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# A new species of *Deamia* (Cactaceae) from Nicaragua

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## Abstract

*Deamia funis sp. nov.* (Cactaceae) from Nicaragua, in the Mesoamerican region, is described and illustrated based on morphological data. The new species is characterized by its often long, dangling (ropey), and relatively narrow, multiribbed stems with relatively small flowers like those of *D. chontalensis*, but with the stigma exerted among or slightly beyond the anthers as occurs in *D. montalvoae* and *D. testudo*.

## Resumen

*Deamia funis sp. nov.* (Cactaceae) de Nicaragua, en la región de Mesoamérica, se describe con base en datos morfológicos y se ilustra. La especie nueva se caracteriza por sus tallos a menudo largos y péndulos (como mecate), relativamente angostos y multicostillados, con las flores relativamente pequeñas parecidas a las de *D. chontalensis*, pero con el estigma exerto entre o algo más allá de las anteras como ocurre en *D. montalvoae* y *D. testudo*.

**Keywords:** brevistyly, floral morphology, taxonomy

## Introduction

The genus *Deamia* Britton & Rose (1920: 212), having recently been reinstated (Korotkova *et al*. 2017) is distributed in the Mesoamerican region and adjacent areas (slightly further north in Mexico). It is characterized by its scandent or epiphytic and often pendent habit, with determinate growth, deposition of a hard and brittle cuticular wax on stems, spines (some finer, hairlike—trichome spines—and more sinuous or flexible than others) on flowers, red to pale red fruits with white pulp (Korotkova *et al*. 2017, Cerén *et al*. 2018). The genus includes three species; *Deamia chontalensis* (Alexander 1950: 132) Doweld [2002('2001'): 41], *D. montalvoae* Cerén *et al.* (2018: 253), and *D. testudo* (Karw. ex Zuccarini 1837: 682) Britton & Rose (1920: 213).

During preparation of the taxonomic treatment for Flora Mesoamericana, examination of materials from Nicaragua revealed specimens that represent the new species of *Deamia* described here. We also provide a list of additional specimens, a distribution map based on the known localities, a comment on conservation status, a discussion of how the new species compares to similar species of the genus as well as a discussion about the unusual brevistylous flowers of *D. chontalensis* and a key to the four known species of the genus. The additional species described here is highly congruent with the known species, particularly the first two, with which it is compared.

## Materials and methods

Herbarium collections of five specimens of the new species preserved at MO and photos of live plants were examined. Observations and measurements of vegetative and available reproductive structures were made in order to characterize the species and compare it with others recently described in the genus (See Cerén *et al.* 2018). The distribution map

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was generated on Tropicos database (https://www.tropicos.org/home) via Google Maps, based on the given coordinates for each collection of the species. The estimate of conservation status is based on guidelines by the IUCN (2022) as well as the continuing dismal response of world leaders to collaborate in the urgent need to forestall human-caused habitat destruction and climate change.

## Taxonomic treatment

***Deamia funis*** Hammel & S. Arias *sp. nov.* (Figs 1, 2)

Type:—NICARAGUA. Matagalpa: 9.1 km N of Matiguás (highway) along road through Tierra Blanca, 2.9 km N of Tierra Blanca, deciduous forest, rocky and heavily grazed, 12°53'53"N, 85°30'15"W, 423 m, 15 March 2017 (fl), *Stevens & Montiel 39242* (holotype, MO!; isotype HULE).

**Diagnosis**:—*In its flowers Deamia funis is outwardly similar to D. chontalensis, but has stamens (1.5–3 vs. 0.4–0.7 cm long) and styles (6–8 vs. 2–2.2 cm long) much longer, and with the stigma exerted among or slightly beyond the anthers (vs. the brevistylous flowers of the latter), furthermore, its stems are less than half the diameter of those of the latter, and with more ribs; the stems are similar to those of D. montalvoae, but the flowers are smaller, less than 1/2 (mostly 1/3) as long as in that species.*

