W, 1500–1530 m, 23 January 1984, *Gentry, A.H. & Solomon, J.C. 44537* (MO); Valley of the Río Zongo, 1/2 to 3/4 of hour by trail down river from the Hydroelectric Plant at Cahua, 16°05'S, 68°03'W, 1400–1600 m, 22 April 1982, *Solomon, J.C. 7492* (BOLV [not seen] MO [2 sheets], SEL, U [2 sheets]); 13.0 km al noroeste del camino entre Yolosa y Caranavi, por el camino a Suapi, al lado del Río Khusillani (ca. 1 km antes de la comunidad Khusillani), 1500 m, 27 May 1988, *Solomon, J.C. 9275* (MO [not seen]); Prov. Nor Yungas, 13.7 km NW of San Pedro on road through Incahuara-Mejillones and along trail to 12 de Octubre, 15°58'S, 67°37'W, 1500 m, 12 February 1983, *Solomon, J.C. 9501* (MO [2 sheets]); Nor Yungas, 13 km al noroeste del camino entre Yolosa y Caranavi, pr el camino a Suapi, al lado del Río Khusillani (ca. 1 km antes de la comunidad Khusillani), 16°08'S, 67°46'W, 1500 m, 27 May 1988, *Solomon, J.C. 18456* (MO).

3. *Macrocarpaea cochabambensis* Gilg-Ben., Notizbl. Bot. Gart. Berlin 13: 381. 1936. TYPE: BOLIVIA. Cochabamba: Prov. Chapare, Incachaca, 2300 m, 30 January 1929, *Steinbach, J. 8992* (type B? [destroyed]; Lectotype: NY, selected by Grant 2005: 47; Isolectotypes: BM, E, G, MO, S, U, Z). Fig. 1A–F.

Shrub, 4–10 m, hyaline hispid to spiculate with short simple hairs on stems, petioles, leaves, inflorescences, bracts and calyces. Stems terete to slightly quadrangular above, solid to hollow, 6–13 mm diam. just below the inflorescence. Leaves ovate, elliptic to obovate, short-petiolate, 12–32 × 10–55 cm long. Petioles robust with strong open vagination one half to nearly equaling the length of the petiole; interpetiolar ridge 2–3 mm. Blades 11–30 × 7–15 cm, entire, not revolute, dark green, with slightly impressed veins above, and slightly raised veins below, hyaline hispid to spiculate throughout especially along veins on lower surface, papery thin, to thin coriaceous; base acuilateral to oblique, cuneate to attenuate and decurrent on the petiole; apex rounded, obtuse to acute. Inflorescence a much branched open

thyse, 20–50+ cm; branches 12–50 cm long, 5–9 flowered per branch. Bracts widely varying in shape and size depending on position in the inflorescence; generally large, leaf-like, elliptic to ovate; sessile to petiolate, 15–90 × 4–65; base aequilateral, oblique, cuneate to rounded; apex acute to obtuse; bract petioles 0–8 mm. Flowers pedicellate, erect; pedicels 5–20 mm long; bracteoles lanceolate to linear, 5–16 × 2–5. Calyx campanulate, 10–13 × 7–11 mm, hyaline hispid to spiculate with short simple hairs, green, ecarinate; calyx lobes broadly reniform, 3–5 × 5–8 mm, apex rounded to flattened. Corolla funnel-shaped, 30–45 mm long, 15–20 mm wide at the apex of the tube, pale yellow (*Ritter & Wood* 2700), pale yellow-green (Solomon 9226), greenish cream (*Gentry* 44200), smooth; corolla lobes ovate, 7–18 × 7–16 mm, apex obtuse to rounded. Stamens 20–25 mm long; filaments 15–18 mm long, filiform, flattened; anthers elliptic, 5–7 × 1.5–2.0 mm, sagittate, versatile. Pollen glabra-type (sensu Nilsson 1968; Grant 2005). Pistil 32–34 mm long; ovary 3–5 × 3–4 mm; style 27–29 × 0.5–1.0 mm; stigma lobes spatulate, 2–4 × 1–2 mm. Capsules ellipsoidal to oblong, 25–35 × 8–12 mm, shiny smooth to pustulate, straw-colored to dark brown, erect to slightly spreading; style remnant 5–12 mm long. Seeds “Perimetrically winged type” (sensu Grant 2005), flattened, square to rectangular in outline, 0.9–1.1 × 0.5–0.9 mm, straw-colored, testa reticulate, wings ribbed.

