

HECHTIA ARAGONII (HECHTIOIDEAE: BROMELIACEAE), A NEW SPECIES FROM OAXACA, MEXICO

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Abstract

Background: Oaxaca is the Mexican state with the highest number of species of *Hechtia* (30). Recent botanical collections in the Sierra Madre del Sur region in the state revealed a species unknown to science.

Question: Are there characters present in the taxon from Río Cajonos in Oaxaca that indicate it is a new species?

Studied species: Hechtioideae, *Hechtia* sp. nov.

Study site and dates: Oaxaca, 2021-2025.

Methods: Live *Hechtia* plants and herbarium material were analyzed and compared to other species of the genus described from the state of Oaxaca and neighboring areas, particularly, flowers of both sexes in anthesis. Morphological descriptions of male and female plants were elaborated based on herbarium and photographic material; a map of geographical distribution was produced; a conservation status assessment under IUCN criteria is provided.

Results: *Hechtia aragonii* is a very distinctive species characterized by the presence of long, acute, twisted dry petals on pistillate flowers, character not found in any other species known in the genus. The new species is known so far from one collection and one locality, in the Sierra Madre del Sur region. The conservation status of the new taxon, is indicated as DD.

Conclusions: Vegetative and floral features as well as geographical distribution allow the recognition of *H. aragonii* as a new species native from Oaxaca, Mexico. With this new species, Oaxaca currently houses 31 species of *Hechtia*.

Keywords: Conservation, dioecy, endemic, floral dimorphism.

Resumen

Antecedentes: Oaxaca es el estado mexicano con mayor número de especies del género *Hechtia* (30). Colecciones botánicas recientes en la Región Sierra Madre del Sur en ese estado revelan una nueva especie para la ciencia.

Preguntas: ¿Los caracteres presentes en el taxón del Río Cajonos indican que es una nueva especie?

Especie de estudio: Hechtioideae, *Hechtia* sp. nov.

Sitio y años de estudio: Oaxaca, 2022-2025.

Métodos: Plantas vivas y material de herbario fueron analizados y comparados con otras especies del género descritas del estado de Oaxaca y áreas adyacentes al sitio de estudio, particularmente se compararon flores de ambos sexos en anthesis. Se elaboraron descripciones morfológicas de ambos sexos en anthesis, basándonos en material de herbario y fotográfico, así como se elaboró un mapa con la distribución geográfica, y se estimó el estado de conservación utilizando los criterios de la UICN.

Resultados: *Hechtia aragonii* es una especie distintiva por la presencia de pétalos largos, delgados y retorcidos en flores pistiladas secas, características que no se encuentran en ninguna otra especie conocida del género. La nueva especie, hasta la fecha, sólo se conoce de una colección y una localidad, ubicada en la región Sierra Madre del Sur. El estado de conservación del nuevo taxón es indicado como DD.

Conclusiones: Características vegetativas y florales, así como la distribución geográfica, permiten reconocer a *H. aragonii* como una nueva especie nativa de Oaxaca, México. Con esta nueva especie, Oaxaca cuenta actualmente con 31 especies de *Hechtia*.

Palabras clave: Conservación, dimorfismo floral, dioicismo, endemismo.

Hechtia Klotzsch (Hechtioideae Givnish) is a genus distributed from the United States of America (Texas), throughout most of Mexico, extending into Belize, Guatemala, and Honduras (Rivera-Martínez *et al.* 2022). The subfamily is characterized within the Bromeliaceae by the presence of dioecy (excepting one polygamomonoecious taxon, *H. gayorum* L.W. Lenz), with supporting morphological, geographical, and molecular data that allow for the recognition of three genera (Ramírez-Morillo *et al.* 2018a, 2018b, 2023). Plants of the genus *Hechtia* have succulent, terrestrial or saxicolous rosettes, with leaves armed with spines. The inflorescence is central or lateral (Ramírez Morillo *et al.* 2014), with small flowers usually arranged in large, branched inflorescences, with each flower lasting a day (and just for a few hours in the morning) and emitting sweet fragrances that attract bees (*Apis mellifera*, stingless and aculeate bees, as well as nectarivorous dipterans) (Ramírez-Morillo *et al.* 2022). Exceptions are the few, red-flowered species, featuring tubular corollas, *i.e.*, *H. rosea* É. Morren ex Baker, *H. iltisii* Burt-Utley & Utley, and *H. meziana* L. B. Sm., that are likely butterfly or hummingbird pollinated (Ramírez-Morillo *et al.* 2022).

