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Randia brevituba (Rubiaceae), a New Species from the Southern Cone of America and Comments on *Randia armata*

Marina D. Judkevich,[1,3] Roberto M. Salas,[1] and Héctor Keller[2]

[1]Instituto de Botánica del Nordeste, CONICET. Sargento Cabral 2131, CP. 3400, c.c. 209. UNNE-FACENA, Corrientes, Argentina.
[2]Facultad de Ciencias Forestales UNaM, Misiones, Argentina.
[3]Author for correspondence (marina-judkevich@hotmail.com)

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Abstract*—*Randia brevituba is a new species of the Paranean region of Argentina and Paraguay. It differs from the closest species, *R. ferox*, which is sympatric, in having short corolla tubes of 4.7–5.4 mm in the pistillate flowers and 2.8–7.9 mm in the staminate flowers, calyx lobes varying in shape and size in the same pistillate flower, and globose fruits 14–17 mm long (versus corolla tubes of 25.0–27.0 and 22.6–34.0 mm long, respectively, calyx lobes equal in shape and size, and fruit 3–5 cm and ovoid, ellipsoid or subglobose in *R. ferox*). We also discuss the taxonomic concept and geographic distribution of *Randia armata*, and conclude that it is markedly different from *R. brevituba* and the other species in the Southern Cone studied here, and moreover, that it does not occur in the Southern Cone. We provide a taxonomic key to distinguish the new species from other species of *Randia* in the Southern Cone of America.

Keywords—Flora of Argentina, Gardenieae, Paranean region, taxonomy.

Randia L. was classically recognized as a pantropical genus with over 200 species (Candolle 1830; Schumann 1891). However, on the basis of vegetative (brachyblasts) and reproductive features (pollen in permanent tetrads), Fagerlind (1943) restricted this genus to native species of the Americas, segregating from it several African and Neotropical genera. *Randia* belongs to the Gardenieae tribe and comprises over 90 species that inhabit evergreen and deciduous forest from sea level up to 3,300 m (Lorence 1986; Gustafsson 1998, 2000). Gustafsson (2000) diagnosed *Randia* by the following combination of features, although there are exceptions to some of these: dioecious woody plants, pollen in permanent tetrads, 1-locular ovary with two parietal placentae, fruits with many discoid seeds embedded in a sweet pulp that turns dark when dry, and the presence of brachyblasts with clustered stipules and leaves.

Gustafsson and Persson (2002) performed a phylogenetic study of 38 species of *Randia* in this modern circumscription, based on the combination of molecular sequence data (5S and ITS) and six morphological characters. Their results showed species of *Randia* to be grouped in three lineages that were intermingled with other morphologically well-defined genera of Gardenieae: *Tocoyena* Aubl., *Sphinctanthus* Benth., and *Rosenbergiodendron* Fagerl. The three lineages of *Randia* can be characterized by molecular, morphological and geographical features. These three lineages were provisionally considered by Gustafsson (2004) as three different genera, but have not been formally separated.

Until the present, no current taxonomic treatment is available to distinguish the species of *Randia* in the Southern Cone of America, only regional floras. In Argentina, three species of *Randia* have been reported (Bacigalupo et al. 2008). The first, *Randia ferox* (Cham. & Schltdl.) DC., from lowland forests in the Northeast, has fragrant flowers and white corollas (Chaco, Corrientes, Misiones, and Formosa). The second, *Randia micracantha* (Lillo) Bacigalupo, from seasonally dry forests in northwestern Argentina (Jujuy, Salta, and Tucuman), has weakly fragrant flowers and yellowish-green corollas (Bacigalupo 1993; Bacigalupo et al. 2008). The third, *Randia armata* (Sw.) DC., from dry forests also has strongly fragrant flowers with white corollas, and has been reported widely from Brazil, Paraguay, Bolivia, and Argentina (Chaco, Corrientes, Misiones, and Formosa) [e.g. Smith and Downs 1956; Bernardi 1985; Bacigalupo et al. 2008; Serrano and Terán 1998; sometimes cited as *Randia spinosa* (Jacq.) H. Karst., nom. illeg. or *Basanacanthus spinosa* (Jacq.) K. Schum.]. However, Delprete et al. (2005) restricted the application of this name to plants from Central America, the Antilles, and northern South America, and excluded the plants of southern South America from its circumscription. More recent work regarding *Randia* from Paraguay was carried out by Bernardi (1985). He reported two species of *Randia* in Paraguay: 1) *R. calycina* Cham. from western Paraguay (Concepción and Amambay departments), and 2) *R. armata*. In the last species he included the following varieties: *Randia armata* var *armata,* widely distributed over the country, *Randia armata* var. *pubescens* (Kunth) R. Knuth, and *Randia armata* var. *ferox* (K. Schum.) Bernardi, the latter two from western Paraguay (Cordillera, Concepción, Amambay, and Presidente Hayes). His work comprised a synopsis of the Paraguayan species of *Randia*, including many varieties and forms treated previously by Chodat & Hassler (1904) under *Basanacantha* Hook. f. In particular, two entities of Chodat & Hassler are pertinent in this work, *Basanacantha spinosa* var. *parviflora* Chodat & Hassl. and *B. spinosa* var. *macrocalyx* Chodat & Hassl. These varieties were synonymized by Bernardi (1985) under *Randia armata* var. *armata,* but we consider both as belonging to a new species here described as *Randia brevituba* Judkevich & R. M. Salas.