**Description**:—Root-climbing plants or trailing epiphytes, with straight spines; stems ± straight and usually pendulous, irregularly branched, the internodes from ca. 0.12 up to ca. 10 m long, 0.6–1.1 cm in diameter, ± cylindrical with ca. (6–)8 relatively rounded ribs, with a brittle, transparent, varnish like epidermal coating and abundant adventitious roots, monomorphic; areoles 1–1.5 cm apart, with 4–18 orange to black, persistent spines, to ca. 1.4 cm long, the trichome-spines lacking or a few persistent. Leaves scalelike, to ca. 0.04 cm long, deltate, acute, soon deciduous. Flowers mostly restricted to the distal, new growth of pendulous stems, nocturnal, 8–10 cm long, actinomorphic, funnel-shaped, the pericarpel ca. 1 cm long, with ca. 8 series of indistinct pustules (podaria) bearing the areoles with the bracteole dark reddish brown, ca. 0.5 mm long, deltate, with dense and conspicuous felt and with few or no spines but abundant trichome-spines (hairs); receptacular tube pale green to greenish yellow, sometimes tinged pink, 5–7 cm long, funnel shaped (the narrow portion of the tube up to ca. 3 × 0.7 cm, the wider portion up to ca. 3.5 × 3 cm), with numerous scattered bracteoles (sometimes intergrading with or positioned upon the outer tepals), up to ca. 2 mm long, the areoles sometimes with a few spines (in the proximal 1/3 to 1/2 of the tube) and with abundant, white to orange trichome-spines to ca. 1.5 cm long; perianth with numerous, slightly differentiated tepals, up to 1.5–2 cm long, the outer tepals pale yellow green to white, sometimes apically pale brown, ascending, ± oblong, obtuse to acute, the inner tepals white, ascending, oblong, acute; stamens numerous, 1.5–3 cm long, attached in two bands, one in the distal 1/3 of the narrow portion of the tube, to ca. 1.5 cm wide, the other uniseriate and born at the mouth of the tube (at its widest point), the filaments white, included (within the cup of the limb), the anthers 1–1.4 × ca. 0.8 mm; style to ca. 6–8 cm long; stigma white to cream, with ca. 8 simple lobes. Submature fruit yellowish green, ca. 2 × 2.5 cm, ovoid, smooth, the areoles with ca. 20 spines, to ca. 0.7 cm long, not completely covering the fruit surface; pulp and seeds not seen.

**Additional specimens examined**:—NICARAGUA. Chontales: 2 km NE of Cuapa along road to Cerro Oluma, dry forest patch on hillside, 12°16'51"N, 85°22'27"W, 355 m, 20 January 2009 (fl.), *Stevens & Montiel 27909* (HULE, MO). Matagalpa: 11.9 km N of Esquipulas (at Puente Kaulapa) along road to San Dionysio; dry forest, 12°44'23"N, 85°47'16"W, 322 m, 3 April 2018 (fl., immature fruit.), *Stevens 40324* (HULE, MO); ibd., 9.1 km N of Matiguás (highway) along road through Tierra Blanca, 2.9 km N of Tierra Blanca, deciduous forest, rocky and heavily grazed, 12°53'53"N, 85°30'15"W, 423 m, 4 January 2013 (fl.), *Stevens & Montiel 33938* (HULE, MO); ibd., 25 February 2022 (flower bud, immature fruits), *Stevens & Calero 44070* (HULE, MO).

**Distribution and habitat**:—*Deamia funis* is known only from low to mid elevations (322–423 m) of fog-zones of dry, seasonal forests on the Atlantic watershed, from central Nicaragua. Although presently endemic to Nicaragua, the species should be sought in similar habitat just to the north, in Honduras. *Deamia testudo*, the only other species in the genus known from Nicaragua is more widespread, and is known to occur sympatrically, at least as close as ca. 25 km (Fig. 3). Several sterile collections from limestone outcrops in a mixture of moist forest and savana of the Atlántico Norte region (northeastern Nicaragua), may belong to this species, but lacking fertile collections from that area, we have not included them.

