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Three new species and growth patterns in *Hechtia* (Bromeliaceae: Hechtioideae)

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Abstract

Three new species of *Hechtia* from the Mexican State of Oaxaca are herein proposed as new: *Hechtia flexilifolia, H. huamelulaensis,* and *H. nivea,* from the physiogeographical provinces of Mixteca Alta, Costas del Sur, and Sierras Centrales de Oaxaca respectively. All three species are described and illustrated. Iconography provided features plants in habitat and under cultivation. An assessment of their conservation status *sensu* IUCN criteria is presented as well. We also discuss and illustrate the three growth patterns identified at this time in the genus.

Keywords: Diversity, endemism, growth patterns, IUCN, Oaxaca, physiogeographical regions

Introduction

Oaxaca ranks third in vascular plant diversity among Mexican states only after Chiapas and Guerrero, with 251 families, comprising 1,824 genera and 8,431 species (García-Mendoza 2004). Among them, angiosperms are the most numerous with 7,752 species, whereas Bromeliaceae is the seventh most diverse family of monocots. However, Oaxaca houses the largest diversity of bromeliads of the country, the latest report accounting for 172 species in 15 genera (Espejo *et al*. 2007a), a figure that represents ca. 50% of all Bromeliaceae reported for Mexico (Espejo *et al*. 2004) and new species are continuously being added.

The genus *Hechtia* Klotzsch (1835: 401) is one of the most interesting members of the Mexican Bromeliaceae. Our latest estimate of the number of species is of 65 (Ramírez & Jiménez 2012), but this figure is becoming rapidly outdated by the discovery of new species every year. Mexico harbors the largest number of species of this genus with ca. 94% of them being endemic to the country, whereas the genus as a whole is restricted to Megamexico III. Espejo *et al.* (2004) reported 14 species of *Hechtia* for Oaxaca, but this number went up to 20 just in three years (Espejo *et al*. 2007a) and five more have been described since then [*H. colossa* Martínez-Correa *et al.* (2010: 746), *H. complanata* Burt-Utley (2012: 6), *H. ixtlanensis* Burt-Utley (2012: 1), *H. isthmusiana* Burt-Utley (2012: 10), and *H. oaxacana* Burt-Utley *et al.* (2011: 7)], and with the three newly species described here, the total number adds up to 28, becoming the leading state in *Hechtia* species richness; furthermore, most of the Oaxacan *Hechtia* species are restricted to the state. In Oaxaca only the genus *Tillandsia* Linnaeus (1753: 286) surpasses *Hechtia* as the most species-rich bromeliad genus with ca. 101 species (Espejo *et al.* 2007a). At present, *Hechtia* includes ca. 70 accepted species out of 89 published binomials. We still have a long way to go in order to reliably document bromeliad diversity in Mexico, until more regions are explored, particularly xerophytic shrublands or open rocky outcrops in remote and inaccessible places.

Givnish *et al.* (2007) proposed a new subfamily, Hechtioideae, with *Hechtia* as its sole member based on molecular evidence. Plants of *Hechtia* are terrestrial or more commonly lithophytic, on volcanic, karstic, or gypsophilous rocks; rosettes are cespitose or rarely caulescent, ranging in size from rather small [ca. 30 cm or smaller in diameter, i.e. *H. edulis* I. Ramírez *et al.* (2011: 363)] to fairly large dimensions [ca. 2 m diameter, i.e. *H. myriantha* Mez (1901: 6)], with succulent leaves, these strongly armed or rarely with serrulate margins. *Hechtia* species occupy mainly xerophytic shrublands, caducifolious tropical forests, and less commonly, *Quercus* Linnaeus (1753: 994) forests (*sensu* Rzedowski 1978). As most bromeliads, many species of *Hechtia* have central inflorescences, but ca. 20% of them have lateral

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