Three New Species of *Rustia* (Rubiaceae, Condamineeae) from Panama and Ecuador

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ABSTRACT. Three new species of *Rustia* are described, two from Ecuador (*R. alba* and *R. viridiflora*) and one from Panama (*R. dressleri*). Illustrations of the three species are provided.

RESUMEN. Se describen tres especies nuevas de *Rustia*, dos de Ecuador (*R. alba* y *R. viridiflora*) y una de Panamá (*R. dressleri*). Se incluyen ilustraciones de las tres especies.

Rustia (Cinchonoideae, Condamineeae; Hooker, 1873; Robbrecht, 1988; Delprete, in prep.) is a genus of trees and shrubs that was founded by Johann Friedrich Klotzsch, curator of the Berlin herbarium in the mid-1800s. Klotzsch (1846) separated *Exostema formosum* Chamisso & Schlechtendal to establish *Rustia*, in honor of Dr. Rust ("Dem Andenken des verstorbenen Präsidenten Dr. Rust gewidmet"). *Rustia*, along with *Tresanthera* H. Karsten, is unique in the woody Rubiaceae in having poricidal anthers and pellucid-punctate leaves. *Rustia* comprises approximately 15 species endemic to tropical America, from Nicaragua to southern Brazil. The only previous work on *Rustia* was published by Donald R. Simpson (1976), but this was restricted to only a few species of western South America.

During preparation of a monographic treatment of the tribe Condamineeae (Delprete, in prep.), I examined several herbarium specimens from poorly collected areas of Central and South America, many of them unidentified or incorrectly identified. Among these collections, I encountered three species new to science, two from Ecuador and one from Panama.

In the following descriptions I use the abbreviations L/W to represent the length to width ratio of the leaf blades, and BA to represent the basal angle from the leaf margin to the midrib.

Rustia alba Delprete, sp. nov. TYPE: Ecuador. Carchi: environs of Maldonado, wet montane forest, 1450–1650 m, 31 June 1978, *M. T. Madison 4808 with T. C. Plowmann, H. A. Kennedy & L. Besse* (holotype, AAU; isotypes, F, QCA, SEL not seen, US). Figure 1.

Arbores vel frutices glabri; stipulae interpetiolares caducae. Foliorum laminae 23–28 cm longae, 13–16 cm latae, glanduli-punctatae; domatia desunt. Inflorescentia 40–46 cm longa; alabastra floralia cylindrica aestivatione valvati-reduplicata; calyx cupulatus ac membranaceus 1.5–3.0 mm longus; corolla alba 1.5–1.9 cm longa ad basim constricta lobis ⅔ longitudinis corollae; antherae exsertae dorsifixae concavae poricidales, thecae ad basim subaequalis; filamentis basiliter dilatatis ascendenti-strigosisque. Capsulas non visi.

Shrub or tree, with several straight trunks 6 m tall (probably stump sprouts). Young branches smooth, glabrous, terete; older branches rugose, terete, grayish to pale brown and with sparse lenticels. *Stipules* interpetiolar, free at base, present only in bud and overlapping, narrowly triangular, glabrous outside, glabrous and with few basal colleters inside, 2.8–3.7 mm long, 7–9 mm wide at base, reddish green, leaving a linear scar ca. 0.5 mm wide of the same color as the stem. *Leaves* petiolate, petioles 2–3 cm long, 3.0–4.5 mm thick, adaxially narrowly concave to flattened, glabrous; basally thickened, not pulvinate; blade 23–28 cm long, 13–16 cm wide, L/W = 1.6:1 to 1.7:1; widely elliptic to widely obovate, acute to rounded at base (BA = 30–45°), obtuse and short-acuminate at apex; the acumen up to 1 cm long; blade when fresh pale green above and yellowish green below, subcoriaceous, drying pale green, glabrous above and below, pellucid punctate (see Fig. 1). Primary and secondary veins glabrous and prominent below, secondary veins 16–21 each side; tertiary veins starting subparallel and openly reticulate in the center, faintly evident above and below; domatia absent. *Inflorescences* terminal, laxly paniculate and pyramidal, 40–46 cm long, basal branches 22–30 cm long, lateral branches 6–8 pairs, decussate; basal portion of axis not branched, 7–11 cm long. Rachis terete, rachis and branches glabrous to minutely hirtellous; flowers on distal branches in cymules (rarely alternate). Distal bracts 4–5 mm long, 4–5 mm wide, deltoid; bracteoles subtending the flowers 2–3 mm long, 2–3 mm wide, deltoid, glabrous. *Flowers* protandrous, pedicellate, pedicel 4–6 mm long, glabrous to minutely puberulent; hypanthium narrowly obconical, 4–6 mm long, 2–3 mm wide, glabrous. *Calyx* cupular with small lobes, membranous and

