

**New and Reconsidered Mexican Acanthaceae IX. *Justicia***

by

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Three species of *Justicia* are newly described from the lowland rain forests of southeastern Mexico (Oaxaca and Veracruz): *J. ardens*, *J. tuxtensis*, and *J. uxpanapensis*. Macromorphological and palynological features of these species are considered in an attempt to elucidate their taxonomic affinities. New combinations in *Justicia* are proposed for *Beloperone nelsonii* (from Nayarit) and *Jacobinia stellata* (from Jalisco). A new name, *Justicia veracruzana*, is proposed for the species previously treated as *Jacobinia paniculata* (Puebla and Veracruz).

RESUMEN

Se describen tres especies nuevas de *Justicia* de las selvas tropicales de la tierra baja del sudeste de México (Oaxaca y Veracruz): *J. ardens*, *J. tuxtensis*, y *J. uxpanapensis*. Se consideran las características macromorfológicas y palinológicas de estas especies para intentar aclarar sus afinidades taxonómicas. Se proponen nuevas combinaciones en *Justicia* para *Beloperone nelsonii* (de Nayarit) y *Jacobinia stellata* (de Jalisco). Un nuevo nombre, *Justicia veracruzana*, se propone para la especie tratada previamente como *Jacobinia paniculata* (de Puebla y Veracruz).

*Justicia* L. is the largest genus of Mexican Acanthaceae with about 80 species in the country (Daniel 1999a). In addition to those species already described, there remain numerous undescribed species, species described in genera now treated as synonymous with *Justicia* but that have not been transferred to that genus, plants of uncertain taxonomic status, and names that have not been placed. Efforts to deal with some of these “problematic” plants and names have resulted in three new species from the lowland rain forests of Veracruz and Oaxaca, new combinations in *Justicia* for *Jacobinia stellata* (from Jalisco) and *Beloperone nelsonii* (from Islas Mariás, Nayarit), and a new name for *Jacobinia paniculata* (from Veracruz and Puebla).

NEW SPECIES

The lowland rain forests on the Gulf slope of southeastern Veracruz and adjacent regions of Oaxaca harbor an impressive assemblage of wet-forest Acanthaceae (Daniel 1991, 1999b, 2001). Herewith, three additional distinctive species of *Justicia* are described from these forests. As has been demonstrated elsewhere (e.g., Acosta C. and Daniel 1993; Daniel 1999b; Daniel and Wasshausen 1990; Durkee and McDade 1996), placement of new taxa from the Neotropics into the infrageneric classification proposed by Graham (1988) is often unsatisfactory.



*Justicia tuxtensis* T. F. Daniel, sp. nov.

Fig. 1 (a-d)

TYPE. — MEXICO. **Veracruz:** Mpio. San Andrés Tuxtla, Estación de Biología Tropical "Los Tuxtlas," vereda vigia I, lat. 18°34–36'N, long. 95°04–09'W, 400–500 m, 19 May 1989, *G. Ibarra M. & S. Sinaca C.* 3372 (holotype: MEXU!; isotype: CAS!).

Herbae usque ad 4 dm. Folia petiolata, laminae ovatae vel ovato-ellipticae, 36–110 mm longae, 11–43 mm latae, 2–2.8-plo longiores qua latiores. Inflorescentia floribus in spicas vel paniculas spicarum; dichasia alterna, sessilia, uniflora. Bracteae aliquantum heteromorphae, oppositae (vel suboppositae), lineares vel lanci-lineares, 1–1.9 mm longae, 0.2–0.3 mm latae. Calyx 5-lobus, 3–3.7 mm longus, lobis homomorphis. Corolla alba et labio inferiore purpurato notato, 6.5–7 mm longa, extus pubescens trichomatibus eglandulosis. Stamina thecis 0.6–1 mm longis, superpositis, theca supera pubescens trichomatibus eglandulosis, theca infera basi calcarata. Capsula 6–9.5 mm longa, pubescens trichomatibus eglandulosis.

Herbs to 4 dm. Young stems subquadrate to quadrate-sulcate to ± flattened, 4 grooves/lines present, bifariously (or at least trichomes concentrated in 2 lines) pubescent with retrorse eglandular trichomes 0.2–0.5 mm long, trichomes usually with prominent maroon septae. Leaves petiolate, petioles to 22 mm long, blades ovate to ovate-elliptic, 36–110 mm long, 11–43 mm wide, 2–3.3 times longer than wide, acute to acuminate at apex, acute to subattenuate at base, surfaces pubescent with antrorse eglandular trichomes (mostly restricted to midvein) to nearly glabrous, margin entire to subsinuate. Inflorescence of axillary and terminal dichasiate pedunculate spikes or panicles of spikes to 9 cm long (including peduncle and excluding flowers), spikes 1–2.5 mm in diameter and panicles 8–37 mm in diameter near midpoint of fertile portion, peduncles 4–15 mm long, (bifariously to) evenly pubescent with an understory of erect to flexuose to antrorse to retrorse eglandular trichomes 0.05–0.2 mm long and an overstory of erect to flexuose glandular trichomes 0.1–0.4 mm long (glandular pubescent), rachis glandular pubescent, inflorescence bracts (if present) sometimes subfoliaceous, linear to linear-elliptic to lanceolate to lance-ovate, 2–10 mm long, 0.5–3 mm wide, abaxial surface pubescent with antrorse eglandular trichomes, inflorescence branches (if present) sometimes clustered (up to 5) at inflorescence nodes; dichasia alternate, sometimes ± secund, 1-flowered, 1 per axil, sessile. Bracts opposite (to subopposite), linear to lance-linear, 1–2.2 mm long, 0.2–0.3 mm wide, somewhat heteromorphic with fertile bract 1.3–2 times longer than sterile bract, abaxial surface glandular pubescent (or sometimes with glandular trichomes sparse or absent). Bracteoles linear to lance-linear, 1.3–2 mm long, 0.2–0.4 mm wide, abaxial surface pubescent like bracts. Flowers sessile to subsessile (i.e., with pedicels to 0.3 mm long). Calyx 5-lobed, 3–3.8 mm long, lobes homomorphic, lance-subulate, 2.4–3 mm long, 0.4–0.6 mm wide, abaxially pubescent like bracts, margins ± hyaline. Corolla whitish with maroon markings on lower lip, 6.5–8 mm long, externally pubescent with flexuose to retrorse eglandular trichomes 0.1–0.2 mm long, tube ± expanded distally, 4–5 mm long, 1.2–1.4 mm in diameter near midpoint, upper lip 2–3 mm long, 2-lobed, lobes 0.1–0.2 mm long, lower lip 2–3 mm long, lobes 0.8–1.3 mm long, 1–1.6 mm wide. Stamens inserted near apex of corolla tube (less than 1 mm from mouth of corolla), 2.5–3 mm long, filaments glabrous or with one or more coarse trichomelike protrusions distally, thecae 0.6–1 mm long, subequal in length, parallel, superposed (gap 0.2–0.3 mm long), distal theca pubescent with flexuose eglandular trichomes, lower theca with a prominent pointed basal appendage 0.2–0.4 mm long; pollen (Fig. 2) 3-colporate, 6-pseudocolpate, exine between colpi and pseudocolpi sometimes appearing as if breaking up into insulae. Style 4.5–5.5 mm long, proximally pubescent with eglandular trichomes, distally glabrous, stigma 0.1–0.2 mm long, asymmetric, lobes inconspicuous. Capsule 6–9.5 mm long, pubescent with erect to flexuose eglandular trichomes 0.05–0.2 mm long (inconspicuous sessile glands