Morphology and similarities: According to the molecular studies (Struwe et al. 2009; Grant unpublished), *Macrocarpaea cochabambensis* appears sister to the large crown clades of sections *Choriophylla* and *Magnolifoliae*, and is not closely related to any species currently analyzed. It is certainly unique in the genus in its broadly reniform and hispid calyx lobes that are combined characters not known in any other species.

Distribution and habitat: Cloud forests of the Andes, 2100–3050 m, endemic to Cochabamba and La Paz provinces of Bolivia.

Etymology: Named for the Department Cochabamba of Bolivia, itself derived from the Quechua language words “qucha” meaning lake, and “pampa” meaning plain.

Specimens examined: Bolivia. Cochabamba: Carrasco, Sehuencas-Pajcha, 2100 m, 17 February 2005, *Alcazar & Altamirano* 303 (MO); Carrasco, Sehuencas-Pajcha, 2200 m, 16 February 2005, *Fernández, E. & Altamirano*

3105 (MO); Prov. Chapare, the road to Corani Pampa, approximately 5 km from the highway to the Chapare, Bosque húmedo montano, 2520 m, 9 December 1995, soft-wooded shrub up to 3 m, on rocky hillside above road in disturbed habitat, locally abundant and commonly encountered elsewhere, corolla pale yellow with a waxy appearance, *Ritter & J. Wood* 2700 (BOLV [not seen], LPB, MO, W); Chapare, ca. 5 km along Corani Pampa road from Chapare-Cochabamba highway, 2550 m, 9 December 1995, *J. Wood* 10204 (K). La Paz: Nor Yungas, de la cumbre bajando 30 km hacia Chuspipata, pasando Cotapata, 2980 m, 21 July 1990, *Beck, St.G.* 17705 (LPB [not seen], NY, U); Nor Yungas, pasando Unduavi fin del asfalto, Cotopata, 3000 m, 11 September 1994, *Beck, St.G.* 21458 (LPB [not seen], NY); Prov. Sud Yungas, Chulumani, subiendo 6 km, arriba pasando la granja Mejillones 16°24'11"S, 67°34'02"W, 2400 m, 29 December 2006, *Beck, St.G. et al.* 29673 (LPB [not seen], NY); Franz Tamayo, P.N. Madidi, bajando de Ichocorpa hacia Chuncani, camino entre Queara y Mojos, 14°39'06"S, 68°57'27"W, 3050 m, 21 April 2007, *Fuentes, A. & F. Zenteno* 11353 (LPB [not seen], MO, NY); P.N. Madidi, entre Queara y Mojos, campamento Chuncani y alrededores, 14°38'19"S, 68°57'33"W, 2900 m, 27 February 2008, *Fuentes, A. & J. Quisbert* 12068 (LPB [not seen], MO, NY); Bautista Saavedra, Area Natural de Manejo Integrado Apolobamba, sector Tajarmarca, más allá de Chaka, por el antiguo camino Laji Soropata-Apolo, 14°52'12"S, 68°46'28"W, 2906 m, 12 April 2009, *Fuentes, A. & M. Vilalobos* 14020 (LPB [not seen], MO, NY); Nor Yungas, near Chuspipata, la selva cloud forest, 16°17'S, 67°50'W, 2800 m, 13 January 1984, *Gentry, A.H. et al.* 44200 (LPB, MO, NY, U [2 sheets]); Inquisivi Prov., “Negro Khota,” slopes of Cerro Negro Khota ca. 3–4 km N of Comunidad Sita, 7 km N of Inquisivi, 16°50'S, 67°08'W, 3000 m, a 10 m high tree in the forest, fruiting stalks pendent, and about 70–100 cm long, frond-like, 14 July 1990, *Lewis* 37463 (COL, MO, NY, U); Above Coroico, 1830–2135 m, December 1865, *Pearce s.n.* (K [3 sheets]); Near Yungas, 1219 m, 1 January 1885, *Rusby* 1172 (NY [“type” “M. gilgiana Rusby” ined] [2 sheets]); Nor Yungas, 2.6 km below Chuspipata on road to Yolosa, 16°17'S, 67°48'W, 2750 m, cloud forest on very steep slopes, little disturbance, tree 4 m, corollas pale yellow-green, seen visited by hummingbird, 14 January 1983,