Of the 15 biogeographical areas proposed by Morrone *et al.* (2017) for Megamexico, the Balsas Basin Biogeographical Province houses the largest number of species (37) of the genus *Hechtia*, of which 22 are endemic. Next to it are Sierra Madre del Sur (25 species and 10 endemics), the Pacific Lowlands (24 species with 11 endemics) (updated from Rivera-Martínez *et al.* 2022). Next to it are Sierra Madre del Sur (25 species and 10 endemics), the Pacific Lowlands (24 species with 11 endemics) (updated from Rivera-Martínez *et al.* 2022, [Table S1](#)). These figures are constantly changing by the new discoveries and the number of taxa in this genus is expected to exceed 100, approximately 95 % of them endemic to the country. Thirty species of *Hechtia* have been recorded for the Mexican State of Oaxaca (modified from Espejo-Serna *et al.* 2007). Out of these 30 species in Oaxaca, 19 are endemic to the state, most of them with restricted geographical and ecological distributions and often referred to as microendemics (Espejo-Serna & López-Ferrari 2018). One species each occurs in the Veracruz and Transmexican Volcanic Belt biogeographical provinces, 14 species in the Balsas Basin (including three endemics), 12 in the Pacific Lowlands (including four endemics), and 20 in the Sierra Madre del Sur (including eight endemics) ([Figure 3](#)).

Materials and methods

Field work to collect material to be compared against the new taxon, was carried out in Oaxaca, under the scientific permits (SGPA/DGVS/01280/21 and SGPA/DGGFS/712/2913/17) issued by the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) to researchers of CICY. To describe the new species, botanical collections were carried out in Oaxaca, where plants of both sexes were collected and herbarium specimens prepared by Juvenal Aragon Parada. The description of the new taxon was elaborated based on herbarium specimens and photographs of plants in the field. Morphological terminology used follows Scharf & Gouda (2008), Radford *et al.* (1974), and Moreno (1984). Type specimens were deposited at CICY and MEXU (acronyms according to Thiers 2026, continuously updated). The new species was morphologically compared, with all the species reported from Oaxaca, Puebla, and Guerrero (Hernández-Cárdenas *et al.* 2020, 2022), including type material and protologues, in order to determine its status. The conservation status of the new species was assessed using the IUCN Red List Criteria (IUCN 2026), and the distribution map was elaborated using QGIS (2025), based on the study of herbarium specimens in several herbaria available online (Red de Herbarios Mexicanos; <https://herbanwmex.net/portal/index.php>; ([Table S2](#)).

Results

Hechtia aragonii I. Ramírez & C. F. Jiménez, sp. nov. ([Figures 1-3](#))

Type. Mexico. Oaxaca, distrito de Villa Alta, municipio San Juan Tabaá, 1.5 km del puente de Lachiroag a San Juan Tabaá, a lo largo del rio Cajonos, 17° 19' 33.2"N, 96° 11' 46.91"W, 581 m snm, 28 diciembre 2021, *J. Aragón-Parada y M. Sosa-Sosa 1667-A* ♀ (Holotype: MEXU! 3 sheets; isotype CICY! 3 sheets).