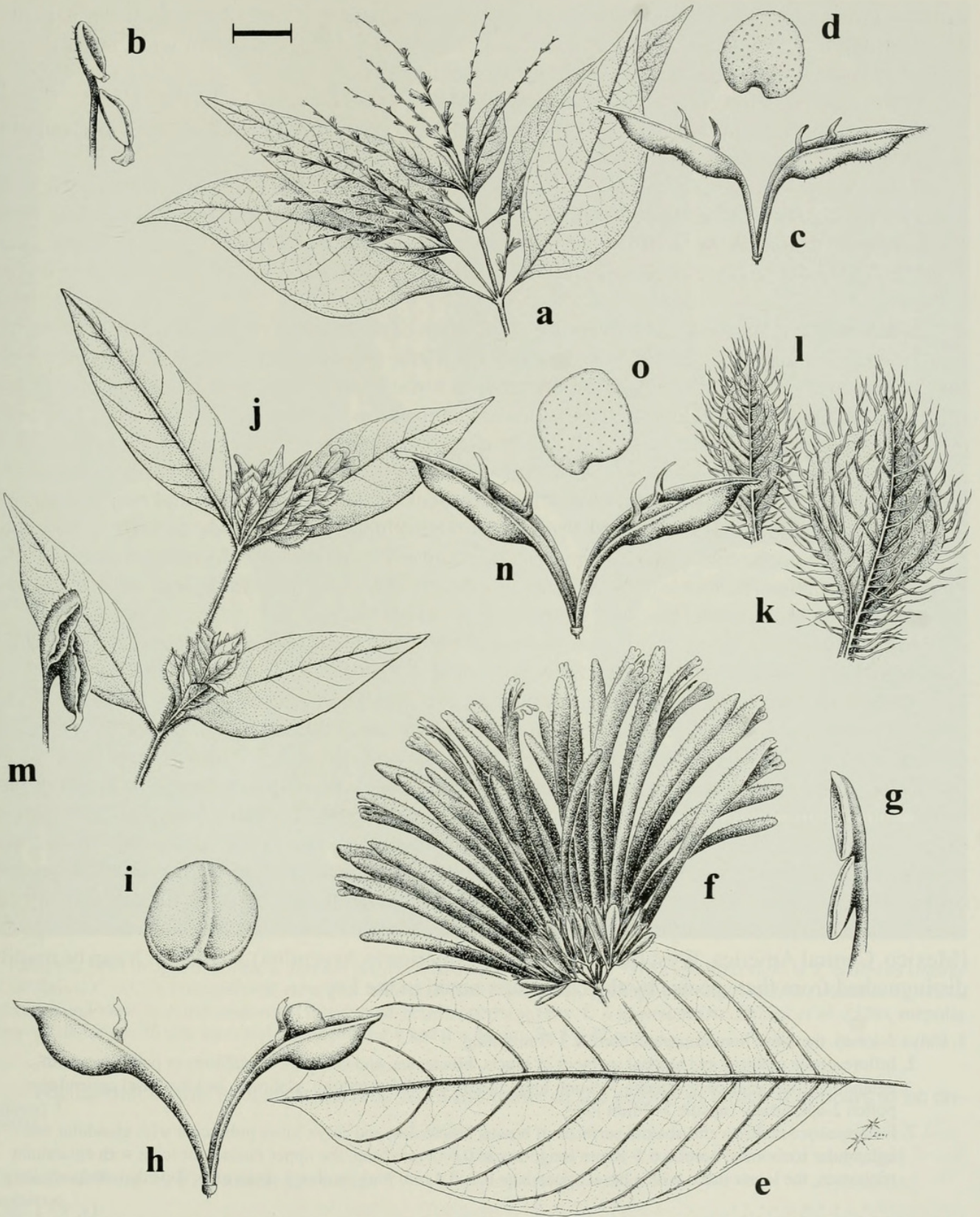


FIGURE 1. a-d, *Justicia tuxtliensis* (Ibarra M. & Sinaca C. 3372). a. habit,  $\times 0.5$ . b. anthers,  $\times 10$ . c. capsule,  $\times 4$ . d. seed,  $\times 6$ . e-i, *J. ardens*. e. leaf (Wendt et al. 4227),  $\times 0.4$ . f. inflorescence (Wendt et al. 4227),  $\times 0.7$ . g. anthers (Wendt et al. 4227),  $\times 4.5$ . h. capsule (Wendt et al. 4765),  $\times 2.3$ . i. seed (Croft & Hannon 63269),  $\times 3.8$ . j-o, *J. uxpanapensis*. j. habit (Vázquez et al. 839),  $\times 0.5$ . k. fertile bract (Vázquez et al. 839),  $\times 3$ . l. sterile bract (Vázquez et al. 839),  $\times 3$ . m. anthers (Wendt et al. 3328),  $\times 9$ . n. capsule (Poole et al. 1493),  $\times 3.5$ . o. seed (Poole et al. 1493),  $\times 6$ . Scale for a, j = 15 mm; for b = 0.8 mm; for c = 1.9 mm; for d = 1.3 mm; for e = 19 mm; for f = 11 mm; for g = 1.6 mm; for h = 3.2 mm; for i = 2 mm; for k, l = 2.5 mm; for m, o = 1.2 mm; for n = 2.1 mm.



usually evident near apex as well), stipe 2–4 mm long, head subellipsoid (often with a slight medial constriction), 4–5.5 mm long. Seeds 4, lenticular, 1.5–2.2 mm long, 1.5–2 mm wide, surfaces and margin covered with low moundlike protrusions, lacking trichomes.

PHENOLOGY. – Flowering and fruiting: April–May.

DISTRIBUTION AND HABITAT. – Southeastern Mexico (Veracruz); plants occur in lowland rain forest (“selva alta perennifolia”) at 400–500 m elevation.

PARATYPES. – MEXICO. **Veracruz:** Estación de Biología Tropical Los Tuxtlas, Cerro Vigía, *A. Gentry et al.* 32250 (US); between Catamaco and Zontecomapan on road to Monte Pio, ca. 7 mi. from Catamaco, *H. Moore & M. Cetto* 6254 (US); Mpio. San Andrés Tuxtla, Est. Biol. Trop. “Los Tuxtlas,” Cerro del Vigía, *T. Ramamoorthy* 2321 (IEB).

In the corolla tube (well below the point of insertion of the stamens) there are two prominent triangular invaginations along the veins to the upper lip. These appear to be homologous with (or identical to) the staminodelike thickenings encountered in some other species with heteromorphic bracts such as *Justicia chol* T. F. Daniel, *J. costaricana* Leonard, and *J. nevlingii* Wassh. & T. F. Daniel (Wasshausen and Daniel 1995; see Fig. 1, f), as well as *J. uxpanapensis* T. F. Daniel (see below). Graham (1988:559) noted that among species from both the Old World and the New World, “the bases of the filaments and of the rugula and the veins beneath them are usually pubescent and may also be produced into the corolla tube as pouch-like processes. These may almost occlude the tube . . .” Hedrén (1989) noted the occurrence of similar invaginations among homomorphically bracted species in the Paleotropical section *Harnieria* (Solms-Laub.) Benth. He also noted these invaginations help to close the access route to the nectar disc and young fruit for small insects.