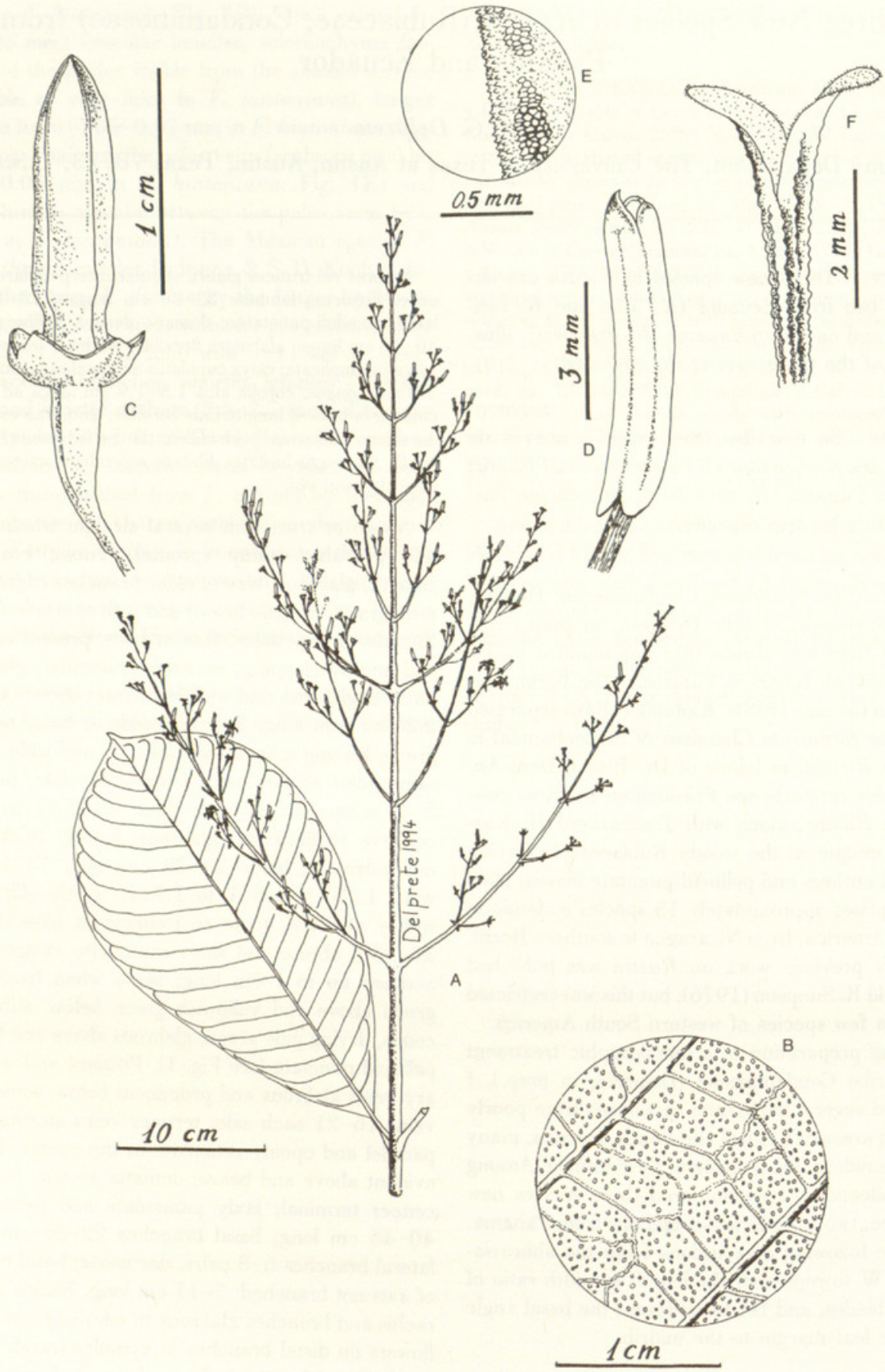

Figure 1. *Rustia alba* Delprete. —A. Habit of inflorescence with mature leaf. —B. Abaxial view of blade showing pellucid punctation. —C. Flower bud showing cupular calyx. —D. Anther. —E. Detail of anther external surface. —F. Style. (Drawn from type: *Madison et al. 4808.*)

glabrous, 1.5–3.0 mm long, calyx lobes 5, 1.0–2.5 mm long and 1.5–2.0 mm wide at base, glabrous and ciliolate; calyx persistent. *Corolla* tubular, 1.5–1.9 cm long, with a basal constriction and reflexed lobes, flower bud cylindrical and pointed at apex, aestivation valvate with contact zone, white, and semifleshy when fresh; tube subcylindrical with basal constriction, 5–6 mm long, ca. 2 mm wide at base and 3.5–4.0 mm wide at the orifice; glabrous and minutely verrucose outside; microscopically (40×) granulose inside, without a ring of hairs; corolla lobes 5, 9–11 mm long, ca. 3 mm wide, narrowly triangular and reflexed, glabrous and minutely verrucose outside; densely ascending short-strigose at base, minutely papillose throughout and microscopically (40×) papillose at margins inside. Lobes ⅔ of corolla length. *Stamens* 5, fully exserted, subequal, filaments attached 4–5 mm from the base of the tube, anthers cylindrical and subsagittate at base (see Fig. 2), rectilinear to slightly curved, 6.5–7.0 mm long, ca. 1.5 mm wide, dorsifixed near the base, the thecae subequal at base, papillose throughout, dehiscing