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## A New Species in the *Tillandsia utriculata* Complex (Bromeliaceae) from Mexico

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**ABSTRACT.** *Tillandsia tehuacana* I. Ramírez & Carnevali, a new species in the *T. utriculata* (L.) L. complex (Bromeliaceae) from Puebla, Mexico, is described and illustrated. The new entity is similar to *T. makoyana* Baker, but the rosettes are cylindrical (vs. funnellform), the leaves are coriaceous (vs. sclerotic), the leaves have a proportionately larger sheath compared with the lamina (vs. leaves with the sheath and lamina subequal), and the rachis of the inflorescence is sharply flexuous (vs. straight). The new species is also characterized by its habit, since it usually grows in dry thorn-scrub-cactus associations, while *T. makoyana* grows in different vegetation types, including oak and low deciduous forests. The new entity is also similar to *T. pinicola* I. Ramírez & Carnevali, but the new taxon differs by its larger rosette and inflorescence, its tubular rosette with leaves that are gray and purple and white lepidote on both sides (vs. a funnellform rosette with green leaves and only sparsely white lepidote abaxially), the floral bracts much shorter than the sepals (vs. subequal), the flowers ovate in shape (vs. tubular), and the three stigmatic lobes twisted together (vs. not twisted together).

**RESUMEN.** Se describe e ilustra *Tillandsia tehuacana* I. Ramírez & Carnevali, una nueva especie del complejo *T. utriculata* (L.) L. (Bromeliaceae). La nueva especie es similar a *T. makoyana* Baker, pero sus rosetas son cilíndricas (vs. en forma de embudo), sus hojas son coriáceas (vs. escleróticas), con una vaina proporcionalmente más larga que la lámina (vs. hojas con la vaina y la lámina subiguales) y el raquis de la inflorescencia es fuertemente flexuoso (vs. recto). También se caracteriza por crecer en matorral xerófilo asociada con cactus, mientras que *T. makoyana* crece en bosques de encino y selvas bajas caducifolias. La nueva especie también es similar a *T. pinicola* I. Ramírez & Carnevali pero tiene unas rosetas cilíndricas con hojas grises y bandas púrpuras, blanco lepidotas en ambas caras e inflorescencias de mayor tamaño (vs. rosetas en forma de embudo con hojas verdes en ambas caras, ligeramente lepidotas en la cara abaxial e inflorescencia tan larga o ligeramente mas larga que la roseta), brácteas florales más cortas que los sépalos (vs. subiguales), flores son

ovoides en forma general (vs. tubular) y los tres lóbulos del estigma son conduplicado-espinalados (vs. conduplicados pero no espinalados).

**Key words:** Bromeliaceae, Mexico, Puebla, *Tillandsia*.

The genus *Tillandsia* L. (subfamily Tillandsioideae) is the largest genus of Bromeliaceae in Mexico, with ca. 192 species, of which 133 are endemic (Espejo-Serna et al., 2004). A description of the *T. utriculata* (L.) L. complex and the species included within it was discussed by Ramírez et al. (2004) and Ramírez and Carnevali (2007), when describing two new entities in the same complex: *T. aesi* I. Ramírez & Carnevali and *T. pinicola* I. Ramírez & Carnevali, both endemic to Mexico.

As part of an ongoing floristic project on the bromeliaceous flora of Mexico, a new species became evident in the state of Puebla. Herbarium specimens of this new species have been previously identified as *Tillandsia makoyana* Baker, but it clearly represents a different entity that is well characterized by rosette and inflorescence characters. We were able to assess this by collecting fertile material in the field and comparing it with other live plants and herbarium specimens of species belonging to the *T. utriculata* complex, such as *T. makoyana*, *T. limbata* Schlechtendal, *T. dasylyriifolia* Baker, *T. pinicola*, and *T. aesi*.

Within the genus *Tillandsia*, some species complexes can only be understood using this two-fold approach, because most of the key characters required to diagnose the taxa become lost upon drying. In many cases, the scarcity of herbarium data fails to expose the often subtle ecological and geographical patterns of sympatric or parapatric species, which can only be disclosed with extensive fieldwork, collections of live plants, and an abundant herbarium record.

***Tillandsia tehuacana*** I. Ramírez & Carnevali, sp. nov.

TYPE: Mexico. Puebla: Mpio. Caltepec, carr. del pueblo de Caltepec a San Luis Atolotitlán, 18°10'45"N, 97°27'14"W, 2120 m, vegetación xerófila con cactáceas columnares y plantas suculentas, 1 Mar. 2005, Ivón Ramírez M. & Carlos Durán 1296 (holotype, CICY [5]). Figure 1.