*Justicia tuxtensis* shows similarities to several tropical American species including *J. metallica* Lindau and *J. pectoralis* Jacq. of sect. *Sarotheca* (Nees) Benth. (Graham 1988) and *J. comata* (L.) Lam. This latter species was treated as a taxon of uncertain infrageneric affinities by Graham (1988). These four species can be distinguished using the key below. Additionally, *J. pectoralis* (Mexico, Central America, West Indies, and South America to Bolivia) differs from *J. tuxtensis* by its unifarious cauline pubescence; subulate bracts and bracteoles; equally to subequally inserted, glabrous, and basally unappendaged thecae; 2-aperturate pollen; and capsules with glandular pubescence. *Justicia metallica* (Costa Rica and Panama) further differs from *Justicia tuxtensis* by its pink to purplish corollas, subperpendicular to perpendicular and glabrous thecae, 2-aperturate pollen, and echinate seed surfaces. In several morphologically conspicuous characters (e.g., clusters of spikes at some inflorescence nodes, calyx form, and corolla size) *Justicia tuxtensis* is similar to the widespread (Mexico, Central America, West Indies, and South America to Argentina) *J. comata*. It can be readily distinguished from that species by the characters noted in the key.

1. Calyx 5-lobed, the lobes homomorphic; corolla 3–7 mm long.
  2. Inflorescence rachises and abaxial surfaces of bracts, bracteoles, and calyx lobes glabrous or pubescent with eglandular trichomes only; corolla 3–6 mm long; thecae 0.3–0.5 mm long, glabrous, lacking basal appendages; pollen 2-aperturate; capsule 3–4 mm long. . . . . *J. comata*
  2. Inflorescence rachises and abaxial surfaces of bracts, bracteoles, and calyx lobes pubescent with glandular and eglandular trichomes; corolla 6.5–8 mm long; thecae 0.6–1 mm long, the upper theca pubescent with eglandular trichomes, the lower theca with a basal appendage 0.2–0.4 mm long; pollen 3-aperturate; capsule 6–9.5 mm long. . . . . *J. tuxtensis*
1. Calyx 4-lobed with the lobes homomorphic or 5-lobed with the lobes heteromorphic (i.e., posterior lobe greatly reduced in size relative to the others); corolla 7.5–14 mm long.
  3. Young stems unifariously pubescent; corolla 7.5–10 mm long; calyx 2–3.5 mm long; thecae subparallel to parallel. . . . . *J. pectoralis*
  3. Young stems bifariously pubescent; corolla 12–14.5 mm long; calyx 4–7.5 mm long; thecae subperpendicular to perpendicular. . . . . *J. metallica*



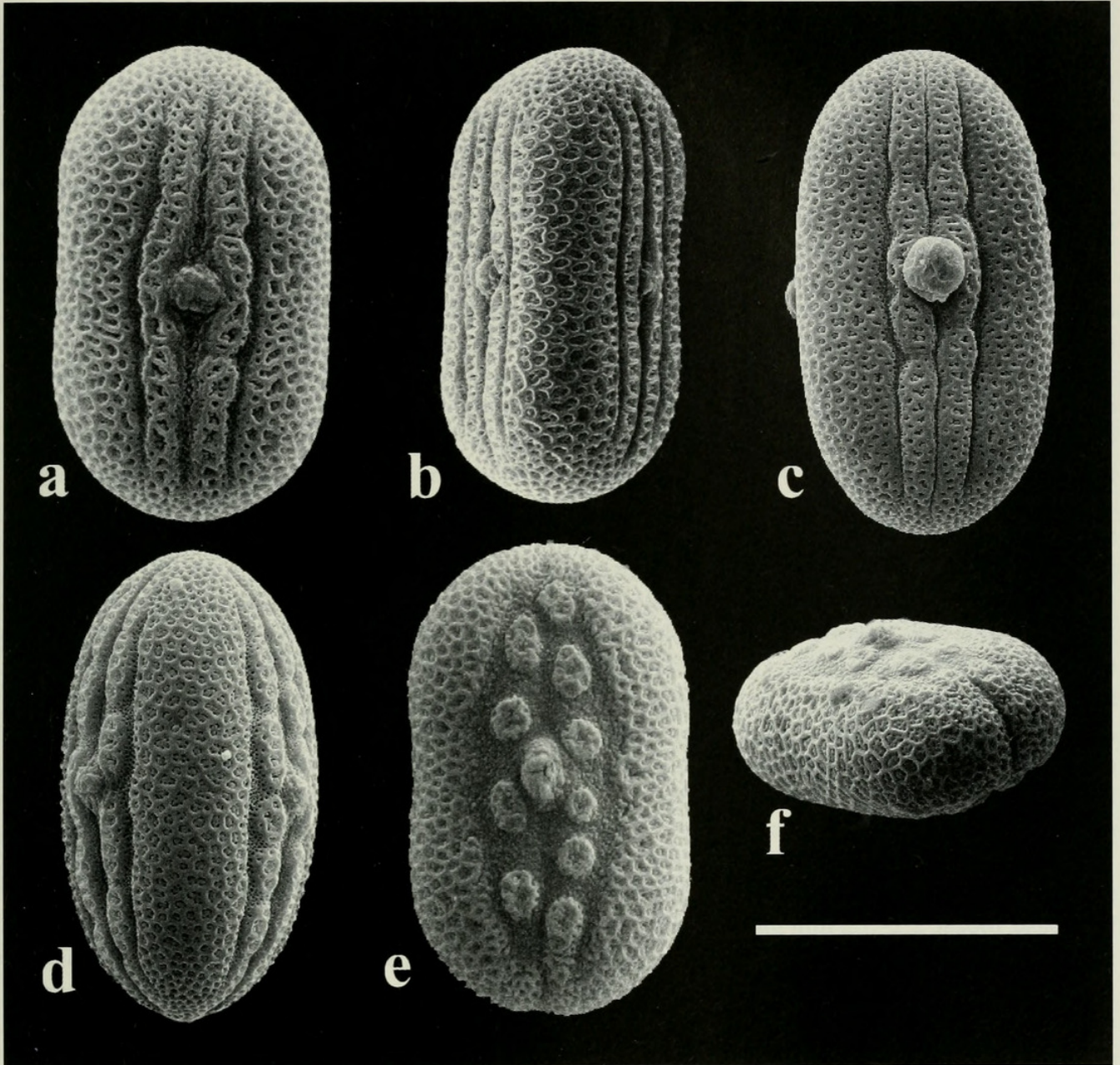


FIGURE 2. SEM images of pollen. a. *Justicia tuxtensis* (Ibarra M. & Sinaca C. 3372), apertural view. b. *J. tuxtensis* (Ibarra M. & Sinaca C. 3372), interapertural view. c. *J. ardens* (Wendt et al. 2822), apertural view. d. *J. ardens* (Wendt et al. 4227), interapertural view. e. *J. uxpanapensis* (Wendt et al. 3328), apertural view. f. *J. uxpanapensis*, (Wendt et al. 3328), subpolar view. Scale for a = 26  $\mu\text{m}$ , for b and e = 32  $\mu\text{m}$ , for c and d = 44  $\mu\text{m}$ , for f = 41  $\mu\text{m}$ .

