



***Hohenbergia mesoamericana* (Bromeliaceae), first record of the genus for Mesoamerica**

***Hohenbergia mesoamericana* (Bromeliaceae), primer registro del género para Mesoamérica**

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Abstract. *Hohenbergia mesoamericana* I. Ramírez, Carnevali et Cetzal is proposed as new, described, and illustrated. Because the genus was previously known only from the Antilles, Colombia, Venezuela, and Brazil, this new species represents the first record of *Hohenbergia* for Mexico and Mesoamerica. The new species is morphologically similar to the Jamaican *H. spinulosa* Mez in having the bracts subtending the spikes far exceeding them (especially the lowermost) and green petals, but differs in several characters, including a more elongate peduncle and rachis resulting in a less dense inflorescence, shorter floral bracts, and pedicellate spikes. The conservation status of the new species is evaluated as critically endangered (CR) according to IUCN criteria.

Key words: Bromelioideae, biogeographical disjunction, conservation, IUCN criteria, Mexico, Yucatán Peninsula.

Resumen. *Hohenbergia mesoamericana* I. Ramírez, Carnevali et Cetzal se propone como especie nueva, se describe y se ilustra. El género era conocido solamente de las Antillas, Brasil, Venezuela y Colombia; por ello, este nuevo taxón representa el primer registro de *Hohenbergia* para Mesoamérica y México. *Hohenbergia mesoamericana* es morfológicamente similar a *H. spinulosa* Mez de Jamaica, por presentar las brácteas de las espigas muy largas (especialmente las basales) y los pétalos verdes. Sin embargo, difiere de ella en varios caracteres, incluyendo el pedúnculo y raquis de la inflorescencia más largos, brácteas florales más cortas y espigas pediceladas. El estado de conservación de la especie nueva es evaluado como críticamente amenazado (CR) según los criterios del IUCN.

Palabras clave: Bromelioideae, conservación, criterios IUCN, disyunción geográfica, México, península de Yucatán.

Introduction

The genus *Hohenbergia* Schult. et Schult. f. comprises 61 species (Luther, 2006), distributed from the West Indies to Brazil, with most of the species reported from Brazil (ca. 73%), most of these (ca. 60%) coming from the state of Bahia. Another large component of the genus comes from the Antilles (ca. 27% of the species). There is a disjunct species in the western slopes of Andean Colombia (*H. andina* Betancur), a geographical distribution suggesting long-distance dispersal.

Plants of *Hohenbergia* are characterized by their terrestrial, saxicolous, or epiphytic habit, and by their stemless rosettes bearing several to many rosulate leaves, with the blades being spinose-serrate. The inflorescence scape is well developed, the rachis mostly bipinnate and lax, though it is rarely digitate or simple. The flowers are perfect in terete strobiles, or on sessile or subsessile

branches. The sepals are asymmetric, mostly very shortly connate, and the petals bear appendages with well developed scales. The stamens are included, with those from series I being free, and those from series II being partially adnate to the petals. The epigynous tube in the flower is shallow or lacking. The ovary remains distinct from the pedicel in fruit, the pollen displays 2 or 4 pores, the placentas are mostly apical, bearing ovules that are obtuse to long-caudate (Smith and Till, 1998).

The genus has been divided into 2 subgenera, *Hohenbergia* and *Wittmackiopsis* Mez. The former comprises taxa from eastern Brazil, with 1 species (*H. stellata* Schult. f.) ranging into Venezuela and the Lesser Antilles. Subgenus *Hohenbergia* features ovules that are mostly caudate (obtuse in *H. utriculosa* Ule), leaves with independent sclerenchyma fascicles, inflorescences that are amply tripinnate in most species (rarely digitate or simple, e.g., *H. littoralis* L. B. Sm.), and petals that are purple, blue, rose, yellow, or green, more rarely white (*H. rosea* L. B. Sm. et R. W. Read). Species in subgenus

Wittmackiopsis Mez were thought to be restricted to the Greater Antilles until this report. They are characterized by flowers with obtuse ovules, leaves without independent sclerenchyma fascicles, elongate inflorescences with the branches bipinnate or rarely with a few basal branches forked (*H. jamaicana* L. B. Sm. and Proctor). The petals are usually white or rarely green, doubtfully blue in *H. caymanensis* Britton ex L. B. Sm. (Smith and Till, 1998).

