

CAPSICOPHYSALIS: A NEW GENUS OF SOLANACEAE (PHYSALEAE) FROM MEXICO AND CENTRAL AMERICA

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ABSTRACT

A new genus from the highlands of eastern and southern Mexico and Central America is described. **Capsicophysalis** is based upon *Chamaesaracha potosina*, first described from San Luis Potosí, Mexico. *Athenaea cernua*, first described from Guatemala, is placed in synonymy. The genus has an unequally 5-lobed corolla, red fruit, 5-lobed, reflexed fruiting calyx (at maturity) and seeds with a tuberculate testa, features unknown in related genera of Solanaceae. A comparative table giving the distinguishing features of *Capsicophysalis* and *Chamaesaracha* is provided.

RESUMEN

Se describe un nuevo género que se distribuye en las montañas del este y sur de México, así como en Centro América. **Capsicophysalis** está basado en *Chamaesaracha potosina*, descrita de San Luis Potosí, México. *Athenaea cernua*, descrita originalmente de Guatemala y que ha sido transferida a tres géneros, queda como sinónimo. El nuevo género tiene una corola irregularmente 5-lobulada, fruto rojo, un cáliz 5-lobulado reflejo al madurar, y semillas con una testa tuberculada. Todas estas características se desconocen en otros géneros relacionados de las solanáceas. Se incluye un cuadro comparativo que permite diferenciar *Capsicophysalis* de *Chamaesaracha*.

KEY WORDS: Solanaceae, *Athenaea*, *Chamaesaracha*, *Physalis*, *Physaleae*, *Physalineae*, Guatemala, Mexico

Hunziker (2001) recognized section *Capsicophysalis* within *Chamaesaracha*, a genus of about 10 species distributed in the arid regions of the southwestern United States and adjacent northern Mexico. Within the section he included three species: *C. cernua*, *C. potosina*, and *C. rzedowskiana*. Hunziker listed *C. cernua* as the type species of the section. All of the species are relatively rare. Hunziker (1980) noted that only seven collections of *C. cernua* were known. We add an additional 7 for a total of 14. Until this study *C. potosina* has been known only from the type collection, all other specimens having been referred to *C. cernua* (= *Athenaea cernua*). Only two collections of *C. rzedowskiana* are known to us, both of which are from San Luis Potosí, Mexico.

Chamaesaracha cernua also has been included in *Physalis* and *Athenaea* and is treated as *Athenaea cernua* in most recent literature. Waterfall (1967) treated the taxon as a variety of *Physalis melanocystis* (Robins.) Bitter. More recently, Hunziker (1980) agreed with Gentry (1973) that the treatment of this species in *Physalis* was unacceptable and, in addition, made a very strong argument for its exclusion from *Athenaea*, which, as now conceived, is a small Brazilian genus of about ten woody species.

Careful morphological comparisons indicate that *C. cernua* and *C. potosina* are conspecific with *potosina* the oldest specific epithet. The species differs in a number of critical features from *Chamaesaracha*, *Physalis*, and *Athenaea*, and is best treated within a new and separate genus, *Capsicophysalis*. *Chamaesaracha rzedowskiana* differs from *Capsicophysalis* in distribution, flowers, fruit and fruiting calyx and, for now, is retained in *Chamaesaracha*.

Chamaesaracha and *Capsicophysalis* (as *Chamaesaracha cernua*) were included by Estrada and Martínez (1999) in their morphology based cladistic analysis of *Physalis* and related genera. They concluded that *C. potosina* was not closely related to either *Physalis* or *Chamaesaracha*. In the strict consensus tree, *C. potosina* forms a clade with *Leucophysalis viscosa* which Averett (2009a) now recognizes as a distinct genus, *Schraderanthus*. *C. potosina* further differs from *Chamaesaracha* in that it is an annual herb of mesic riparian forests (Table 1).

Capsicophysalis potosina is relatively rare and is represented by only a few collections in herbaria. Unfortunately, mature fruiting calyces are not always seen and the feature has not been noted in the literature. However, it clearly is present on a number of specimens, including type material of both *C. potosina* and *C. cernua*. The very distinctive irregularly lobed corolla, once seen, is easily observed on herbarium sheets but has not been noted in the literature. The mature calyx also appears to be a dark red on herbarium sheets. More information on these interesting characters would be welcome.

Capsicophysalis (Bitter) Averett & M. Martínez, stat. nov. *Physalis* sect. *Capsicophysalis* Bitter. Repert. Spec. Nov. Regni Veg. 20:370. 1924. *Chamaesaracha* sect. *Capsicophysalis* (Bitter) Hunz., Genera Solanacearum 230. 2001. TYPE SPECIES, *Capsicophysalis potosina* (B.L. Rob. & Greenm.) Averett & M. Martínez.