The epithet of this species is derived from the name of the region in which it appears to be endemic.

***Justicia ardens* T. F. Daniel, sp. nov.**

Fig. 1 (e–i).

TYPE. – MEXICO. **Veracruz**: Mpio. Minatitlán, Cerro Blanco, ca. 7 km NE de Uxpanapa (Pob. 12) en camino a Pob. 15, ca. 17°14'N, 94°09'W, 200 m, 19 October 1983, *T. Wendt et al.* 4227 (holotype: CAS!; isotypes: to be distributed from CHAPA).



Frutices usque ad 2.5 m alti. Folia petiolata, laminae ovato-ellipticae vel ellipticae, 105–290 mm longae, 49–128 mm latae, 1.6–3.3-plo longiores quam latiores. Inflorescentia floribus in fasciculos terminales densos; dichasia  $\pm$  opposita, sessilia vel subsessilia, uniflora. Bracteae homomorphae,  $\pm$  oppositae, oblanceolatae, 7–11 mm longae, 1.5–2.5 mm latae. Calyx 5-lobus, 8–11 mm longus, lobis homomorphis. Corolla aurantiaca et apice lutea, 50–60 mm longa, extus pubescens trichomatibus glandulosis. Stamina thecis 2.2–3.2 mm longis, impariter insertis vel superpositis, basi ecalcaratis, glabris vel theca supera pubescens trichomatibus glandulosis. Capsula 12.5–17 mm longa, glabra.

Shrubs to 2.5 m tall. Young stems quadrate to quadrate-sulcate, bifariously pubescent with antrorse eglandular trichomes 0.2–0.5 mm long. Leaves petiolate, petioles to 50 mm long, blades ovate-elliptic to elliptic, 105–290 mm long, 49–128 mm wide, 1.6–3.3 times longer than wide, acuminate to abruptly short-acuminate at apex, acute to attenuate at base, abaxial surface glabrous, adaxial surface pubescent with antrorse eglandular trichomes along midvein, margin entire to  $\pm$  irregularly subsinuate. Inflorescence of axillary (in axils of distalmost pair of leaves) and terminal pedunculate panicles of modified spikes collectively forming a dense terminal subcapitate cluster of flowers, individual panicles 15–32 mm long (including peduncle and excluding flowers), fertile portion 10–20 mm in diameter near midpanicle, peduncles of panicles to 6 mm long, rachises and peduncles pubescent like young stems; dichasia  $\pm$  opposite, 1-flowered, 1 per axil, sessile to subsessile. Bracts  $\pm$  opposite, oblanceolate, 7–11 mm long, 1.5–2.5 mm wide, abaxially glabrous, margin ciliate with flexuose eglandular trichomes to 1 mm long. Bracteoles oblanceolate to linear, 6–11 mm long, 0.7–1.5 mm wide, abaxial surface glabrous, margin ciliate like bracts. Flowers sessile. Calyx 5-lobed, 8–11 mm long, lobes lanceolate, subequal, 7–9.5 mm long, 0.9–1.2 mm wide, abaxially glabrous, margin ciliate with flexuose eglandular trichomes. Corolla subfusiform in bud, orangish with yellow at apex, 50–60 mm long, externally pubescent with erect to flexuose glandular trichomes 0.05–0.6 mm long, tube gradually expanded from near base, 30–40 mm long, 3–4.2 mm in diameter near midpoint, upper lip 19–22 mm long, 2-lobed, lobes 0.5–0.6 mm long, lower lip 18–22 mm long, 3-lobed, lobes 2.5–4 mm long, 1–1.5 mm wide. Stamens inserted in distal 1/3 of corolla tube, 26–30 mm long, filaments glabrous distally, sparsely pubescent with eglandular trichomes near base, thecae 2.2–3.2 mm long, equal to subequal (distal theca often longer),  $\pm$  parallel, unequally inserted (overlapping by up to 0.9 mm) to superposed (contiguous), glabrous (or distal theca apically pubescent with a few eglandular trichomes), lacking basal appendages; pollen (Fig. 2) 3-colporate, 6-pseudocolpate, exine between colpi and pseudocolpi sometimes breaking up into insulae. Style 48–58 mm long, glabrous, stigma subequally to unequally 2-lobed, lobes 0.05–0.2 mm long. Capsule 12.5–17 mm long, glabrous, stipe 6.5–9 mm long, head subglobose, 6–8 mm long. Seeds 4 (or fewer by abortion), lenticular, subcordate, 3.5–3.8 mm long, 3–3.5 mm wide, immature surfaces and margin covered with slender trichomelike protrusions less than 0.5 mm long, mature surfaces and margin smooth, glabrous.

PHENOLOGY. – Flowering: October–November; fruiting: December–January.

DISTRIBUTION AND HABITAT. – Southeastern Mexico (Oaxaca, Veracruz); plants occur in lowland rain forests (with *Terminalia*, *Dialium*, *Guatteria*, *Ficus*, *Pouteria*, *Poulsenia*, *Symphonia*, *Sterculia*, *Guarea*, *Crataevia*) at 100–350 m elevation.

PARATYPES. — MEXICO. **Oaxaca**: Uxpanapa Region, along road between Esmeralda (17 km E of Sarabia) and Río Manea, 11.5–13.5 mi S of Esmeralda, 17°04'N, 94°45'W, *T. Croat & D. Hannon 63269* (CAS); Mpio. Sta. María Chimalapa, Congregación Nicolás Bravo, ca. 3–5 km S de la pob. Río Alegre, Veracruz, Arroyo de la Cascada, cerca del Rancho Rutt, ca. 17°10'N, 94°42'W, *T. Wendt et al. 4765* (CAS). **Veracruz**: Mpio. Hidalgotitlán, reserva ejidal, laderas del Cerro Amarillo, ca. 17°47'N, 94°39'W, *G. Castillo C. 348* (F); Mpio. Minatitlán, lomas S del Poblado 11 y al S de la brecha 105, ca. 27 km E de La Laguna, ca. 17°14'N, 94°18'W, *T. Wendt et al. 2822* (CAS).



The spikes of this species are unusual in that the bracts and bracteoles are rotated 90° from their normal position and they are fused basally forming a short pedunclelike stalk. The flowering inflorescences are usually so dense that these peculiarities are not readily evident.