The results presented here are part of a more comprehensive study including all species of the Southern Cone of America. In the Americas, observations in major South American herbaria, including those in the Southern Cone, indicate that *Randia armata* is one of the names most commonly applied to specimens identified as belonging to *Randia*. We therefore also provide a short discussion about the taxonomic concept of *Randia armata* in the context of species from the Southern Cone of America.

Materials and methods

Conventional taxonomic methods were followed. Several specimens from all species of *Randia* that grow in the Southern Cone were

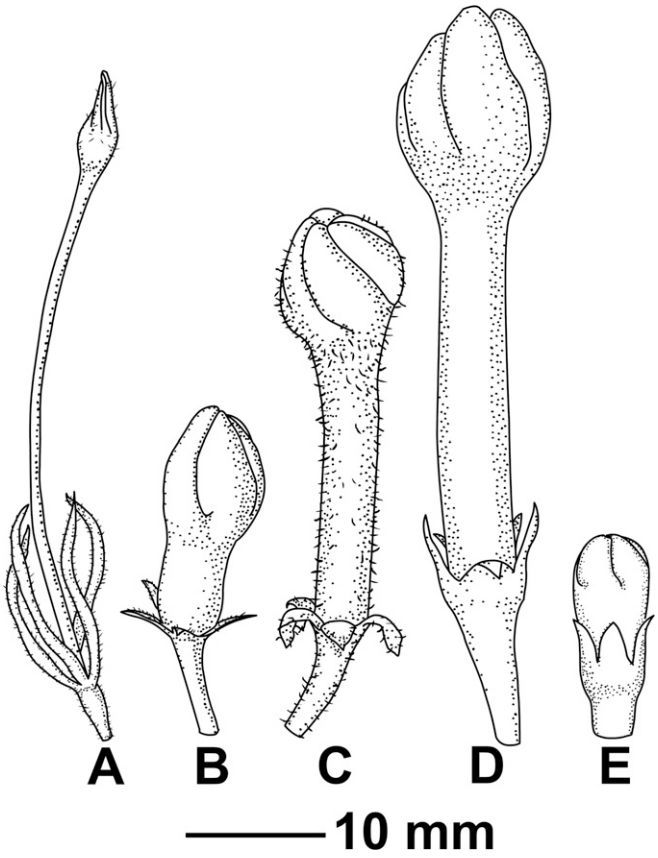

Fig. 1. Comparison of size and shape of the staminate floral bud of some *Randia* species. A. *R. armata.* B. *R. brevituba.* C. *R. calycina.* D. *R. ferox.* E. *R. micracantha*. A from *Rolander s.n.* (SBT); B from *Keller and Franco 12254* (CTES); C from *Hahn 683* (CORD, MO); D from *Judkevich et al. 34* (CTES); E from *Salas 491* (CTES).

examined (see Appendix 1: *Randia calycina*, *R. ferox*, and *R. micracantha*), including numerous specimens outside of the study area for comparison with the new species *R. brevituba*. We also include in Appendix 1 the citations for specimens of *R. armata* that we examined. We use the terms pistillate and staminate instead of female and male respectively, according to Cocucci (2006). Only in *Randia brevituba*, the pollen grains were analyzed according to Erdtman (1966), and the measurements were taken using a light microscope (LM), Leica DM LV2, and a scanning electron microscope (SEM), JEOL 5800 LV. We follow the terminology proposed by Punt et al. (2007). Thirty pollen grains were measured from the species using LM and SEM micrographs.

Results

In the Southern Cone of America, the genus *Randia* has four species: *R. calycina*, *R. ferox*, *R. micracantha*, and the new species *R. brevituba*, described below. In the main regional herbaria (AS, CTES, CORD, FCQ, LIL, PY, and SI), almost all specimens of these species are commonly misidentified as *R. armata* (sometimes as *R. spinosa* nom. illeg. or *Basanacanthus spinosa*). In this context, we propose a taxonomic delimitation of *R. armata,* the new *R. brevituba*, and the other three species in southern South America.

The most complete taxonomic work on *Randia armata* is by Taylor and Lorence (1993). They applied the name *R. armata* to a morphologically variable spiny shrub or small tree, distributed from Mexico and the Lesser Antilles to Paraguay. The authors extensively reviewed the nomenclatural issues, reporting the taxonomy of this species as very problematic. They made a lectotypification with an illustration by Jacquin (lectotype: "icon in Jacquin, Select. Stirp. Amer. Hist.: t. 49. 1763"). We consider this lectotype useful to distinguish this species from the other species of the Southern Cone of America but only when specimens bear flowers. When specimens only have fruits, correct identification is more difficult due to the similarity of fruits across these *Randia* species. After examining the lectotype and additional herbarium material (see Appendix 1), we found two diagnostic features that allow relatively easy distinction of species. In *R. armata* the floral bud apex is narrowly piriform (in staminate and pistillate flowers) and the corolla tube is ca. 1 mm wide, whereas in the other species (*R. brevituba*, *R. calycina*, *R. ferox*, and *R. micracantha*) the apex bud is ovoid, hemispherical, deltoid, rounded or obtuse, and the corolla tube is 2–6 mm wide (Fig. 1). Additional morphological features distinguishing *R. armata* from the other species of the Southern Cone of America are listed in Table 1.