**Phenology**:—Flowering plants have been found only in the months of January to April, during the dry season.

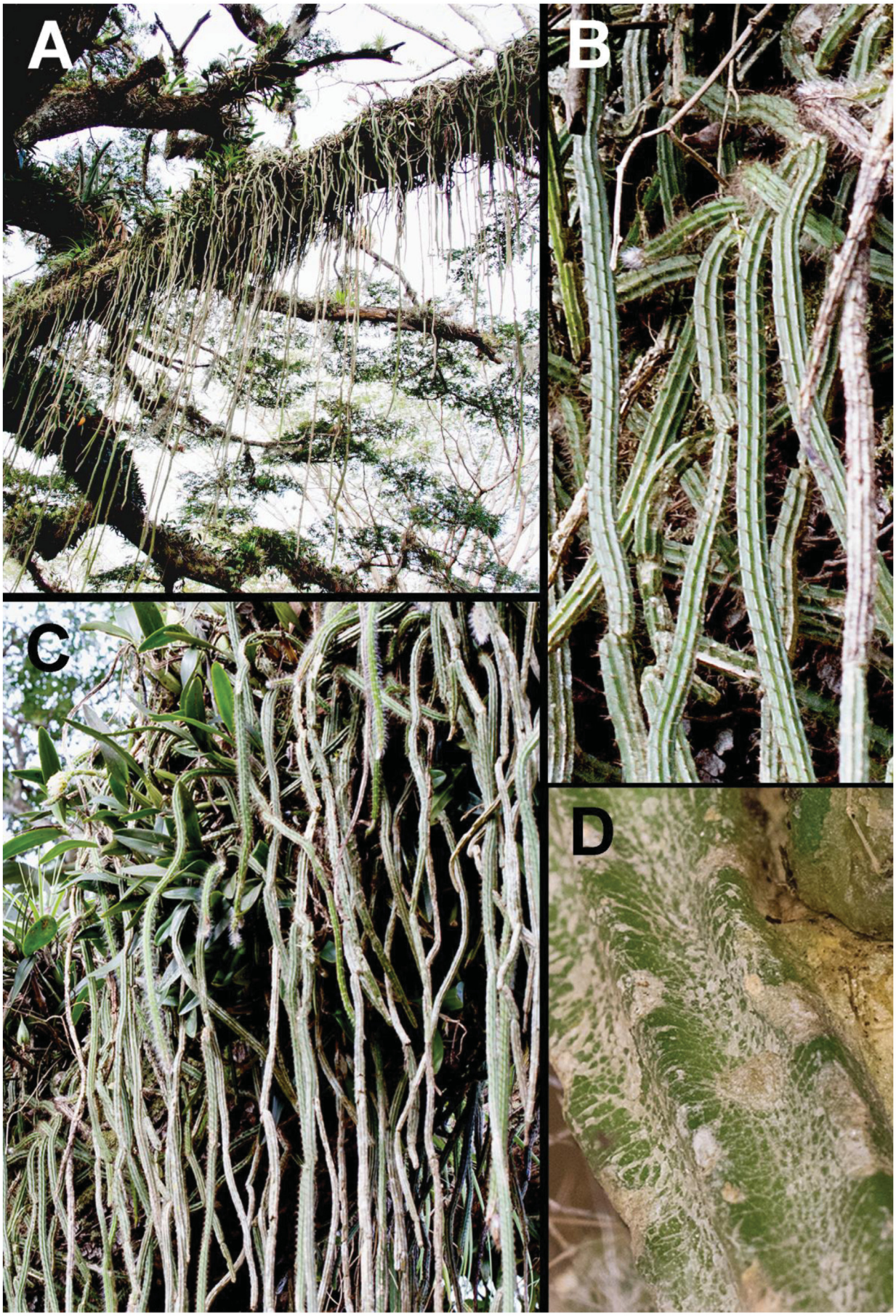


**FIGURE 1**. *Deamia funis*, vegetative characters. A–C. Habitat and habit (*Stevens & Montiel 33938*). D. Close-up of stem showing cracks in epidermal wax (*Stevens & Montiel 39242*). Photo credits: all Montiel.

