New Species of *Justicia* and *Razisea* (Acanthaceae) from Costa Rica, with Taxonomic Notes

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**Abstract.** New species of *Justicia* and *Razisea* are described from the Caribbean lowlands of northern Costa Rica. *Justicia sarapiicensis* sp. nov. is an unusual vine with large, magenta bracts and white, villous corollas. While morphologically most similar to several large-bracted South American justicias, the echinulate pollen grains of this species suggest a relationship with *Rhacodiscus*. This genus was distinguished from *Justicia* on the basis of echinulate pollen and appears to be an artificial grouping of species better placed within *Justicia*. Clarification of the relationships of *Justicia sarapiicensis* will await resolution of this large and taxonomically difficult genus as a whole. The four species currently placed in *Razisea* share several unusual features including monothecate anthers and corolla with the upper lip strongly reduced and the lower lip barely distinct from the tube. Pollen analysis of *Razisea wilburnii* sp. nov., along with literature reports of pollen of the remaining species, indicates that this genus is incorrectly placed in Justiceae, Odontoneminaceae. Based on pollen evidence, as well as the long-recognized similarity between *Razisea* and *Kalbreyeriella*, it is recommended that *Razisea* be moved to Justiceae, Justiciinae.

In the course of field work in the Caribbean lowlands of northern Costa Rica, previously undescribed species belonging to two genera of Acanthaceae were discovered. This region of Costa Rica is particularly poorly known botanically and it is expected that further collections will result in a better understanding of the ranges of these two species. The extensive collecting being carried out toward completion of a flora for the La Selva field station of the Organization for Tropical Studies will greatly expand our knowledge of the plants of this extremely diverse area.

*Justicia sarapiicensis* McDade, sp. nov., figs. 1–2.—Type: Costa Rica, Heredia, Finca La Selva, at confluence of Ríos Sarapiquí and Puerto Viejo, near town of Puerto Viejo de Sarapiquí, 100 m, 27 Feb 1980, *Hammel 7896* (holotype: DUKE; isotypes to be distributed).

Suffrutex volubilis ad 15 m; folia ovata, 5–10 cm longa, 2.4–4.5 cm lata, acuta vel acuminata, basi obtusa vel parum cordata, integra, glabra; petiolis 2–17 mm longis. Inflorescentiae paniculatae, terminales, laxe ramosae; bracteae ovatae, magentaee, 22–25 mm longae, 6–10 mm latae, attenuatae, glabrae. Calycis segmenta 5, aequalia, 15–22 mm longa, 2–4 mm lata, alba, acuta, glabra; corolla alba, 6.5–7 cm longa, villosa, tubo 38–40 mm longo, labium superum integrum, 23–26 mm longum, acutum, labium infernum 27–29 mm longum, trilobatum, 3–4 mm longum; stamina 2, antheraeae bithecae, 3–3.5 mm longae; stigma 3–4 mm ultra antheras exserta. Capsula glabra, 16–18 mm longa, 5–6 mm lata, rubiginosa. Semina 4, orbicularia, 3–4 mm in diam.
Fig. 1. *Justicia saraptiquensis*.  

a. Habit of distal, flowering part of vine (from McDade 363 and Sperry 783, DUKE).  
b. Mature fruit with calyx and bracts reflexed as in nature (from Sperry 783, DUKE).

