
Synopsis of *Plinia* (Myrtaceae) in Mesoamerica

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ABSTRACT. The 14 species of *Plinia* known from Mesoamerica are reviewed. Eight new species are described and illustrated: one from Nicaragua, *P. nicaraguensis*; two from Costa Rica, *P. guanacastensis* and *P. moralesii*; and five from Panama, *P. cerrocampanensis*, *P. coclensis*, *P. darienensis*, *P. gentryi*, and *P. panamensis*. One species, *P. salamancana*, is transferred from *Eugenia*. A key to the Mesoamerican species is provided.

RESUMEN. Se examinan las 14 especies de *Plinia* conocidas de Mesoamérica. Se describen y ilustran ocho nuevas especies, una de Nicaragua, *P. nicaraguensis*, dos de Costa Rica, *P. guanacastensis* y *P. moralesii* y cinco de Panamá, *P. cerrocampanensis*, *P. coclensis*, *P. darienensis*, *P. gentryi* y *P. panamensis*. Se transfiere una especie, *P. salamancana*, de *Eugenia*. Se provee una clave para las especies de Mesoamérica.

Key words: Costa Rica, Mesoamerica, Myrtaceae, Nicaragua, Panama, *Plinia*.

This report is the product of a revision of *Plinia* L. undertaken for the Flora Mesoamericana Project. *Plinia* is a Neotropical genus of shrubs and small trees, occurring from Brazil and Peru north to the West Indies and Cuba, and westward to Panama, Costa Rica, Nicaragua, and Belize. The genus is characterized by flowers with the hypanthium prolonged beyond the summit of the ovary, a calyx fused and nearly closed in bud that splits at anthesis into four irregular lobes, and a bilocular ovary with two locules per ovule. The fruit is a single- or several-seeded berry; the seeds have a papery coat enclosing an embryo with two large, plano-convex cotyledons and a reduced, indistinct hypocotyl. The fleshy fruits place *Plinia* in Myrtaceae tribe Myrteae, along with nearly all New World Myrtaceae; the embryo characters place it in the subtribe Eugeniinae (McVaugh, 1968; Landrum & Kawasaki, 1997).

Recent estimates of the number of species in *Plinia* have ranged from as few as 6 (Sánchez Vindas, 2001) to approximately 30 (McVaugh, 1989). The newly described taxa presented here raise the es-

timate to ca. 40 species. The nearly seven-fold difference is indicative of the confusion as to what, exactly, constitutes a *Plinia*. The core group of species in *Plinia*, including all known Mesoamerican taxa, shares with the type species, *P. pinnata* L., the character of sessile or subsessile flowers grouped in cauliflorous, glomerate inflorescences that are subtended by up to 10 pairs of prominent, decussate bracts superficially resembling an involucre (McVaugh, 1968). However, several authors have increased the number of included species by weighting certain floral characters and discounting inflorescence structure. Kausel (1956) transferred three species from *Myrciaria* (*M. cauliflora*, *M. jacobitcaba*, and *M. trunciflora*) solely on a single character of the embryo, the presence of separate, plano-convex cotyledons. But in at least one of these species, *Myrciaria cauliflora* (Martius) O. Berg, the flowers have a tubular hypanthium, circumscissile at the base and falling as a unit with the perianth and androecium after anthesis (M. L. Kawasaki, pers. comm.). This character is common to all *Myrciaria*, but is otherwise unknown in *Plinia*. McVaugh (1958, 1963) referred to *Plinia* any eugenioid species with floral characters as described above. Included were species with axillary, racemose inflorescences and pedicellate flowers (e.g., *Plinia clausa* McVaugh).

Kausel and/or McVaugh have been followed by some subsequent authors (e.g., Rotman, 1982; Sobral, 1993; Kawasaki & Holst, 2002), though with varying degrees of enthusiasm. Landrum and Kawasaki (1997: 532) described *Plinia* as "an arbitrarily defined group." McVaugh himself considered it a "heterogeneous assemblage" (1963: 507); his inclusion of the racemose taxa was provisional, pending reevaluation when better data on the generic limits became available. The confusion is not unique to *Plinia*, but indicative of the current unsettled state of generic concepts in the Eugeniinae. The issue will not be satisfactorily resolved until a comprehensive analysis of the subtribe is performed.

The Mesoamerican species of *Plinia* are shrubs

or small trees, 10 m or shorter, of evergreen lowland and montane forests and cloud forests. All have the floral and inflorescence characters of the *Plinia* "core group." The bark is smooth, white, gray, or brown, and exfoliates in plates. Vestiture is composed of straight or recurved, simple trichomes, 0.5–3 mm long, and is quite dense on young growth.

The branchlets are weakly to strongly compressed near the outermost nodes. They are bilaterally channeled between the two outermost nodes in *Plinia guanacastensis*, *P. nicaraguensis*, and *P. panamensis*. Young growth is sericeous or velutinous, the trichomes are simple, 0.5–3 mm long, erect or recurved, and typically white or golden-brown. The vestiture thins but persists with age.

Unlike *Eugenia*, where terminal, vegetative buds tend to be rather uniform and unremarkable, in *Plinia* they often have species-specific characters. The buds are ovate to broadly ovate, up to 1 cm long, and protected by 8 to 14 ovate to broadly ovate, imbricate scales, which vary among species in size, shape, and vestiture. When a bud breaks, the inner scales tend to enlarge and change shape. However, the outer 2 to 4 scales retain their conformation and, when present, are often useful for identification. The most significant characters of the scales are general shape, whether or not the back is carinate, the shape of the apex, whether rounded, acute, or acuminate, and whether or not the margins are scarious or ciliate. The form of the inflorescence bracts often approximates that of the vegetative bud scales.

The leaves in *Plinia* are petiolate. The blades are narrowly elliptic or lanceolate to elliptic or ovate. Emergent leaves are commonly sericeous or arachnoid, densely covered with simple, white trichomes up to 3 mm long. This covering is soon lost; in mature leaves the vestiture is thinner, usually composed of trichomes shorter than 1 mm and often restricted to the midvein or to one side of the leaf. Venation is brochidodromous; the submarginal vein formed by the lateral veins as they curve to meet the next succeeding lateral vein may be prominently looped if the lateral veins are few and rather remote from the margin, as in *P. salticola* McVaugh, or it may appear straight if it is close to the margin or if the lateral veins are numerous, as in *P. panamensis*. The veins may be weakly convex or flush with the surface of the blade (e.g., *P. darienensis*) or moderately to deeply impressed in the upper surface (e.g., *P. panamensis*). Leaf bases, typically cuneate, are cordate in *P. panamensis* and subcordate to abruptly truncate in *P. cerrocampanensis*. Excepting *P. gentryi*, which has acute or acuminate,

bluntly tipped leaves, leaf apices are acuminate to caudate, with a sharply pointed tip. Petioles are terete or flattened dorsally, with pubescence that tends to match the branch to which it is attached more than it does the blade.

The glomerate inflorescences are borne on the trunks and larger branches. The bracts subtending the inflorescence are persistent and conspicuous in flower, though at times obscured by mature fruit. The identifying characters are similar to those of the vegetative bud scales: shape, apices, margins, and vestiture. The 2 to 10 flowers are sessile, borne in pairs, and subtended by a pair of bracteoles that are similar to the bracts.

The flowers are 4-merous, with the hypanthium prolonged into a tube above the summit of the ovary. The size and shape of the hypanthium, the degree to which it is ribbed, and vestiture type provide useful, species-level characters. The calyx is fused and nearly closed in bud, the tips of the calyx lobes outlining a terminal pore. At anthesis, the calyx tears irregularly into 4 lobes and reflexes. The petals are caducous and rarely found in herbarium collections. They are white with irregular margins and, in the few specimens seen, pubescent on both surfaces. The stamens are numerous, borne in a ring at the base of the calyx lobes that is presented as the calyx reflexes. Like the petals, the stamens are apparently quickly lost and infrequently seen in specimens. The ovary is 2-loculed, with 2 ovules per locule. The single style is glabrous.

The fruit is a weakly to strongly compressed berry, usually single-seeded, 3–12 cm in diameter. The pericarp is succulent when ripe, yellow or orange with a sweet odor. Ribbing may be present or absent. The membranous seed coat surrounds the embryo of a reduced hypocotyl and two massive, separate, plano-convex cotyledons. In some species the embryo is purple or reddish purple.

***Plinia* L., Sp. Pl. 516. 1753. TYPE: *Plinia pinnata* L.**

KEY TO THE MESOAMERICAN SPECIES OF *PLINIA*

- 1a. Leaves 5.5–10 cm long.
 - 2a. Leaves elliptic or oblong, coriaceous.
 - 3a. Lateral veins 10 to 14 per side, the leaf apex acute or acuminate, the tip 1–5 mm, blunt or rounded 5. *P. gentryi*
 - 3b. Lateral veins 16 to 22 per side, the leaf apex acuminate or caudate, the tip 10–25 mm, sharply pointed 13. *P. salamancana*
 - 2b. Leaves lanceolate or narrowly elliptic, chartaceous.