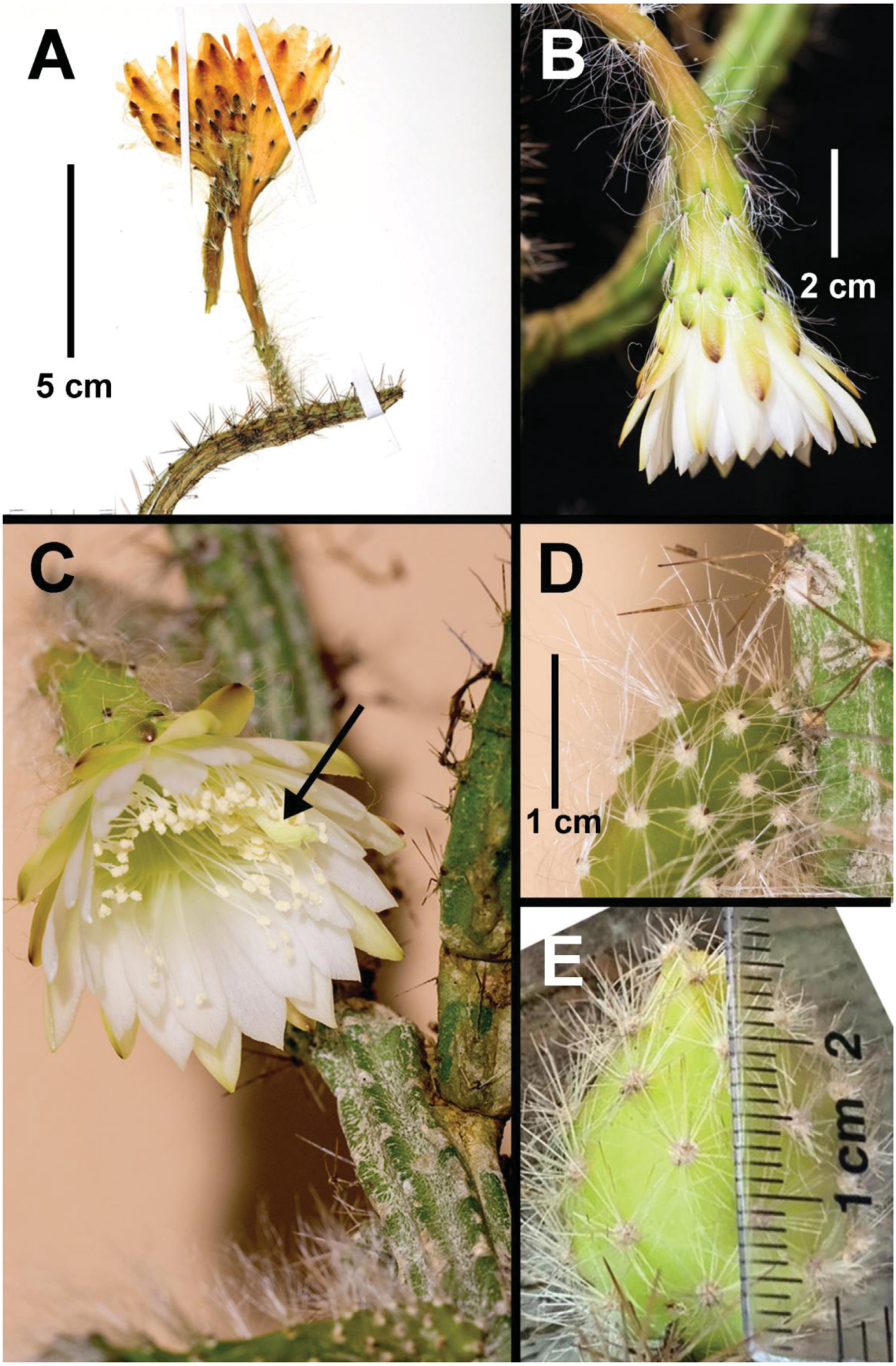


**FIGURE 2**. *Deamia funis*, reproductive characters (A–D from *Stevens & Montiel 39242*, E from *Stevens & Calero 44070*). A. Side-view of flower on specimen. B. Side-view of flower in life. C. Front-view of flower in life (arrow at stigma). D. Close-up of base of flower in life. E. Submature fruit, in life. Photo credits: A, Hammel; B–D, Montiel; E, Chamorro.