Taxonomic Treatment

Randia brevituba Judkevich & R. M. Salas, sp. nov.—TYPE: ARGENTINA. Misiones: Dpto. San Ignacio, Establecimiento Pomera S. A., 27°13′35.1″S, 55°34′41.2″W, 92 m alt., 17 Sep 2014 (P, fl, fr), *Keller and Franco 12253* (holotype: CTES!, isotype: SI!).

Basanacantha spinosa var. *macrocalyx* Chodat & Hassl., Bull. Herb. Boissier, sér. 2, 4: 173. 1904. syn. nov.—TYPE: PARAGUAY. Canindeyú, ad ripam fluminis Carimbatay, Dec 1901–1902 (S, fl), *E. Hassler 5822* (holotype G00400524!, 3 sheets).

Basanacantha spinosa var. *parviflora* Chodat & Hassl., Bull. Herb. Boissier, sér. 2, 4: 173. 1904. syn. nov.—TYPE: PARAGUAY. Concepción, "*in glareosis siccis pr. Concepción*", Sep 1901 (P, fl), *E. Hassler 7374* (lectotype: G00400265!, here designated; isolectotypes: BM n.v, G00400267!, G00400268!, G00400269!, G00400270!, MO!, MPU!, NY!, P!, S!, UC!).

Table 1. Morphological features distinguishing *Randia brevituba* from *R. armata*, *R. calycina*, *R. ferox*, and *R. micracantha*.

Character	*R. armata*	*R. brevituba*	*R. calycina*	*R. ferox*	*R. micracantha*
Calyx lobes	Narrowly elliptic	Spatulate, elliptic, narrowly obovate, or rarely triangular	Spatulate, elliptic or narrowly obovate	Obovate or narrowly triangular	Narrowly triangular or subovate
Length of calyx lobes	5–9 mm	1.8–8.8 mm	3–7 mm	6–20 mm	2–4 mm
Apex of floral bud	Narrowly piriform	Broadly ovoid	Ovoid and obtuse	Ovoid, rarely deltoid	Inconspicuous and obtuse
Length of Corolla	20–26 mm	5–15 mm	17–23 mm	28–50 mm	3.5–8 mm
Diameter of corolla tube	ca. 1 mm	2–3.5 mm	1.5–2.2 mm	2.5–5 mm	2–4 mm

