

Taxonomy of *Chamaesaracha* (Solanaceae)

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ABSTRACT

Chamaesaracha is a commonly encountered genus of perennial herbs largely confined to Texas and north-central Mexico. Averett (1973), as part of a Doctoral Thesis, monographed the genus; in this he recognized the generitype, *C. coronopus*, and six other species: *C. coniodes*, *C. sordida*, *C. edwardsiana*, *C. pallida*, *C. villosa* and *C. crenata*, but excluded *C. potosina*. Hunziker (1980) accepted the latter and proposed two additional species: *C. cernua* and *C. rzedowskiana*, and added two more in 1995, *C. viscosa* and *C. spruceana*; Averett (2005) described *C. darcyii* and yet another *C. geohintonii* (Averett 2010). Henrickson (2009) added *C. arida* and *C. texensis*. My reevaluation of the genus has resulted in the recognition of 10 species, but with a revised structuring and nomenclature, as follows: *C. arida*, *C. coniodes* (including *C. texensis*), *C. coronopus*, *C. crenata*, *C. edwardsiana*, *C. felgeri* B.L. Turner, **sp. nov.**, *C. geohintonii*, *C. pallida*, *C. rzedowskiana*, and *C. sordida*. *Chamaesaracha cernua*, *C. potosina*, *C. spruceana* and *C. viscosa* belong with other genera and are excluded. Photographs of the types of the newly described taxa are provided. A key to the taxa and distribution maps for all of the species is presented, along with observations relative to the dispositions made. Published on-line www.phytologia.org *Phytologia* 97(3): 226-245 (July 1, 2015). ISSN 030319430.

KEY WORDS: Solanaceae, *Athenaea*, *Chamaesaracha*, *Leucophysalis*, Texas, Mexico.

Averett (1973) published a taxonomic account of the genus **Chamaesaracha**, this part of his doctoral studies. In this, he recognized seven species, as indicated in the above abstract. Hunziker (1980, 1995) proposed five additional species: **C. rzedowskiana**, **C. cernua**, **C. potosina**, **C. viscosa** and **C. spruceana**; Averett (2005) and Averett (2010), added an additional two species, **C. darcyii** and **C. geohintonii**.

The present author first became interested in the complex while working with Averett to identify Texas material for his Atlas of Texas Plants (Turner 2003). He and yet other workers had found the species of **Chamaesaracha** highly variable and keys for their recognition difficult to use. Independently, Averett had started to reexamine some of the taxa, having had doubts about several of the species added to the genus by Hunziker. Subsequent field studies and herbarium work over a several year period, by both Averett and myself, has led to the recognition of additional species of **Chamaesaracha**, results of this activity presented below.

CHAMAESARACHA (A. Gray) Benth. & Hook.

Overall, my concept of the genus is about the same as that of Averett (1973), with the exception that I include **C. rzedowskiana** in the genus. With the addition of this very distinctive element, and the recognition of **C. felgeri** (described below) the only expansion to the generic description of **Chamaesaracha** is that of habit: the genus now includes an annual or weak perennial species with prostrate stems, the latter rooting at the nodes. Because of this I have not felt the necessity to describe again **Chamaesaracha**: Averett's presentation seems adequate. Following Averett, I have excluded from the genus, *C. potosina*, *C. cernua*, *C. viscosa* and *C. spruceana*.

I believe the information presented herein will help clarify the taxonomy of **Chamaesaracha** but it remains a taxonomically difficult group of several similar, highly variable species. For example, pubescence, as in **Physalis** (Seithe and Sullivan, 1990), is an important taxonomic character within **Chamaesaracha** but may be under relatively simple genetic control. This likelihood is amply attested to by the work of Oppenheimer et al. (1998) who found that a single gene could account for the production of dendritic hairs in the genus **Arabidopsis**. Such simple genetic mechanisms may account for some of the variability observed among the species of **Chamaesaracha**. Indeed, leaf and stem vestiture in the latter is fairly, but almost never completely, consistent within a taxon and must be used in conjunction with other characters, especially leaf shape, when attempting identifications. With the exception of **C. rzedowskiana**, no species exhibits a unique character but, rather, each possesses a unique combination of characters. This may make my key to species difficult to use, so one should utilize both geography and the more complete descriptions of each of the species so as to assure identification.