- 4a. Lateral veins 14 to 15 per side; fruits lenticular 2. *P. coclensis*
- 4b. Lateral veins 15 to 25 per side; fruits oblate or subglobose 12. *P. puriscalensis*
- 1b. Leaves 9–40 cm long.
 - 5a. Lateral veins 20 or more per side.
 - 6a. Leaf base cordate . . . 9. *P. panamensis*
 - 6b. Leaf base cuneate.
 - 7a. Lateral veins inscribed or impressed in the upper leaf surface 11. *P. povedae*
 - 7b. Lateral veins flat or slightly convex 4. *P. darienensis*
 - 5b. Lateral veins fewer than 20 per side.
 - 8a. Lateral veins flat or slightly convex on both surfaces; not prominent.
 - 9a. Lateral veins 6 to 10 per side 14. *P. salticola*
 - 9b. Lateral veins 12 to 18 per side.
 - 10a. Leaf blades 9–12 cm, the petioles 5–10 mm; Belize . . . 10. *P. peroblata*
 - 10b. Leaf blades 9–21 cm, the petioles 15–20 mm; Costa Rica . . 7. *P. moralesii*
 - 8b. Lateral veins inscribed in the upper leaf surface, prominent on the lower leaf surface.
 - 11a. Leaf tips 15–20 mm.
 - 12a. Glands on the lower leaf surface numerous, red or brown, distinct 1. *P. cerrocampanensis*
 - 12b. Glands on the lower leaf surface numerous, concolorous and indistinct 6. *P. guanacastensis*
 - 11b. Leaf tips 20–40 mm.
 - 13a. Leaf tips 20–30 mm; petioles 12–20 mm 8. *P. nicaraguensis*
 - 13b. Leaf tips 30–40 mm; petioles 8–10 mm 3. *P. cuspidata*

1. *Plinia cerrocampanensis* Barrie, sp. nov.
TYPE: Panama. Panamá: Cerro Campana, 800–1000 m, 3 Apr. 1972, A. Gentry 4944 (holotype, MO; isotype, F). Figure 1.

Species haec a *Plinia cuspidata* foliis laminis basibus cordatis vel truncatis et apicibus brevioribus differt.

Shrubs or trees to ca. 6 m; young growth velutinous, the trichomes 2–3 mm, coarse, coppery at first, turning white, branchlets compressed below the terminal node, the bark red, velutinous, ultimately white, glabrate; outer scales of the vegetative buds 3–6 × 2–3 mm, ovate, carinate dorsally, pubescent, the margins scarious-ciliate, the apex acuminate or apiculate. Leaves narrowly elliptic or elliptic, the blades 10–20 × 3.5–6.5 cm, 2.5–3.7

times as long as wide; chartaceous; drying green above, paler green or yellow below, the veins commonly red or brown on the lower surface; midvein flat or convex on both surfaces; lateral veins 10 to 14 per side, inscribed in the upper surface, prominent on the lower surface; submarginal veins similar to the laterals and arched between them, 2–3 mm from the margins; surfaces of young leaves sericeous or arachnoid, the trichomes 2–3 mm, slender, white, the upper surface ultimately glabrate or with a few persistent trichomes, often near the base, the midvein puberulent, the lateral veins glabrate, the lower surface persistently pubescent, the trichomes ca. 2 mm, contorted, the midvein and lateral veins puberulent; glands numerous and small, red or brown on the lower surface; base subcordate or abruptly truncate; margins entire; apex abruptly acuminate, the tip 15–20 mm, sharply pointed; petioles 10–15 mm, terete or flattened dorsally, coarsely puberulent, the vestiture similar to the branchlets. Inflorescence cauliflorous, sessile, flowers ca. 8; bracts 2–5 × 1.5–3 mm, ovate, the back carinate, the base rounded, tomentose, the margins scarious-ciliate, the apex acuminate, paired in ca. 4 decussate ranks; buds 8–10 mm, pyriform, the ovary tomentose, the trichomes ca. 2 mm, white, the calyx glabrous, glandular, the pore 1–2 mm diam., the tips of the calyx lobes ciliate. Flowers sessile; bracteoles ca. 6 × 2 mm, lanceolate, the outer surface tomentose, the base rounded, the margins scarious-ciliate, the apex acuminate; hypanthium campanulate, the tube extending 2–3 mm beyond the summit of the ovary, the throat glabrous, ca. 4 mm diam. at the base of the staminal ring; calyx lobes 2–3 × 2–3 mm, oblong or obovate, both surfaces glabrous, the apex broadly acute, ciliate; petals 3–4 × 2.5–3 mm, obovate, white, both surfaces puberulent, the trichomes ca. 0.1 mm, the margins and apex irregular, ciliate; stamens ca. 200, 5–7 mm; style ca. 10 mm. Fruits 30–50 × 40–60 mm, oblate or turbinate; pericarp fleshy with numerous, indistinct, vertical ridges, sparsely pubescent; mature color yellow or orange.

Habitat, distribution, and phenology. Ridge-top cloud forests and adjacent Atlantic slope montane wet forests in the Parque Nacional Altos de Campana, Panama, 700–1000 m. Collected in flower May to July; collected in fruit March to May.

Plinia cerrocampanensis is distinguished by the carinate bud scales and inflorescence bracts with acuminate to apiculate apices and the narrowly elliptic leaves, 10–20 cm long, with subcordate or abruptly truncate bases and numerous, small red glands on the lower surface. The other Panamanian



Figure 1. *Plinia cerrocampaensis* Barrie (Gentry 4944; holotype, MO).

species with cordate leaf bases, *P. panamensis*, has broader and typically much longer leaves (14–30 cm) with numerous, deeply inscribed lateral veins. The ovate, dorsally carinate bracts with acuminate apices are similar in shape, though about twice

the size, to those of *P. cuspidata* Gómez-Laurito & Valverde. The two may be distinguished by several leaf characters, among them the apices, which are caudate-aristate in *P. cuspidata*, with the acumen 30–40 mm long. The leaf bases are cuneate, and

the glands on the undersurface are green or clear, not red. This is one of three Panamanian species, the others being *P. coclensis* and *P. gentryi*, that occur in isolated patches of low-elevation cloud forests along the Continental Divide. These habitats are known to be rich in endemics (Myers, 1969; Lewis, 1971).

Paratypes. PANAMA. **Panamá:** Cerro Campana, Busey 848 (MO); P. N. Altos de Campana, sendero del Tigre, Correa A. & Montenegro 9543 (F), Espinosa et al. 709 (F), Galdames 745 (F), Galdames et al. 4318 (MO); Sendero de Interpretación, 1 km al E del Campamento de los guardabosques de INRENARE, Correa A. & Montenegro 9623 (F), Galdames 1106 (F); Recorrido por el sendero a un costado del Camino Zamora, Correa A. & Montenegro 11150 (F); Cordillera del Llorón, Galdames et al. 3796 (F, MO); upper slopes of Cerro Campana within the boundary of the national park administered by RE-NARE, LeDoux 2578 (MO).

2. *Plinia coclensis* Barrie, sp. nov. TYPE: Panama. Coclé: summit at Alto Calvario, low montane cloud forest, ridge-type vegetation, 4 Apr. 1977, J. P. Folsom & R. Robinson 2399 (holotype, MO; isotypes, F, MO). Figure 2.

Pliniam puriscalensem aemulans, sed foliis nervis paucioribus et fructibus lenticularibus differt.

Shrubs or trees, 1.5–5 m; young growth sericeous, the trichomes white, 1–2 mm. Branchlets slender, weakly compressed at the upper nodes; bark red, smooth, ultimately glabrate or with a few persistent trichomes; the outer scales of the vegetative buds broadly ovate, 1–2 × 1–2 mm, the back carinate, glabrous, the margins ciliate, the apex acute. Leaves narrowly elliptic or lanceolate, the blades 5.5–8 × 1.5–2.2 cm, 3–4.4 times as long as wide; chartaceous; drying a concolorous green; midvein flat or convex on the upper surface, convex on the lower surface; lateral veins 14 to 15 per side, obscure on one or both surfaces of mature leaves; submarginal veins similar to the laterals and weakly arched between them, ca. 2 mm from the margins; the upper and lower surfaces glabrate or persistently puberulent near the base of the midvein; glands minute, obscure on mature leaves; base cuneate; margins cartilaginous; apex caudate, the tip 15–25 mm; petioles 8–10 mm, puberulent, ultimately glabrate; terete or weakly compressed dorsally. Inflorescences, flowers, and attached fruits not seen. Fruits 10–20 × 20–40 mm, lenticular; pericarp fleshy, obscurely ribbed, glabrous; mature color unknown.

Habitat, distribution, and phenology. Wet forests, Pacific Slope, Coclé Province, Panama, 400–900 m. Collected in fruit January to April.

Plinia coclensis is distinguished by the carinate, broadly ovate bud scales with acute apices, the narrowly elliptic leaves with cuneate bases, and strongly lenticular fruits that are obscurely ribbed and glabrous. The leaves are similar in size and shape to those of the Costa Rican species *P. puriscalensis* P. E. Sánchez & Q. Jiménez, which has oblate or subglobose, rather than lenticular, fruits.

Paratypes. PANAMA. **Coclé:** Coclecito Road, transection from 1 mi. beyond divide to ridge top, de Nevers et al. 6746 (F, MO); 7 km N of Llano Grande on road to Coclesito, Hammel 1944 (MO).