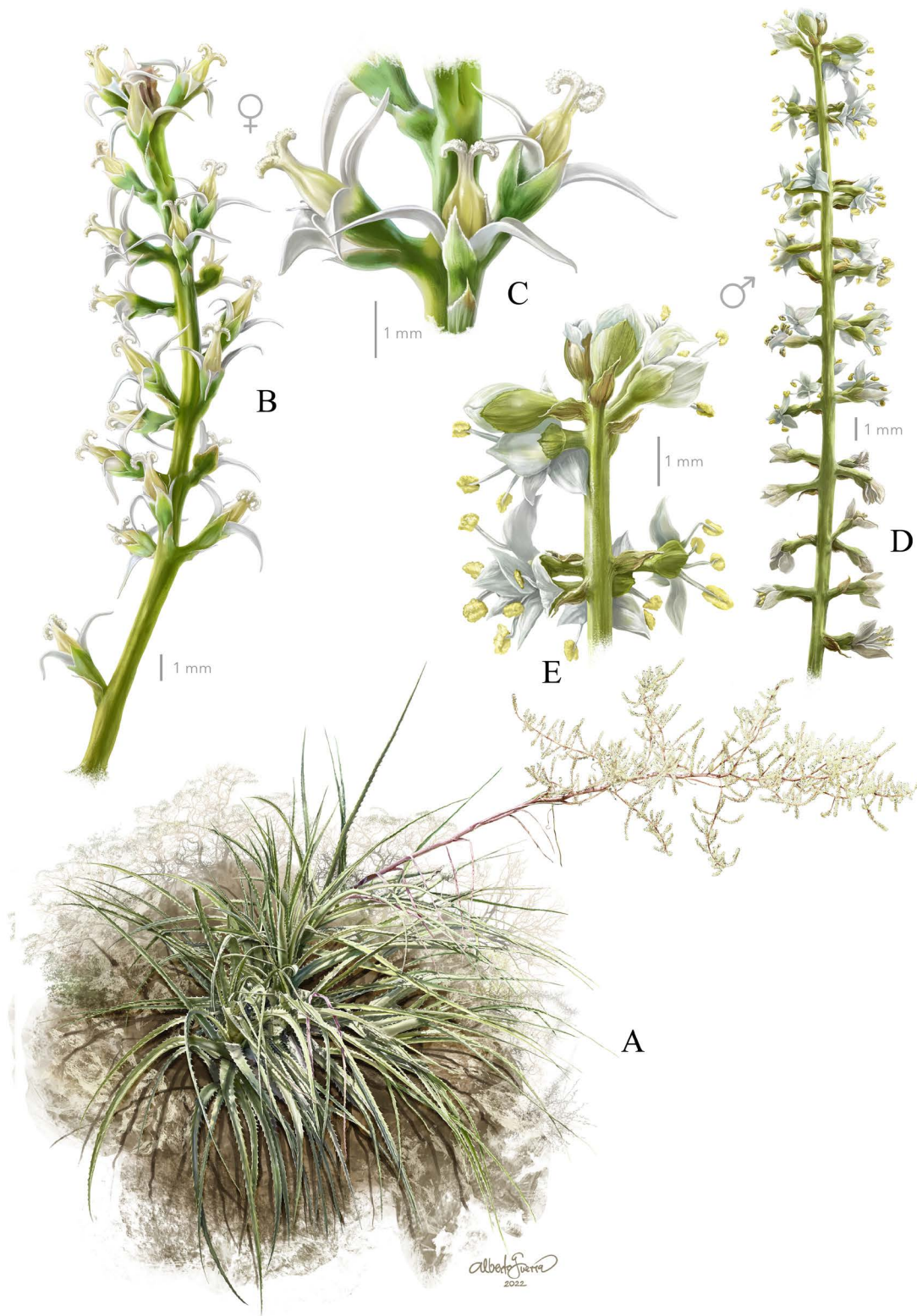


Figure 1. *Hechtia aragonii*. A) Staminate plants in habitat. B) Branch with pistillate flowers in anthesis. C) Detail of pistillate flowers. D) Branch with staminate flowers. E) Details of staminate flowers. Illustrated by Alberto Guerra based on photographs by Juvenal Aragón Parada.