The infrageneric affinities of this species are not obvious using Graham's (1988) infrageneric classification. *Justicia ardens* shares several diagnostic characters (e.g., compound spicate inflorescences, long and yellowish corollas) with species (e.g., *J. aurea* Schltld.) in section *Cyrtanthera* (Nees) V.A.W. Graham. Pollen grains among species in that section, however, are described as 2-aperturate with three to four rows of insulae on each side of the apertures. Among species of *Justicia* with yellow or orange corollas more than 50 mm long in the Uxpanapa-Chimalapa regions of Veracruz and Oaxaca, *J. ardens* can be distinguished using the following key:

1. Inflorescences subtended by cupulate involucre formed by 2 bracts connate for (1/4–) 1/3–1/2 their length, fused proximal portion 15–35 mm long; calyx 15–25 mm long; corolla externally glabrous; thecae 5–7.3 mm long; capsule 44–52 mm long, seeds 8–10 mm long. . . . . *J. borraerae*
1. Inflorescences not subtended by cupulate involucre as above; calyx 3.5–11 mm long; corolla externally pubescent; thecae 1.9–3.5 mm long; capsule 10–23 mm long, seeds 3–4 mm long.
  2. Corolla externally pubescent with eglandular trichomes only, trichomes yellowish; calyx lobes 1.5–2.8 mm wide; thecae with conspicuous basal appendages. . . . . *J. fimbriata*
  2. Corolla externally pubescent with glandular (and sometimes also eglandular) trichomes, trichomes not yellowish; calyx lobes 0.9–1.3 mm wide; thecae lacking basal appendages.
    3. Inflorescence of elongate panicles; bracts abaxially pubescent; calyx 3.5–8 mm long, abaxially pubescent; corolla yellow, externally pubescent with glandular and eglandular trichomes, lobes of lower lip 1–2 mm long, buds cobralike (i.e., erect but prominently curved near apex so that distal portion of bud is horizontal); capsule pubescent; seed papillate; pollen 2-aperturate. . . . . *J. aurea*
    3. Inflorescence of dense terminal subcapitate clusters; bracts abaxially glabrous; calyx 8–11 mm long, abaxially glabrous; corolla orangish with yellow at apex, externally pubescent with glandular trichomes only, lobes of lower lip 2.5–4 mm long, buds erect throughout (i.e., not cobralike); capsule glabrous; mature seed smooth; pollen 3-aperturate. . . . . *J. ardens*

The epithet of this species, meaning burning or glowing in Latin, refers to the dense clusters of brightly colored flowers that must appear like flames in the forest understory.

***Justicia uxpanapensis* T. F. Daniel, sp. nov.**

Fig. 1 (j–o).

TYPE. — MEXICO. Veracruz: Mpio. Hidalgotitlán, brecha La Laguna-El Elefante, 17°17'N, 94°30'W, 150 m, 26 July 1974, *M. Vázquez et al.* 839 (holotype: MEXU!; isotypes: MO! NCU!).

Herbae perennes usque ad 2.5 dm altae. Folia petiolata, laminae ovatae vel ellipticae vel anguste ellipticae, 29–80 mm longae, 12–32 mm latae, 2.2–4.6-plo longiores quam latiores. Inflorescentia floribus in spicas; dichasia alterna, sessilia, uniflora. Bracteae heteromorphae, alternae; bracteae fertiles ellipticae vel late ellipticae, 11–14 mm longae, 5–8.5 mm latae; bracteae steriles lanceolatae vel ellipticae, 7–11 mm longae, 1.5–3.5 mm latae. Calyx 5-lobus, 5–6 mm longus, lobis homomorphis. Corolla rosea vel purpurea, 14.5–18 mm longa, extus pubescens trichomatibus eglandulosis. Stamina thecis 1–1.4 mm longis, impariter insertis, theca supera pubescens trichomatibus eglandulosis, theca infera basi calcarata. Capsula 9–10 mm longa, pubescens trichomatibus eglandulosis.

Erect to spreading perennial herbs to 2.5 dm tall. Young stems quadrate-sulcate, ± bifariously pubescent with an understory of antrorsely appressed eglandular trichomes 0.2–0.5 mm long and ± evenly pubescent with an overstory of flexuose eglandular trichomes 1–3 mm long. Leaves petiolate, petioles to 7 mm long, blades ovate to elliptic to narrowly elliptic, 29–79 mm long, 12–30 mm wide,



2.2–4.6 times longer than wide, acute to acuminate at apex, acute to subattenuate at base, surfaces pubescent with flexuose to antrorse eglandular trichomes, margin entire. Inflorescence of axillary and terminal pedunculate dichasiate spikes to 75 mm long (including peduncle and excluding flowers), 7–17 mm in diameter near midspike, peduncles 3–4.5 mm long, pubescent like young stems, rachis  $\pm$  evenly pubescent with antrorse to antrorsely appressed eglandular trichomes 0.2–0.6 mm long; dichasia alternate, secund, sessile, 1 per axil, 1-flowered. Bracts sometimes drying dark, alternate, heteromorphic, fertile bracts larger than sterile bracts, petiolate, elliptic to broadly elliptic, 11–14 mm long, 5–8.5 mm wide, abaxial surface and margin pubescent with flexuose eglandular trichomes 1–2.2 mm long, sterile bracts petiolate, lanceolate to elliptic, often asymmetric, 7–11 mm long, 1.5–3.5 mm wide, pubescent like fertile bracts. Bracteoles linear, 6–10 mm long, 0.4–2 mm wide, pubescent like bracts. Flowers sessile. Calyx 5-lobed, 5–6 mm long, lobes homomorphic, lanceolate, 4.5–5 mm long, 0.4–0.9 mm wide, abaxially very sparsely pubescent with antrorse eglandular trichomes along midvein 0.1–0.6 mm long, margin and apex with a few antrorse eglandular trichomes. Corolla pinkish or purplish, 14.5–18 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.7 mm long, tube 9–9.5 mm long, gradually expanded distally, 3 mm wide near midpoint, upper lip 5.5–7 mm long, 2-lobed, lobes 0.6–0.8 mm long, lower lip 6–8.5 mm long, lobes 3–5 mm long, 2.5–6 mm wide. Stamens inserted near apex of corolla tube, 5–5.7 mm long, filaments glabrous, thecae 1–1.4 mm long, subequal in size (lower larger), subparallel to subperpendicular, unequally inserted (overlapping by 0.2–0.4 mm), upper theca pubescent with eglandular trichomes, lower theca with a basal appendage 0.3–0.4 mm long; pollen (Fig. 2) 2-aperturate, apertures flanked on each side by 1 (–2) rows of insulae. Style 9.3 mm long, glabrous, stigma subcapitate to minutely and  $\pm$  equally 2-lobed, 0.1 mm long. Capsule 9–10 mm long, distally pubescent with flexuose eglandular trichomes 0.2–0.3 mm long, stipe 3.5–4 mm long, head subellipsoid with a slight medial constriction, 5–6.3 mm long. Seeds 4 per capsule, sublenticular, 2–2.8 mm long, 1.4–2.1 mm wide, surfaces sometimes  $\pm$  wrinkled and forming ridges, surfaces and margin covered with low moundlike protuberances.

PHENOLOGY. — Flowering and fruiting: May–July.

DISTRIBUTION AND HABITAT. — Southeastern Mexico (Veracruz); plants occur in lowland rain forests at 150–170 m elevation.

PARATYPES. — MEXICO. **Veracruz**: brecha, near Poblado 2, Uxpanapa military reserve, *J. Poole et al.* 1493 (MEXU, TEX); Mpio. Hidalgotitlán, lomas al SE del Poblado 6, 17°16'N, 94°30'W, *T. Wendt et al.* 3328 (CAS).

As in several other heteromorphically bracted species (see above under *J. tuxtensis*), the internal surface of the corolla tube (below midpoint) has 2 prominent invaginations, each pubescent with eglandular trichomes. Pollen of this species (based on *Wendt et al.* 3328) has a furrowlike polar connection between trema regions. I have not observed similar furrows in pollen of other Mexican *Justicia* (Daniel 1998).

