

Odontonema aliciae, a New Heterostylous Species of Acanthaceae from Panama

Thomas F. Daniel ¹ and Juan F. Carrión ²

¹ Department of Botany, California Academy of Sciences, 55 Music Concourse Drive, Golden Gate Park, San Francisco, CA 94118 U.S.A.; Email: tdaniel@calacademy.org; ² Programa de Pós-graduação em Botânica, Departamento de Biologia Vegetal, Laboratório de Ecologia e Evolução de Plantas, Universidade Federal de Viçosa, 36570-000, Viçosa-MG, Brazil; Email: carrionjf@gmail.com

Odontonema aliciae is described as a new species of Acanthaceae from southern Panama. It differs from the other species of Panamanian *Odontonema* by the combination of its subauriculate leaves; relatively short and pink corollas; and glabrous internodes, peduncles, and pedicels. Like several other species of the genus, *O. aliciae* is distylous, and its pollen is triaperturate (3-colporate, 6-pseudocolpate). Morphological characters of the species are illustrated in photographs, its distribution is plotted on a map, and the species is compared to putatively related taxa.

Se describe *Odontonema aliciae* como una nueva especie de Acanthaceae del sur de Panamá. Se diferencia de las otras especies panameñas de *Odontonema* por la combinación de hojas subauriculadas; corolas relativamente cortas de color rosa; y entrenudos, pedúnculos y pedicelos glabros. Como varias otras especies del género, *O. aliciae* es distila, y su polen es triaperturado (3-colporado, 6-pseudocolpado). Características morfológicas de la especie son ilustradas en fotografías, su distribución es trazada en un mapa, y la especie es comparada con taxones putativamente relacionados.

Odontonema Nees consists of 28 species of shrubs occurring from northern Mexico southward throughout Central America and the West Indies to southeastern Brazil (Daniel, unpublished). Daniel and McDade (1995) recognized four species of the genus from Panama, and provided a key to distinguish them. Several collections from coastal regions of the Azuero Peninsula and nearby islands reveal the presence of a distinctive species of the genus endemic to southern Panama, which we describe below.

***Odontonema aliciae* T. F. Daniel and J. F. Carrión, sp. nov.**

Figure 1.

TYPE.— **PANAMA: Veraguas:** P.N. Cerro Hoya, Restingue, islote, E800443, N510434, 18 Jul 2011 (flr), A. Ibáñez, R. Flores, N. León, J. Domínguez, A. Jiménez, L. Vega, & V. Sánchez 6928 (holotype, PMA; isotypes: CAS, MO). Figure 1.

DIAGNOSIS.— *Odontonema aliciae* differs from all other Panamanian species of *Odontonema* by the combination of its subauriculate leaves; short (13–20 mm long) and pink corollas; and glabrous internodes, peduncles, and pedicels.

Shrubs to 1.5 m tall. Young stems subquadrate to quadrate, internodes glabrous, nodes pubescent with a line or arc of flexuose to erect eglandular trichomes 0.2–0.7 mm long between petioles, trichomes becoming ± deciduous in fruiting plants. Leaves sessile to subsessile, petiole (if present) to 4 mm long, distal blades elliptic to obovate-elliptic to subpandurate, 90–263 mm long, 24–84