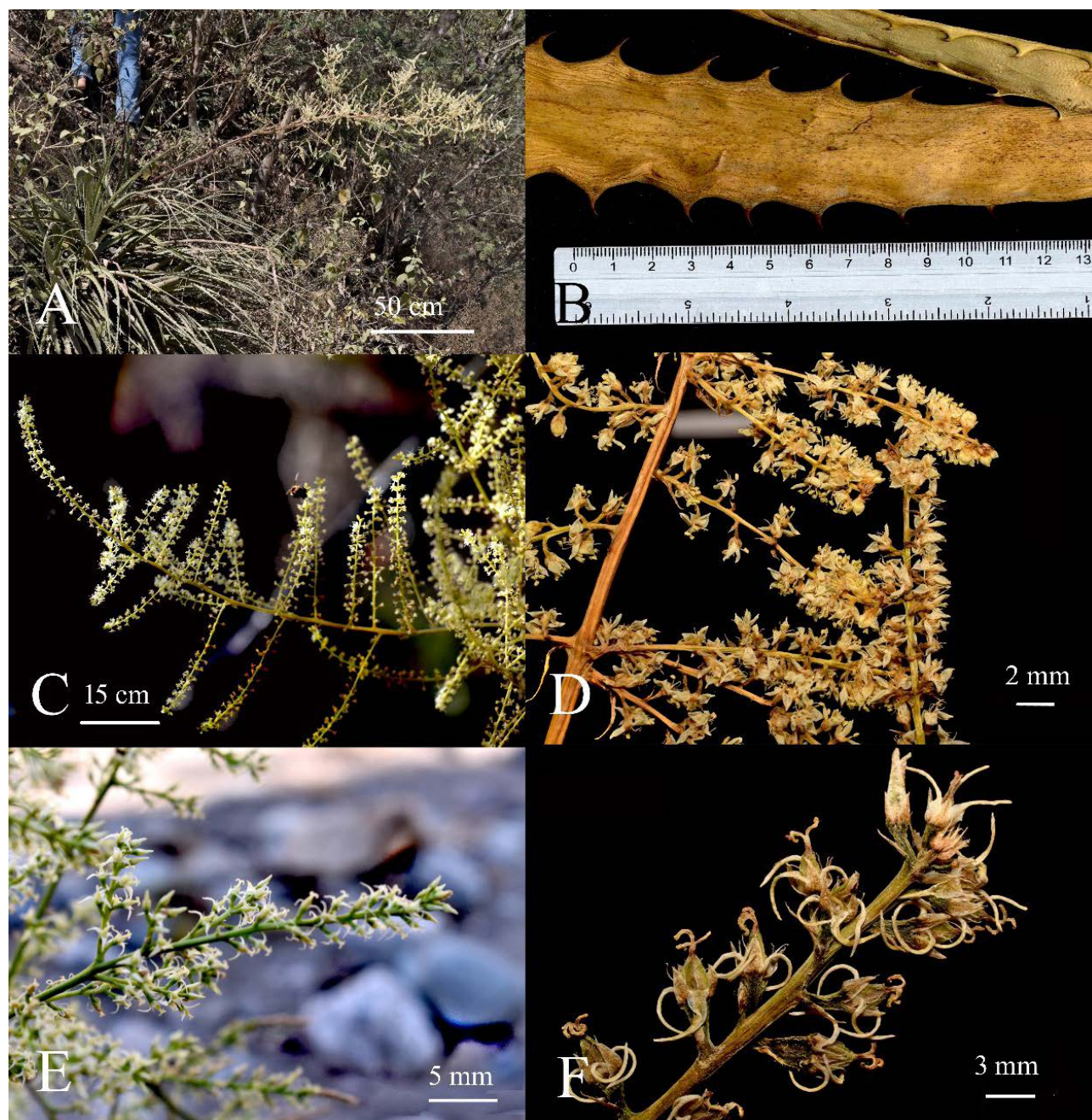


Figure 2. *Hechtia aragonii*. A. Staminate plant in habitat. B. Features of the leaves, including margins and spines C. Staminate inflorescence in habitat. D. Details of dry staminate flowers. E. Pistillate inflorescence in habitat. F. Detail of dry pistillate flowers. Photographs A, C, E, by Juvenal Aragón Parada. B, Carlos F. Jiménez Nah. D, F, Ivón M. Ramírez-Morillo. Plate was elaborated by Rodrigo Duno.

Diagnosis. *Hechtia aragonii* is distinguishable from all *Hechtia* species by its large pistillate flowers, $6-7 \times 9.3-9.5$ mm in anthesis, by its white, narrowly triangular, cucullate, acute petals, 3.7-4 mm long, almost twice as long as the ovary (2-2.5 mm long). Morphologically closest to *Hechtia flexiliifolia* I. Ramírez & Carnevali but the new taxon features more leaves (40-60 vs. (20-)30-40 in *H. flexiliifolia*), which are glabrous adaxially (vs. white lepidote) and wider (3.5-4.5 vs. 1.5-2.5 cm).