Suffrutescent vine climbing to 15 m; stems terete, glabrous to sparsely pubescent on young stems, the trichomes appressed, white, 0.2–0.5 mm long, the cystoliths numerous, hyaline, linear, 0.2–0.3 mm long, nodes swollen. Leaves opposite, petiolate, petioles 2–17 mm long, slender, sparsely pubescent, the trichomes appressed, white, 0.2–0.5 mm long, blades ovate 5–10 cm long, 2.5–4.5 cm wide, frequently unequal especially at distal nodes, basally obtuse to truncate or very slightly cordate,
apically acute to slightly acuminate, entire, essentially glabrous above and below, the cystoliths prominent on both surfaces, as of stems. Flowers in panicles of 1–15, borne laxly on more or less dichotomously branching peduncles, lower internodes 20–32 mm, reduced to 5–15 mm immediately below flowers, sparsely pubescent, the trichomes appressed, white, 0.2–0.3 mm long; peduncles bearing paired bracts at one or two lowest nodes, these ovate, 12–16 mm long, 6–10 mm wide; bracts subtending flowers borne singly or in pairs, ovate, magenta, 22–25 mm long, 14–19 mm wide, apically obtuse and rounded, glabrous; the paired bracteoles subtending each flower lanceolate, magenta, 16–19 mm long, 6–10 mm wide, apically attenuate, glabrous. Calyx lobes 5, equal, 15–22 mm long, 2–4 mm wide, white, apically acute and apiculate, glabrous; corolla white, strongly bilabiate, 6.5–7 cm long, moderately villous, the trichomes white, erect, twisted and curling, 1–1.5 mm long, the tube 38–40 mm long, 5–6 mm wide at base, narrowed to 2.5–3 mm above ovary, expanding to 5–6 mm at throat, adaxial surface provided with a narrow rugula partially investing style, the upper lip erect, entire, 23–26 mm long, apically acute, the lower lip slightly reflexed at anthesis, 27–29 mm long, apically 3-lobed, each lobe 3–4 mm long; stamens biserose, the anther sacs about 4 mm long, very slightly superposed, upper cell 1 mm above lower, extending 4–7 mm below tip of upper lip, acetylated pollen prolate (73 × 48 μm), radiosymmetric, biporate, echinate (fig. 2); style filiform, extending 3–4 mm beyond anthers. Fruits clavate, 16–18 mm long, 5–6 mm wide, glabrous, reddish-brown when immature, dark brown at dehiscence, floral bracts, bracteoles, and calyx of fruiting plants strongly reflexed to expose capsules. Seeds 4, orbicular, strongly flattened, 3–4 mm in diameter, glabrous, the surface with minute verrucae.


Additional specimens examined. Costa Rica: Alajuela, vicinity of Villa Quesada, San Carlos, 575 m, Smith 1785 (F). Heredia, Finca La Selva, confluence of Rios Sarapiquí and Puerto Viejo, near town of Puerto Viejo de Sarapiquí, 100 m, Folsom 8835 (DUKE), Folsom 8906A (DUKE), Folsom 9450 (DUKE), Grayum 1276 (DUKE), Grayum 2990 (DUKE), Hammel 8711 (DUKE), Hammel 9675 (DUKE), McDade 363 (DUKE), McDade 391 (DUKE), Sperry 783 (DUKE), Sperry 828 (DUKE), Sperry 1082 (DUKE). Duplicates of the La Selva specimens have yet to be distributed.

The bilabiate corolla with well-defined and elongate upper and lower lips, two biserose anthers, lack of staminodes, and porate pollen place this new species in Justicia s.l. as discussed below. Justicia sarapiquensis may be readily distinguished from other species by its viny habit; large magenta bracts and bracteoles; white calyx; and white, villous corolla. The phylogenetic relationships of the new species remain obscure. The size and color of floral bracts and bracteoles; size, color, and pubescence of the corolla; and anther morphology are strongly reminiscent of the monotypic South American Megaskepasma Lindau, which is characterized as tall, much-branched shrubs with dense, terminal, spicate inflores-
Fig. 2–3. Scanning electron photomicrographs of acetolyzed pollen grains. 2. *Justicia sarapiquensis* (McDade 363), equatorial view. 3. *Razisea wilburii* (McDade 306), equatorial view.

scences. Most strikingly, pollen grains of *Megaskepasma* are spheroidal, apparently aporate, and densely covered with circular insulae. The only other viny species of *Justicia* known to me, *J. graciliflora* (Standley) D. Gibson, differs from *J. sarapiquensis* in corolla morphology (lower lip broader than upper lip and deeply three-lobed), anther morphology (thecae strongly superposed), and pollen morphology (biporate with rows of closely spaced insulae flanking each pore). It thus seems likely that the viny habit of these two species is the result of convergence rather than derivation from a shared viny ancestor. The pollen of *J. sarapiquensis* suggests a relationship with species of the segregate *Rhacodiscus* Lindau. This small group of species was separated from *Justicia* by Lindau (1897) on the basis of possession of echinate pollen grains rather than the insulae-ornamented grains typical of *Justicia*. *Justicia sarapiquensis*, however, bears a stronger overall resemblance to several of the large-bracted South American species of *Justicia* (e.g., *J. leucerythra* Leonard, *J. cabrerae* Leonard, *J. xanthostachya* Leonard) than to any of the species placed in *Rhacodiscus* by Lindau (1897) and Brenekamp (1948a, b).