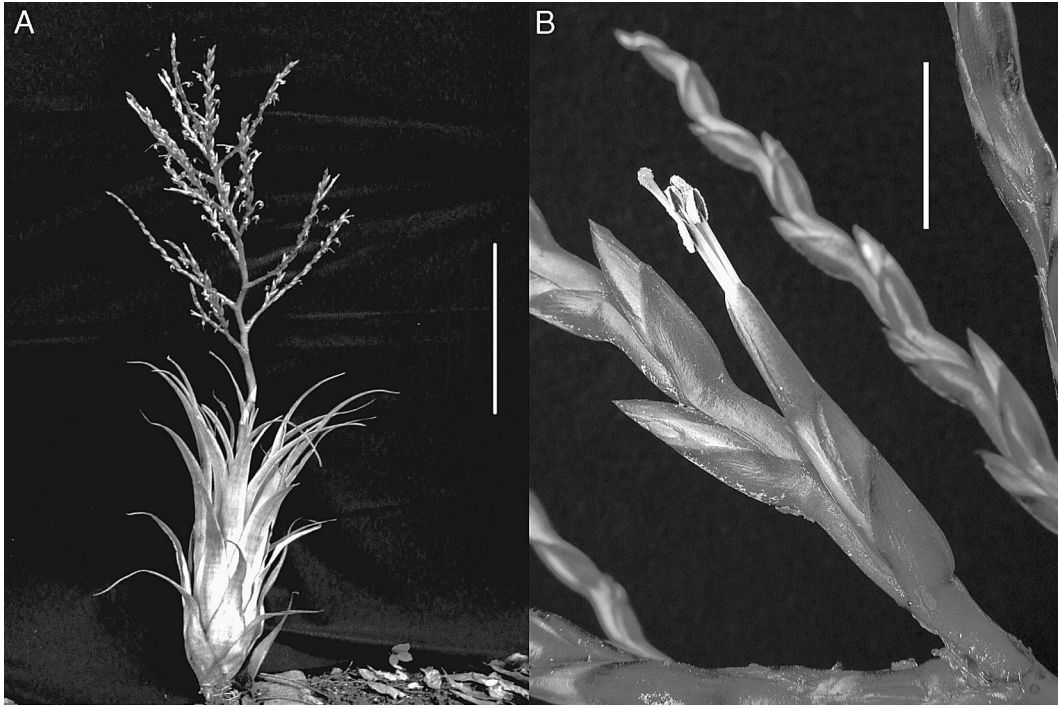


Figure 1. *Tillandsia tehuacana* I. Ramírez & Carnevali. —A. Habit. Scale bar = 20 cm. —B. Detail of flower. Scale bar = 2.5 cm. Based on the holotype, I. Ramírez & C. Durán 1296 (CICY). Photographs by Francisco Lorea-Hernández.

Haec species *Tillandsiae makoyanae* Baker similis sed rosula cylindrica nec infundibuliformi, vaginis foliaribus argyro-purpureis suffusis atque coriaceis nec scleroticis, floriis actinomorpha nec zygomorpha, filamentis stylisque pallidis viridibus nec albis differt.

Epiphytic herb, 120–130 cm high. Rosette and inflorescence almost equal in length, rosette with 25 to 30 leaves when flowering, forming a cylindrical rosette, to 25–30 cm diam., the size of leaves shorter on the more external ones, gradually increasing in size toward the rosette center, leaf tips slightly divergent, foliar sheaths impounding. Foliar sheaths erect, gray, white lepidote externally, somewhat concave, conspicuously nerved, drying castaneous, much darker on the adaxial surface, oblong to widely elliptic, 13–19 × 7–9 cm, gradually merging into the blade; foliar blades narrowly triangular at base, long-attenuate and acute, coriaceous, rather soft, conspicuously nerved abaxially, (18–)28–40 × (3.2–)5.5–6 cm, gray and white lepidote on both surfaces, conspicuously nerved. Inflorescence a bipinnate panicle, to 80–85 cm, oblong, spikes ca. 14, ca. 5 of these branched, short branches to (6–)10–14 cm, long branches to 19–27 cm, 4 to 8 flowers on short spikes, 10 to 15 flowers on longer ones, some branches with the first 2 bracts sterile, glabrous but with a resinous substance on the axils of branches and basal flower on each spike;