Key to species

1. Plants strictly prostrate, the stems markedly zig-zag and rooting at nodes; easternmost San Luis Potosi and Queretaro**C. rzedowskiana**
1. Plants variously procumbent to erect, not rooting at the nodes...(2)
2. Corollas, when flared, 2-3 cm across; mid-stem leaves mostly 7-12 cm long; sepals pubescent with elongate dendritic hairs; deep sandy soils of Yuma Co., Arizona.....**C. felgeri**
2. Corollas, when flared, 1.0-2.0 across; mid-stem leaves mostly 2-6 cm long; sepal pubescence otherwise...(3)
3. Pedicels 5-15 mm long; stem-hairs mostly 1-2 mm high, beneath a dense array of glandular hairs 0.3-0.4 mm high.....**C. sordida**
3. Pedicels mostly longer, the stem-hairs various; widespread...(4)
4. Mid-stem leaves mostly 1.5-3.5 cm wide, their vestiture mostly composed of elongate trichomes with an understory of short glandular hairs, a few dendritic hairs interspersed among these.....**C. crenata**
4. Mid-stem leaves mostly 0.3-1.5(2.5) cm wide, variously pubescent or glabrate, but not as described in the above...(5)
5. Mid-stems glabrous to variously pubescent with dendritic hairs, the latter often intermixed with a smattering of smaller glandular hairs...(7)
5. Mid-stems markedly viscid with glandular hairs, the latter often over-topped by elongate simple trichomes, or these intermixed with a smattering of short dendritic or branched hairs...(6)
6. Plants forming nearly prostrate mats ca 2 ft across; leaf-blades ovate, markedly lobate, rarely not; roots fleshy, 6-10 mm thick; USA, e Chi, Coa, e Dur.....**C. crenata**
6. Plants forming erect clumps; leaf blades mostly unlobed, or nearly so; roots slender, 2-5 mm thick; widespread.....**C. sordida**
7. Leaves glabrous or nearly so; Edwards Plateau of central Texas..... **C. edwardsiana**
7. Leaves variously pubescent (except for *C. pallida*); widespread...(8)

8. Mid-stem leaves mostly entire (rarely not); Trans-Pecos, Texas, southern New Mexico and north-central Mexico.....**C. pallida**
8. Mid-stem leaves markedly lobate or closely sinuate (rarely not)...**(9)**
9. Mid-stem leaves various, but not usually as described below; pubescence varied, but not white-tufted or cottony-like...**(11)**
9. Mid-stem leaves markedly linear-lobate, usually dissected (rarely not)...**(10)**
10. Pubescence composed of peculiar, short, white-tufted dendritic hairs.....**C. arida**
10. Pubescence composed of longer, stellate and/or dendritic trichomes, occasionally glabrate; s Texas and ne Mexico**C. coronopus**
11. Leaves flabellate with lobed margins, rarely entire; pubescence an array of dendritic hairs 1-2 mm high; Mexico and western Texas**C. crenata**
11. Leaves and/or pubescence not as described in the above...**(12)**
12. Leaves moderately to heavily stipitate-glandular (occasionally with stellate hairs in a few populations, esp. in southern Texas); widespread.....**C. coniodes**
12. Leaves pubescent with dense, eglandular, dendritic hairs; USA, north-central Tex and sw Okla.....**C. darcyi**

CHAMAESARACHA ARIDA Henrickson , Phytologia 91: 186. 2009.

Maps 1a, 1b

TYPE: USA. NEW MEXICO: Santa Fe Co., 19 mi S of Santa Fe, Averett & Tomb 339 (Holotype: TEX)

Erect rhizomatous perennial 6-20 cm high. Stems sparsely to moderately pubescent with distinctive short-branched cottony-like hairs. Leaves mostly linear-lanceolate, 3-8(10) cm long, 3-15 mm wide, mostly 4-6 times as long as wide, their margins remarkably lobate, rarely not. Flowers single, axillary, the peduncles (at anthesis) mostly spreading, 1-4 cm long. Calyces (flowering) 4-5 mm long, the lobes 2-3 mm long, pubescent like the stems. Corollas pale yellow or "yellow-green," 15-20 mm across the expanded corolla. Fruits a berry, orbicular, 6-8 mm across, containing 30-50 seeds. Seeds, ca 2 mm long, 1.5 mm wide. Chromosome number, $n = 24$ pairs.