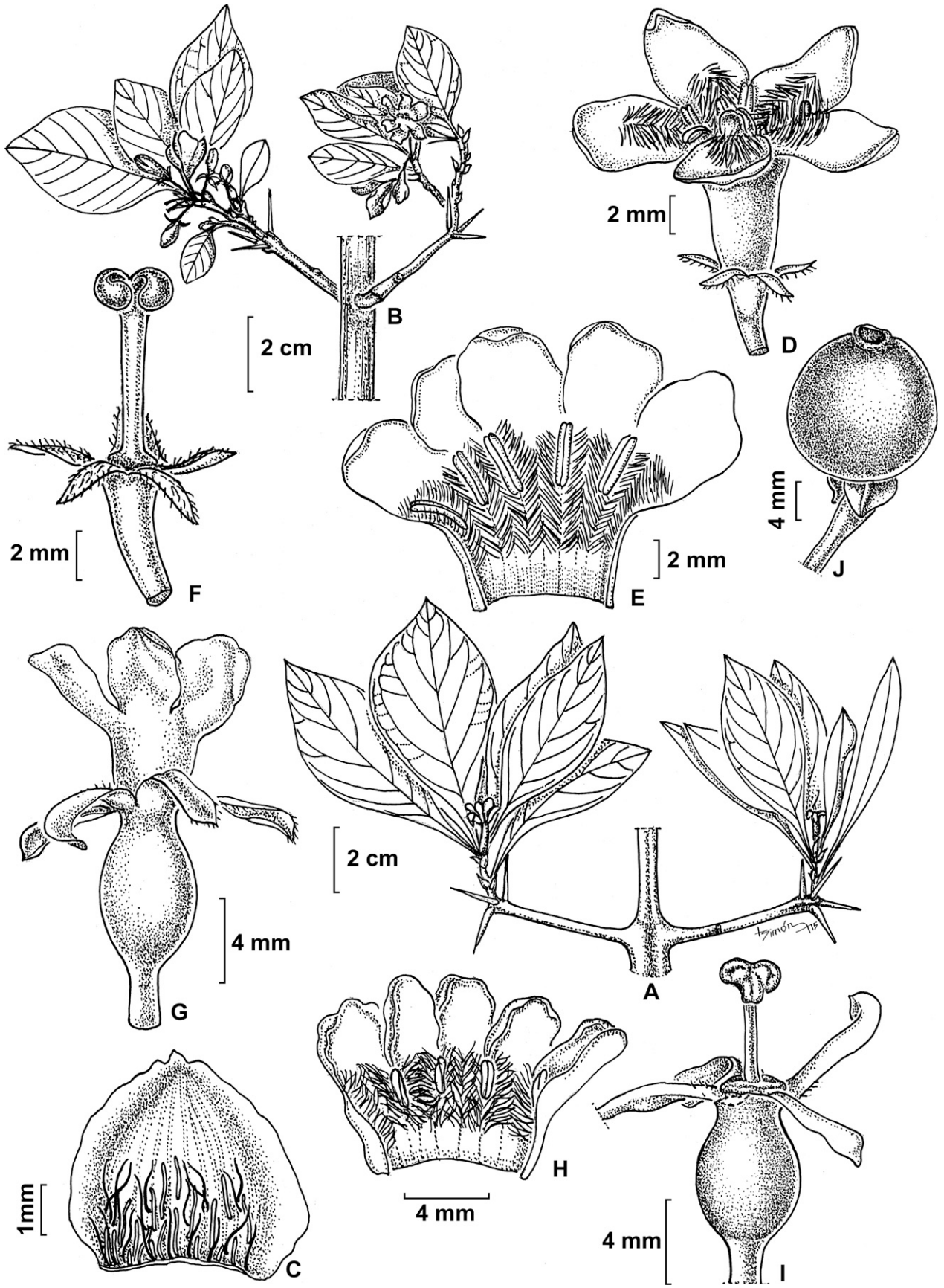

FIG. 2. *Randia brevituba*. A. Branches with pistillate flowers. B. Branches with staminate flowers. C. Interior of stipular lobe. D. Staminate flower. E. Interior of corolla of staminate flower. F. Hypanthium, calyx lobes, and pistillode. G. Pistillate flower. H. Interior of corolla of pistillate flower. I. Hypanthium, calyx lobes, style, and stigma. J. Fruit. Illustration by Laura Simón. A, G–J from *Keller and Franco 12253* (CTES); B–F from *Keller and Franco 12254* (CTES).

Similar to *Randia ferox* (Cham. & Schltdl) DC., it differs in having the leaves broadly ovate with cuspidate or abruptly acuminate apex (versus leaves elliptic, ovate, oblong, or obovate with acute or obtuse apex, not cuspidate), in the short corolla tube with length/width ratio 1.4:1 (pistillate) and 2.5:1 (staminate) [versus a long corolla tube with length/width ratio 5.8:1 (pistillate) and 8.7:1 (staminate)], corolla lobes yellow and inflexed at the anthesis end (versus corolla lobes white and not inflexed), corolla throat markedly pubescent (versus corolla throat puberulous), fruit 1.4–1.7 cm long, globose, pericarp coriaceous and 0.3–0.4 mm thick (versus fruit 3–5 cm long, commonly ovoid, obovoid or ellipsoidal, rarely subglobose, pericarp ligneous and 1.2–3.5 mm thick).

Tree or treelet, 3–7.4 m tall, dioecious, maximum basal diameter of trunk 19 cm; branches opposite, with 3–4 spines per node, 5.6–14.8 × 0.78–2.5 mm, with 1–2 brachyblasts at the apex. Leaves petiolate; petiole 3.1–17.2 mm long, glabrous; blades broadly ovate, 32–78 × 18.1–48 mm, base attenuate, apex cuspidate, shortly acuminate, or rarely mucronate,