by two pores at apex; filaments ca. 3 mm long, flattened and widened at base, with a basal tuft of ascending strigose hairs 0.3–0.5 mm long. *Style* exserted, 16–20 mm long, glabrous, style branches ovate, 3.0–3.5 mm long and 1.0–1.3 mm wide at base, stigmatic surface papillose. *Ovary* two-celled, placentation axile, turbinate to narrowly oblong, glabrous, with many ovules in each locule horizontally inserted. *Capsule* not seen, but probably obconical to obovoid, like the hypanthium.

Rustia alba is similar to *R. formosa* (Chamisso & Schlechtendal) Klotzsch but differs mainly in having a bigger inflorescence (exceptionally up to 36 cm long in *R. formosa*), smaller flowers; calyx cupular, more expanded and membranous; shorter styles; and longer membranous style lobes (ca. 3 mm long in *R. alba* vs. ca. 1 mm long in *R. formosa*).

Rustia alba is known only from the type, which was collected in the cloud forest of northern Ecuador, around Maldonado; in contrast, *R. formosa* is endemic to central and southern Brazil. *Rustia alba* is easily distinguishable from all other species of *Rustia* in western South America by its white erect flowers (hence the epithet) and by its widely obovate leaves.

Rustia viridiflora Delprete, sp. nov. TYPE: Ecuador. Morona-Santiago: Achutza, Jibaro settlement in the vicinity of Macuma, ca. 50 km N of Macas, 23 Mar. 1973, *H. Lugo 3674* (holotype, GB sheets A and B). Figure 2.