Using Graham's (1988) infrageneric classification, *J. uxpanapensis* appears somewhat similar to species in sect. *Simonisia* (Nees) V.A.W. Graham. Unlike species in that section, however, in *J. uxpanapensis* the fertile bracts are elliptic to broadly elliptic (vs. triangular, lanceolate, or oblanceolate), the corollas are 14.5–18 mm long (vs. 19–64 mm long), pollen grains have 2–4 rows of insulae in the trema regions (vs. 4–6 rows in similar grains of sect. *Simonisia*), and the seeds are sublenticular (vs. not compressed) and glabrous (vs. pubescent). Affinities of this species are probably best sought among other heteromorphically bracted species from southern Mexico such as *J. nevlingii* and *J. chol.* These morphologically similar species can be distinguished using the following key:



1. Corolla pinkish or purplish, 14.5–18 mm long; bracts alternate, sterile bracts 7–10 mm long; calyx 5–6 mm long; pollen 2-aperturate; capsule 9–10 mm long. . . . . *J. uxpanapensis*
1. Corolla white to yellow or greenish yellow with maroon markings, 8.5–11.5 mm long; bracts opposite, sterile bracts 2–6 mm long; calyx 2.5–5 mm long; pollen 3–4-aperturate; capsule 6–8.5 mm long.
  2. Young stems with trichomes concentrated in 2 lines; inflorescence of axillary dichasiate spikes; bracteoles 0.4–1 mm wide; style pubescent; seeds 4, covered with low rounded papillae or ridges; pollen 3-aperturate. *J. chol*
  2. Young stems with trichomes restricted to 4 lines; inflorescence of (axillary and) terminal panicles of dichasiate spikes; bracteoles 1.2–2.2 mm wide; style glabrous; seeds 2, smooth; pollen 4-aperturate. . . . . *J. nevlingii*

## NEW COMBINATIONS AND A NEW NAME

*Beloperone* Nees and *Jacobinia* Nees are now usually treated as congeneric with *Justicia* (e.g., Graham 1988). Although nomenclatural renovations for most taxa described in these genera have been published, names do not appear to exist in *Justicia* for several Mexican taxa. Two new combinations and a new name are proposed below for three of them. Complete descriptions that permit comparison of these taxa with other species of *Justicia* are also provided.

***Justicia stellata* (B. L. Rob. & Greenm.) T. F. Daniel, comb. nov.**

*Jacobinia stellata* B. L. Rob. & Greenm., Proc. Amer. Acad. Arts 29:390. 1894. TYPE. — MEXICO. **Jalisco**: dry cliffs, barranca of Tequila, 16 Oct 1893, *C. Pringle 4573* (holotype: GH!; isotypes: MEXU, NSW!, NY!, US!).

Perennial herbs or shrubs of unknown height. Young stems subterete to subquadrate, densely and evenly pubescent with cream-colored stellate to dendritic eglandular trichomes 0.2–1 mm long. Leaves petiolate, petioles to 20 mm long, blades ovate to ovate-elliptic, (22–) 30–135 mm long, (6–) 9–64 mm wide, 2.3–3.4 (–3.7) times longer than wide, acute to acuminate at apex, acute to subattenuate at base, surfaces pubescent with stellate to dendritic trichomes, the abaxial surface usually more densely so, margin entire to subcrenate. Inflorescences of axillary and/or terminal pedunculate dichasiate thyrses to 60 mm long (including peduncle and excluding flowers), ca. 20 mm in diameter near midpoint of fertile portion, thyrses collectively forming a terminal panicle, axillary thyrses alternate or opposite, 1 per axil, pedunculate, peduncles to 22 mm long, pubescent like young stems and with erect glandular trichomes 0.2–0.5 mm long as well, rachises pubescent like peduncles (except with eglandular trichomes sparser); dichasia alternate, 1-flowered, often ± secund, 1 per axil, pedunculate, peduncles 2–4 mm long, pubescent like rachis. Bracts sessile to petiolate, opposite, linear to narrowly elliptic to obovate-elliptic, 7.5–17 mm long, 1.7–4 mm wide, abaxial surface pubescent like rachis. Bracteoles linear to oblanceolate-spatulate, 6.5–10.5 mm long, 1–1.8 mm wide, abaxial surface pubescent like rachis. Flowers sessile to subsessile. Calyx 5-lobed, 17–21 mm long, lobes linear to oblanceolate-spatulate, subequal, 15–18 mm long, 1–2.2 mm wide, abaxially pubescent like rachis. Corolla “reddish purple” (fide protologue), 36–44 mm long, externally pubescent with glandular (and a few unbranched eglandular trichomes) 0.2–0.4 mm long, tube gradually expanded distally, 21–26 mm long, 2.8–3 mm in diameter near midpoint, upper lip 18–19 mm long, 2-lobed, lobes 0.5–0.6 mm long, lower lip 17–19 mm long, spreading, lobes 3 mm long, 3–3.5 mm wide. Stamens inserted near apex of corolla tube, 18–19 mm long, filaments distally pubescent with glandular trichomes 0.05–0.1 mm long, thecae 2.5–2.9 mm long, equal to subequal, subperpendicular, unequally inserted (overlapping by 2 mm), pubescent (especially upper theca) with glandular trichomes 0.05–0.1 mm long, lower theca with a spurlike basal appendage to 0.2 mm long; pollen (Fig. 3) 2-aperturate, apertures flanked on each side by 2 rows of insulae. Style 35–42 mm long, glabrous, stigma equally 2-lobed, lobes 0.2 mm long. Capsule 13–15 mm long, pubescent with glandular trichomes 0.1–0.2 mm long, stipe length unknown, head shape and length unknown. Seed num-



ber and shape unknown, 3.5 mm long, 3 mm wide, surfaces papillose, papillae pubescent with trichomes less than 0.05 mm long.

PHENOLOGY. — Flowering and fruiting: October.

DISTRIBUTION AND HABITAT. — Western Mexico (Jalisco); although the precise habitat remains unknown, the type locality is in a region of tropical deciduous forest and thornscrub at an elevation less than 1200 m.

The presence of branched trichomes is unusual among American Acanthaceae and their abundance in this species makes it readily identifiable.

I am not aware that this species has ever been collected subsequent to Pringle's collection in 1893. It is odd that a plant with such large and colorful flowers would not have been recollected in more than 100 years in a region that has been visited by numerous botanists. The species must be either very rare or no longer extant.

***Justicia nelsonii* (Greenm.) T. F. Daniel, comb. nov.**

*Beloperone nelsonii* Greenm., Proc. Amer. Acad. Arts 33: 488. 1898. TYPE. — MEXICO. Nayarit: Islas Marias, María Madre Island, 3–25 May 1897, *E. Nelson 4246* (holotype: GH!; isotype: US!).