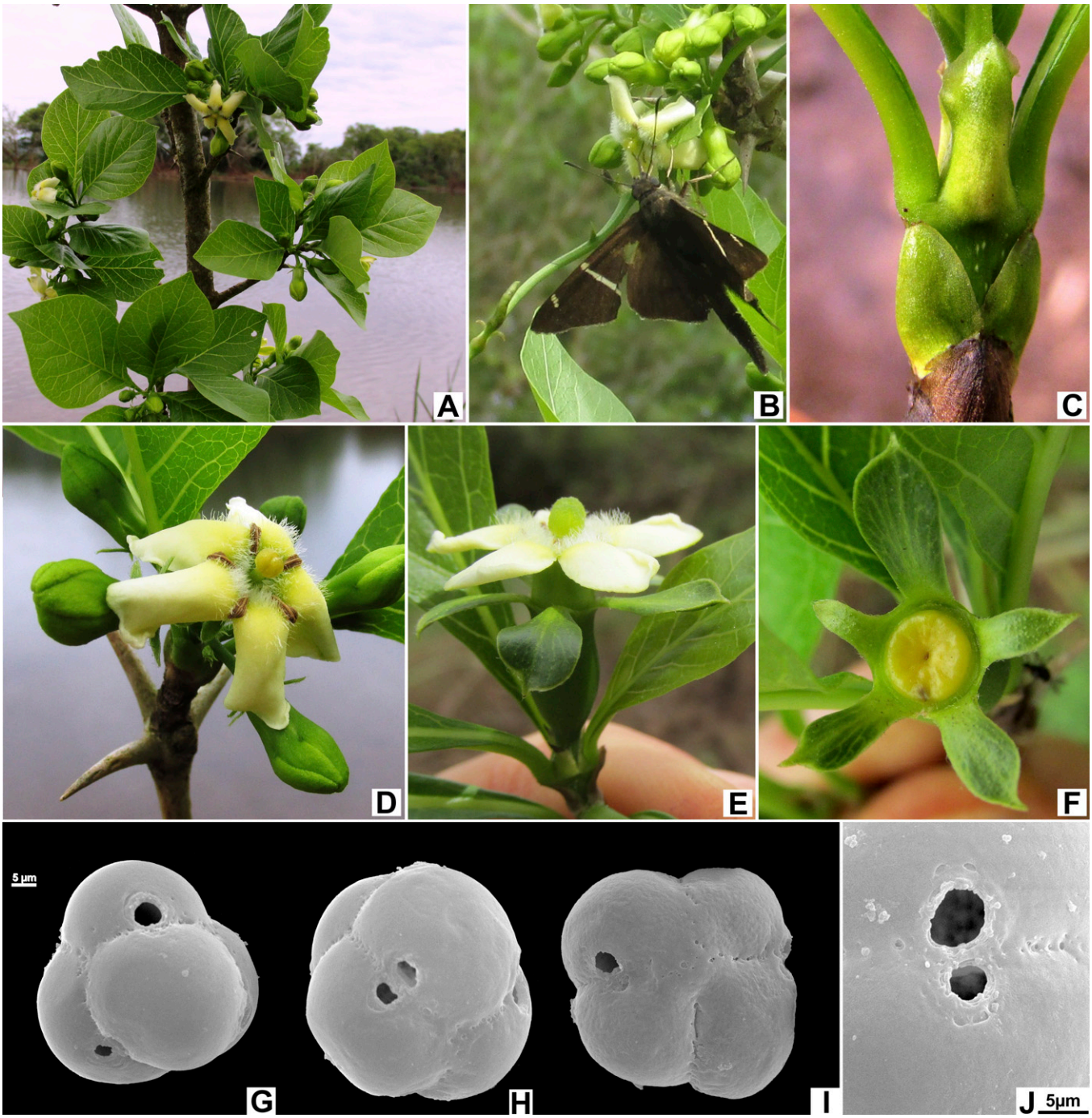

FIG. 3. *Randia brevituba*. A. Flowering branches. B. Pollinator, *Urbanus teleus*. C. Imbricate stipules and base of leaves. D. Staminate flowers with reflexed corolla lobes. E–F. Pistillate flower. E. Corolla with erect lobes. F. Calyx lobes. G–I. Tetrads of pollen. G. Tetrahedral pollen. H. Decussate pollen. I. Rhomboidal pollen. J. Detail of pores and psilate exine of pollen. A–D from *Keller and Franco 12254* (CTES); E–F from *Keller and Franco 12253* (CTES); G–I from *Keller and Paredes 10686* (CTES).

glabrous on both faces except for the puberulous veins; secondary nerves 5–8 on both sides of the mid-vein, ascendant; domatia in the form of tuft of hairs at junction of midrib and secondary nerves; stipules green, caducous, triangular or ovate, with acute or acuminate apex, 2.2–5.54 mm long, externally glabrous, internally with colleters and trichomes uniformly distributed. Inflorescences terminal and fasciculate, the staminate ones 3–8-flowered, the pistillate ones 1-flowered. Flowers 5-merous, pleasantly fragrant, apex of floral bud broadly ovoid; staminate flowers pedicellate, pedicel 3.4–9.2 mm long; hypanthium obconic, puberulous and reduced, calyx 5-lobed, lobes commonly equal or unequal, triangular or rarely spatulate, externally glabrous, internally pubescent, margin glabrous or puberulous, 1.8–3.9 mm long; corolla salverform, tube green, externally glabrous, internally pubescent from middle of tube to the base of corolla lobes, 2.8–7.9 × 2–3.2 mm; lobes obovate, at apex rounded, at beginning of anthesis patent and white, becoming yellow and inflexed with age, 2.5–6.5 mm long; pistillode partially exerted, with apparent stigmatic portion 2-fid, the branches ovate, smooth; stamens partially exerted, anthers sessile, 1.5–1.6 mm long; pollen in permanent tetrads; tetrads tetrahedral, decussate and rhomboidal; tetrahedral tetrads 50.8–63.3 μm in diameter, isolated grains symmetrical, triporate, 22.4–35.3 μm (polar view), 34.7–44.1 μm (equatorial view), with circular pores 4.7–8.4 μm in diameter; decussate tetrads 54.5–60.3 μm, isolated grains triporate, 22.2–30.6 μm (polar view), 34.6–42.1 μm (equatorial view), pores circular, 5.8–8.6 μm diameter; tetrads rhomboidal 50–70.2 μm, isolated grains, 2–3 porate, 30–37.6 μm (polar view), 35.2–43.1 μm (equatorial view), pores circular, 6.1–9.3 μm diameter, psilate exine in all types of tetrads; pistillate flowers pedicellate, pedicel 2.8–3 mm long; hypanthium urceolate and puberulous, 7.1–7.9 mm long, calyx 5-lobed, lobes unequal in shape and size, variously foliaceous, spatulate, elliptic, narrowly obovate or narrowly triangular, with mucronate or acuminate apex, externally glabrous, internally pubescent, with margin ciliate, 4.2–8.8 mm long; corolla salverform, tube green, externally glabrous, internally pubescent from middle of tube to the base of corolla lobes, 4.7–5.4 × 3.3–3.5 mm; lobes obovate, with apex rounded, 3.6–4.8 mm long; staminodes partially exserted; apparent anther portion sessile; style partially exerted, glabrous; stigma 2-fid, stigmatic branches ovate, papillose. Fruit globose, puberulous, 13.7–17.2 × 12.5–16 mm; pericarp wall 0.3–0.4 mm thick, coriaceous, seeds obovate in outline, flattened, 2–4 mm long, blackish, immersed in pulp. Figures 1B, 2–5.