Arbores usque ad 16 m altae; stipulae interpetiolares caducae. Foliorum laminae 34–62 cm longae, 9.5–20.5 cm latae, glandulis punctatae; domatia desunt. Inflorescentia 22–54 cm longa, paniculata et secundiflora; alabastra floralia cylindrica acuminata, aestivatione valvati-reduplicata; calyx valde redactus 0.3–0.5 mm longus truncatus; corolla viridis 1.9–2.2 cm longa, lobis ¼–⅕ longitudinis corollae ad basim bulbosa; antherae rectae pilosae inclusae poricidales basaliter subcaudatae dorsifixae prope basim; filamenta tereta ad basim aurei-pilosa. Capsulae angustissime obconicae 18–23 mm longae disco conico.

Tree 6–16 m tall. Young branches glabrous to minutely puberulent, terete; older branches becoming glabrous, rugulose, terete, grayish to pale brown and with sparse punctiform to linear lenticels, up to 1.0 cm long. *Stipules* not seen, probably interpetiolar and free at base (observed from stem scars), leaving a linear scar 1.0–1.5 mm wide, of the same color as stem. *Leaves* petiolate, petiole 4.5–7.0 cm long, 3–5 mm thick, subterete, glabrous; basally thickened, not pulvinated; blade 34–62 cm long, 9.5–20.5 cm wide, L/W 3:1 to 3.5:1; lanceolate to elliptic, acute to obtuse (BA = 35–65°) at base, acute to attenuate at apex, sometimes tapering to an acumen 2–3 cm long; blade when fresh dark green above and dull green below; drying pale brown, stiff-chartaceous; glabrous above and below, pellucid punctate (see Fig. 2). Primary and secondary veins glabrous and prominent below, secondary veins 19–25 each side; tertiary veins starting subparallel and openly reticulate in the center, faintly evident above and fairly evident below; domatia absent. *Inflorescences* terminal, 22–54 cm long, 9–22 cm wide at base, laxly paniculate and pyramidal, with decussate racemoid lateral branches; lateral branches 3–7 pairs, basal portion of axis not branched, 10–20 cm long. Rachis terete to decussately obtuse-compressed, rachis and branches glabrous to minutely puberulent; flowers on distal racemoid branches or on racemoid cymules. Bracts subtending lateral branches 1–3 mm long, 2–3 mm wide, deltoid; bracteoles subtending the flowers 0.5–1.0 mm long, 0.7–1.0 mm wide, deltoid, glabrous. *Flowers* protandrous, pedicellate, pedicel 6–9 mm long, glabrous to minutely puberulent; hypanthium narrowly obconical, 4–6 mm long, 2–4 mm wide, glabrous to minutely golden hirtellous. *Calyx* reduced to a wavy margin with barely distinguishable lobes, 0.3–0.5 mm long and persistent. *Corolla* tubular with bulbous base and small constriction just above, 1.9–2.2 cm long, flower bud cylindrical, aestivation valvate with contact zone, color green throughout (rarely reddish with green lobes), semifleshy when fresh; tube subcylindrical and striate, 1.4–1.8 cm long, 4–5 mm wide at base and 2.0–2.5 mm wide at the orifice, glabrous