The subfamily Bromelioideae is composed of 31 genera and 722 species (Stevens, 2001 onwards) and is most diverse in Brazil. In Mexico, only 21 species of this subfamily have been reported (Espejo et al., 2004), of which only a few are restricted to the country. These include a single species of *Aechmea* Ruiz et Pav. (*A. matudae* L. B. Sm.), 2 species of *Bromelia* L. (*B. palmeri* Mez and *B. hemisphaerica* Lam.) and *Greigia* Regel (*G. juareziana* L. B. Sm and *G. vanhyningii* L. B. Sm.), and the genus *Ursulaea* Read et Baensch with 2 species [*U. macvaughii* (L.B. Sm.) Read et Baensch and *U. tuitensis* (Magaña et E. J. Lott) Read et Baensch]. The Yucatán Peninsula is even more species-poor with only 2 species of *Bromelia* and 3 of *Aechmea* represented, none of them endemic but instead widely ranging species.

There are 31 species of Bromeliaceae currently known from the Mexican states of the Yucatán Peninsula, *i.e.*, Campeche, Yucatán, and Quintana Roo (modified from Ramírez and Carnevali, 1999, Espejo et al., 2004, Ramírez et al., 2004). They belong to the following genera: *Aechmea*, *Bromelia*, *Catopsis* Griseb., *Hechtia* Klotszsch, *Tillandsia* L., and *Vriesea* Lindl.

During the course of botanical exploration of the eastern section of the Mexican Yucatán Peninsula, we found a population of plants referable to the genus *Hohenbergia*. The species has proven not to be conspecific with any of the previously proposed taxa in the genus and is herein described as new. This constitutes the first report of the genus for Mexico and the Central American mainland.

Description

Hohenbergia mesoamericana I. Ramírez, Carnevali et Cetzal, sp. nov. Figs. 1-4. Type: MEXICO. Quintana Roo: municipio Solidaridad, predio Punta Young, rancho Estrella del Sur, fracción B y rancho Estrella del Sur, fracción C, flexión derecha del km 266 + 200, de la carretera federal 307 Reforma Agraria-Puerto Juárez, tramo Tulum – Playa del Carmen, 20°32'33"N, 87°9'50"W, 10 Marzo 2008, a nivel del mar, *William Cetzal Ix 20* (holotype CICY (3 sheets); isotype MO (3 sheets)).

Species haec H. spinulosae Mez similis sed inflorescentia proportione longiore, multo laxiore, 1-pinnata (vs. 2-pinnata), ramis cylindricis 3.2-4.9 cm longis (vs. fusiformibus, 1.8-2.2 cm longis), pedicellatis (vs. plerumque sessilibus), bracteis primariis proportione brevioribus et sepalis brevioribus (11.4 vs. 7.5 mm longis) differt.