Solomon, J.C. 9226 (BOLV [not seen], MO [2 sheets], SEL [2 sheets], U [2 sheets]).

Over the years, I have annotated several sheets of Bang 8992 with a “b” number, as “Bang 8992b” (F, G, GH, K), because they actually represent *Macrocarpaea cinchonifolia*.

4. *Macrocarpaea fuentesii* J. R. Grant, *sp. nov.*

TYPE: BOLIVIA. Dpto. La Paz: Prov. Franz Tamayo, Area Natural de Manejo Integrado Apolobamba, Laji-Soropata, sector Waturuyo, bajando del camino, antes de pasar el río Laji, bosque secundario de yungas en ceja de monte inferior pluvial, con *Clusia*, Ericaceae spp., arbusto ca. 4 m, botones y flores amarillentoverdosas, carnosas, cáliz anguloso, aroma entre agradable a jazmin y rancio, hojas de inflorescencia con un par de glándulas basales por el envés, frutos viejos, silicagel, foto, alcoholizada, 14°53'14.0"S, 68°51'14"W, 3218 m, 25 June 2010, A. Fuentes, E. Chavez & D. Alanes 16811 (Holotype: NY [3 sheets]; isotype LPB [not seen]). Fig. 2.

A *Macrocarpaea weigendiorum* J. R. Grant et *Macrocarpaea zophoflora* Weaver & J.R. Grant *cui affinis, sed calycibus carinatis et longioribus differt.*

Shrub, 2–7 m, hyaline hispid to spiculate with short simple hairs on stems, petioles, leaves, inflorescences, bracts and calyces. Stems terete to slightly quadrangular above, solid to hollow, 8–22 mm diam just below the inflorescence. Leaves broadly elliptic, petiolate, 43–53 cm long. Petioles 75–110 mm, robust with strong open vagination one half the length of the petiole; interpetiolar ridge 9–12 mm. Blades 33–44 × 17–24 cm, entire, not revolute, dark green, with slightly impressed veins above, and slightly raised veins below, hyaline hispid to spiculate throughout especially along veins on lower surface, papery thin; base aequilateral to oblique, distinctly auriculate; apex obtuse to acute. Inflorescence a much branched open thyrse to 25–70+ cm; branches 20–70 cm long, 5–9 flowered per branch. Bracts oblong, elliptic, ovate to lanceolate, sessile to petiolate, 22–85 × 6–44 mm; base aequilateral to oblique, cuneate, rounded to short-attenuate; apex acute to obtuse; bract petioles 0–10 mm. Flowers pedicellate, erect; pedicels 20–23 mm long, distinctly angled; bracteoles linear to lanceolate, 10–16 × 2–3 mm. Calyx campanulate, 22–25 × 10–17, hyaline hispid to spiculate with short simple hairs, green, ecarinate on calyx lobes, but distinctly