3. *Plinia cuspidata* Gómez-Laurito & Valverde, Lankesteriana 3: 11. 2002. TYPE: Costa Rica. Limón: Talamanca, Bratsi, Buena Vista, Finca ACODEFO, 25 Nov. 2000, O. Valverde & S. Mora 1339 (holotype, USJ).

Illustration. Gómez-Laurito & Valverde, Lankesteriana 3: 12; f. 1. 2002.

Shrubs or trees, to 15 m; young growth sericeous, the trichomes 1–3 mm, white. Branchlets compressed and bilaterally grooved immediately below the terminal nodes; bark reddish brown, villosulous, the trichomes 0.3–0.5 mm, straight and recurved, brown, ultimately sordid; outer scales of the vegetative bracts 1–3 × 1–1.5 mm, ovate, carinate, appressed-pubescent on the outer surface, the margins scarious, the apex acuminate. Leaves elliptic, the blades 13–23 × 5–10 cm, 2–3 times as long as wide, chartaceous, drying a concolorous green; midvein convex between two parallel grooves on the upper surface, prominent on the lower surface; lateral veins 14 to 18 per side, shallowly to deeply inscribed in the upper surface, prominent on the lower surface; submarginal veins similar to the laterals and weakly arched between them, 4–5 mm from the margins; the upper surface ultimately glabrate, the midvein glabrate or persistently pubescent, the trichomes erect or recurved, ca. 2 mm, the lower surface persistently but sparsely pubescent, the trichomes 0.3–0.5 mm, the midvein and lateral veins pubescent to tomentose; glands numerous on both surfaces, obscure above on mature leaves; base cuneate to obtuse or rounded; margins planate; apex abruptly caudate acuminate, the tip 30–40 mm, sharply pointed; petioles 8–10 mm, villosulous, similar to the branchlets, terete. Inflorescences cauliflorous, sessile, flowers 4 to 10; bracts 1.5–3.5 × 1.5–3 mm, lanceolate to ovate, sparsely pubescent to tomentose on the outer surface, the margins scarious-ciliate, the apex acute, paired in 4 decussate ranks; buds 9–10 mm, pyriform, tomentose, the pore 1–2 mm across. Flowers sessile;



Figure 2. *Plinia coclensis* Barrie (Folsom & Robinson 2399; holotype, MO).

bracteoles ca. 2 × 1 mm, lanceolate or ovate, tomentose, the margins scarious-ciliate, the apex acute or acuminate; hypanthium campanulate, ca. 7 mm, the tube extending 3–4 mm beyond the summit of the ovary, the ovary and tube tomentose, the trichomes ca. 1 mm, white; calyx lobes ca. 4 × 4 mm, oblong, tomentose without, villosulous within, the margins irregular, the apex rounded; petals white, both surfaces puberulent, the trichomes ca. 0.1 mm; stamens ca. 130; style 3–4 mm. Fruits 30

× 35–40 mm, oblate or lenticular; pericarp fleshy, smooth, yellow at maturity; calyx persistent, reduced, the lobes deciduous.

Habitat, distribution, and phenology. Wet forests, Atlantic slope, from central Panama to central Costa Rica, 0–900 m. Collected in flower in July; collected in fruit February to April.

Plinia cuspidata is distinguished by the carinate vegetative bud scales with acuminate apices, leaf blades with 14 to 18 lateral veins per side and abruptly caudate-acuminate apices 30–40 mm long, and oblate or lenticular, smooth fruits. Many of the specimens examined were originally identified as *P. povedae*, the leaves of which tend to be narrower, with 20 to 40 lateral veins per side and the leaf apex less abruptly acuminate. The fruits of *P. povedae* are costate and typically have 6 to 8 prominent ribs.

Additional specimens examined. COSTA RICA. **Cartago:** Moravia de Turrialba, *Poveda* 960 (CR, F). **Limón:** Guápiles, Los Angeles, San Miguel, *Herrera & Schik* 3798 (F, MO); Est. Carillo, Sendero a las tomas de agua, Cerro Coronel, E of Laguna Danto, *Stevens* 23805 (MO); Cerro Coronel, E of Río Zapote, E of new road to Raphia swamp, within 1 km of Río Colorado, *Stevens et al.* 24675 (F). **Puntarenas:** Osa, Sierpe, Boca Ganado, Fila Ganado, *Herrera et al.* 6657 (CR, F); Osa, Bajando Cerro Brujo hacia el oeste, Sierpe, *Marín & Trejos Ureña* 329 (INB, MO). **San José:** P. N. Braulio Carillo, Est. Carillo, *Sánchez V.* 566 (CR). PANAMA. **Bocas del Toro:** Siguiendo el camino que va a Quebrada Bonyic, *Santamaría & Lara* 1091 (F). **Coclé:** vic. La Mesa, bey. El Valle, on N slope of Cerro Gaital, *McPherson* 11222 (F). **Panamá:** Capira, NE side of Cerro Trinidad, *Foster* 2111 (MO).

4. *Plinia darienensis* Barrie, sp. nov. TYPE: Panama. Darién: Río Pirre, old forest 10 mi. S of El Real near “Dos Bocas,” 2 Apr. 1971, *R. Foster & T. Lowenbach* 2271 (holotype, MO; isotypes, F, MICH). Figure 3.

Plinia panamensis similis, sed foliis laminis basibus cuneatis et venis lateralibus et submarginalibus convexis vel planis differt.

Shrubs or trees to ca. 7 m; young growth sericeous, the trichomes 2–4 mm, coarse, coppery branchlets weakly compressed; bark brown, flaking, densely to sparsely pubescent, the trichomes ca. 0.2 mm, straight or recurved; outer scales on vegetative buds 3–5 × 5–8 mm, depressed ovate, densely appressed pubescent, the margins undulate, scarios-ciliate, the apex rounded. Leaves narrowly elliptic, the blades 14–40 × 6–8 cm, 3–5.5 times as long as wide; coriaceous; midvein flat or concave on the upper surface, prominent on the lower surface; lateral veins 20 to 35 per side, flat or slightly convex; submarginal veins similar to the

laterals and arched between them, 1–2 mm from the margins; the upper surface ultimately glabrate, the midvein persistently sericeous or hispidulous, the trichomes ca. 0.1 mm, erect, the lower surface glabrate or with a few persistent trichomes near the base, the midvein hispidulous, the trichomes ca. 0.2 mm; glands numerous and minute on both surfaces or obscure above; base cuneate; margins revolute near base; apex acuminate or caudate, the tip 15 mm, sharply pointed; petioles 10–15 mm, densely puberulent, similar to the branchlets, terete. Inflorescence cauliflorous, sessile; flowers 2 to 4; bracts ca. 2 × 2 mm, ovate, the outer surface tomentose, the inner surface with scattered trichomes, the margins undulate, irregular, scarios, the apex rounded, paired in 2 to 4 decussate ranks; buds 12–15 mm, pyriform, the base tomentose, the tube and calyx sparsely pubescent. Flowers sessile; bracteoles ca. 2 × 2 mm, similar to the bracts, ovate, the outer surface tomentose, the inner surface with scattered trichomes, the margins undulate, irregular, scarios, the apex rounded; hypanthium campanulate, the tube elongate 3–5 mm beyond the summit of the ovary, 6–8 mm diam. at the base of the staminal ring, the base tomentose, the tube and the outer surface of the calyx lobes glabrate; calyx lobes ca. 9 × 7.5 mm, oblong, pubescent on the inner surface, the margins irregular, the apex rounded; petals not seen; stamens ca. 400; style ca. 18 mm. Fruits 65–80 mm diam., oblate, the calyx lobes and tube persistent; pericarp fleshy, 4 to 8 prominent ribs plus numerous indistinct intermediates, sparsely pubescent; mature color orange or yellow.

Habitat, distribution, and phenology. Wet forests, Darién Province, Panama, 300 m. Collected in flower and fruit October to April.

Plinia darienensis is characterized by narrowly elliptic leaves with blades 14–40 cm long, with lateral and submarginal veins that are flat or nearly so on both surfaces. In the other large-leaved Panamanian species, *P. panamensis* and *P. povedae*, the lateral veins are inscribed. *Plinia panamensis* differs also in having cordate leaf bases. The outer bud scales are broader than long with undulate, scarios-ciliate margins. The fruits are similar in appearance to those of *P. panamensis*, though possibly somewhat smaller. Fruits of the latter with diameters of 120 mm have been seen, but, as the measurements for *P. darienensis* are based on only two collections and five fruits, it may be that the apparent size difference is an artifact of inadequate sampling.