Plant terrestrial, acaulescent, rosulate, flowering ca. 140 cm tall. Leaves ca. 130 cm long, strap-shaped, soft-coriaceous; foliar sheaths 13-15 cm long, 14-15 cm wide, quadrangular, overlapping and forming a basal tank, green but turning black castaneous due to the detritus filling the tank, glabrous, entire, part of the margins hyaline; blades ca. 120 cm long, 14 cm wide at base, 11.2 cm wide at the middle, 4 cm wide near the apex, strap-shaped, not narrowed toward the base, slightly attenuating towards the apex, both surfaces green, slightly and sparsely verrucose, strongly nervate when dry, margins finely serrulate, spines up to 1 mm long, dark castaneous, unevenly distributed, curved, apex 1.5 cm wide, abruptly and shortly acuminate, blackish, acute and distinctly cuspidate, sclerotic, apicule 5 mm long. Inflorescence a panicle, fertile part of inflorescence (rachis) 24 cm long; scape 54 cm long, 5-6 mm diameter, much shorter than leaves, green, erect, terete, stout, densely white-lanate, internodes 5-9 cm long, alternating sizes, *i.e.*, not decreasing in size toward the apex; scape bracts 9-12.5 cm long, 0.5-1 cm wide, long triangular, acute, longer than internodes, rarely shorter than internodes, green, margins finely serrate, white-lepidote on both surfaces, thinly membranaceous, nervate when dry, curved upwards; primary bracts like scape bracts but narrower, 2.4-8.2 cm long, 4-6 mm wide, thinly membranaceous, green, white-lepidote both surfaces, margins sparsely serrate, spines ca. 1 mm long; spikes 21, polystichous, 3.2-4.9 cm long, 2-2.5 cm wide when flattened, 2.5-3 cm apart, oblong in general shape, forming an acute angle with the rachis, the lower ones much shorter than primary bracts, upper ones twice as long than primary bracts, spikes pedicellate, pedicels 3-5 mm long, terete, white-floccose; flowers polystichous, 15-21 per spike, 16 mm long, sessile; floral bracts 12 mm long, 5.6 mm wide, wide triangular, green, acute then abruptly and long acuminate, margins sinuose, apex light-green, white-lepidote both surfaces, nervate, as long or slightly shorter than sepals; sepals 11.4 mm long, 4 mm wide, free, erect, asymmetrical, green, ovate-triangular in general shape; petals 12.5 mm long, 3 mm wide, elliptic, erect, apex incurved, multinerved, green, basally white, membranaceous, with 2 appendages, these ca. 3.9-4.2 mm long, located at both sides of the base of the filaments of the stamens, white, 2-3-furcate apically, margins fimbriate; filaments 9 mm long, white, the antipetalous filaments adnate to the middle part of the petals; anthers 2.7 mm



Figure 1. *Hohenbergia mesoamericana* I. Ramírez, Carnevali et Cetzal, in habitat. Photograph by William Cetzal Ix.

long, 0.5 mm wide, mucronate, versatile, white, pollen yellow; ovary 7.5 mm long, 5.8 mm wide, inferior, ovoid, green, slightly white-lepidote at base, ovules obtuse, stigma longer than stamens in anthesis, green, with 3 stigmatic conduplicate (but not spiraled) twisted lobes. Fruit 4-4.2 mm long, 2-2.3 mm diameter, ovoid, immature seeds, 0.2-0.3 mm long, ovoid, orange.

Taxonomic summary

Hohenbergia mesoamericana is only known as an epiphyte growing on the low portion of tree trunks, very close to the forest floor, with the roots surrounded by dry leaves, in low deciduous forests dominated by *Erythroxylum confusum* Britton (Erythroxylaceae), at sea level. This type of vegetation is typically found over limestone outcrops. This highly endangered type of vegetation is the home of many of the regional Yucatán Peninsula endemics (Durán et al., 1998, Carnevali et al., 2003), including this novelty.



Figure 2. *Hohenbergia mesoamericana* I. Ramírez, Carnevali et Cetzal. A, immature inflorescence; B, mature inflorescence. Photograph by William Cetzal Ix.

The specific epithet highlights that this is the only species of *Hohenbergia* known from the Mesoamerican subcontinent.