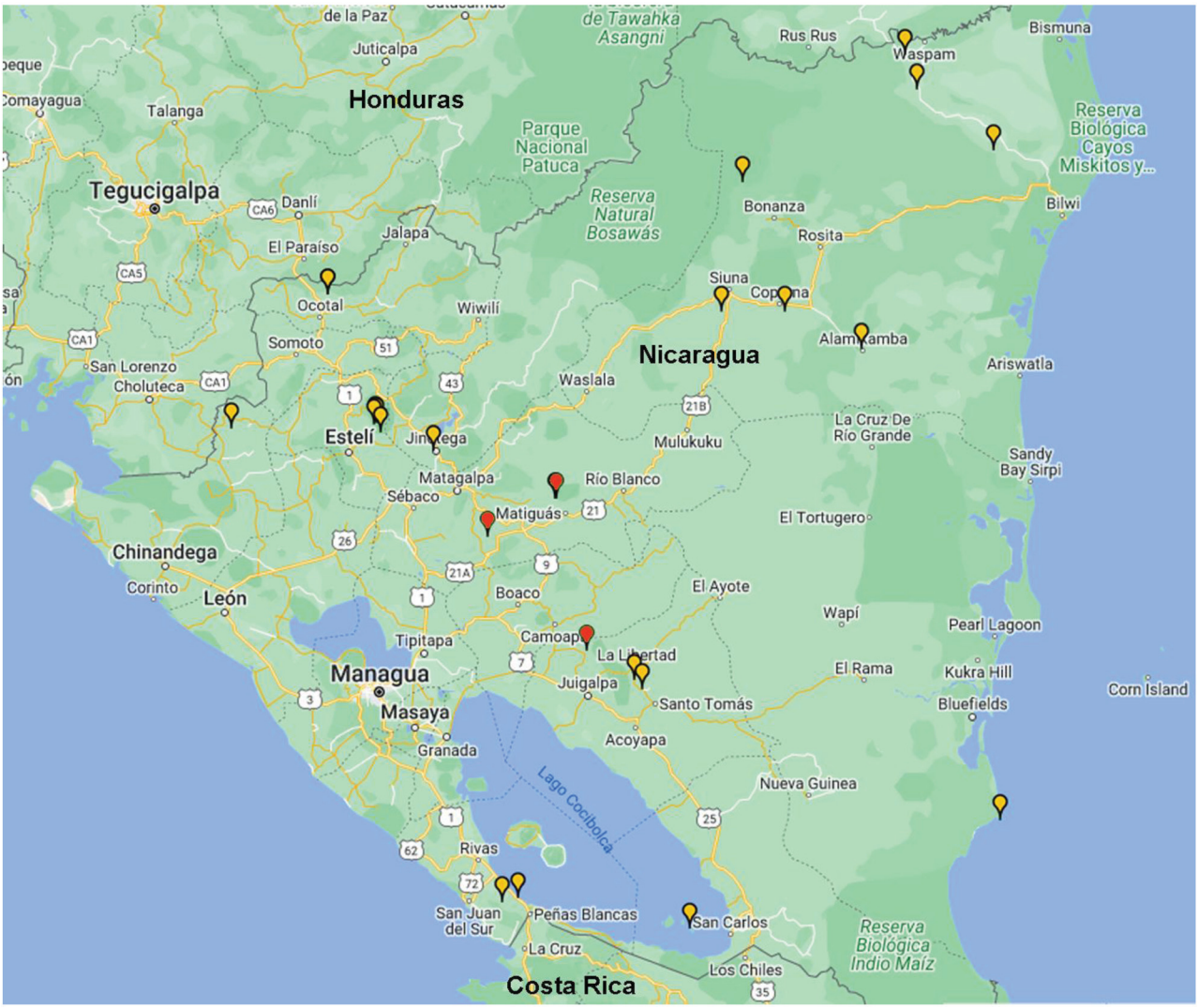


**FIGURE 3**. *Deamia funis* and *D. testudo*, distribution map. Total distribution of *D. funis* (red balloons); Nicaraguan distribution of *D. testudo* (yellow balloons). Map generated from specimens on Tropicos (Google Maps).

**Etymology**:—The epithet refers to the long, dangling, rope-like stems common in this species when found growing on horizontal branches of trees.

**Preliminary conservation status**:—The new species is not known for sure to occur within any protected area, but the type and two other collections were found within a few km of the Reserva Natural Sierra Quirragua and one other collection from very near the Reserva Natural Sierra Amerrisque. The species has been collected from only three different localities and we estimate that a polygon encompassing all three of them covers an area of no more than 5000 km$^2$. We consider that the area where this plant is known to occur, being subject to cattle farming, suffers from continuing habitat destruction. Thus, by the guidelines for using the IUCN Red List categories and criteria (2022), table 2.1, B1 a and b, this species ought to be considered endangered (EN). In any case, all species of plants everywhere, except common weeds and cultivated plants should be considered endangered. Human caused habitat destruction and climate change are not making things any better.