Paratypes. PANAMA. **Darién:** La Boca de Pirre,

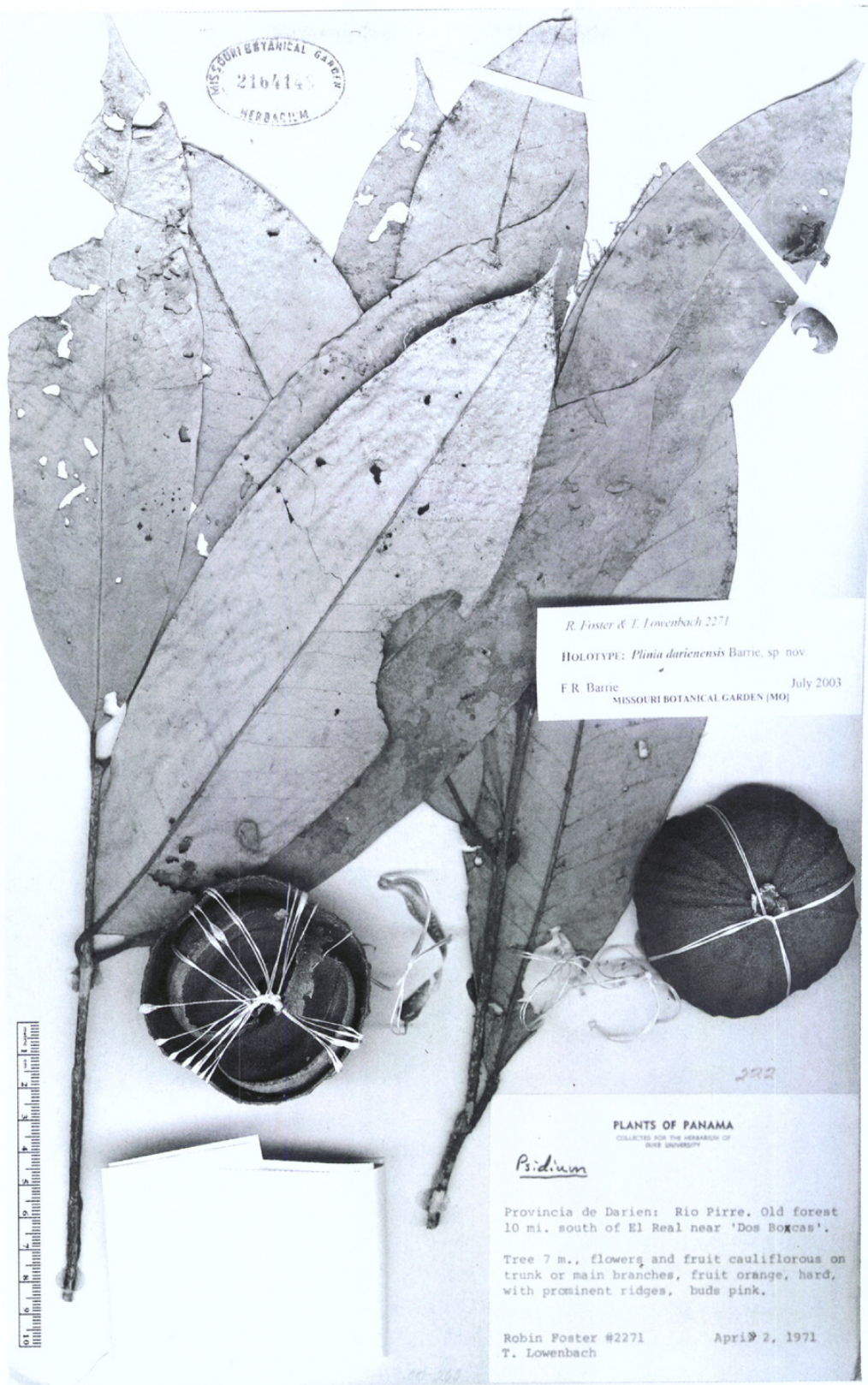


Figure 3. *Plinia darienensis* Barrie (Foster & Lowenbach 2271; holotype, MO).

Bristan 1247 (MO); Camino del Pirre, Duke & Bristan 258 (MO); Cerro Pirre, valley betw. Pirre & next most southerly peak, Folsom 4391 (MO); ca. 3 mi. SE of Pijibasal, ca. 9 mi. S of El Real, vic. of confluence of Dos Bocas & Río Pirre, Hartman 12011 (F, MO).

5. *Plinia gentryi* Barrie, sp. nov. TYPE: Panama. Panamá: near top of Cerro Jefe to 1 mi. beyond, 1 Jan. 1972, A. Gentry 3448 (holotype, MO). Figure 4.

MISSOURI
BOTANICAL GARDEN
HERBARIUM

Nº 04968854



Figure 4. *Plinia gentryi* Barrie (Gentry 3448; holotype, MO).

A *Plinia salamancana* foliis nervis paucioribus, apicibus brevioribus et petiolis longioribus differt.

Trees ca. 5 m; young growth coarsely tomentose, the trichomes 1–3 mm; branchlets compressed at the outer nodes; bark reddish, puberulent, the tri-

chomes ca. 0.2 mm, contorted, ultimately glabrate; outer scales of the vegetative buds ca. 1 × 1 mm, broadly ovate, the margins rounded, ciliate, the scales otherwise glabrous. Leaves elliptic, the blades 3.5–7.5 × 1.5–4 cm, 1.7–2.5 times as long

as wide; coriaceous; midvein convex or flat on the upper surface, convex on the lower surface; lateral veins 10 to 14 per side, often obscure above on mature leaves, convex below; submarginal veins similar to the laterals and arched between them, 1–2 mm from the margins; both surfaces glabrate or with a few persistent trichomes near the base, the midvein glabrate or persistently puberulent above, persistently puberulent below, the trichomes ca. 0.2 mm; glands numerous, minute and punctate on the upper surface, scattered on the lower surface; base obtuse; margins revolute; apex acute or abruptly acuminate, the tip 1–5 mm, blunt or rounded; petioles 8–15 mm, puberulent, the vestiture similar to the branchlets, ultimately glabrate, terete or somewhat flattened dorsally. Inflorescence cauline, flowers not seen, apparently 4; bracts not seen; attached fruits not seen. Fruits 15–25 × 25–35 mm, oblate; pericarp fleshy, rugulose, pubescent, more densely near the apex; calyx deciduous in ripe fruit, leaving a terminal, circular scar; mature color not known.

Habitat, distribution, and phenology. Apparently endemic to the cloud forest area on Cerro Jefé, Panama, 900 m. Collected in fruit in January.

Apparently restricted to the narrow band of cloud forest along the ridge of the Continental Divide on Cerro Jefé, *Plinia gentryi* is most similar to *P. salamancana* (Standley) Barrie, which grows in the wet montane forests at lower elevations. The two may be readily distinguished by leaves alone. The leaf blades of *P. gentryi* tend to be shorter (3.5–7.5 cm long vs. 6–10 cm in *P. salamancana*) and broader (1.7–2.5 times as long as wide vs. 2.5–2.8 in *P. salamancana*), with shorter apices (1–5 mm vs. 15–25 mm). The ultimate leaf tip is blunt or rounded, rather than sharply pointed, as is the case in *P. salamancana*. In both species, in mature leaves the lateral veins are obscure on the upper surface, which is dotted with numerous, minute, punctate glands.

Etymology. Named in honor of the late, noted tropical botanist Al Gentry, who collected the type of this species, as well as that of *P. cerrocampanensis*.

Paratypes. PANAMA. **Panamá:** Cerro Jefe, Duke 9468 (MO); near top of Cerro Jefé to 1 mi. beyond, Gentry et al. 3471 (MICH, MO).

6. *Plinia guanacastensis* Barrie, sp. nov. TYPE: Costa Rica. Guanacaste: P. N. Guanacaste, Cord. de Guanacaste, Cerro Cacao, Est. Cacao, 10 Mar. 1991, C. Chávez 512 (holotype, INB; isotypes CR, F). Figure 5.

Species haec a *Plinia salticola* plus venis lateralibus foliis et fructibus immaturis puberulis differt.

Trees to ca. 12 m; emergent growth sericeous, the trichomes 1–2 mm, white; branchlets compressed, bilaterally channeled below the terminal nodes, the bark reddish, puberulent, the trichomes ca. 0.1 mm; outer scales of vegetative bracts ca. 1 × 1 mm, widely ovate, the margins scarious, the apex rounded or mucronate. Leaves narrowly elliptic or elliptic, the blades 12–16 × 4–6 cm, 2.7–3.5 times as long as wide; chartaceous; drying a concolorous green or paler on the lower surface; midvein flat or convex on the upper surface, prominent on the lower surface; lateral veins 10 to 18 per side, inscribed in the upper surface, prominent on the lower surface; submarginal veins similar to the laterals and arched between them, 4–5 mm from the margins; the upper surface persistently pubescent along the midvein and the lateral veins, otherwise glabrate, the lower surface with a few persistent trichomes, the midvein sericeous, the trichomes 1–2 mm, the lateral veins puberulent; glands numerous, obscure above on mature leaves; base cuneate; margins revolute near the base; apex caudate-acuminate, the tip 15–20 mm, sharply pointed; petioles 10–15 mm, puberulent, similar to the branchlets, terete. Inflorescence cauliflorous, sessile; flowers 2 to 8; bracts 1–2 × 1–2 mm, semicircular, convex, a few trichomes on the outer surface, the margins ciliate, the apex rounded, paired in 2 to 4 decussate ranks of decreasing size; buds not seen. Flowers and mature fruits not seen. Immature fruits ca. 2 cm, obconic, sessile, constricted below the remnants of the calyx, puberulent, the trichomes white or golden, ca. 0.1 mm; calyx lobes deciduous, the tube persistent, forming a crown ca. 3 × 2 mm on the developing fruit.