Remarks

Hohenbergia mesoamericana appears to be most similar to *H. spinulosa* Mez, from Jamaica (portrayed in Baensch and Baensch, 1994: 111), with which it shares the general habit, the relatively short inflorescence, the extremely long bracts subtending the primary spikes, and the flowers with green petals. These 2 are apparently the only species of *Hohenbergia* subgenus *Wittmackiopsis* Mez with truly green petals; all others display white petals (or apparently blue in *H. caymanensis*). However, *H. mesoamericana* is readily distinguished from *H. spinulosa* by means of several inflorescence and floral characters. In *H. mesoamericana* the inflorescences are relatively longer, conspicuously laxer, and with the bracts subtending the primary spikes relatively shorter. In *H. mesoamericana* the bracts subtending the lowermost spikes are 2.5-3 times longer than the spikes, whereas in *H. spinulosa* they are at least 6-7 times longer. The spikes are 20-22 in number, 3.2-4.9 cm long, and cylindrical in *H. mesoamericana* while they exceed 40 in number, are 1.8-2.2 cm long, and fusiform in the Jamaican taxon. In *H. mesoamericana* the floral bracts are 12 mm long while they exceed 15 mm in *H. spinulosa*. The sepals in *Hohenbergia spinulosa* are ca. 7.5 mm long, but 11.4 mm long in *H.*