Additional Specimens Examined—ARGENTINA. Misiones: Dpto. San Ignacio, Paraná River, 27°12′49.1″S, 55°36′8.9″W, 97 m, 1 Feb 2012 (S, fl), *Keller and Paredes 10686* (CTES); idem, Corpus, 19 Sep 1946 (S, fl), *Álvarez 3390* (CTES, LIL); Establecimiento Pomera S.A., 27°13′20.5″S, 55°34′41.4″W, 17 Sep 2014 (P, fl), *Keller and Franco 12258* (CTES); idem, 27°13′35.5″S, 55°34′41.6″W, 17 Sep 2014 (S, fl), *Keller and Franco 12254* (CTES); idem (fl), 27°13′32.9″S, 55°34′41.7″W, 17 Sep 2014 (S, fl), *Keller and Franco 12255* (CTES); idem (P, fl). PARAGUAY. Concepción: "*in glareosis siccis prope Concepción*", Sept 1901 (S, fl), *Hassler 7449* (G00400266, G00400271, S, UC).

Distribution and Habitat—The new species occurs in northern Argentina (Dept. San Ignacio, Misiones province) and Paraguay (Dept. Concepción and Canindeyú). In Argentina, two collections are known, representing one locality. One collection is at the mouth of Chuño River where it joins the Paraná River. The other Argentinian collection is from near the small village of Corpus, just a few kilometers north of the first one. In Paraguay, no current collections

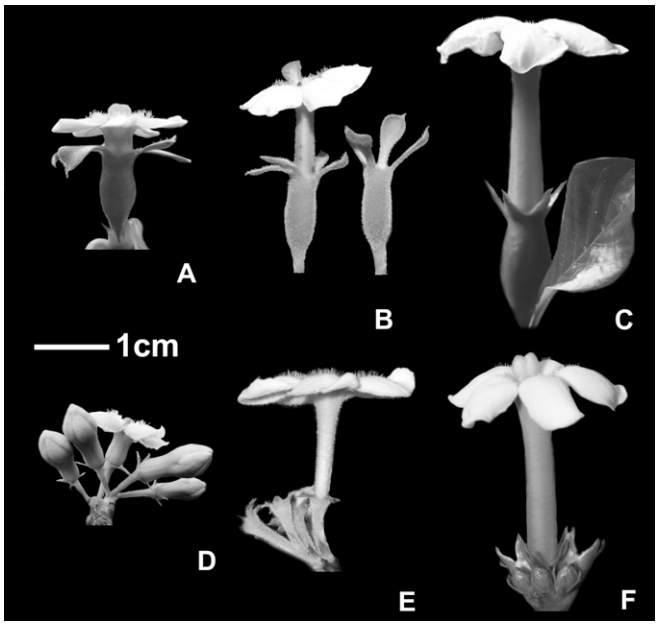

FIG. 4. Comparison of pistillate and staminate flowers from some *Randia* species. A, D. *Randia brevituba*. B, E. *Randia calycina*. C, F. *Randia ferox*. A from *Keller and Franco 12253* (CTES); B from *Judkevich and Salas 49* (CTES); C from *Schinini 28784* (CTES); D from *Keller and Franco 12254* (CTES); E *Judkevich and Salas 54* (CTES); F *Judkevich et al. 34* (CTES).

are available to determine ecological and distributional aspects; in this country the species is only known from two old collections representing two localities. In Argentina, *Randia brevituba* grows in seasonally flooded riverside areas and on small river islands with open and sparse vegetation. In these sites, it is apparently a heliophilous pioneer species growing as isolated individuals in secondary riparian forests. It is also found in nearby pine monoculture

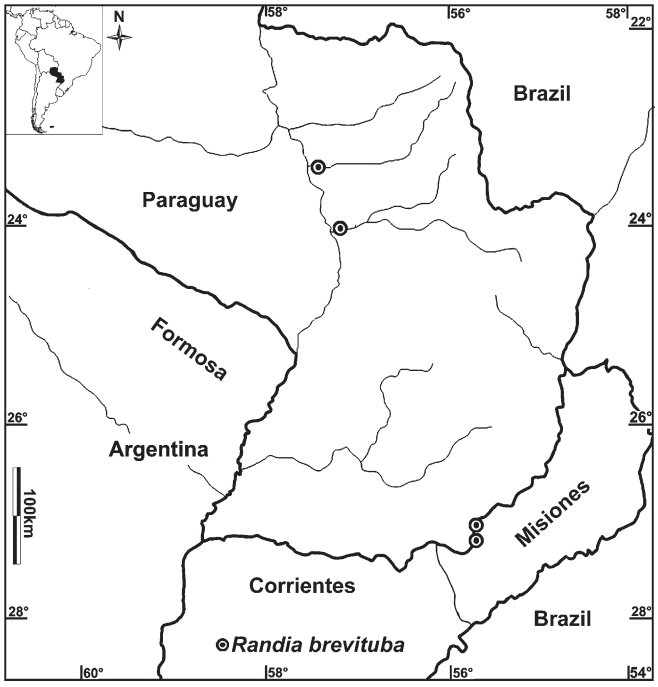

FIG. 5. Geographical distribution of *Randia brevituba*.

stands. The flowers, with a strong scent similar to *Jasminum officinale* L., are visited by bees and some Lepidoptera such as *Urbanus teleus* Hübner (1821) (Fig. 3 B). This species flowers from September to February and fruits from April to May.