Habitat, distribution, and phenology. Montane wet forests in the Cordillera de Guanacaste, Costa Rica, 800–1000 m. Collected in flower in August; collected in fruit February to March.

The developing fruits of *Plinia guanacastensis* are similar to those of *P. salticola* McVaugh, but are puberulent rather than glabrous or nearly so. While the leaf blades of both species are approximately the same length, 12–16 cm here, 9–17 cm in *P. salticola*, the leaves of *P. guanacastensis* tend to be narrower, 2.7–3.5 times as long as wide versus a ratio of 2–3:1 in *P. salticola*, with about twice as many lateral veins, 10 to 18 versus 6 to 10 per side, which are inscribed, rather than flat or convex, as in *P. salticola*.

Paratypes. COSTA RICA. **Guanacaste:** Liberia, P. N. Guanacaste, Cord. de Guanacaste, Est. Cacao, Sendero a

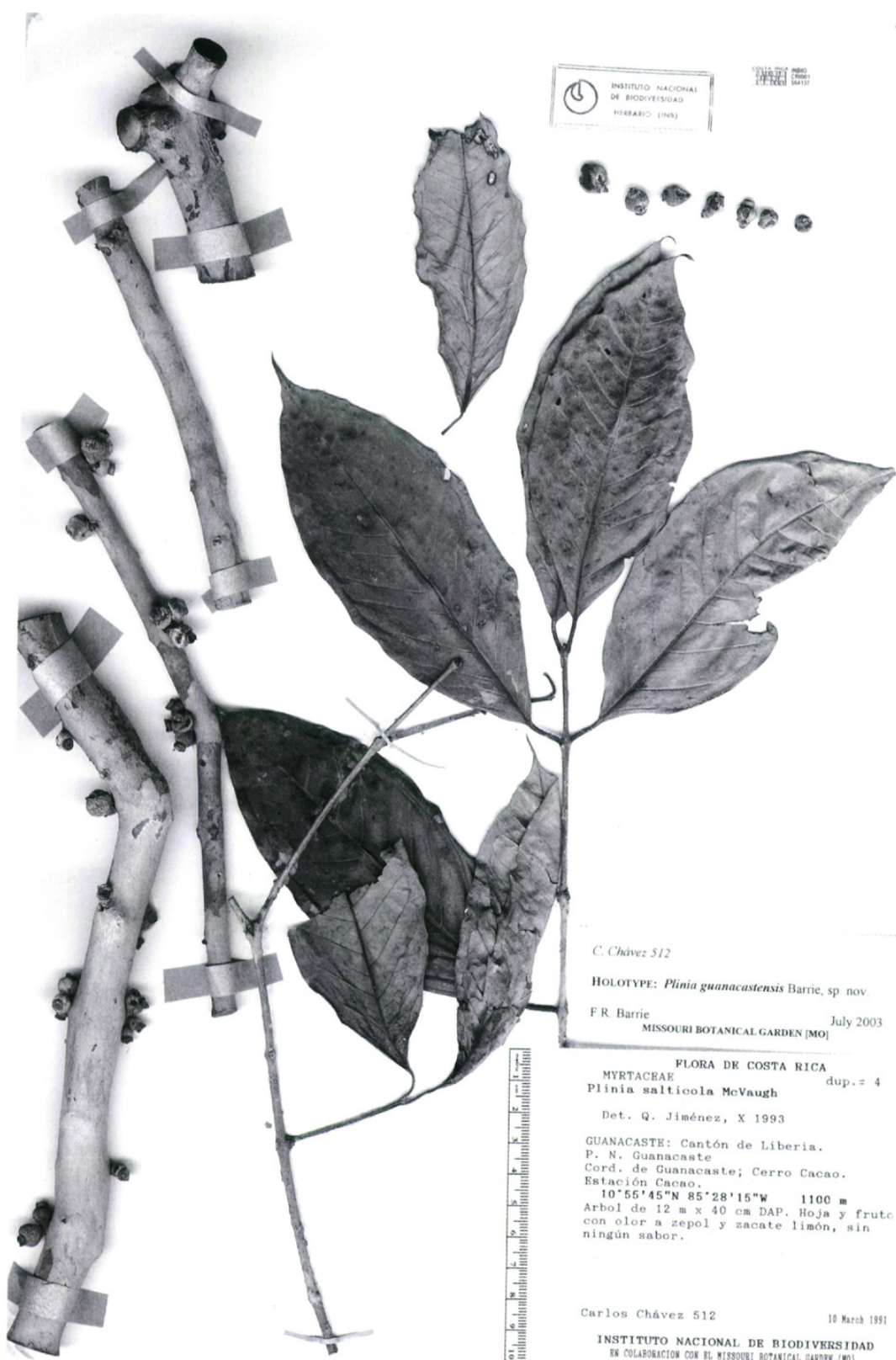


Figure 5. *Plinia guanacastensis* Barrie (Chávez 512; holotype, INB).

casa de Fran, Angulo *et al.* 35 (CR, F, INB, MO); Sendero Arenal, Gamboa 57 (CR, INB); Sendero a la Cima, Rodríguez *et al.* 3112 (INB); Tilarán, Cordillera de Tilarán, 1–2 km W of Lago de Cote, 13 km N of Tilarán, Continental Divide on SE slope of Volcán Tenorio, Eco-Lodge, Haber & Zuchowski 11646 (INB).

7. *Plinia moralesii* Barrie, sp. nov. TYPE: Costa Rica. San José: Fila Bustamante, Hda. Tiquires, Los Ayarales, 3 June 1995, J. F. Morales 4316 (holotype, INB; isotypes, F, MO). Figure 6.



Figure 6. *Plinia moralesii* Barrie (Morales 4316; holotype, INB).

Species haec a *Plinia salticola* plus venis lateralibus foliis, petiolis longioribus et hypanthiis costatis et tomentosis differt.

Shrubs or trees to 5 m; young growth sericeous, the trichomes white, 2–3 mm; branchlets com-

pressed; bark red, soon turning white, smooth, coarsely puberulent, the trichomes ca. 0.2 mm, straight and recurved, ultimately glabrate; outer scales of the vegetative buds 2–3 × 2–3 mm, widely ovate, convex, a few scattered trichomes on the

outer surface, the margins scarious-ciliolate, the apex acute. Leaves narrowly elliptic, the blades $9\text{--}21 \times 3\text{--}6$ cm, 3–4.5 times as long as wide; chartaceous; midvein flat on the upper surface, convex on the lower surface; lateral veins 12 to 18 per side, flat or slightly convex; submarginal veins similar to the laterals and arched between them, 3–5 mm from the margins; the upper surface glabrate, the lower surface glabrate or with a few persistent trichomes near the base, the midvein puberulent on both surfaces, the trichomes ca. 0.2 mm, straight or recurved; glands obscure above on mature leaves, scattered, dark below; base cuneate, margins recurved near the petiole; apex tapering from the middle, then abruptly acuminate, the tip ca. 15 mm, sharply pointed; petioles 15–20 mm, coarsely puberulent, similar to the branchlets, ultimately glabrate, terete or depressed dorsally. Inflorescences cauliflorous, sessile, flowers 4 to 8; bracts $3\text{--}10 \times 5\text{--}6$ mm, ovate, the outer surface sericeous, the margins scarious, the apex acute or acuminate, paired in 2 to 4 decussate ranks of decreasing size; buds not seen. Flowers sessile; bracteoles ca. 3–2 mm, ovate, the outer surface sericeous, the margins scarious, the apex acute or acuminate; hypanthium 10–15 mm, campanulate, uniformly tomentose, the trichomes white, 1–2 mm, the base prominently ridged, the tube extending 4–5 mm beyond the summit of the ovary, ca. 8 mm diam. at the staminal ring; calyx lobes $5 \times 4\text{--}7$ mm, broadly ovate to oblong, sericeous on the inner and outer surfaces, the margins irregular, the apex truncate or rounded; petals, stamens, and style not seen. Fruit 30–40 mm diam., globose or subglobose, the pericarp fleshy, costate with numerous, prominent, anastomosing ridges; calyx tube persistent, the lobes deciduous; mature color unknown.

Habitat, distribution, and phenology. Montane wet forests, central Costa Rica, 1000–2200 m. Collected in flower and fruit March to July.

Compared to the leaves of *Plinia salticola*, the leaf blades in *P. moralesii* are similar in length but narrowly elliptic, with longer petioles, 15–20 mm versus 6–13 mm, and more numerous lateral veins, 12 to 18 versus 6 to 10 per side. The leaves are generally narrower than those of *P. guanacastensis*, which also has shorter petioles, 10–15 mm, and longer leaf tips (15–20 mm), but the same number of lateral veins. The hypanthium of *P. moralesii* is tomentose and strongly ribbed, and the immature fruits, at least, are costate, with numerous, prominent, anastomosing ridges. Fully mature fruits were not seen. This is the only Central American *Plinia* occurring consistently above 1000 m.

Etymology. Named in honor of the collector of the type, José Francisco Morales, the author of numerous contributions on the Costa Rican flora.