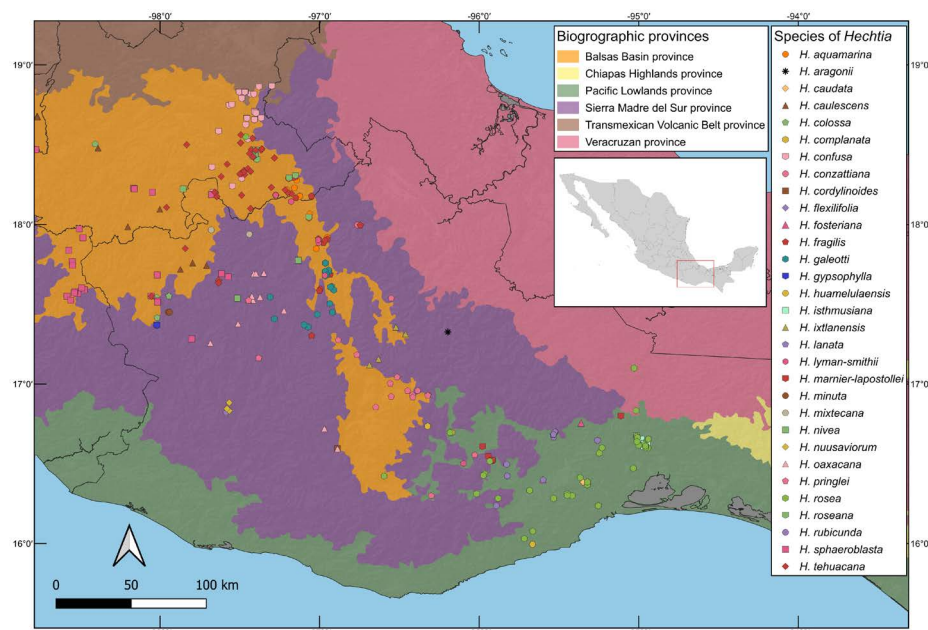


Figure 3. Geographical distribution of species of the genus *Hechtia* in Oaxaca by biogeographical provinces sensu Morrone *et al.* (2017), including *Hechtia aragonii*. Map elaborated by Ricardo Rivera-Martinez.

Description. Terrestrial or lithophytic plants, 1.5-2 m high in flower, rosettes somewhat caulescent, cespitose, 50-70 cm high, 50-60 cm diameter, generally forming dense, small groups of more than ten rosettes. Leaves 40-60, stiff, the central ones erect, the basal ones slightly reflexed; sheaths partially known, 5-6 cm wide, involving the stem but leaves separated and then stem partially visible; blades narrowly triangular, attenuate, $75-85 \times (1-) 3.5-4.5$ cm, succulent, U-shaped in cross section, greenish, densely white lepidote abaxially, glabrous and dull green adaxially, margin straight, armed; spines antrorse, triangular, (1.5) 2.5-5 (-8) mm long, 0.8-1.5 (-2) cm apart, light green. Inflorescence central, erect, emerging from a mature rosette (strict sympodial growth pattern, type SPP, *sensu* Ramírez Morillo *et al.* 2014). Staminate inflorescences a 2 (-3)-branched panicle, cylindrical in general shape, erect but becoming somewhat arched in bloom, 1.7-2 m long (observed from field photos of the plant); peduncle terete, 1-1.2 m long, 1.5 cm diameter at the base, reddish, white-lepidote, internodes 8-9 cm long; peduncle bracts with sheaths and blades with no clear differentiation, narrowly triangular, long attenuate, acuminate, $31-48 \times 2.4-3$ cm, finely dentate, glabrous above, sparsely lepidote below, reddish, strongly armed at the base to spinulate towards the apex, multinerved, sparsely lepidote at base and glabrescent towards apex on adaxial and abaxial surfaces, usually much longer than internodes, the apical ones almost as long as internodes; main axis 76-85 cm long, ca. 9 mm diameter at the base, 4 mm diameter at the apex, terete, light green to pinkish, slightly lepidote, internodes (2-) 2.5-5 cm long; primary bracts triangular, acute, (3-) $4.4-5.6 \times 0.8-1.2$ cm, as long as the stipe of the basal branch, papyraceous, apex apiculated and pungent, margin erose, brownish, multinerved, lepidote adaxially, glabrous abaxially; stipe of the basal primary branches 4-5 (-6) cm long, 4-6 mm diameter at the base, flattened; primary branches 22, erect-patent to reclinated, 17-39 cm long; secondary branches 14-29 in number, (1.5-) 3-14 cm long, each with (13-) 35-60 flowers; in some apical primary branches a short branch present between the stipe of the primary branch and the primary bract; branch rachis flattened, glabrous, smooth, slightly ribbed when dry, reddish. Flowers pedicellate, polystichous, erect, 4-5 mm long, 1.3-1.7 mm diameter; floral bracts oblong, attenuate and acuminate at the apex, $1.5-1.9 \times 0.4-0.7$ mm, light green, abaxially and adaxially sparsely lepidote, margin erose and hyaline, 1-nerved, longer than the sepals at anthesis; pedicels 1.8-2 mm long, 0.8-1 mm diameter; sepals oblong-ovate, acuminate, light green, $1.3-1.7 \times 1-1.2$ mm, margin slightly erose, lepidote, 3-nerved, shorter than petals, erect in anthesis; petals elliptic, rounded, $2-2.4 \times 1.5-1.9$ mm, spreading, white, 5-nerved; stamens with flattened triangular filaments, 1.5-1.8 mm long, white, adnate