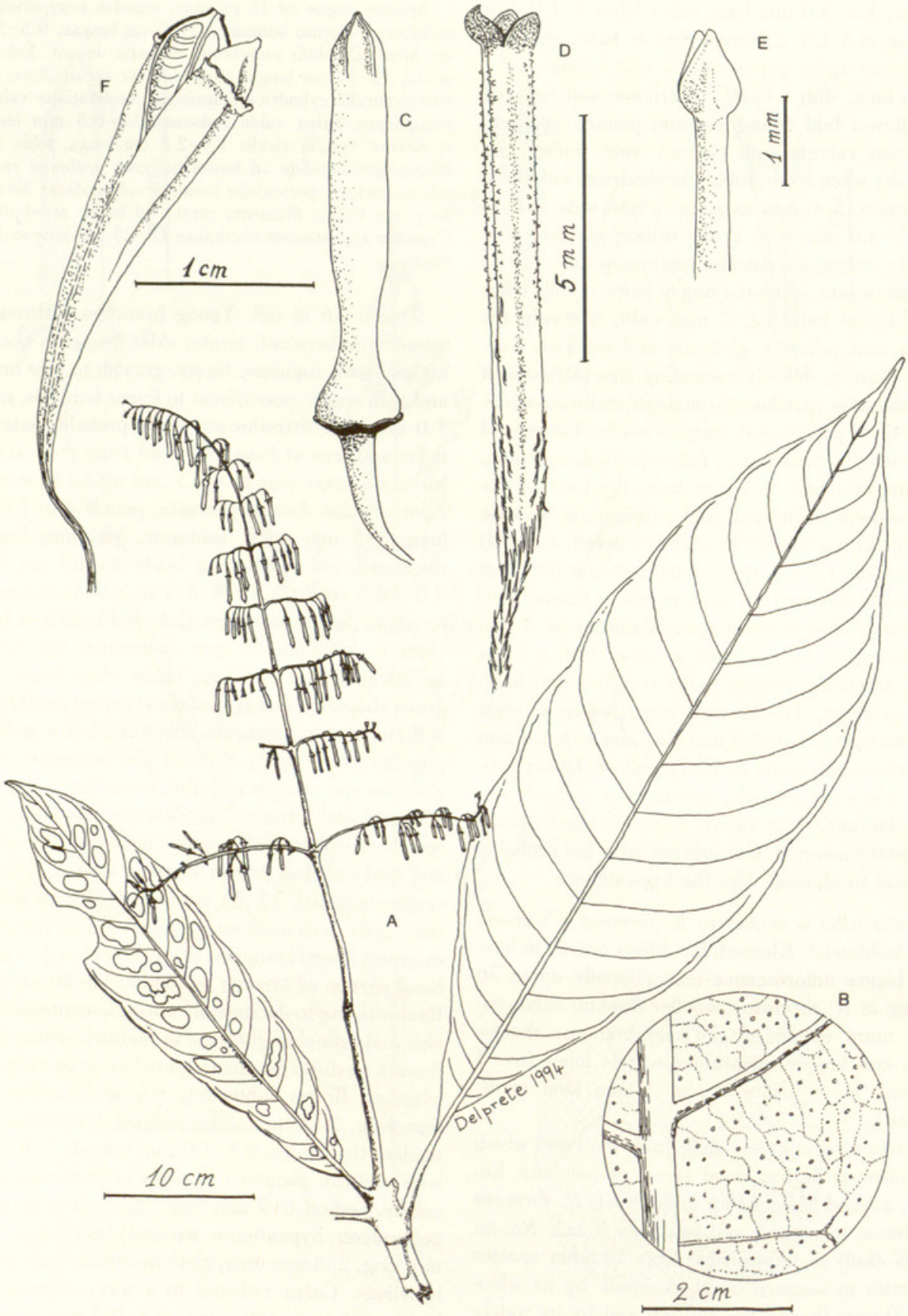

Figure 2. *Rustia viridiflora* Delprete. —A. Habit of inflorescence with mature leaves. —B. Abaxial view of blade showing pellucid punctation. —C. Flower bud showing bulbous base. —D. Anther. —E. Style. —F. Mature capsule showing conical disk. (Drawn from holotype: *H. Lugo 3674*, sheets A and B; capsule drawn from paratype: *F. Prieto CHUP-20.*)