Paratypes. COSTA RICA. **Alajuela:** San Ramón, Valle Escondido, Finca Aeropecuaria Peyra, sendero dentro del bosque, Jiménez *et al.* 1302 (INB, MO). **San José:** Acosta, Fila Bustamante, Hacienda Tiquires, Los Ayarales, Morales 4339 (F, INB, MO); Tiquires, Valerio 1681 (F); Zona Protectora Cerros de Escazú, Río Negro entrando por Palmichal, Vargas & Sánchez V. 974 (CR).

8. *Plinia nicaraguensis* Barrie, sp. nov. TYPE: Nicaragua. Atlántico Sur: Atlanta, Caño el Tigriillo (La Picada), 8 Nov. 1982, A. Laguna 156 (holotype, MO). Figure 7.

A *Plinia povedae* foliis laminis brevioribus, venis later-alibus paucioribus et petiolis longioribus differt.

Trees to ca. 7 m; young growth not seen; branchlets compressed, bilaterally channeled below the terminal node, densely puberulent, the trichomes ca. 0.2 mm, straight or recurved; outer scales of vegetative buds ca. $1\text{--}2 \times 3$ mm, broadly depressed ovate, puberulent on the outer surface, the margins scarious-ciliolate, the apex rounded. Leaves ovate or elliptic, the blades $17\text{--}28 \times 6\text{--}11$ cm, 2.5–3 times as long as wide; chartaceous; midvein depressed on the upper surface, prominent on the lower surface; lateral veins 10 to 14 per side, plus intermediates, flat or inscribed on the upper surface, prominent on the lower surface; submarginal veins similar to the laterals and weakly arched between them, 2–4 mm from the margins; the upper surface glabrate, the midvein persistently puberulent, the lateral veins persistently puberulent near the midvein, the lower surface with persistent, scattered trichomes, the midvein and lateral veins persistently puberulent; glands numerous on both surfaces; base obtuse; margins entire; apex abruptly caudate-aristate, the tip 20–30 mm, sharply pointed; petioles 12–20 mm, puberulent, terete or flattened dorsally. Inflorescence, flowers, attached fruits not seen. Fruits ca. 45×55 mm, oblate, the pericarp fleshy, costate with 20 to 40 prominent ridges; calyx and tube persistent; mature color yellow; sweet and aromatic.

Habitat, distribution, and phenology. Wet forests, Atlántico Sur (formerly Zelaya), Nicaragua, 200–300 m. Collected in fruit in November.

Identified in the *Flora de Nicaragua* (Sánchez Vindas, 2001) as *Plinia povedae* P. E. Sánchez. However, *P. nicaraguensis* differs in its leaves with fewer lateral veins (to 14 plus a few intermediates, vs. to 40 in *P. povedae*), abruptly caudate-aristate apices and longer petioles (to 20 mm vs. 12 mm in

P. povedae), and fruits with more numerous (20 to 40 vs. 8 to 16) prominent ridges. The leaf apices of *Plinia cuspidata* are similar in form but longer (30–40 mm) and it, too, has shorter petioles, only to 10 mm.

Paratype. NICARAGUA. **Atlántico Sur:** Nueva Guinea, Río el Zapote, *Laguna 61* (MO).

9. *Plinia panamensis* Barrie, sp. nov. TYPE: Panama. Panamá: Gorgas Memorial Labs yellow fever research camp, "Campamento Cuatro," 5–10 km NE of Altos de Pacora, on ridge top, 21–24 Nov. 1974, S. Mori & J. Kallunki 3411 (holotype, MO). Figure 8.

Pliniae darienensis similis, sed foliis laminis praealae impressinerviis vel sulcinerviis et basibus cordatis differt.

Trees to 5 m; young growth velutinous, the trichomes 2–3 mm, white or golden brown; branchlets compressed, bilaterally channeled below the terminal node; bark reddish brown, smooth, velutinous, the trichomes 0.5–2 mm, golden brown; outer scales of vegetative buds not seen. Leaves elliptic to narrowly elliptic, ovate or lanceolate, the blades 14–30 × 4–11 cm, 2.1–3.7 times as long as wide; coriaceous; midvein sulcate on the upper surface, prominent below; lateral veins 25 to 50 per side, inscribed or sulcate on the upper surface, prominent below, interconnected by numerous, inscribed reticulate veins; submarginal veins similar to the laterals, straight, 2–3 mm from the margins; the upper surface of immature leaves sericeous, the trichomes white, 2–3 mm, ultimately glabrate, the midvein, lateral and submarginal veins densely pubescent, the trichomes 1–2 mm, the lower surface sparsely to densely pubescent, more densely so along the midvein, lateral, and submarginal veins, the trichomes 2–3 mm; glands obscure on both surfaces of mature leaves; base cordate; margins revolute; apex caudate, the tip 20–40 mm, sharply pointed; petioles 10–15 mm, tomentose, similar to the midvein, terete. Inflorescence cauliflorous, sessile, flowers 2 to 4; bracts ca. 2 × 1.5 mm, ovate, pubescent on the outer surface, the margins scarious, the apex acute or acuminate; paired in 4 to 8 decussate ranks of decreasing size; buds not seen. Flowers sessile; bracteoles ca. 7 × 3 mm, lanceolate, tomentose on both surfaces, the margins scarious-ciliate, the apex acuminate; hypanthium ca. 7 mm, campanulate, velutinous, the trichomes 2–3 mm, white, the base costate, the ribbing obscured by the vestiture, the tube elongate 3–4 mm beyond the summit of the ovary, 4–5 mm diam. at the staminal ring; calyx lobes 5–6 × 3 mm, oblong, to-

mentose on the outer surface and at the tips within, the margins irregular, the apex broadly acute; petals not seen; stamens not seen; style not seen. Fruits 70–120 mm diam., oblate, the pericarp fleshy, costate, the ribs 4 to 8, prominent; calyx tube persistent; mature color yellow.

Habitat, distribution, and phenology. Wet forests, central Panama. 600–900 m. Collected in fruit in April, July, and November.

Plinia panamensis is distinguished by the large leaves with cordate bases, numerous, deeply inscribed to impressed lateral veins and similarly impressed, nearly straight submarginal veins, 2–3 mm from the margins. The large fruits, 7–12 cm in diameter, have 4 to 8 prominent ribs. This species is most similar to *Plinia darienensis*, which has leaves of comparable size, but the veins are not impressed and the leaf base is cuneate. The fruits of the latter species are similar in appearance but smaller, at least in the few specimens examined.

Plinia povedae, which is found in western Panama and Costa Rica, also has velutinous branchlets and leaves of similar size, with similar lateral and marginal veins, but the leaf bases are cuneate and the fruits are much smaller, 25–50 mm in diameter.

Paratypes. PANAMA. **Coclé:** Continental Divide N of Penonome on rd. to Coclecito, *Hammel 4034* (MO). **Colón:** Cerro Brewster, P. N. Chagres, *Aguilar et al. 969* (F). **San Blas:** *de Nevers et al. 5378* (MO).

10. *Plinia peroblata* (Lundell) Lundell, *Wrightia* 3: 124. 1965. *Eugenia peroblata* Lundell, *Wrightia* 2: 124. 1961. TYPE: Belize. Cayo: Gorge Creek section, Hummingbird Hwy., 26 Aug. 1955, *P. Gentle 8845* (holotype, LL).

Trees to 10 m; young growth not seen. Branchlets somewhat compressed at the nodes; bark white, pubescent, the trichomes ca. 0.3 mm, straight and recurved, reddish; vegetative buds not seen. Leaves ovate to elliptic, the blades 9–12 × 2.5–4 cm, 3.2–3.8 times as long as wide; chartaceous; midvein convex on the upper surface, prominent on the lower surface; lateral veins 12 to 15 per side, flat or slightly convex on both surfaces; submarginal veins similar to the laterals and weakly arched between them, 2–3 mm from the margins; vestiture restricted to trichomes along the upper edge of the margins, or with a few persistent trichomes near the base of the lower surface and the midvein pubescent below, the trichomes 0.2–0.3 mm, or glabrate on both surfaces; glands obscure on the upper surface, scattered on the lower surface; base cuneate, margins revolute; apex acuminate to caudate acuminate; petioles 5–10 mm, terete or weakly flat-

MISSOURI
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No 3190148



Figure 7. *Plinia nicaraguensis* Barrie (Laguna 156; holotype, MO).

tened dorsally, pubescent, the vestiture similar to that of the branchlets. Inflorescence cauliflorous; not seen. Flowers not seen. Fruits ca. 12 × 25 mm, lenticular, sessile; pericarp fleshy, the surface irregular, lacking well-defined ridges; mature color orange; sweet.

Habitat, distribution, and phenology. Evergreen wet forests, Belize, at elevations of 0–100 m. Collected in fruit August to September.

Plinia peroblata is known only from three collections, two fruiting and one sterile, and is the only *Plinia* known from Belize. The strongly compressed



S. Mori & J. Kallunki 3411

HOLOTYPE: *Plinia panamensis* Barrie, sp. nov.

F. R. Barrie July 2003
MISSOURI BOTANICAL GARDEN [MO]

MISSOURI
BOTANICAL GARDEN
HERBARIUM

Nº 04968855

PANAMA
Prov. Panama

Family: MYRTACEAE

Gorgas Memorial Labs yellow fever research
camp, "Campamento Cuatro", 5-10 km NE of
Altos de Pacora. Alt. ca. 600 m.
a.) In forest on slope.
b.) On ridge top.
Tree, 4½ m tall, 7 cm dbh. Frt depressed-
globose, red, sweet-smelling, borne on trunk,
1-seeded. Frt collected, 5.5 cm long, 7 cm
wide. Several smaller frts seen higher on
trunk. Seed flattened, large.