Annual or weak perennial herbs to 1 m high; herbage glandular pubescent, mixed with longer hairs; leaves petiolate, thin to membranous; flowers 1–2 in axils, campanulate–subrotate, 1.5–3 cm wide, corolla white, yellowish, or yellow-green with villous pads in the throat, unequally 5-lobed and slightly irregular, aestivation plicate; calyx campanulate, 5-lobed, accrescent in fruit, at first loosely investing the berry, then splitting and becoming reflexed below the berry, red, the lobes thickened along the margins; fruit a berry, shiny red or orange-red; seeds discoid 1–1.5 mm long, testa tuberculate.

The striking features of this distinctive genus include the irregular corolla, red or orange-red fruit, the red reflexed, deeply lobed structure of the mature calyx, and rod-like projections on the seed testa (Fig. 1). All of these features are uncommon among related genera, and the irregular corolla is completely novel. The latter character is evident in the types of both *C. potosina* and *C. cernua* and present in all of the cited specimens with flowers. The red fruit is largely unknown among potential relatives except in *Brachistus* and *Schraderanthus viscosus*, both of which have 6–8(–10) flowers arising in fascicles from the axils and other distinguishing features.

Capsicophysalis potosina (B.L. Rob. & Greenm.) Averett & M. Martínez, comb. nov. (**Figs. 1–2**). BASIONYM, *Chamaesaracha potosina* B.L. Rob. & Greenm. Amer. J. Sci. 50:161. 1895. *Saracha potosina* (B.L. Rob. & Greenm.) Averett, Ann. Missouri Bot. Gard. 57:380. 1971. TYPE: MEXICO. SAN LUIS POTOSI: Tamasopo Canyon, Nov 1880, Pringle 3654 (HOLOTYPE: VT!; ISOTYPE: GH!).

Athenaea cernua Donnell Smith, Bot. Gaz. 48:297. 1909. *Physalis melanocystis* (Robins.) Bitter var. *cernua* (Donnell Smith) Waterfall, Rhodora 69:99. 1967. *Chamaesaracha cernua* (Donn.-Sm.) Hunz., Contr. Gray Herb. 210:25–26. 1980. TYPE: GUATEMALA. DEPT. ALTA VERAPAZ: Sasia, 900 m, May 1908, Tuerckheim II 2245 (HOLOTYPE: US!; ISOTYPE: CORD).

Physalis capsicoides Bitter, Repert. Spec. Nov. Regni Veg. 20:371. 1924. TYPE: MEXICO. VERACRUZ: Papantla, Jan 1829, Schiede 1191. Note.—Hunziker (1980) notes that he has not seen any material of this collection but the long and precise description agrees in detail with the taxon in question. We also have not seen material of this collection.

Plants herbaceous annuals or weak perennials to 1 m high; herbage largely glabrous except for a few hairs along the stems and leaf margins; leaves petiolate, blades 2–4 cm long and 1–2 cm wide (about ½ as wide as long), narrowly ovate-lanceolate, margins entire, acute-acuminate at the tip, lamina thin, on short petioles; flowers 1–2 from axils on pedicels 3 cm long, flowering calyx ca 15 mm long and 12 mm wide, campanulate and rounded at the base, divided 1/2–3/4 its length, lobes acute to slightly acuminate; corolla ca. 1 cm long, yellow-white, rotate-campanulate; anthers white-yellow, 2 mm long, filaments ca 3 mm long, connected to the base of the anthers; fruiting calyx 8–12 mm long and wide, campanulate, exceeding the berry and becoming reflexed at maturity, berry orange-red to bright red at maturity; seeds dark brown, testa tuberculate with rod-like projections.

Distribution.—*Chamaesaracha potosina* is distributed from Guerrero and Tamaulipas in Mexico south to Guatemala and Honduras (Fig. 2).