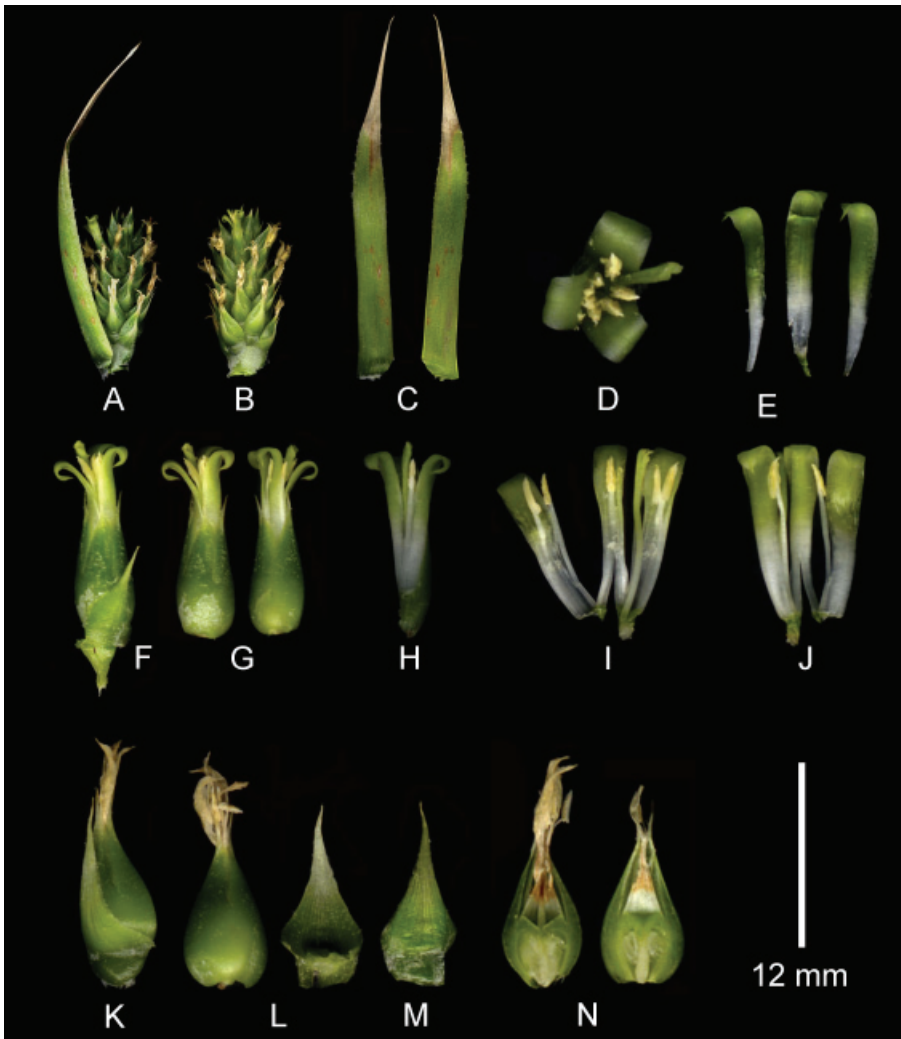


Figure 3. *Hohenbergia mesoamericana* I. Ramírez, Carnevali et Cetzal. Floral parts: A, spike with primary bract; B, spike; C, two primary bracts; D, flowers in anthesis; E, petals; F, flower with floral bract; G, flowers with floral bract removed; H, flowers with sepals removed; I, petals with stamens and stigma; J, petals with stamens, stigma removed; K, immature fruit with floral bract; L, immature fruit without floral bract; M, floral bracts, abaxial and adaxial views; N, longitudinal section of an immature fruit showing ovary and immature seeds. Illustrated by William Cetzal Ix.

diverged westward. Based on floristic similarities it has been concluded that the floristic relationships of the Yucatán Peninsula are closer to northern Mesoamerica (Estrada-Loera, 1991, Carnevali et al., 2003) than to the Antilles, despite the fact that the westernmost tip of Cuba is only ca. 200 km from the easternmost tip of the Yucatán Peninsula. The most striking feature of the Yucatán Peninsula and

mesoamericana. Furthermore, the foliar spines are shorter in *H. mesoamericana* (1 vs. 2 mm long).

This is the first record of the genus *Hohenbergia* from Mesoamerica or elsewhere in the American mainland north of Colombia and Venezuela. Whether its mainland distribution is due to vicariance from an ancestral distribution or is due to a long-range dispersal event remains to be investigated. The emerged portions of the Antillean Plate have apparently never been in contact with the emerged portions of modern-day Mesoamerica (Coney, 1982). This fact apparently precludes vicariance as an explanation for the current disjunct distribution of *Hohenbergia* subg. *Wittmackiopsis*. The Antillean Plate was closest (probably ca. 300 km) to the then-emerged eastern portion of the current day Yucatán Peninsula during its SW-NE migration at the Paleogene-Eocene border (40-50 my). The emerged portion of the Antillean Plate then

the Antillean floras is not what elements they share, but those that are missing from each area. In the Bromeliaceae, very few species are shared between the Antilles and the Mesoamerican mainland (Smith and Downs, 1979). In another large and mainly epiphytic family, the Orchidaceae, there are several endemic genera in the Antilles that are totally absent from the Mesoamerican mainland (*Broughtonia* R. Br., *Tolumnia* Raf., *Tetramicra* Lindl., *Quisqueya* Dod, *Dilomilis* Raf., *Psychilis* Raf., etc.). Similarly, many Mesoamerican orchid genera are absent from the Antilles. This evidence strongly suggests a long history of isolation between the 2 areas. However, there is a small but distinct Antillean element in the flora of current day Yucatán Peninsula, which requires an explanation. A “stepping stone” migration through the several small islands that constituted the emerged portions of the Antillean Plate into the Yucatán Peninsula at various