peduncle as long as the leaves when blooming (when dry and flattened, leaves slightly longer than peduncle), reddish pink, glabrous, 50–55 × 1.2–1.3 cm, covered by tubular, acute, imbricate bracts, base almost completely enclosing the peduncle, sheath and blade distinct, sheaths widely triangular, 2.5–4.5 × 3.3–3.6 cm, abruptly tapering into a narrowly triangular blade, 4–13 × 4–6 cm, white lepidote on both surfaces, in sharp contrast between the red, shiny peduncle and the white lepidote bracts, these erect with the tip slightly diverging from peduncle, usually longer than internodes but these exposed, upper ones shorter than internodes; internodes 2.5–5 cm; rachis red or reddish pink, to 0.7 cm diam., strongly flexuous, glabrous, dorsoventrally flat with flowers in 2 rows; bracts of the spikes widely triangular, acute and short-acuminate, base cordate, 2.2–3.5 × 2–2.4 cm, entire, slightly pink, densely white lepidote; floral bracts triangular to oblong-triangular, nerved, acute, navicular, red, margin hyaline drying sometimes dark purple, slightly white lepidote adaxially, barely covering the rachis, 1.3–1.5(–2.4) × 0.1–1.1(–1.5) mm, subequal in length to sepals but inserted below them and appearing much shorter when flower is open; pedicel thick, 5 × 5 mm. Flowers 5–6 cm, actinomorphic, erect, each flower lasting 1 day, protandrous, odorless, basally geniculate; corolla

forming a tube that is wider at base; *sepals* widely elliptic, acute, rounded,  $2.3\text{--}2.5 \times 1\text{--}1.2$  cm, 2 of them basally connate by 6 mm, green, red margins, shiny, longer than floral bract; *petals* narrowly oblong, rounded,  $3\text{--}3.1 \times 5\text{--}6$  mm, slightly oblique, constricted ca. 2 cm distally from base, lilac, free portion ca. 1.2–1.5 cm; *stamens* exerted, in 2 series, 1 slightly shorter than the other, filaments light green, plicate, 3.5–4 cm; *anthers* black, 8–9 mm, dorsifixed, pollen yellow; *ovary* 9–10 mm, pyramidal; *stigma* exerted, slightly protruding above the anthers at anthesis, conduplicate-spiral, to 4 cm, basally light green, apically apple green. *Fruit* a septicidal capsule (3–)3.5–4  $\times$  0.7–0.8 mm.

*Habitat, distribution, and phenology.* *Tillandsia tehuacana* is restricted to dry slopes and valleys covered by shrubby, sparse vegetation with many cacti (including tall columnar species), thorny legumes, and *Bursera* Jacquin ex L. All known populations occur in the Tehuacán Valley, in the Mexican state of Puebla, at 2000–2220 m elevation. It has been collected in flower in March, and fruiting collections are known from February and July. The inflorescence produces a transparent, sometimes yellowish resin at the base of the branches.

*Eponymy.* The name is based on the type locality from the Tehuacán Valley.

*Tillandsia tehuacana* is one of the most distinctive members of the *T. utriculata* complex, at least when living specimens can be studied. Herbarium specimens of *T. tehuacana* have been previously identified as *T. makoyana*, but these specimens differ from the latter in the cylindrical shape of the rosette (vs. funnellform in *T. makoyana*), the coriaceous and not sclerotic foliar sheaths (vs. sclerotic in *T. makoyana*), and the light green filaments and style (vs. white in *T. makoyana*). Rosettes of *T. tehuacana* seem to be monocarpic because we did not observe offsets in the studied specimens as they are observed in other members of the complex (i.e., *T. dasyliirifolia*). The species occurs at low densities, in thorn-scrub-cactus associations, at elevations between 1000 and 2200 m. On the other hand, although *T. makoyana* rosettes also tend to be monocarpic, they occur at higher densities in a variety of vegetation types, including oak forests and low caducifolious forests, at elevations of up to 1700 m (pers. obs.). Also, *T. tehuacana* flowers in March, while *T. makoyana* mainly blooms in August. It is difficult to distinguish between these species with herbarium material, but *T. tehuacana* has softer leaves, usually drying dark gray or black, while the leaves of *T. makoyana* tend to dry a paler gray hue.

Floral bracts in the new entity generally have a dark purple margin, a character usually not present in the other species. In addition, dry flowers of *T. tehuacana* feature stigmas that look much longer than stamens, an effect caused by the shrinkage of plicate filaments and/or perhaps the enlargement of style.

*Paratypes.* MEXICO. **Puebla:** mun. Zapotitlán Valley area along rd. from Chazumba, Oaxaca to Acatepec, betw. Calipa & Acatepec, C. E. Smith Jr., F. A. Peterson & Narciso Tejeda 3998 (F); Zapotitlán Valley area near Cerro Tarántula betw. Teloxtoc & San Juan Raya, 21 July 1961, C. E. Smith Jr., F. A. Peterson & Narciso Tejeda 4000 (F); mpio. Tehuacán, Paraje Cruz Santa Ana, Santa Ana Teloxtoc, 17 Feb. 1998, E. Guízar & A. Castañeda 3935 (UAMIZ); La Huerta, near Tehuacán, 17 Feb. 1905, William Trelease s.n. (MO 3264986), cultivated at the Missouri Botanical Garden (132/04/32), 9 May 1904 (MO-3264984), cultivated at the Missouri Botanical Garden (130/04/36), 15 Aug. 1905, G. E. McClure s.n. (MO 3264987, MO 3264988).

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