Additional material examined: **BELIZE.** Cayo: Arenal-Valentine road, Jun–Aug 1936, Lundell 6181 (US); Vaca Plateau, 8 Mar 1980, Whitefoord 2023 (MO). **GUATEMALA.** Peten: Dolores, 22 Aug 1961, Contreras 2746 (LL); Dolores, 5 km E of village, 30 Aug 1961, Contreras 2830A (TEX); Tikal, 18 Jan 1962, Lundell 17186 (LL); Tikal Nat'l. Park, 14 Feb 1959, Lundell 15548 (LL); Tikal Nat'l. Park, 9 Mar 1959, Lundell 15805 (LL); Ciebal, Sayaxche, 17 Mar 1970, Contreras 9764 (LL). **HONDURAS.** Dist. Toledo: Edwards road beyond Columbia, 15 May 1948, Gentle 6535 (LL). **MEXICO.** Chiapas: 9 km S de Palenque, 6 Apr 1985, Cabrera & Cabrera 8168 (TEX); Mpio. Ocoingo, 14 Sep 1985 Martínez 13823 (TEX). **Guerrero:** Montes de Oca, 21 April 1938, Hinton 14034 (GH, LL); Dist. Galena, Carrizo-El Río, 20 Oct 1939, Hinton 14689 (GH). **Oaxaca:** Mpio. Sta. Maria Chimalapa, 26 July 1985, H. Hernandez G. 1375 (TEX). **Tamaulipas:**

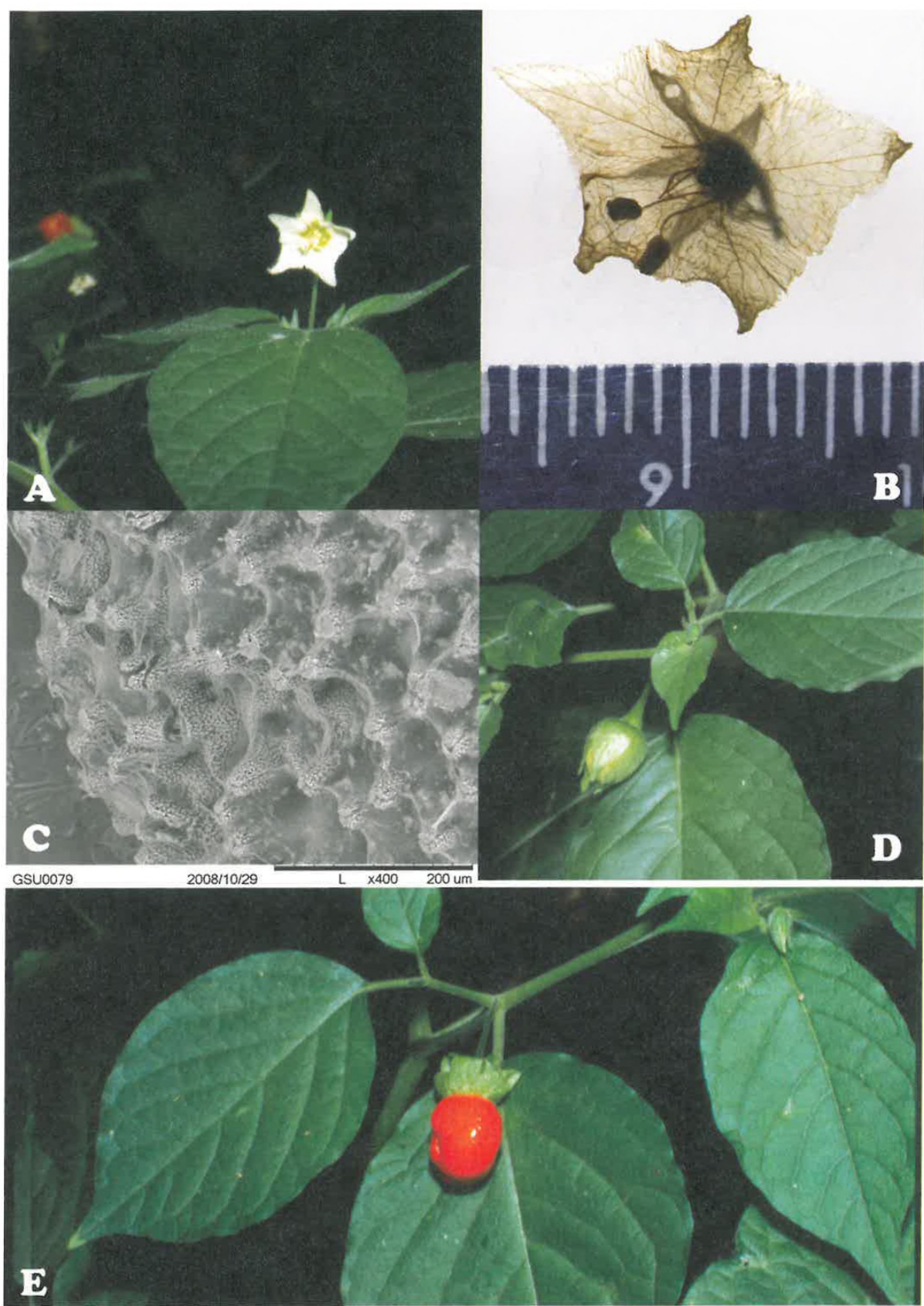


FIG. 1. *Capsicophysalis potosina*: A. flower; B. cleared flower showing unequal lobes; C. SEM of seed; D. immature fruit with calyx enclosing the berry; E. mature fruit with red berry and reflexed calyx.