or golden hirtellous outside; ascending strigose at base inside, without a ring of hairs, the remaining medial and superior zone glabrous or with sparse hairs; corolla lobes 5, 3–5 mm long, ca. 2.5 mm wide at base, triangular to ovate, glabrous outside, glabrous and with minute glandular hairs (hairs up to 0.5 mm long) at margins inside. Lobes ¼ to ⅕ of corolla length. *Stamens* 5, included (only the very tip exserted), subequal, filaments attached 3.5–5.5 mm from the base of the tube, anthers elongated and rectilinear, 11–12 mm long, 1.2–1.3 mm wide, dorsifixed near the base, base subcaudate, with sharp ridges, papillose-echinate to ascending-strigulose and descending glandular-pilose at base; dehiscing by two pores at apex; filaments 6–7 mm long, sparse ascending-pilose and with a tuft of golden pilose hairs at base. *Style* exserted, 22–28 mm long, glabrous and minutely verrucose throughout, style branches ovate and acute at apex, 1.0–1.3 mm long, stigmatic surface smooth to minutely papillose. *Ovary* two-celled, placentation axile, turbinate to narrowly obconical, glabrous, with many ovules in each locule horizontally inserted. Immature fruits green to reddish. *Capsules* very narrowly obconical (see Fig. 2), apex shortly conical, (14–)18–23 mm long, 4–6 mm wide, black and without lenticels, capsule and disk black and glabrous, disk obviously exceeding the calyx; dehiscing loculicidally, disk-septicidal dehiscence absent even in old capsules.

Rustia viridiflora is unique in the genus in having basally bulbous green flowers and capsules very narrowly obconical with a conical disk. It is known from the eastern slopes of the southern Ecuadorian Andes (Prov. Morona–Santiago), at the western margin of the Amazon forest.

Paratype. ECUADOR. **Morona–Santiago:** low hills W of Río Chupiangas, 20–22 Nov. 1944, *F. Prieto CHUP-20* (NY [2], US).

Rustia dressleri Delprete, sp. nov. TYPE: Panama. Panamá: El Llano–Cartí Highway, 8–10 km N of El Llano, 31 Aug. 1974, *R. Dressler 4703* (holotype, MO). Figure 3.

Arbores vel frutices; stipulae interpetiolares caducae. Laminae 30–45 cm longae, 9.5–13.0 cm latae, glandulipunctatae; domatia desunt vel tricomata pauca brevia praesentia. Inflorescentia 12–21 cm longa paniculata; alabastra floralia clavata, aestivatione valvati-reduplicata; calyx valde redactus ca. 0.5 mm longus truncatus; corolla alba 1.2–1.4 cm longa lobis ½ longitudinis corollae; antherae exsertae poricidales concavae basaliter rotundatae dorsifixae prope basim; filamenta basaliter dilatata ad basim descendens-pilosa. Capsulas non visi.

Shrub or tree (specimen collected from fallen branches). Young branches grayish, glabrous, terete; older branches glabrous, rugose, terete, pale brown-grayish, lenticels absent; leafy branchlets semisucculent, 7–9 mm wide. *Stipules* not seen, interpetiolar, free at base (observed from stem scars), leaving a linear scar ca. 1 mm wide, of the same color as stem. *Leaves* petiolate, petioles 28–32 mm long, ca. 3.0 mm thick, adaxially concave to flattened, glabrous; thickened and becoming corky at base; blade 30–45 cm long, 9.5–13.0 cm wide, L/W 3:1 to 4:1; narrowly elliptic to oblanceolate, cuneate (BA = 20–25°) at base, acute and acuminate at apex, the acumen ca. 1 cm long; blade when fresh shiny grass-green above and pale grayish green below, subcoriaceous; drying olive-green, semicoriaceous; glabrous above and below; evidently pellucid punctate (see Fig. 3). Primary and secondary veins glabrous and prominent below, secondary veins 24–30 each side, subparallel; tertiary veins starting subparallel and openly reticulate in the center, very evident above and faintly evident below; domatia absent or a tuft of few hairs. *Inflorescences* terminal, 12–21 cm long, reduced panicles with opposite decussate branches; basal branches 6.5–11.0 cm long, lateral branches 4–5 pairs, basal portion of axis not branched, 0.9–2.0 cm long. Rachis decussately compressed and terete at base, rachis and branches semisucculent, glabrous throughout and moderately puberulent at nodes; flowers in opposite cymules on rachis and lateral branches. Distal bracts subtending lateral branches 2.5–3.0 mm long, 3–4 mm wide, deltoid, glabrous; bracteoles subtending the flowers 1.0–1.5 mm long, 1–2 mm wide, deltoid, glabrous. *Flowers* protandrous, subsessile or pedicellate, pedicel 0.5–4 mm long, glabrous; hypanthium obconical, 2.5–3.5 mm long, 2.0–2.5 mm wide, glabrous. *Calyx* extremely reduced, with a wavy margin or with barely distinguishable lobes, ca. 0.5 mm long, sometimes ciliolate, persistent. *Corolla* tubular with spreading lobes, 1.2–1.4 cm long; flower bud clavate, ca. 2.5 mm at base and 3.5–4.0 mm at bulge; aestivation valvate with contact zone, color white, semifleshy when fresh; tube 7–8 mm long, 2.5 mm wide at base and 3.5–4 mm wide at the orifice, glabrous outside, glabrous inside and with a ring of white-pilose retrorse to erect hairs, 5–6 mm from the base, at the point of attachment of the filaments, which is also the base of the corolla lobes; corolla lobes 5, 5–6 mm long, ca. 3 mm wide, triangular, semifleshy, glabrous outside, white-strigose at base and margins microscopically (40×) papillose inside. Lobes ca. ½ of corolla length. *Stamens* 5, partially exserted because of narrowly spreading lobes, subequal, filaments attached 5–6 mm from the base of the tube, anthers concave, yellow and banana-shaped, 4–5 mm long,