**Discussion**:—By its stems 0.6–1.1 cm in diameter with ca. (6–)8 ribs (*vs.* stems 1–2 cm in diameter with 7 or 8 ribs) this new species overlaps somewhat with those of *Deamia montalvoae,* but in floral characters it differs markedly from that species by its much shorter flowers [8–10 *vs.* (23–)27–30 cm long in *D. montalvoae*]. However, in size and overall form the funnel-shaped flowers of the present species are almost identical to those of *D. chontalensis*, which however, has stems 2.5–3.5 cm in diameter with only 5 or 6(–7) acute ribs. The fruits of *D. funis* differ from both latter two species by the surface being hardly at all covered by the areole spines, and in that respect are more similar to the fruits of *D. testudo*.

The flowers of *Deamia chontalensis* itself are unique among species of the genus, and at least uncommon among all Cactaceae. An illustration showing the three main floral types in Cactaceae in the review by Mandujano *et al*. (2010) shows only styles with the stigma exerted among or slightly beyond the anthers (i.e., longistylous). They mention only one study of one species (*Opuntia robusta* H.L. Wendl. ex Pfeiffer) with a brevistylous morph. The flowers of *D. chontalensis*, however, were originally described as unusual for having an "extremely short style" (Alexander, 1950), and were illustrated (Bravo-Hollis 1978) with the stigma as being positioned well below the level of the anthers, in fact, below the insertion of the short stamens (i.e., brevistylous). Furthermore, the protologue includes a curious note attributed to the original collector "Mr. MacDougall notes that the style extends 7 mm beyond the stamens at anthesis but is back in place below the stamens when the flower closes." This juxtaposition, so contrary to the usual—where the stigma is exerted slightly beyond or among the anthers—could appear to be some sort of error in the description (the original collection having been lost and the lectotype, a photo that reveals nothing in this respect). Nonetheless, the short style (2–2.2 cm long) with the stigma positioned well below the anthers, has been confirmed with recent collections of *D. chontalensis* (Fig. 4). No species of *Deamia* with more than one flower morph is known. The suggestion that the style stretches out and then shrinks back has not been confirmed. The stamens of *D. chontalensis* are also unusually short for a flower of this size, ranging from only 0.4 to 0.5 cm long; stamen length in the other species of *Deamia* varies from 1.5–20 cm long. These characters in the floral morphology of *D. chontalensis* are strongly suggestive of a particular pollination syndrome worthy of investigation. Thus, although the flowers of *D. chontalensis* and *D. funis* are outwardly similar, the latter is further distinguished by its longer style (6–8 cm long) and stamens (1.5–3 cm long), with the stigma among or slightly exceeding the anthers.

The submature fruits are similar to those of other species in the genus, in having a smooth surface with spiny areoles, the spines (as in the fruits of *Deamia testudo*) not completely covering the surface; we are confident that all characters of the new species, especially that of the unique epidermal wax of the stems, often with a sort of cob-web pattern of cracking, are congruent with its placement in *Deamia*.




**FIGURE 4**. *Deamia chontalensis*, long section of flower showing brevistyly, with the stigma positioned below the anthers (*Yañez & Arias 004*, MEXU). Photo credits: Arias.

To facilitate identification of the four known species of *Deamia* we include a key.

**Key to the species of *Deamia***

1. Stems 0.6–2 cm in diameter, the ribs (6–)7 or 8, acute or rounded; flowers longistylous ..... 2
- Stems 2.5–15 cm in diameter, the ribs 3–10, acute; flowers longistylous or brevistylous ..... 3

2. Spines up to 1.4 cm long; stem ribs rounded; flowers 8–10 cm long ..... *Deamia funis*
- Spines up to 2.6 cm long; stem ribs acute; flowers (23–)27–30 cm long ..... *Deamia montalvoae*
3. Flowers 6–9 cm long, brevistylous with the stamens 0.4–0.5 cm long and the style 2–2.1 cm long, the stigma positioned well below the level of anthers; stems 2.5–3.5 cm in diameter ..... *Deamia chontalensis*
- Flowers 22–28 cm long, longistylous with the stamens 9–20 cm long and the style 22–24 cm long, the stigma positioned among or just beyond the anthers; stems 3–15 cm in diameter..... *Deamia testudo*

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