Perennial herbs to 5 dm tall. Young stems subquadrate,  $\pm$  evenly (or trichomes  $\pm$  concentrated in 2 lines) and sometimes densely pubescent with erect to flexuose eglandular trichomes 0.2–0.7 (–1) mm long. Leaves petiolate, petioles to 25 mm long, blades ovate to elliptic, 30–90 mm long, 11–40 mm wide, 2.4–2.8 times longer than wide, acute at apex, acute to subattenuate at base, surfaces pubescent with erect to flexuose to antrorsely appressed eglandular trichomes, margin entire to subsinuate-crenate. Inflorescence of terminal pedunculate  $\pm$  densely bracteate dichasiate spikes to 40 mm long (including peduncles and excluding flowers), 12–14 mm in diameter near midpoint of fertile portion, peduncles to 6 mm long, pubescent like young stems, rachis evenly pubescent with erect to flexuose eglandular trichomes 0.2–0.6 mm long; dichasia opposite, sessile, 1 per axil, 1-flowered. Bracts opposite, obovate to elliptic, narrowed proximally, 8–11 mm long, 2.8–5 mm wide, apically erect, abaxial surface pubescent with erect to flexuose to antrorse eglandular (to subglandular) and sometimes glandular trichomes 0.05–0.5 mm long. Bracteoles linear-elliptic to linear to lance-linear, 6–9 mm long, 1.1–2.1 mm wide, abaxial surface pubescent like bracts. Flowers sessile. Calyx 5-lobed, 4.5–5.5 mm long, lobes homomorphic, lanceolate to lance-subulate, 3.3–4.3 mm long, 0.7–0.9 mm wide, abaxially pubescent like bracts. Corolla white, 21–23 mm long, externally pubescent with flexuose eglandular trichomes 0.2–0.5 mm long, tube 11–13 mm long, 2.8–3.3 mm in diameter near midpoint, gradually expanded distally, upper lip 9–9.7 mm long, 2-lobed, lobes 0.8 mm long, lower lip 10–11.5 mm long, lobes 3.5–5 mm long, 1.6–2.6 mm wide. Stamens 9–10 mm long, inserted near apex of corolla tube, filaments pubescent with eglandular trichomes, thecae 1.3–1.8 mm long, subequal, subparallel, unequally inserted (overlapping by 0.5–1 mm), dorsally pubescent with flexuose eglandular trichomes, each with a bulbous basal appendage to 0.4 mm long (appendage of lower theca larger than that of upper theca); pollen (Fig. 3) 3 (–4)-aperturate (see Discussion). Style 14–19 mm long, pubescent with upward-pointing eglandular trichomes, stigma 0.2 mm long, lobes unequal 0.1–0.2 mm long. Capsule 9–11 mm long, pubescent with flexuose eglandular trichomes 0.1–0.2 mm long, head subellipsoid, 6.5–7 mm long. Seeds 4, 3.2 mm long, 2.5 mm wide, surfaces minutely papillose, margin with inconspicuous apically barbed trichomelike protuberances (at least on portions of the margin).

PHENOLOGY. — Flowering: May, October; fruiting: May.

DISTRIBUTION AND HABITAT. — Pacific islands off the west coast of Mexico (Nayarit); plants occur on canyon floors at an unknown elevation.



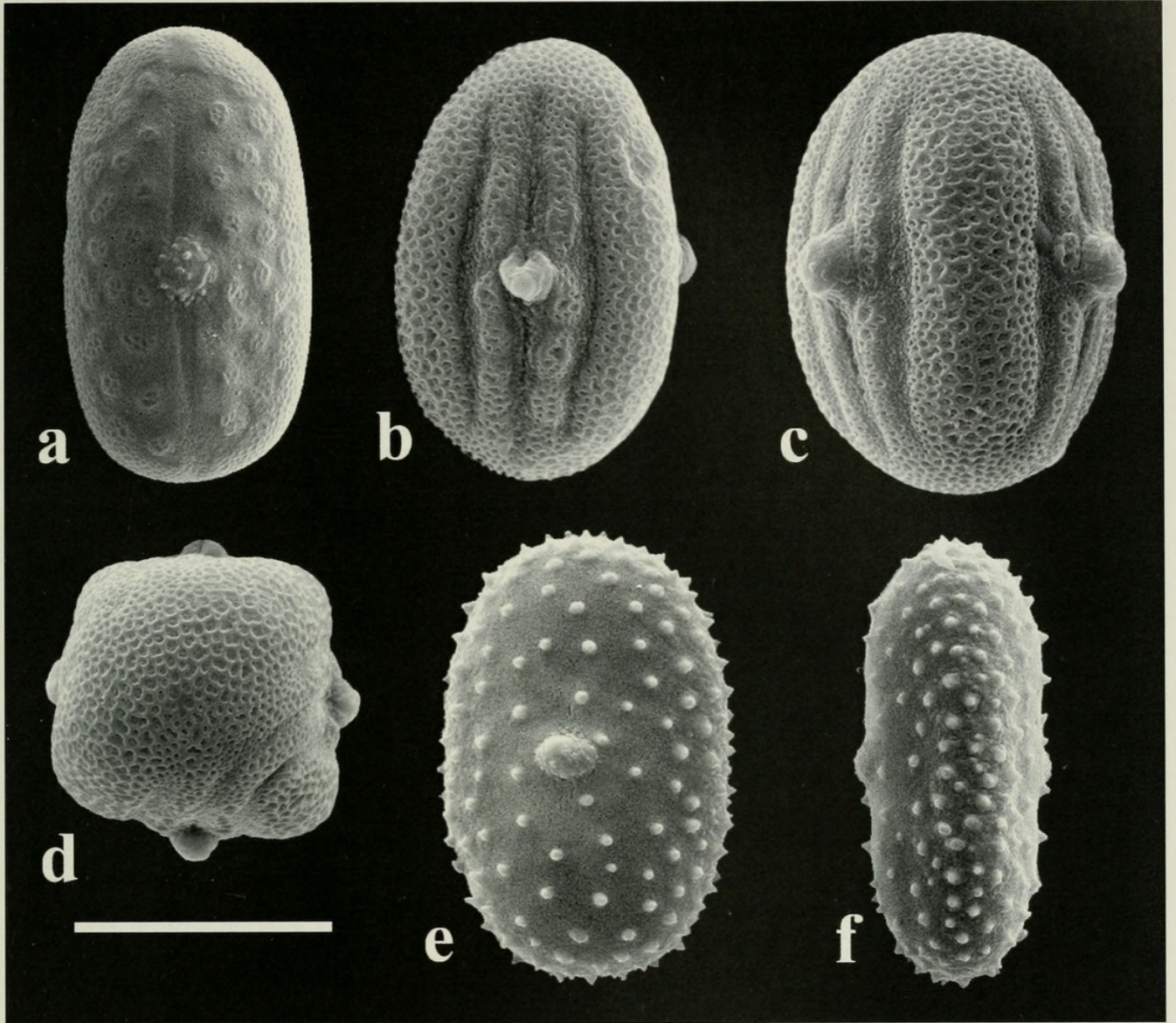


FIGURE 3. SEM images of pollen. a. *Justicia stellata* (Pringle 4573), apertural view. b. *J. nelsonii* (Nelson 4246), apertural view. c. *J. nelsonii* (Nelson 4246), interapertural view. d. *J. nelsonii* (Nelson 4246), polar view. e. *J. veracruzana* (Chazaro & H. de Chazaro 4078), apertural view. f. *J. veracruzana* (Chazaro & H. de Chazaro 4078), interapertural view. Scale for a and e = 32  $\mu\text{m}$ , for b and d = 19  $\mu\text{m}$ , for c = 23  $\mu\text{m}$ , for f = 35  $\mu\text{m}$ .

ADDITIONAL SPECIMENS EXAMINED. — MEXICO. **Nayarit:** Tres Mariás Islands, María Madre Island, *R. Ferris* 5692 (DS), *F. Maltby* 137 (US).