Conservation Status*—Randia brevituba* is considered endangered [EN B1ab(i,ii,iv), B2ab(i,ii,iv)] according to IUCN red list criteria (IUCN 2001). Its area of occupancy (AOO) was estimated as 333.6 km^2 and the extent of occurrence (EOO) as 27 km^2 (cell width 3 km). This species is known from nine collections representing only three locations, all of them outside protected areas and so subject to habitat destruction.

***Etymology*—**The epithet '*brevituba*' refers to the relatively short corolla tubes in both the staminate and pistillate flowers.

Taxonomic Notes*—Randia brevituba* can be easily distinguished from other *Randia* species found in the region in having a short corolla tube (2.8–7.9 mm long), with the length/width ratio 1.46:1 for the staminate corolla and 2.52:1 for the pistillate corolla, and its corolla lobes with the base of the inner surface markedly pubescent and becoming inflexed and yellow-colored by the end of anthesis. Also, the calyx lobes of the pistillate flowers have a marked variation in shape and length on the same flower, ranging from spatulate, elliptical, or narrowly obovate to narrowly triangular. The calyx lobes of the staminate flower may occasionally be spatulate like those of the pistillate flowers, but usually differ in shape from the pistillate calyx lobes. This variation in shape of the calyx lobes of *R. brevituba* is similar to that found in *Randia calycina*, which has variously spatulate, elliptic or narrowly obovate lobes. In contrast, in *Randia ferox* in southern South America the shape of the calyx lobes is relatively constant. Figure 4 shows a comparison of shape and size of the pistillate and staminate flowers of *R. brevituba*, *R. calycina* and *R. ferox*.

Key to *Randia* in the Southern Cone of America

1. Each branch with one node bearing spines, the spines mostly robust but sometimes slender; corolla salverform, white or later becoming yellowed; pollen grains with psilate exine 2
   2. Leaf blades pubescent or hispid, rarely the adaxial face glabrous; calyx and external surface of corolla pubescent; fruit puberulous, with numerous lenticels at maturity . . . . . *Randia calycina*
   2. Leaf blade glabrous or puberulous on both faces; calyx and external surface of corolla glabrous; fruit glabrous, without lenticels 3
      3. Leaf blade broadly ovate, cuspidate or abruptly acuminate; pistillate flower with calyx lobes spatulate, elliptic, narrowly obovate, or rarely triangular, externally glabrous, internally pubescent; corolla white becoming yellow by the end of anthesis, tube 4.7–5.4 mm (pistillate) and 2.8–7.9 mm (staminate) long; fruit globose, 1.4–1.7 cm long, pericarp 0.3–0.4 mm thick, coriaceous . . . . . *Randia brevituba*
      3. Leaf blade ovate, oblong-ovate or obovate, acute or obtuse at apex; pistillate flower with calyx lobes narrowly triangular, glabrous; corolla white, tube 25.0–27.0 mm (staminate) and 22.6–34.0 mm (pistillate) long; fruit ovoid, ellipsoid or subglobose, 3–5 cm long, pericarp 1.2–3.5 mm thick, ligneous . . . . . *Randia ferox*
1. Each branch with two or more nodes bearing spines, the spines slender; corolla infundibuliform, yellow-green or yellow; pollen grains with reticulate exine . . . . . *Randia micracantha*

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Appendix 1. Additional specimens examined of the remaining species of the Southern Cone of America.

***Randia armata*—**BRASIL. Sine loco (mislabeled as Rio de Janeiro), 8 Sep 1867 (S, fl), *A. F. M. Glaziou 1519* (R). Acre: Rio Branco to Porto, Acre hwy, Km 39, 13 Oct 1980 (S, fl), *S. R. Lowrie et al. 513* (INPA); Mun.

Sena Madureira, Rio Macanã, Seringal São Bento, 18 Sep 1978 (S, fl), *J. L. Santos 181* (INPA). Amazonas: Rio Cunhuá at Deni Indian village, forest beside stream, 29 Nov 1971 (P, fr), *G. T. Prance et al. 16530* (INPA, MG, NY).

SURINAME. Sine loco, sine data (S, fl), *N. Rolander s.n.* (SBT13419).