S. Mori & J. Kallunki 3411 21-24 Nov. 1974
MISSOURI BOTANICAL GARDEN HERBARIUM

Figure 8. *Plinia panamensis* Barrie (Mori & Kallunki 3411; holotype, MO).

fruits are most similar to those of *P. coclensis*. The combination of cauliflorous inflorescence and sessile flowers, and the lenticular fruits, will distinguish this species from any other Belizian Myrtaceae.

Additional specimens examined. BELIZE. **Toledo:** Bladen Nature Reserve, NE lowlands, near plot 2, *Brewer 321* (DAV, F); Bladen Nature Reserve, NE lowlands, Plot 2, tree no. 1382, *Brewer 844* (DAV, F).

11. *Plinia povedae* P. E. Sánchez, *Brenesia* 25–26: 313. 1986 [1988]. TYPE: Costa Rica. Puntarenas: Alto de los Mogos, camino a Rincón de Osa, 30 May 1985, N. Zamora V. & L. J. Poveda 975 (holotype, CR; isotypes, CR, F, MO).

Illustration. P. E. Sánchez V., *Brenesia* 25–26: 315; f. 1. 1986.

Shrubs or trees, 4–6 m; young growth velutinous, the trichomes to 3 mm, white or golden; branchlets compressed at the terminal nodes; bark smooth, reddish, coarsely tomentose, the trichomes 0.5–1.5 mm, straight or recurved, white, golden, or sordid; outer scales of vegetative buds 1–3 × 1.5–3 mm, widely ovate, convex, pubescent on the outer surface, the margins scarious, the apex acute, the ultimate tip mucronulate. Leaves elliptic to narrowly elliptic or oblanceolate, the blades 14–40 × 4–10 cm, 2.5–5.5 times as long as wide; chartaceous; drying a concolorous green or olive; midvein convex between 2 parallel grooves on the upper surface, prominent on the lower surface; lateral veins 20 to 40, inscribed to impressed in the upper surface, prominent on the lower surface; submarginal veins similar to the laterals, straight, 4–5 mm from the margins; persistently pubescent along the midvein and the lateral veins or ultimately glabrate; glands numerous on both surfaces, obscure on mature leaves; base cuneate; margins revolute; apex acuminate to caudate, the tip to 40 mm; petioles 8–12 mm, terete, pubescent, the trichomes ca. 0.3 mm, straight or recurved. Inflorescence cauliflorous, sessile, solitary or in groups of 2 to 3; bracts 4-ranked, the larger bracts 4–5 × 4–5 mm, the smaller ca. 2.2 mm, ovate or oblong, tomentose on the outer surface, the margins ciliate, the apex rounded; buds pyriform, ca. 8 mm, tomentose, the apical pore ca. 5 mm across, the calyx lobes triangular, 2 × 3 mm. Flowers sessile; bracteoles 4–5 × 3 mm, tomentose on the outer surface, the base free, the margins ciliate, the apex rounded; hypanthium ca. 10 mm, campanulate, costate, the tube prolonged ca. 6 mm above the ovary, ca. 6 mm diam. at the staminal ring, uniformly tomentose or

the trichomes somewhat thinner near the apex; calyx lobes ca. 5 × 5 mm, oblong, tomentose on the inner and outer surface, the margins irregular, the apex ciliate; petals not seen; stamens ca. 100, ca. 7 mm; style not seen. Fruits 25–50 mm diam., oblate, the calyx tube persistent on developing fruit; pericarp fleshy, costate, the ribs 6 to 8 (to 16), prominent, ca. 2 mm across, villosulous; mature color unknown.

Habitat, distribution, and phenology. Tropical and premontane wet forests, eastern Costa Rica and western Panama, 0–700 m. Collected in flower February and October; collected in fruit April to June and October.

Plinia povedae is similar to *P. panamensis* in several respects. Both have velutinous branchlets, with white or golden hairs to 3 mm long, and large leaves with numerous, inscribed lateral veins. However, in *P. panamensis* the shape of the leaves varies from elliptic to ovate or lanceolate, whereas here they vary from elliptic to narrowly elliptic or oblanceolate. *Plinia panamensis* differs also in having cordate leaf bases and in its much larger fruits, 70–120 mm in diameter versus 25–50 mm here.

Some of the specimens placed under *Plinia cuspidata*, *P. moralesii*, or *P. nicaraguensis* in this treatment have been previously annotated as *P. povedae*. As a group, the three species are most readily separated from *P. povedae* by having leaves with no more than 18 lateral veins per side.

Additional specimens examined. COSTA RICA. **Heredia:** Sarapiquí, Llanura de San Carlos, La Virgen, *Zamora et al.* 2524 (INB, MO). **Limón:** El Progreso, entre Cerro Muchilla y Cerro Avioneta, cabeceras de Río Suruy, Fila Matama, Valle de la Estrella, *Herrera & Chacón* 2643 (CR, F, MO). **Puntarenas:** Res. For. Golfo Dulce, Osa Peninsula, Rancho Quemado, ca. 15 km W of Rincón, NW end of valley, near Fila Ganado, *Hammel et al.* 16886 (CR, F, MEXU, MO), *Hammel et al.* 16988 (CR, F, MO, TEX); Sierpe, W of Rancho Quemado on road to Drake, *Maas et al.* 7873 (F, MO); Alto de los Mogos, Pt. Jiménez, *Rodríguez M.* 13 (CR); camino a Rincón de Osa, *Zamora & Sánchez* 1185 (CR). **San José:** Pérez Zeledón, Tinamaste, Finca de los Suizos, *Estrada* 2129 (CR). PANAMA. **Bocas del Toro:** along road above Chiriquí Grande, *McPherson* 7341 (F). **Veraguas:** Isla Canales, P. N. Coiba, *Galdames et al.* 2608 (F), *Galdames et al.* 2609 (F), *Galdames et al.* 2624 (F).

12. *Plinia puriscalensis* P. E. Sánchez & Q. Jiménez, *Brenesia* 32: 113. 1989 [1990]. TYPE: Costa Rica. San José: Zona Protectora La Cangreja, Santa Rosa de Puriscal, 29 Apr. 1988, Q. Jiménez & P. E. Sánchez 586 (holotype, CR; isotypes, CR, F, MO).

Illustration. *Brenesia* 32: 116, f. 1. 1989 [1990].

Tree or shrub to ca. 7 m; young growth not seen; vestiture unknown; branchlets weakly compressed, slender, flexible; bark reddish brown, flaking, puberulent, the trichomes erect or recurved; outer scales of vegetative buds $1\text{--}1.5 \times 1\text{--}1.5$ mm, broadly ovate, convex, coarsely pubescent, the trichomes ca. 0.5 mm, the margins ciliate, the apex acute. Leaves lanceolate to narrowly elliptic, the blades $5.5\text{--}9 \times 1.5\text{--}2.5$ cm, 3–3.7 times as long as wide; chartaceous; drying dark green above, paler below; midvein flat or convex on the upper surface, convex on the lower surface; lateral veins 15 to 25 plus intermediates, obscure on the upper surface, raised on the lower surface; submarginal veins similar to the laterals and arched between them, 1–2 mm from the margins; persistently puberulent only along the midvein on the upper surface, glabrate or with a few, scattered trichomes on the lower surface; glands obscure on both surfaces; base cuneate; margins planate; apex acuminate or caudate acuminate; petioles 8–10 mm, brown, pubescent, terete. Inflorescences cauliflorous, sessile, flowers 2 to 4; bracts ca. 1×0.5 mm, ovate, the margins ciliate, the apex acuminate; buds ca. 4 mm, ob-ovoid, the base tomentose, the hypanthium tube glabrous, the apical pore ca. 1 mm across. Flowers sessile, the hypanthium campanulate, the tube prolonged 2–3 mm above the ovary, 3–4 mm across at the staminal ring; the base of the hypanthium tomentose, the tube glabrous within and without, glandular on the outer surface; calyx lobes $1.5\text{--}2.5 \times 2.5\text{--}4$ mm, irregular, reflexed at anthesis; petals $1.5\text{--}2 \times 1.5\text{--}2$ mm, broadly ovate, puberulent on both surfaces, the margins irregular; stamens ca. 80, 6–8 mm; style ca. 10 mm, glabrous. Fruits 30–50 mm diam., oblate or subglobose; pericarp fleshy, developing fruits with numerous ribs, ultimately the surface irregular, without well-defined ribbing; calyx persistent in developing fruit; mature color yellow; fragrant.

Habitat, distribution, and phenology. Apparently endemic to gallery forests in the Zona Protectora la Cangreja, San José Province, Costa Rica, 500–1000 m. Collected in flower in April; collected in fruit September to October.

Plinia puriscalensis is readily distinguished from other Costa Rican *Plinia* by the lanceolate or narrowly elliptic leaves, no more than 9 cm long. The leaves are most similar to those of the Panamanian species *P. coclensis*, which has lenticular, rather than oblate or subglobose, fruits.