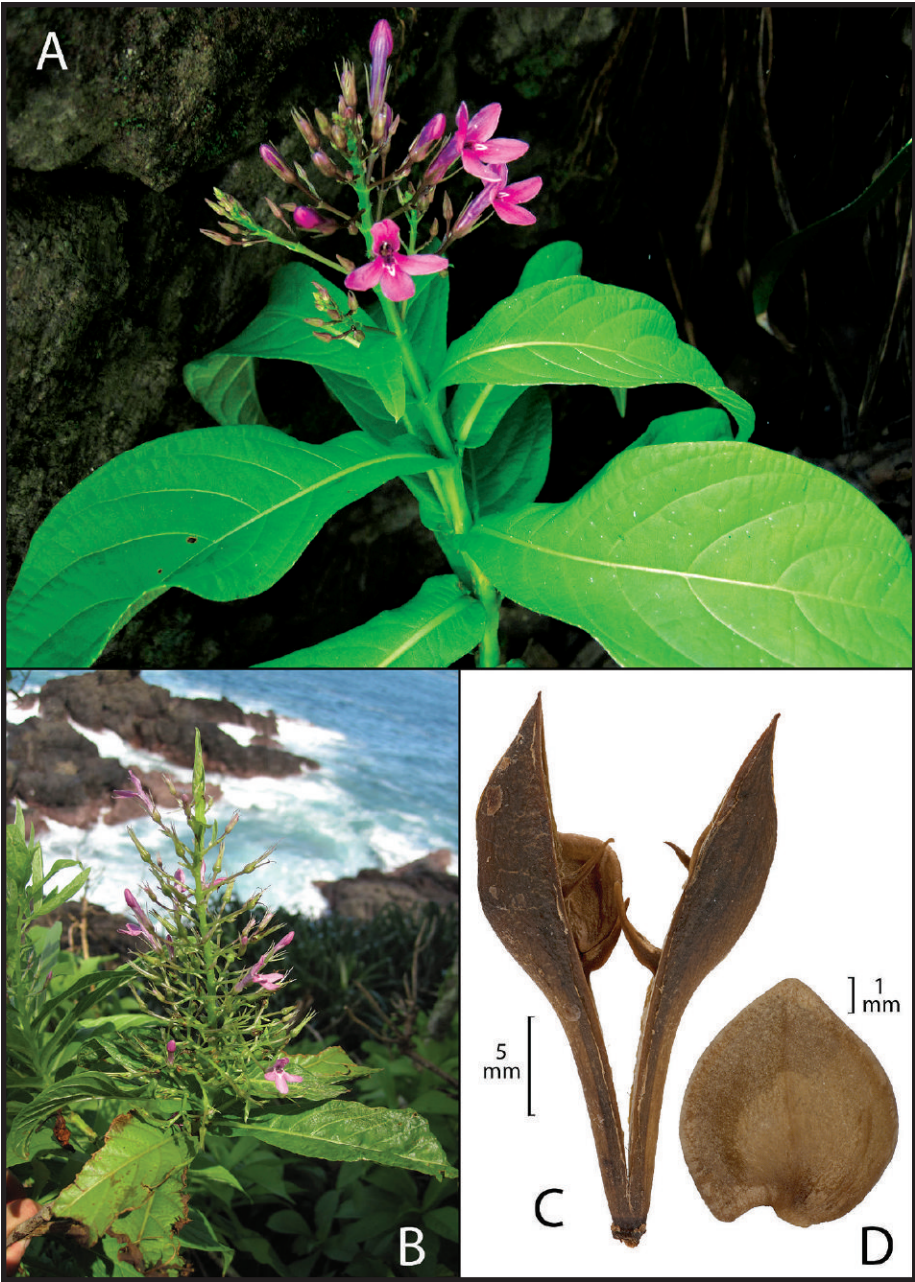


FIGURE 1. *Odontonema aliciae*. A. Habit showing distal leaves with subauriculate bases and inflorescence. B. Habit and habitat. C. Capsule. D. Seed. A, B from the type *A. Ibáñez et al.* 6928, photos by A. Ibáñez, used with permission; C, D from *Nee & Andres* 46341.