The discordant pattern of relationships suggested by different features of this unusual plant is rather typical of the problems encountered in resolving relationships among the genera placed by Brenekamp (1965) in Justiceae, Justiciinae [composed of genera placed by Lindau (1895) in Justiceae and Isoglossae, Porphyrocominae]. As currently accepted, this group is composed of a number of genera that are recognized by one or more derived characters and are probably monophyletic (e.g., *Habra-canthus* with monothecous anthers and an elongate, filiform upper corolla lip), as well as the large and ill-defined *Justicia*. Many segregate genera were distinguished from *Justicia* in the nineteenth century, but a growing number have been submerged by recent workers as unreliably distinct from *Justicia* (e.g., Leonard 1958; Gibson 1972). This seems to reflect
not differences of opinion as to acceptable generic characters, but rather lack of morphological discontinuities among groups of species within *Justicia* s.l., as well as a high level of discordance among supposed generic characters. Lindau’s (1895) subdivision of the group relied heavily on pollen characters but was based upon very incomplete knowledge. Further work has revealed many misalignments, as well as much diversity in pollen morphology even within supposedly homogeneous groups (e.g., Raj 1961; Petriella 1968; Gibson 1972). Differences in anther morphology and morphology of the upper and lower corolla lips have been suggested as valid generic characters, but more thorough studies involving large numbers of species have shown continuous variation between supposedly distinct genera (e.g., see Gibson 1972 for a discussion of anther morphology in this group). As Bremekamp (1965) has pointed out, a thorough study of the entire tribe (Justicinae sensu Bremekamp) is long overdue and would be a monumental undertaking. Worthy of further study are inflorescence structure, seed shape and patterning, and presence of a rugula in the upper corolla lip. Until thorough studies of these, as well as traditional characters, can be carried out to provide strong evidence for recognition of monophyletic groups of species, a broad interpretation of *Justicia* probably best represents our current confusion as to relationships within this group.

*Razisea wilburii* McDade, sp. nov., figs. 3–4.—Type: Costa Rica, Heredia, Finca La Selva, at confluence of Rios Sarapiquí and Puerto Viejo, near town of Puerto Viejo de Sarapiquí, 100 m, 5 Dec 1979, *Wilbur* 28248 (holotype: DUKE; isotypes to be distributed).

Frutex usque ad 1.5 m altus; folia anguste ovata vel obovata, 14–20 cm longa, 6–10 cm lata. Inflorescentiae racemosae, floribus oppositis, singularibus vel 2–3 in fasciculis, pedicellii 2.5–5 mm longi; bracteae lanceolatae, 4–6 mm longae, 1–1.5 mm latae, glabrae. Calyx glaber, segmentis linearibus, acutis, 5–6 mm longis, 0.5 mm latis; corolla rubra, 2.5–3.3 cm longa, tubo 2.3–2.6 cm longo, basi 1.5 mm lato, fauce 5–7 mm lato; stamina 3–8 mm ultra labium superum exserta, antherae 3–3.5 mm longae; stigma 1–3 mm ultra antheras exserta. Capsula glabra, 16–22 mm longa, 3–4 mm lata. Semina 4, orbicularia, 3 mm in diam.

Suffrutescent, sparsely branching shrub to 1.5 m; pubescence of stem in two lines, the trichomes erect or somewhat curling, white, about 0.25 mm long, the stems becoming glabrous with age, the cystoliths prominent, dense, linear, 0.2–0.3 mm long. Leaves opposite, petiolate, petioles 2–11.5 cm long, moderately pubescent, the trichomes appressed, white, 0.25–0.5 mm long, blades narrowly ovate to obovate, 14–20 cm long, 6–10 cm wide, basally acute to obtuse, apically acuminate, entire to crenate, essentially glabrous and with prominent cystoliths above and below, except moderately pubescent on veins below, the trichomes appressed, white, 0.25–0.5 mm long, the last pair of leaves subtending inflorescence frequently much reduced. Inflorescences terminal, 1–3, racemose, to 30 cm