Additional specimens examined. COSTA RICA. **San José:** Zona Protectora La Cangreja, Santa Rosa de Puriscal, Jiménez 917 (CR, F, MO); Z. P. La Cangreja, Santa

Rosa de Puriscal, Morales 539 (CR, MO); San Martín de Puriscal, en la Fila Vara Blanca, cabecera de Río Negro, límite NW Cangreja, Morales 3904 (INB, MO); Cerros de Puriscal, San Martín de Puriscal, En Tacotal, Ramírez *et al.* 363 (CR, F, INB, MO); Bosque de Cangreja, Sta. Rosa de Puriscal, Zamora & Jiménez 1288 (CR, F, K, MO).

13. *Plinia salamancana* (Standley) Barrie, comb. nov. Basionym: *Eugenia salamancana* Standley, Ann. Missouri Bot. Gard. 26: 295. 1939. TYPE: Panama. Panamá: vic. of Salamanca Hydrographic Station, R. Pequení, 28–29 July 1938, R. E. Woodson, P. H. Allen & R. J. Siebert 1570 (holotype, F; isotypes, MO, NY). Figure 9.

Shrubs or trees to 6 m; young growth sericeous, the trichomes 0.5–2 mm, white. Branchlets compressed; bark reddish or gray, flaking, puberulent, the trichomes ca. 0.3 mm, straight or recurved; vegetative buds not seen. Leaves elliptic or oblong, the blades $6\text{--}10 \times 2\text{--}3.5$ cm, 2.5–2.8 times as long as wide; coriaceous; midvein flat on the upper surface, prominent on the lower surface; lateral veins 16 to 22 per side, obscure on the upper surface in mature leaves; submarginal veins similar to the laterals, straight, 1–2 mm from the margins; the upper surface glabrate or with persistent trichomes along the midvein and margins, the lower surface with persistent, appressed trichomes, the midvein persistently sericeous; glands numerous, small, punctate in the upper surface of mature leaves; base cuneate or obtuse; margins revolute; apex acuminate or caudate, the tip 10–25 mm, sharply pointed; petioles 4–9 mm, puberulent, flattened dorsally, becoming corky with age. Inflorescences cauliflorous, bracts $1\text{--}2 \times 1\text{--}2$ mm, ovate pubescent on both surfaces, the margins ciliate, the apex acute. Flowers not seen. Fruits $15 \times 17\text{--}25$ mm, oblate; pericarp fleshy, obscurely ribbed, pubescent near the apex; mature color yellow.

Habitat, distribution, and phenology. Premontane and montane wet forests, central Panama, 100–800 m. Collected in fruit March to May.

The holotype and isotypes of *Eugenia salamancana* bear several sessile, cauliflorous inflorescence buds, but are otherwise sterile. The buds, enclosed in five or six ranks of decussate bracts, indicate that the taxon is more appropriately placed in *Plinia*. The elliptic or oblong leaves with the lateral veins often obscure on the upper surface and the numerous minute, punctate glands are similar to those of *P. gentryi*, but the leaves of *P. salamancana* have acuminate or caudate, sharply pointed apices and shorter petioles (to 9 mm vs. 15 mm in *P. gentryi*).



Figure 9. *Plinia salamancana* (Standley) Barrie (Woodson et al. 1570; holotype, F).

Additional specimens examined. PANAMA. **Colón:** Santa Rita Arriba, 2–4 km de la carr. Boyd–Roosevelt, Correa A. et al. 11518 (F); Santa Rita Ridge, forest along trail bey. rd. end, McPherson 10238 (F, MO). **Panamá:** Cerro Jefé, Gómez-Pompa et al. 3070 (BM, MO); along road curling around summit, McPherson 10633 (F, MO);

along trail off road tow. Alto Pacora, McPherson & Stockwell 10883 (MO); desviación 300 m antes de llegar a la torre, Valdespino et al. 693 (MO); cabecera del río San Cristóbal, Valdespino et al. 686 (MO).

14. *Plinia salticola* McVaugh, Fieldiana, Bot. 29:

505. 1963. TYPE: Costa Rica. San José: Cataratas de San Ramón, 21 Feb. 1931, A. M. Brenes 13443 (holotype, NY; isotype, F).

Illustration. McVaugh, Fieldiana, Bot. 29: 505, f. 13. 1963.

Trees to ca. 8 m; young growth sericeous, the trichomes golden, 1–2 mm; branchlets weakly compressed; bark reddish brown, puberulent, the trichomes ca. 0.3 mm, straight or recurved; outer scales of the vegetative buds 1–3 × 3 mm, widely ovate, convex, sparsely pubescent on the outer surface, the margins ciliate, the apex rounded. Leaves elliptic, the blades 9–17 × 3–6 cm, 2–3 times as long as wide; chartaceous; drying a concolorous green; midvein flat or convex on the upper surface, convex on the lower surface; lateral veins 6 to 10 per side, flat or slightly convex on both surfaces; submarginal veins similar to the laterals and arched between them, 5–8 mm from the margins; the upper surface glabrate, the midvein puberulent, the trichomes ca. 0.1 mm, the lower surface glabrate or with a few trichomes near the base, the midvein puberulent; glands numerous, obscure on one or both surfaces of mature leaves; base cuneate; margins entire; apex acuminate; petioles 6–13 mm, pubescent, the trichomes ca. 0.2 mm, sulcate or flattened dorsally. Inflorescences cauliflorous, sessile, flowers 2 to 4; bracts 2–3 × 1–2 mm, ovate, sparsely pubescent on the outer surface, the margins scarious, the apex acute; buds 5–10 mm, pyriform, initially strigose, ultimately the base puberulent, the apex glabrate. Flowers sessile; bracteoles 1.5–2 × 1–1.5 mm, sparsely pubescent on the outer surface, the margins scarious-ciliate, the apex acute; hypanthium 7–9 mm, campanulate, the base tomentose, the tube prolonged 4–5 mm beyond the summit of the ovary, glabrous or with a few hairs on the outer surface, ca. 5 mm diam. at the base of the staminal ring; calyx lobes ca. 3 × 2 mm, obovate or oblong, the margins and apex irregular; petals ca. 4 × 4 mm, widely elliptic, white, the margins scarious; stamens ca. 150, 5–7 mm; style 10–15 mm. Fruits ca. 60 mm diam., oblate; pericarp fleshy, the surface of immature fruits undulate or with poorly defined ridges, the surface of mature fruits apparently smooth, glabrous or with a few scattered trichomes; calyx persistent in developing fruit; mature color unknown.

Habitat, distribution, and phenology. Wet montane forests from Monteverde in Alajuela, Costa Rica, east to Chiriquí, Panama, 500–1300 m. Collected in flower in September; collected in fruit February to December.

Plinia salticola has widely ovate bud scales with

rounded apices and leaves with relatively few (6 to 10) lateral veins that are flat or slightly raised and somewhat remote submarginal veins, 5–8 mm from the margins. The fruits are glabrous or nearly so, with an undulate surface when immature, though it is apparently smooth in mature fruit. The ranges of *P. salticola* and *P. moralesii* overlap in central Costa Rica. The latter species differs in having leaves with a greater number of lateral veins (12 to 18 per side) and longer petioles (15–20 mm). The hypanthium is campanulate in both species, but in *P. moralesii* it is 10–15 mm long and uniformly tomentose on the outside, while in *P. salticola*, it is 7–9 mm long and tomentose near the base only.

Additional specimens examined. COSTA RICA. **Alajuela:** UCR Reserva, Volcán Muerte, above the headquarters of the Río San Lorenzo, Berringer & Gómez-Laurito 2554 (F); San Ramón, R. F. de San Ramón, on slopes above & in the valley of the Río San Lorencito, Burger et al. 12122 (CR, F, MO); Est. Biol., Burger et al. 12446 (F); Faldas de la Fila Volcán Muerto, Gómez-Laurito 8288 (CR), Gómez-Laurito 10027 (CR, F); ca. Col. Palmareña, Gómez-Laurito 10549 (CR, F), Herrera et al. 310 (F, MO), Wattenberg & Rivera 15 (CR); Est. río San Lorencito, sendero El Saño, Morales et al. 1427 (CR, MO); R. F. Arenal, río Peñas Blancas, Quebrada Agua Gata, Finca La Mona, Obando 110 (CR, MO); Monteverde Reserve, Peñas Blancas river valley, Haber et al. 6099 (CR, F, MO); Quebrada Celeste, Haber & Bello C.7047 (CR, F, MO). **Limón:** El Progreso, fila Matama, valle de La Estrella, Herrera & Chacón 2712 (R, F, MO). **Puntarenas:** Rancho Quemado, cabeceras de Quebrada Quebradona, finca Florencia, Martín 52 (CR, MO). **San José:** Puriscal, Faldas Fila Vara Blanca, San Martín de Puriscal, Jiménez et al. 1427 (MO); Z. P. Cerros Turrubares, Turrubares, Faldas del Cerro Bares, Jiménez et al. 931 (CR, F). PANAMA. **Chiriquí:** vic. Fortuna Dam, forested slopes along ridge at S boundary of watershed, McPherson 9089 (MO), in valley S of lake, McPherson & Aranda 10109 (F).

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