mm wide, length:width = 2.9–4.5, reduced in size distally to 23 mm long and 3 mm wide, subauriculate at base, attenuate at apex, adaxially glabrous, abaxially pubescent with erect to flexuose eglandular trichomes to 0.7 mm long, trichomes sometimes restricted to major veins or deciduous in fruiting plants. Inflorescence of axillary (from distal nodes) and terminal pedunculate thyrses to 115 mm long and 50 mm across near midpoint (including peduncle and excluding corollas/capsules) or sometimes with axillary pedunculate dichasia in axils of some distal leaves, peduncles of thyrses (and dichasia in leaf axils) 11–30 mm long, glabrous, rachis pubescent like young stems, dichasia of thyrses mostly opposite, 2–7 (or more)-flowered, pedunculate, peduncles of dichasia 5–13 mm long, glabrous. Bracts sometimes caducous, lanceolate to subulate, 2.2–8 mm long, 0.4–1.4 mm wide, abaxially glabrous. Bracteoles and secondary bracteoles subulate to lanceolate, 1–3.5 mm long, 0.3–1 mm wide, abaxially glabrous, margin usually ciliate or trichomes deciduous in fruiting plants. Flowers heterostylous, pedicellate, pedicels 4.5–9 mm long, glabrous. Calyx 6.5–9 (–12 in fruit) mm long, tube 0.5–1.5 (–2.5 in fruit) mm long, lobes lanceolate to lance-subulate, 5.5–8 (–10 in fruit) mm long, 0.7–1.1 mm wide, abaxially glabrous. Corolla pink to purple with white marking on lower-central lobe, 13–20 mm long, externally glabrous, internal surface of limb glandular, tube subcylindric 7.5–11 mm long, narrow proximal portion 5–6 mm long, 1.7–2.3 mm in diameter (measured flat), throat inconspicuous, 4–6 mm long, upper lip 6–9.5 mm long, lobes 2.5–3 mm long, lower lip 5.5–11 mm long, lobes 4.8–9.5 mm long. Thrum stamens exerted from mouth of corolla, 5.5–10 mm long, pin stamens included in corolla tube, 3.5 mm long, thecae 2–2.5 mm long, staminodes 2, ca. 1 mm long. Pollen (*Hammel* 5472) spherical to subspheroidal (P:E = 0.97–1.00), 3-colporate, 6-pseudocolpate, colpi and pseudocolpi microverrucate, interapertural surfaces reticulate, polar diameter (P) 30–36 μm , equatorial diameter (E) 31–36 μm . Ovary glabrous, style pubescent with flexuose eglandular trichomes, thrum style 3.8–4.5 mm long, pin style 12–13 mm long, stigma $\pm$ 2-lobed, lobes ca. 0.1 mm long. Capsule 20–30 mm long, glabrous, stipe 7–10 mm long, head 13–17 mm long. Seeds flattened (plano-convex to concavo-convex), flattened surfaces subcordate to subcircular to subsquare in outline, longest axis 6–7.8 mm, shortest axis 4.5–6.3 mm, 1.3–1.7 mm thick, surfaces and margin smooth to slightly roughened.

PHENOLOGY.— Flowering: July–October; fruiting: December.

DISTRIBUTION AND HABITAT.— Panama (Los Santos, Veraguas), on the Azuero Peninsula and islands off the southern coast of Panama to the west of that peninsula (Fig. 2); plants occur on slopes along rocky shoreline and in forests adjacent to beaches at elevations less than 10 m.

ETYMOLOGY.— The specific epithet honors Spanish botanist Alicia Ibáñez, who has contributed greatly to the knowledge of the Panamanian flora, especially to that of Coiba National Park and neighboring regions. She also collected the type and co-collected two of the paratypes.

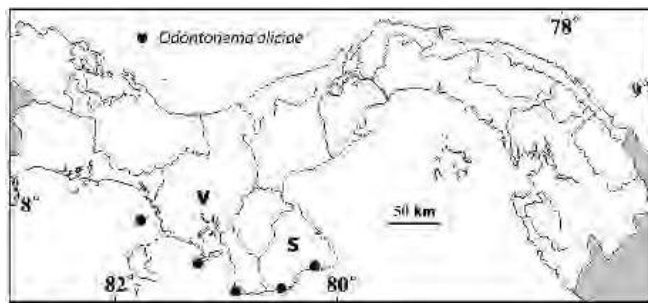


FIGURE 2. Map of Panama showing the distribution of *O. aliciae* (V and S refer to the provinces of Veraguas and Los Santos, respectively)

IUCN CONSERVATION STATUS.— *Odontonema aliciae* is presently known from five relatively recent collections (collected between 1978 and 2012) with an extent of occurrence (EOO) of 4,106 km² and an area of occupancy (AOO; grid cell area of 4 sq. km) of 20 sq. km. In reality, the terrestrial EOO is considerably less than that calculated because a significant part of the EOO consists of approximately 1,500 sq. km of open ocean (but there is potential habitat on small islands that occur in the oceanic region). The linear distances of occurrence are 170 km west to east and 65 km north to south.

Primary threats to the species consist of seaborne events (e.g., tsunamis, hurricanes) and human-mediated coastal habitat deterioration. Given any of these potential threats, the number of locations of this species is less than five. A potentially mitigating factor that might favor the long-term perpetuation of this species is the occurrence of some plants in protected areas (e.g., *Ibáñez et al.* 6928 occurs in Cerro Hoya National Park; *Carrión et al.* 543 occurs in Coiba National Park). The other three collections occur in areas lacking official protection, and some of these areas have undergone or will potentially undergo deterioration due to construction of tourist infrastructure in the coastal regions in which the plants occur. According to label information on collections and field observations, at different localities plants varied from the dominant species present (e.g., *Ibáñez et al.* 6928) to occasional (*León et al.* 753) to rare (*Carrión et al.* 543). Based on the number of locations and an inferred decline in the extent and/or quality of habitat in the range of this species, two of the subcriteria would appear to be met for an assessment of Endangered for *Odontonema aliciae*, given its AOO (i.e., B2, a, b).