Randia calycina—ARGENTINA. Chaco: Dpto. Bermejo, Colonia Benítez, 28 Nov 2014, *M. D. Judkevich & R. M. Salas 57* (CTES); Dpto. San Fernando, Barranqueras, Paranacito, 7 Apr 2007 (P, fr), *G. Rotta 453* (CTES). Formosa: Dpto. Formosa, 12 Km South of Formosa, 19 Jun 1975 (P, fr), *A. Krapovickas & A. Schinini 28515* (CTES, SI): Dpto. Pilcomayo, Estancia Guaycolec, 10 Sep 2014 (P, fl), *M. D. Judkevich & R. M. Salas 49* (CTES); ídem, 10 Sep 2014 (S, fl), *M. D. Judkevich & R. M. Salas 52* (CTES); ídem, Monte Lindo, 11 Sep 2014 (S, fl), *M. D. Judkevich & R. M. Salas 54* (CTES).

BRAZIL. Paraná: Mun. Paranaguá, Morro Bento Alves (Forte da Fortaleza), 07 Nov 1986 (P, fr), *R. M. Silva et al. 24899* (UEC).

PARAGUAY. Presidente Hayes, Estancia Maroa, 23°32'33″S, 57°54'7″W, 19 Oct 2004 (P, fl), *M. Vera et al. 98* (CTES, FCQ); Villa Hayes, Estancia La Golondrina, 24°55'S, 57°40'W, 9 Sep 1982 (E, fl), *W. Hahn 683* (CTES, CORD, MO).

Randia ferox—ARGENTINA. Corrientes: Dpto. San Martín, Cerro Capará, 09 Apr 2013 (S, fl), *W. A. Medina & R. M. Salas 384* (CTES). Misiones: Dpto. Candelaria, San Juan, 13 Jul 1974 (P, fr), *E. Schwindt 374* (CTES, LIL); Dpto. Guaraní, Predio Guaraní, 26°54'59″S, 54°12'18″W, Arroyo Soberbio, 9 Sep 1994 (P, fl, fr), *A. Schinini et al. 28784* (BH, CTES, CUVC, GH, LIL, MEXU, MO, MSC, K); Dpto. San Pedro, Colonia San Lorenzo, 29-IX-2007 (S, fl), *H. A. Keller et al. 4436* (CTES); ídem, Parque Provincial Moconá, Mirador del Yaboty, 27°09'03.67″S, 53°54'51.09″W, 250 m, 07 Mar 2013 (S, fl), *M. D. Judkevich et al. 34* (CTES).

BRAZIL. Minas Gerais: Mun. Carrancas, road to Serra de Bicas, about 1 Km from the city, 8 Oct 1998 (S, fl), *L. S. Kinoshita et al. 98-602* (UEC). Paraná: Mun. Araucaria, Novo Nordisk, 14 Dec 1998 (P, fr), *G. Gatti & A. L. S. Gatti 336* (CTES, ICN). Rio Grande do Sul: Mun. Santa María, Reserva Biológica do Ibicuí-Nirim, 4 Oct 1989 (P, fr), *A. L. Bonotto 22* (CTES). São Paulo: Mun. Angatuba, Estação Ecológica de Angatuba, 09 Oct 1987 (S, fl), *R. B. Torres et al. 307* (UEC).

PARAGUAY. *Itapúa*: Pirapó, CEDEFO, 26°30'S, 56°50'W, 4 Aug 1984 (P, fr), *W. Hahn & L. P. de Molas 2761* (CTES, CORD, MO).

Randia micracantha—ARGENTINA. Jujuy: Dpto. El Carmen, Dique Las Maderas, South of Perico, Feb 1997 (P, fr), *J. Protomsatro 1230* (CTES, MCNS); Dpto. San Pedro, Route 56, 13 May 1998 (P, fr), *A. Krapovickas et al. 47412* (CTES); Dpto. Santa Bárbara, Sierras de Maíz Gordo, near Salta border, 24°17'S, 65°11'W, 800 m, 15 Dec 1998 (S, fl), *O. Ahumada et al. 9025* (CTES, JUA). Salta: Dpto. Capital, Villa San Lorenzo, Quebrada de Arteaga, Finca Las Costas, 29°44.87'S, 65°30.958'W, 1400 m, 15 Jan 2014 (P, fr), *M. D. Judkevich 48* (CTES); Dpto. San Martin, Aguaray, 21 Sep 2012 (S, fl), *R. M. Salas 491* (CTES). Tucumán: Dpto. Capital, Jul 1901 (P, fr), *M. Lillo 2834* (CORD, LIL); ídem, Routh to Cristo de San Javier, 14 Sep 2005 (P, fr), *H. A. Keller 3149* (CTES).

BOLIVIA. Chuquisaca, Prov. Luis Calvo, El Salvador-CIMBOC, 20°41'S, 63°11'W, 850 m, 10 Apr 1993 (P, fr), *C. S. Toledo et al. 11596* (CTES, MCNS). Cochabamba, Mizque road to Aiquile, 2600 m, 30 Oct 1992 (E, fl), *C. Antezana 423* (CTES). Santa Cruz, Prov. Vallegrande, road to Vallegrande, 3 Km North West of Cochabambita, 18°13'S, 64°12'W, 1700 m, 28 Dec 1988 (P, fr), *M. Saldías 538* (CTES, USZ). Tarija, Prov. Arce, community Guavillas, 23.8 Km South of Padcaya, on road to Bermejo, 21°59'S, 64°40'W, 2100 m, 27 Apr 1983 (P, fr), *J. S. Solomon 10187* (CTES, LPB, MO).