FIG. 2. Distribution of *Capsicophysalis potosina*.

Mpio. Victoria, Cañon de La Libertad, May 1994, Martínez s.n. (UAT); Mpio. de San Nicolás, a 5 km del inicio de la brecha a González, 28 Nov 1998, Martínez 5329 (QMEX).

GENERIC RELATIONSHIPS

Capsicophysalis probably is most closely related to *Schraderanthus viscosus* (Schrad.) Averett which Averett (2009a) recognized as a distinct genus. Hunziker (1991) had included *S. viscosus* in *Leucophysalis* and later (1995) in *Chamaesaracha*. He returned the species to *Leucophysalis* in his *Genera Solanacearum* (2001). Neither *Capsicophysalis* nor *Schraderanthus* seems to be especially close to *Chamaesaracha* and certainly not congeneric.

Capsicophysalis has a distribution similar to that of *Schraderanthus*, *Brachistus* and *Tzeltalia*, but *C. potosina* extends farther to the north in the Mexican states of San Luis Potosí and Tamaulipas. Morphologically, *Capsicophysalis* is similar to *Schraderanthus* and *Brachistus* which also have orange or red berries, but the flowers are not in fascicles and, at maturity, the fruiting calyx is reflexed under the berry. Table 1 compares *Capsicophysalis* to *Schraderanthus* and *Chamaesaracha*. Averett (2009a, 2009b) provides further discussion of the history and taxonomy of *Schraderanthus* and its relationship to *Leucophysalis* and *Brachistus*, including supporting molecular data from Olmstead et al. (2008) and Whitson and Manos (2005).

Hunziker (2001) placed *Brachistus* in Tribe Solaneae, subtribe Witheringinae while Olmstead et al., (1999, 2008) place *Brachistus* in Tribe Physaleae, subtribe Physalineae. *Capsicophysalis* has a strongly accrescent fruiting calyx characteristic of the Physaleae as described by D'Arcy and Averett (1996). We therefore include *Capsicophysalis* in Physaleae, subtribe Physalineae, near *Schraderanthus* and *Brachistus*. All three have bright red or orange-red fruit which is relatively uncommon in the Physalineae.

TABLE 1. Comparative characters of *Capsicophysalis*, *Schraderanthus*, and *Chamaesaracha*.

	Capsicophysalis	Schraderanthus	Chamaesaracha
Habit	Erect, herbaceous, annual	Erect, herbaceous to woody, annual or perennial	Ascending or spreading perennial herbs
Habitat and distribution	Mesic forest, southern Mexico, Guatemala and Honduras	Mesic forest, southern Mexico, Guatemala	Arid regions of southwestern U.S. and northern Mexico
Inflorescence	1–2 flowers from axils	6–8 flowers from axils, in fascicles	1–2 flowers from axils
Corolla	less than 3 cm wide, w/o maculations in the throat	4–5 cm wide, with green broken maculations in the throat	2–4 cm wide, with white tomentose pads in the throat
Fruit	Red, fleshy berry	Red, fleshy berry	Green, dry berry
Fruiting calyx	Accrescent, reflexing under the berry at maturity, red	Accrescent, rotate to slightly reflexed under the berry at maturity, red	Accrescent, appressed to and partially enclosing the berry, green
Seeds	Testa tuberculate with rod-shaped projections	Testa rugose-reticulate, honeycombed	Testa rugose-reticulate, honey-combed

ACKNOWLEDGMENTS

Marshall Crosby provided helpful comments about the nomenclature and we appreciate the assistance of those herbaria which were visited and those from which specimens were borrowed, GH, LL, TEX, QMEX, US, UAT, and VT. We thank Alan Harvey for assistance with the photographs and distribution map and 3 anonymous reviewers for their corrections and helpful comments on the manuscript.

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Averett, John E and Martínez, Mahinda. 2009. "CAPSICOPHYSALIS: A NEW GENUS OF SOLANACEAE (PHYSALEAE) FROM MEXICO AND CENTRAL AMERICA." *Journal of the Botanical Research Institute of Texas* 3, 71–75.

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