PARATYPES.— **PANAMA: Los Santos:** Playa Venado, 30 km E of Tonosi on hwy. 50, 30 Oct 1978 (flr), *B. Hammel* 5472 (MO, PMA); road along coast, 07°14'N, 80°31'W, 14 Dec 1995 (flr), *M. Nee & T. Andres* 46341 (NY, PMA, US). **Veraguas:** PN Coiba, Isla Contreras, Isla Fragata, N416326.62, W866367.81, 11 Jan 2012 (flr), *J. Carrión et al.* 543 (PMA); Golfo de Montijo, Cébaco, E472764, N826429, 10 Aug 2011 (flr), *N. León et al.* 753 (PMA).

Neotropical relatives of *Odontonema* in the *Pseuderanthemum* lineage of Acanthaceae: Justicieae include several morphologically similar genera: *Chileranthemum* Oerst., *Oplonia* Raf., *Pulchranthus* V.M. Baum, Reveal & Nowicke, and *Pseuderanthemum* Radkl. ex Lindau (McDade et al. 2000). Morphological distinctions among these genera, all of which contain heterostylous species, are largely based on form of the corolla, which likely reflects adaptation to different predominant pollinators (cf. Daniel 1995, especially fig. 1).

A Colombian species originally described as *Odontonema stenostachyum* Leonard (Leonard 1958) and treated as *Pseuderanthemum stenostachyum* (Leonard) V.A.W. Baum by Baum (1982), belongs to the *Pseuderanthemum* lineage. Like *O. aliciae*, it has sessile to subsessile and “more or less subauriculate” leaf blades (Leonard 1958:392). In the protologue of *O. stenostachyum*, the corollas were described as immature and an accompanying illustration shows them as buds only; this condition was verified by studying the type collection at US. Because Baum (1982) did not provide a rationale for transferring this species to *Pseuderanthemum*, and because the differences between these two genera are subtle at best, the generic affinities of *P. stenostachyum* remain suspect. It can be distinguished from *O. aliciae* by the characters in the following couplet:

- 1a. Internodes of vegetative stems and inflorescence rachis, peduncles, and pedicels glabrous; inflorescence broad (ca. 50 mm across near midpoint) with dichasia pedunculate; calyx 6.5–9 mm long; corolla pink to purple with white markings on lower-central lobe; seeds with longest axis 6.5–7.5 mm. *Odontonema aliciae*
- 1b. Internodes of vegetative stems and inflorescence rachis, peduncles, and pedicels pubescent; inflorescence narrow (ca. 20 mm across near midpoint) with dichasia sessile to subsessile;

calyx 4–5 mm long; corolla white; seeds with longest axis ca. 3 mm long
 *Pseuderanthemum stenostachyum*

Among Mexican and Central American *Odontonema*, *O. auriculatum* (Rose) T.F. Daniel is also morphologically similar and is perhaps a closer relative of *O. aliciae*. *Odontonema auriculatum* occurs in western Mexico, from Sinaloa to Oaxaca, where plants grow in tropical deciduous and tropical subdeciduous forests at elevations from 60–230 m (Daniel 1995). That species is characterized by the combination of its conspicuously auriculate leaves and red flowers (Daniel 1995). It can be further distinguished from *O. aliciae* by the characters and distributions summarized in the following couplet:

- 1a. Corolla pink to purple, 13–20 mm long, tube 7.5–11 mm long, subcylindric, throat inconspicuous (i.e., not well differentiated from narrow proximal portion of tube); calyx 6.5–9 mm long, lobes, 5.5–8 mm long; dichasia pedunculate, peduncles 5–13 mm long; leaves sessile to subsessile (i.e., with naked petiole to 4 mm long), subauriculate at base; Panama *O. aliciae*
- 1b. Corolla red, (20–) 25–30 mm long, tube 13–20 mm long, funnellform, throat conspicuous; calyx 2–5 mm long, lobes 1.4–4 mm long; dichasia sessile to pedunculate, peduncles 1–4 mm long; leaves sessile, conspicuously auriculate at base; Mexico *O. auriculatum*