Considerable variation in pubescence is evident among the few known collections of this species. *Maltby* 137 and the isotype at US have glands on the bracts, bracteoles and calyx. These are not evident on *Ferris* 5692 or the holotype. The young stems of *Ferris* 5692 are also more densely pubescent than those of the other collections.

In the protologue of *Beloperone nelsonii*, Greenman (1898) noted that this species closely resembles *B. comosa* Nees (= *Justicia fulvicoma* Schltdl. & Cham.) but has a shorter corolla with a broader lower lip and somewhat larger leaves with longer and less pubescent petioles. These taxa are indeed quite similar. Comparison of both species reveals that they can be distinguished by the following couplet:



Corolla white, 21–23 mm long; bracts 2.8–5 mm wide, apically erect; stamens 9–10 mm long; style 14–19 mm long.	<i>J. nelsonii</i>
Corolla orange, 25–38 mm long; bracts 6–12 mm wide, apically recurved-spreading; stamens 13–17 mm long; style 30–34 mm long.	<i>J. fulvicoma</i>

Some abnormalities were noted in pollen of *Nelson 4246* (Fig. 3) including unusual twisting. Whereas most grains appeared to be 3-aperturate, some were 4-aperturate. On each side of the apertures, there is some evidence of the exine separating to form indistinct insulae.

***Justicia veracruzana* T. F. Daniel, nom. nov.**

*Jacobinia paniculata* Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:153. 1855, not *Justicia paniculata* of earlier authors [e.g., N. L. Burm. (1768), Forssk. (1775), Rose (1895), Sessé & Moc. (1887)]. TYPE. — MEXICO. **Veracruz:** Colipa, March 1841, *F. Liebmann s.n. (10674)* (syntypes: C!, CAS!, P!, US!); Mirador, March 1842, *F. Liebmann s.n. (10675)* (syntype: C!).

Perennial herbs to 2 m tall. Young stems terete to subquadrate,  $\pm$  bifariously to  $\pm$  evenly pubescent with flexuose antrorse to antrorsely appressed eglandular trichomes 0.1–0.3 mm long, trichomes with conspicuous maroon septae, soon glabrate. Leaves petiolate, petioles to 40 mm long, blades ovate-elliptic to elliptic to obovate, 35–180 mm long, 21–85 mm wide, 1.8–2.5 times longer than wide, often asymmetric, round to acute to subacuminate at apex, acute to subattenuate at base, surfaces sparsely pubescent with antrorse to antrorsely appressed eglandular trichomes, trichomes  $\pm$  restricted to major veins, margin entire to crenate. Inflorescence of pedunculate dichasiate spikes (to racemes) or panicles of spikes (to racemes) from axils of distal leaves and inflorescence bracts, collectively forming an open terminal panicle to 18 cm long, 4–7.5 cm in diameter near midpoint of fertile portion, peduncles of spikes (to racemes) or panicles to 30 mm long, pubescent like young stems; inflorescence bracts opposite, often caducous, linear to linear-elliptic, 4–6 mm long, 0.8–1 mm wide, abaxial surface pubescent with antrorsely appressed eglandular trichomes; spikes (to racemes) or panicles opposite, 1–2 per axil, rachis pubescent like young stems; dichasia alternate, often  $\pm$  secund, 1-flowered, 1 per axil, sessile. Bracts often caducous, triangular to subulate, 1–1.5 mm long, 0.5 mm wide, abaxial surface pubescent with antrorse to antrorsely appressed eglandular trichomes 0.05–0.1 mm long. Bracteoles often caducous, triangular to linear, sometimes conduplicate, 1.2–2 mm long, 0.3–0.6 mm wide, abaxial surface pubescent like bracts. Flowers subsessile to pedicellate, pedicels 0.5–1.5 mm long. Calyx 5-lobed, 9.5–18 mm long, lobes lanceolate to lance-linear to linear-elliptic (to oblanceolate), equal to subequal, 8–16 mm long, 1.5–3.5 mm wide, abaxially sparsely pubescent (at least proximally) with antrorsely appressed eglandular trichomes 0.05–0.1 mm long. Corolla yellow, 31–36 mm long, externally pubescent with erect to flexuose glandular and eglandular trichomes 0.1–0.3 mm long, tube 14–17 mm long, 3 mm in diameter near midpoint,  $\pm$  gradually expanded distally, throat indistinct, upper lip 16–18 mm long, 2-lobed, lobes 0.4 mm long, lower lip 15–17 mm long, lobes 2.5–4.5 mm long, 1–1.5 mm wide. Stamens inserted near apex of corolla tube, 17–19 mm long, thecae subparallel to subperpendicular, 2.5–3.3 mm long, subequal, unequally inserted (overlapping by 1.5–2.2 mm), glabrous, lower theca with a  $\pm$  bulbous basal appendage 0.2–0.3 mm long; pollen (Fig. 3) 2-aperturate, multiechinata. Style 29–34 mm long, distally glabrous, stigma subcapitate, 0.1–0.2 mm long, lobes inconspicuous. Capsule 14–17 mm long, glabrous, stipe 5–7 mm long, head ellipsoid to obovoid, 9.5–10.5 mm long. Seeds 4, lenticular, 2–3.5 mm long, 2.5–3.2 mm wide, surfaces and margin tuberculate with rounded to subconic protuberances bearing minute projections.

PHENOLOGY. — Flowering: January–March, October; fruiting: January–March, October.

DISTRIBUTION AND HABITAT. — Southeastern Mexico (Puebla, Veracruz); plants occur in tropical deciduous forest at 1650 m elevation.



ADDITIONAL SPECIMENS EXAMINED. — MEXICO. **Guanajuato**: cultivated in Guanajuato, 1889, *A. Duges* 78,c (US). **Puebla**: Mpio. Patlanalán, camino del paraje El Aguacate, Ver. a Patlanalán, Pue., *M. Chazaro & P. Hernández de Chazaro* 4078 (US). **Veracruz**: Zacuapan, Barranca de Tenampa, *C. Purpus* 4334 (US); Barranca del Fortín San Martín Tlacatopec, *C. Purpus* 16780 (US).

Most of the collections of *J. veracruzana* were made more than 70 years ago. However, *Chazaro & Hernández de Chazaro* 4078, collected in 1986, reveals the relatively recent persistence of this species in nature. Pollen of *J. veracruzana* conforms to Graham's (1988) "Type 9," which lacks a trema area and is covered with short, subconical echinae. Such pollen was noted by Graham (1988) in several species of her sect. *Plagiacanthus* (Nees) V.A.W. Graham. *Justicia veracruzana* differs from Graham's (1988) description of that section by its seeds that are tuberculate (vs. smooth) and lack a differentiated margin (vs. "with a distinct margin").

#### ACKNOWLEDGMENTS

I am grateful to Jenny Speckles for preparing the line drawing, Scott Serata for assisting with the scanning electron microscope, Gary Williams and Darrell Ubick for help with the digital images of pollen, Fernando Chiang and Roberto Gonzalez T. for checking herbaria at MEXU and IBUG for specimens of *Justicia stellata*, and the curators of the following herbaria for making specimens available: C, CAS, DS, F, GH, IEB, MEXU, MO, NCU, NY, P, TEX, and US.

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