to the base of pistillode; anthers oblong, ca. 0.8-1 mm long, dorsifixed, green-yellowish; pistillode reduced, white, ca. 0.6×0.8 mm, stigmatic lobes reduced, erect, ca. 0.3 mm long. Pistillate inflorescences a 2-branched panicle, in general shape ellipsoid (larger branches at the middle part of the axis), erect, 1.5-1.9 m long (observed from field photos of the plant and herbarium material), erect, soon arched; peduncle terete, 1-1.20 m long, 1.9 cm diameter at the base, green, glabrous; internodes 3.5-4.5 cm long; peduncle bracts with sheaths and blades without a clear division, narrowly triangular, long attenuate, acuminate, $16-44 \times 2-2.8$ cm, reddish at the base, light green at the apex, strongly armed at the base to spinulate or entire at the apex, multinerved, sparsely lepidote at base of adaxial and abaxial surfaces, glabrous towards apex on both surfaces, larger to equaling the length of the internodes; main axis 52-70 cm long, ca. 0.8 cm diameter at the base, terete, light green, internodes (1.2-) 2-4.2 cm long; primary bracts triangular, long acuminate, (1.5-) $3.7-7.2 \text{ cm} \times 3-8 \text{ mm}$, longer the length of the stipe; stipes 1.4-3.7 cm long, flattened; primary branches 16-27 in number, diffuse to divaricate (forming an angle of $70-90^\circ$ relative to the main axis), (3-) 15-35 cm long; secondary branches 8-17 in number, (1-) 3-8.5 cm long, each with (4-) 8-32 flowers; branch rachis flattened, glabrous, smooth, slightly ribbed when dry, green. Flowers with sepals and petals adnate to the ovary, 6-7 mm long, 9.3-9.5 mm diameter; floral bracts triangular, attenuate and acuminate, $2.8-3 \times 0.8-1.2$ mm, margin erose, 1-nerved, basally green, apically brown, sparsely white lepidote; pedicel terete, ribbed when dry, 2.5-3.5 mm long, 0.8-1 mm diameter; sepals triangular, acuminate, $1.8-2.2 \times 1-1.3$ mm, basally green, apically brown, entire, sparsely white lepidote, 3-nerved, erect in anthesis; petals narrowly triangular, acute, cucullate, entire, $3.7-4 \times 1-1.2$ mm, white, 5-nerved, adnate to the ovary and recurved in anthesis; staminodes six, hyaline, laminar, 1.8-2 mm long, as long at the ovary and attached to its base, white; ovary superior, ovoid, 2-2.5 mm long, 1.3-1.5 mm diameter, green-yellowish, slightly lepidote, stigmatic lobes recurved, 1.5-1.7 mm long, adnate at the base, white, equaling the length of the petals in anthesis; placentation central, ovules fusiform, ca. 0.5×0.2 mm. Fruits unknown.