Like many other species of *Odontonema*, *O. aliciae* is distylous with some individuals having long stamens and short styles (thrum flowers; e.g., *Ibáñez et al.* 6928 at PMA-plant on left side of sheet) whereas others have shorter stamens and longer styles (pin flowers; e.g., *Hammel* 5472 at PMA). Although floral visitors were not observed to *O. aliciae*, the flowers are suggestive of those often pollinated by hummingbirds and/or bees. Corolla color varies from pink (e.g., *Ibáñez et al.* 6928) to purple (e.g., *Carrión et al.* 543). Pollen of *O. aliciae* is of the basic type common to most species of the genus (i.e., 3-colporate, 6-pseudocolpate; Fig. 3) and to the *Pseuderanthemum* lineage (Baum 1982; Daniel 1998; McDade et al. 2000).

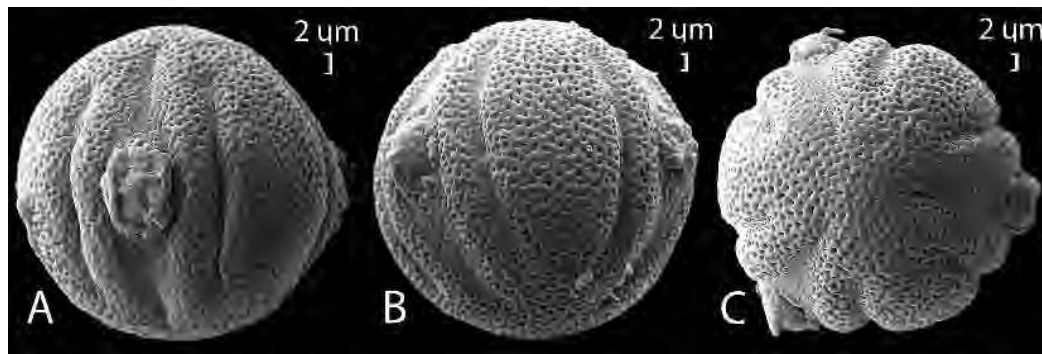


FIGURE 3. Pollen of *Odontonema aliciae* (*Hammel* 5472). A. Equatorial/subapertural view. B. Subequatorial/interapertural view. C. Polar view.

ACKNOWLEDGMENTS

We thank the Autoridad Nacional del Ambiente (ANAM) for facilitating this research via collecting permits (SC/P-26–11, SC/P-10–11), the Secretaría Nacional de Ciencia, Tecnología e Innovación (SENACYT) for funding much of fieldwork, the Smithsonian Tropical Research Institute (STRI) for supporting logistical aspects of this work through the International Cooperative Biodiversity Groups (ICBG) program. We are also grateful to botanists Noemí León and Rodolfo Flo-

res, who were research assistants during the trips; Mireya Correa for providing images of specimens at PMA; Scott Serata for assisting with SEM; Jim Reveal for supplying a copy of Baum's thesis on *Odontonema*; Alicia Ibáñez for use of her photographs of the new species; and Vic Smith for assistance with montage photography at CAS.

LITERATURE CITED

- BAUM, V. M. 1982. A revision of the genus *Odontonema* (Acanthaceae). Unpublished M.Sc. Thesis, University of Maryland, College Park, Maryland, USA.
- DANIEL, T. F. 1995. A revision of *Odontonema* (Acanthaceae) in Mexico. *Contributions of the University of Michigan Herbarium* 20:147–171.
- DANIEL, T. F. 1998. Pollen morphology of Mexican Acanthaceae: Diversity and systematic significance. *Proceedings of the California Academy of Sciences*, ser. 4, 50:217–256.
- DANIEL, T. F., AND L. A. MCDADE. 1995. Additions to the Acanthaceae of Panama. *Annals of the Missouri Botanical Garden* 82:542–548.
- LEONARD, E. C. 1958. The Acanthaceae of Colombia, III. *Contributions of the U.S. National Herbarium* 31:323–781.
- MCDADE, L. A., T. F. DANIEL, S. E. MASTA, AND K. M. RILEY. 2000. Phylogenetic relationships within the tribe Justicieae (Acanthaceae): Evidence from molecular sequences, morphology, and cytology. *Annals of the Missouri Botanical Garden* 87:435–458.