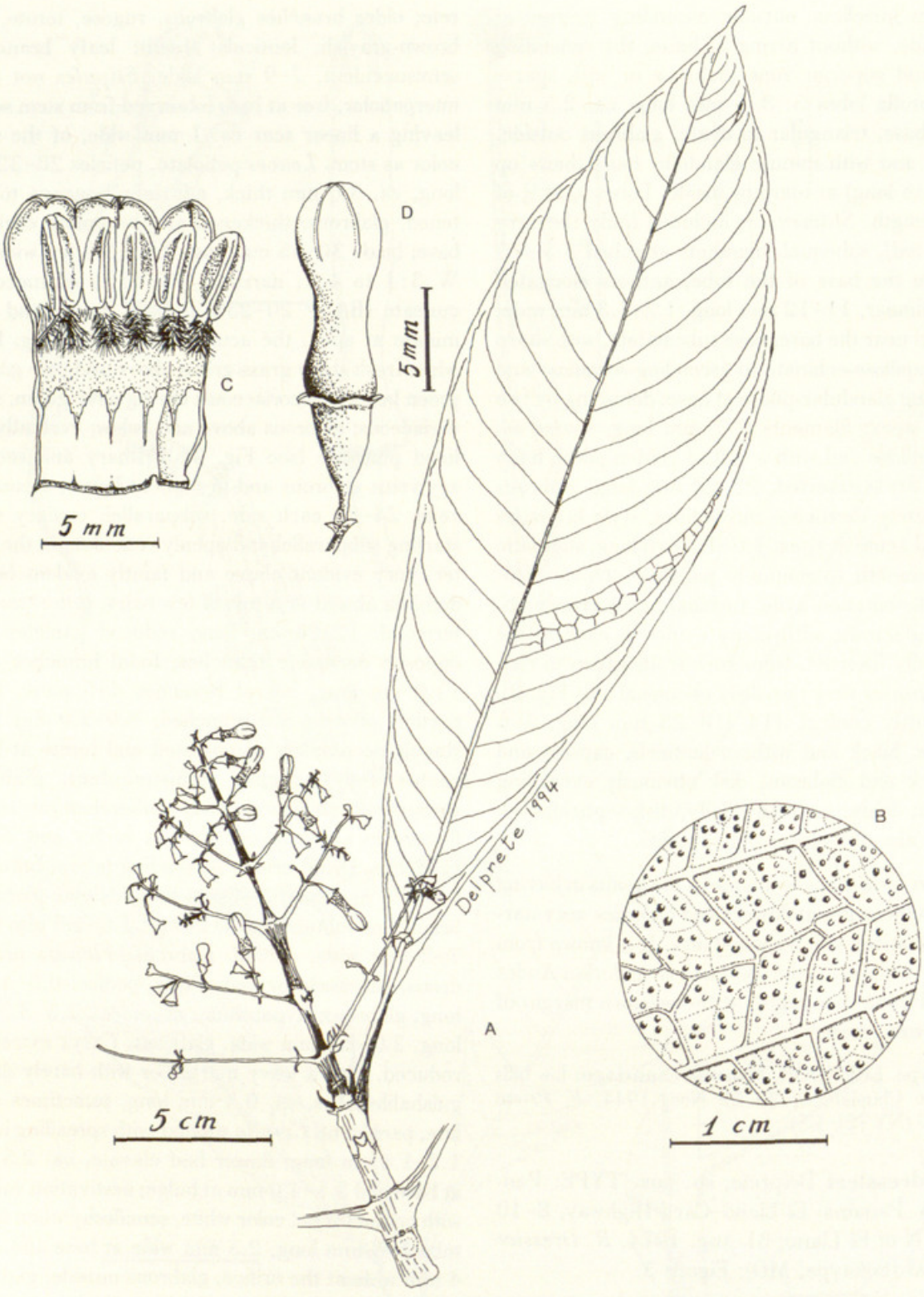

Figure 3. *Rustia dressleri* Delprete. —A. Habit of inflorescence with mature leaf. —B. Abaxial view of blade showing pellucid punctation. —C. Detail of open flower showing callous base and descending pilose tufts. —D. Flower bud. (Drawn from holotype: *Dressler 4703.*)

1.8–2.0 mm wide, dorsifixed near the base, bases of thecae rounded and subequal, microscopically (40×) papillose-echinate throughout, dehiscing by two pores at apex; filaments ca. 2 mm long, distally terete and basally flattened, adnate to tube, glabrous throughout and barbate at base, with a tuft of descending white-pilose hairs 0.1–0.2 mm long (see Fig. 3). *Style* exserted, 13–16 mm long, glabrous, style branches ovate to narrowly ovate, ca. 1.5 mm long, stigmatic surface smooth. *Ovary* two-celled, placentation axile, obconical, with many ovules in each locule horizontally inserted. *Capsule* not seen.

Rustia dressleri is very closely related to *R. occidentalis* (Bentham) Hemsley in having fleshy clavate buds, but differs in having white flowers (flesh-red to purple in *R. occidentalis*), filaments with basal tuft of descending white-pilose hairs (puberulent in *R. occidentalis*), larger inflorescences (up to 11 cm long in *R. occidentalis*), young branchlets thick and semisucculent, the whole plant glabrous, leaf blades 30–45 cm long (exceptionally up to 30 cm in *R. occidentalis*), and with 24–30 secondary veins each side (11–16 in *R. occidentalis*).

In his treatment of Rubiaceae for the *Flora of Panama*, Dwyer (1980) erroneously cited the paratype of *Rustia dressleri* (*Dressler 4749*) as *R. panamensis* Dwyer. The latter was subsequently reduced to synonymy under the new combination *R. costaricensis* (Standley) Lorence (Burger & Taylor, 1993).

Rustia dressleri differs from *R. costaricensis* in its inflorescence 12–21 cm long (vs. 20–33 cm long in *R. costaricensis*), twice compound (vs. thrice compound in *R. costaricensis*), with 4–5 pairs of lateral branches (vs. 8–11 pairs in *R. costaricensis*), flower bud clavate (vs. pointed in *R. costaricensis*), corolla tubular (vs. cupular in *R. costaricensis*) and 12–14 mm long (vs. 3–4 mm long in *R. costaricensis*).

Known only from two collections, this species was first encountered by Robert L. Dressler as fallen branches along a stream. Dressler is a well-known orchidologist, and I am pleased to honor him with this eponym.

Paratype. PANAMA. **Panamá**: El Llano–Cartí Highway, 10–12 km N of El Llano, 12 Sep. 1974, *R. Dressler 4749* (MO).

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