Distribution and ecology. Plants of *Hechtia aragonii* occur in dense groups of individuals, growing as lithophytes or terrestrials, mainly on sun-exposed rocky slopes, inside tropical deciduous forest vegetation (*sensu* Rzedowski 1978) with northern exposure, frequently accompanied by *Lysiloma acapulcense* (Kunth) Benth. (Fabaceae), *Agave angustifolia* Haw. (Asparagaceae), *Cochlospermum vitifolium* (Willd.) Spreng. (Bixaceae), *Annona cherimola* Mill. (Annonaceae), *Cnidoscolus* sp., *Euphorbia* sp. (Euphorbiaceae), *Bursera* sp. (Burseraceae), *Iresine* sp. (Amaranthaceae), and *Cedrela* sp. (Meliaceae) [*fide* collectors]. *Hechtia aragonii* is distributed in the Sierra de Juárez region within the Sierra Madre del Sur biogeographic area region (*sensu* Morrone *et al.* 2017), in an area that is characterized by seasonally dry vegetation, at elevations below 600 meters.

Preliminary conservation status. *Hechtia aragonii* is at this time known from a simple gathering at the type locality. According to the IUCN, it must be assessed as DD (data deficient).

Phenology. The material of the new species was collected in bloom in December; fruits are unknown.

Etymology. The new taxon is dedicated to Dr. Juvenal Aragón Parada, a botanist native from Oaxaca, who collected and photographed the new species in habitat along with M. Sosa-Sosa.

Additional specimens examined. Mexico. Oaxaca, distrito de Villa Alta, municipio San Juan Tabaá, 1.5 km del puente de Lachiroag a San Juan Tabaá, a lo largo del río Cajonos, $17^\circ 19' 33.2''$ N, $96^\circ 11' 46.91''$ W, 581 m, 28 diciembre 2021, J. Aragón-Parada y M. Sosa-Sosa 1667-A ♂ (CICY, MEXU).

Discussion

We propose as new this species of *Hechtia* from the Sierra Madre del Sur biogeographical province, in the Mexican State of Oaxaca. Due to the presence of floral dimorphism in the genus, for practical reasons, comparisons with other similar species will be made by parts: rosettes, pistillate and the staminate flowers (fruits will not be compared since

they are unknown to us at this time for the new taxon). Rosettes of *H. aragonii* are similar to those of *H. flexiliifolia* (Ramírez Morillo *et al.* 2014) but with more leaves (40-60 vs. (20-)30-40), glabrous (vs. white-lepidote) and wider (3.5-4.5 vs. 1.5-2.5 cm) foliar blades. Pistillate flowers of *H. aragonii* are conspicuously distinct from all described species in the genus, showing the largest pistillate flowers known in the genus (6-7 × 9.3-9.5 mm in anthesis), by its white, narrowly triangular, cucullate, acute petals, these 3.7-4 mm long, almost twice as long as the ovary (2-2.5 mm long); also the dry pistillate flowers show whip-like petals (Figure 2F). The staminate flowers of *H. aragonii* are similar to those of several species particularly those of *H. rubicunda* López-Ferr. & Espejo, which occurs in the same biogeographical area (Sierra Madre del Sur). *Hechtia aragonii* has larger staminate inflorescences (1.7-2.05 vs. 1.4-1.5 m), longer stipes (4-5(-6) cm vs. 2-5 cm), more secondary branches (14-29 vs. 2-6), larger floral pedicel (1.8-2 vs. ca. 2 mm), larger and wider sepals (2-2.4 × 1.5-1.9 vs. 2.7-4 × 2-2.3 mm), light brown (vs. green) and wider (1.5-1.9 vs 2-2.3 mm) petals. Additionally, *H. rubicunda* blooms from April-May whereas *H. aragonii* flowers in December. Additional images of *H. rubicunda* are available in the protologue of the species (López-Ferrari & Espejo-Serna 2014).

Acknowledgments

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Supplementary material

Supplemental data for this article can be accessed here: <https://doi.org/10.17129/botsci.3921>

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Author contributions: IMRM analyzed all available material, delimited the species, wrote the manuscript; CFJN elaborated the morphological description and comparisons with similar species; RRM analyzed the diversity of species of *Hechtia* by biogeographical province in Oaxaca, and elaborated the map.

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