carinate on calyx tube, keels to 0.5–2 mm; calyx lobes ovate to rotund, 7–12 × 7–15 mm, obtuse to rounded, often splitting at the apex. Corolla funnel-shaped, 64–65 mm long [85 mm long as liquid-preserved], 25–30 mm wide at the apex of the tube, yellowish-green (Fuentes 16811), smooth; corolla lobes ovate to reniform, 13–15 mm [19–21 mm as liquid preserved] × 10–12 mm [23–25 mm as liquid preserved], rounded to obtuse, edges involute. Stamens 38–45 mm long as liquid preserved; filaments 27–33 mm wide as liquid preserved, filiform, flattened; anthers elliptic, 8–10 mm [11–12 mm as liquid preserved] × 2–3 mm [4–5 mm as liquid preserved], sagittate, versatile; pollen glabra-type (sensu Nilsson 1968; Grant 2005). Pistil at least 50 mm, but of the only specimen available the pistil is immature; ovary 10–13 × 5–6 mm; style and stigma unknown. Capsules ellipsoidal to oblong, 35–40 × 12–14 mm, faintly wrinkled to ribbed, dark brown, erect to slightly spreading; style remnant 5–8 mm long. Seeds “Perimetrically winged type” (sensu Grant 2005), flattened, square to rectangular in outline 1.1–2.0 × 0.6–1.0 mm, straw-colored, testa reticulate, wings ribbed.

Morphology and similarities: *Macrocarpaea fuentesii* has as unique calyx reminiscent of *M. weigendiorum* in that both species are strongly keeled, yet the latter is completely glabrous and much smaller. Rather, *Macrocarpaea fuentesii* appears to be related to *M. maguirei* and *M. zophoflora* due to similarly robust leaves with auriculate bases, glabrous-type pollen, perimetrically-winged seeds, and high-elevation habitat (2700–3300 m). It differs notably from both in its calyx where it is strongly keeled on the unlobed portion of the calyx, and 22–25 mm long (vs. 15–20 mm in *M. zophoflora*, and 9–14 mm long in *M. maguirei*).

Distribution and habitat: Cloud forests of the Andes, 3218–3327 m, endemic to La Paz province of Bolivia.

Eponymy: Named for Alfredo Fernando Fuentes Claros (1971–), a Bolivian botanist at the Herbario Nacional de Bolivia (LPB) and collector of the type. This material was collected under the auspices of the Proyecto Madidi, collaboration between the Missouri Botanical Garden Herbarium (MO) and the Herbario Nacional de Bolivia (LPB). Fuentes was the first collector of this species. However since this was sterile (*Fuentes 13887*), he returned a year later to collect flowering material (*Fuentes 16811*).



FIGURE 2. *Macrocarpaea fuentesii* J. R. Grant. A, leaf; B, branch of the inflorescence; C, flower; D, flower cross-section and pistil; E, anthers; F, capsules. Drawn from *Fuentes 16811* (NY) by Bobbi Angell.

Paratypes: BOLIVIA. La Paz: Bautista Saavedra, Area Natural de Manejo Integrado Apolobamba, sector Codo, más allá del campamento, antes de subir al cerro mas alto (Buena Vista), por el antiguo campino Sorapata-Apolo, bosque bajo montano de yungas, en ceja de monte interior pluvial, en filo de serranía, arbolito monopodial, 2.3 m, estéril, 14°53'04"S, 68°46'15"W, 3327 m, 6 April 2009, *A.F. Fuentes & S. Achá 13887* (MO); Franz Tamayo, Area Natural de Manejo Intefrado Apolobamba, Chaka, 200 m al SW del campamento minero, parcella temporal de muestreo (0,1 ha), bosque ceja de monte, abundantes musgos en troncos,

ramas y suelo, ladera empinada W, arbolito 3.6 m, 8.5 cm PAP, corteza externa amarilla, interna fibrosa, estéril, 14°53'07"S, 68°46'38"W, 3243 m, 21 August 2009, *M. Cornejo, M. Quiñones, F. Delgado, V. Fernandez & J. Carhuari 860* (MO); Franz Tamayo, Area Natural de Manejo Intefrado Apolobamba, Chaka, campamento minero, sendero Apacheta–El Codo, bosque ceja de monte con Bromeliaceae, Asteraceae, Cunoniaceae, filo de cerro, 14°53'06"S, 68°46'42"W, 3315 m, arbolito 7 m botones florales verdes, flores verde amarillentas, 21 August 2009, *M. Cornejo 931A* (MO).

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