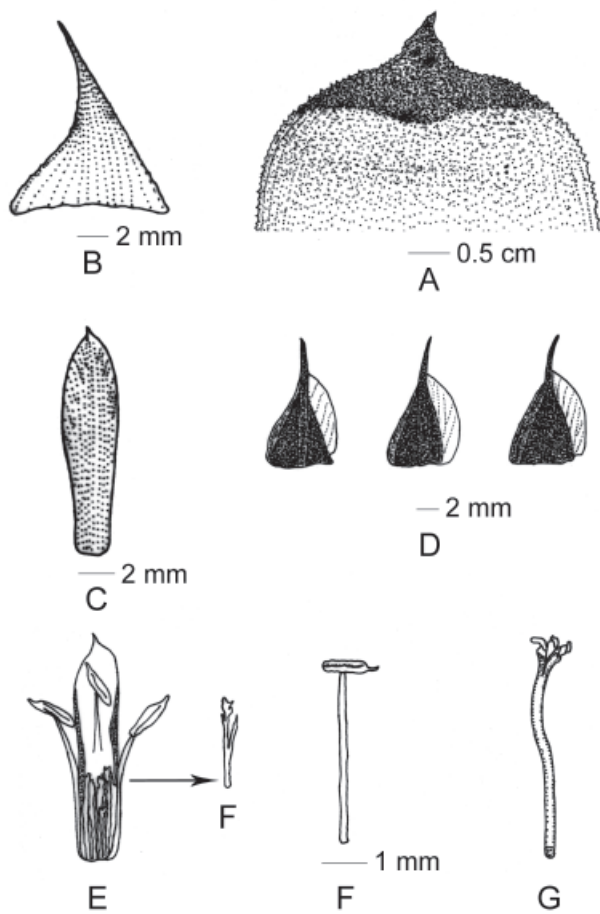


Figure 4. *Hohenbergia mesoamericana* I. Ramírez, Carnevali et Cetzal. A, apical portion of the leaf with details of the foliar apex; B, floral bract; C, petal; D, sepals; E, petals with stamens and petal appendages; F, petals appendages; G, stamen; H, stigma. Based on holotype. Illustrated by Carlos F. Jiménez-Nah.

times during the eastward drift of the Antillean plate is a likely explanation for this small but conspicuous Antillean element. Thus, *H. mesoamericana* or its common ancestor with other species of *Hohenbergia* subg. *Wittmackiopsis*, most likely arrived into the Mesoamerican mainland in this fashion. The apparently small phenetical divergence between the Mesoamerican taxon and the rest of the subgenus is, however, noteworthy, suggesting a recent invasion of the mainland by this bromeliad group. Today's Jamaica is located more than a thousand kilometers from the only known locality of *H. mesoamericana*, thus making highly unlikely recent long range dispersal. An alternative explanation could be the frequent hurricanes occurring in the Caribbean, which could have been a factor in the dispersal of the Antillean elements found in the Yucatán Peninsula (and other areas of Mesoamerica),

allowing for the transportation of propagules (wind-borne seeds) or of stray birds carrying the seeds of *Hohenbergia* in their guts. Examples of this kind of dispersal in other plant groups occurring in the Yucatán Peninsula are taxa such as *Jacquinia arborea* Vahl (Theophrastaceae), *Canella winterana* (L.) Gaertn. (Canellaceae), and *Senna polyphylla* (Jacq.) H. S. Irwin et Barneby (Fabaceae), among several others. A phylogenetic analysis of the genus *Hohenbergia*, coupled with a molecular-clock hypothesis would be required to test these alternative biogeographical scenarios as explanations for the disjunct distribution of *Hohenbergia* subg. *Wittmackiopsis*.

According to the IUCN (2001), *Hohenbergia mesoamericana* would be classified as critically endangered (CR) since it meets criterion D. The species is known from a single population consisting of probably only 2-3 plants/genotypes. Furthermore, the habitat where it grows, a low-stature, thorn forest or arid tropical scrub that is associated with rocky outcrops close to the sea along the eastern coast of the Yucatán Peninsula, is severely fragmented due to human activities, particularly tourist developments. The lone population known was discovered during a vegetation assessment required by federal law prior to the construction of a series of condominiums and other tourist developments. Since no measures were taken at the time to protect the few plants located, this population may already be extinct. *Hohenbergia mesoamericana* remains to be rediscovered in 1 or more of a series of isolated patches of this severely fragmented habitat, all of them bound to disappear given that they lie within the so-called "Riviera Maya". With any luck, populations of this species will be discovered within the boundaries of the Sian Ka'an Biosphere Reserve, which lies 50 km to the south, where extensive tracts of suitable habitat still exist in relatively good condition. Fortunately, a small cutting of the plant was brought into cultivation and vegetatively reproduced; these propagules now survive in several plant collections, at CICY's Jardín Botánico Regional "Xítbal'neek" (Mérida, Yucatán), and at the Jardín Botánico "Dr. Alfredo Barrera Marín" (Chetumal, Quintana Roo). Once the plants are brought into flower, we will attempt to reproduce *Hohenbergia mesoamericana* by seeds.

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