Averett (1973) included this taxon under his broad concept of **C. coronopus**, as had earlier workers. Henrickson (by annotation) long treated the taxon as but a variety of **C. coronopus**, but, presumably, after noting the treatment of his proposed variety as specifically distinct (through annotations by Turner at LL-TEX), he also accepted its present status. Typical **C. coronopus** occurs largely to the east of **C. arida**. The two taxa are readily recognized by both vestiture and to some extent by leaf shape. Following Henrickson, and the present author, most of the references to **C. coronopus** in floristic literature for West Texas, New Mexico, Colorado, Arizona, and California would now be **Chamaesaracha arida**. Averett (2009), however, demurs noting that:

Most, but not all, of the western populations of *C. coronopus*, as treated by Averett (1973), do have the short, branched hairs Henrickson described, but other consistent differences from these and populations of *C. coronopus* in south Texas are not found. Moreover, equal or greater differences are seen among several populations in the western United States and northern Mexico. I see little justification for the recognition of *C. arida* as a separate species but, with further analyses, it plausibly might be recognized at the varietal level.

Herein, I accept the specific status bestowed by Henrickson, this after treating the taxon as such myself, while Henrickson preferred varietal status, to judge from his early annotations of the complex.

CHAMAESARACHA CONIODES (Moriciand ex Dunal) Britt., Mem. Torrey Bot. Club 5: 287. 1895.

Maps 2a, 2b

Solanum coniodes Moriciand ex Dunal in DC., Prod. 13: 64. 1852.

TYPE: USA. TEXAS: "inter Laredo et Bejar [San Antonio]," Feb-Mar 1828, *Berlandier exs. 1494*. (lectotype G-DC, selected by Averett, 1973; isolectotype GH!). Dunal, in his protologue, cited two collections by Berlandier, 1463 and 1494. The former was apparently collected along San Miguel Creek in what is now eastern Frio or southwestern Atascosa counties, the latter in March of 1828 from some verdant river site between San Miguel and San Antonio, to judge from label data at GH. Both collections are on the type sheet at GH.

[Averett (2010b) correctly notes that both Henrickson and Turner (by annotation 1997) misidentified the above type as **C. coronopus**, an error on my part due to ignorance, at the time, of the morphological parameters and distribution of the latter. I now agree with Averett's assessment.]

Solanum linsecumii Buckl., Proc. Acad. Nat. Sci. Philadelphia 1862: 6. 1863.

TYPE: USA. TEXAS. Llano Co., w/o specific locality, "June," w/o year, *Buckley s.n.* (holotype PH!). The type has unusually broad leaves, but possesses mostly slender branched hairs on its stem and peduncles, much as a somewhat glabrous form of **C. coronopus**.

Chamaesaracha texensis Henrickson, Phytologia 91: 187. 2009.

TYPE: USA. TEXAS. Kinney Co., "open rocky soil near the Nueces River, Hy. 334," 17 Apr, 1957, *D.S. Correll 15965* [with Rollins & Chambers] (Holotype: LL-TEX).

In his original description of *C. texensis*, Henrickson stated "From *Chamaesaracha sordida* distinguished by the young leaves being irregularly toothed, lacerate to pinnatifid, with entire to toothed lobes (not entire to bluntly or shallowly few toothed and tetraploid ($n=24$) not diploid $n=12$)."

Averett (2009) also considered Henrickson's *C. texensis* as belonging to the **C. coniodes** complex, but noted that Gray (1876) treated **C. coniodes** as synonymous with **C. sordida**, a treatment that was followed by Correll and Johnston (1970), this emended by Johnston (1990). Britton (1895), however, included the latter name under **C. coniodes**, this treatment followed by Rydberg (1896) [the latter misspelling it as "C. conioides."] The two species, however, are quite distinct and were recognized as such by Averett (1970, 1973, 2010b), whose views are followed here. Relevant to the following discussion, it should be noted that neither taxon has ever been confused with **C. coronopus**, except for the above errors in typification of **C. conioides** by both Henrickson and Turner.

Chamaesaracha coniodes is the most variable species of the genus, exhibiting essentially all forms of pubescence and a variety of leaf shapes. It also varies from robust plants to those relatively small in stature and occurs in a variety of habitats. Unfortunately, the type has a dense covering of dendritic hairs (as also noted by Averett, 2010b), atypical, but not unknown in the species, especially as it occurs to the north and west of the Edwards Plateau of Texas; otherwise it is comparable to **C. coniodes**. Henrickson (2009) recognized the more southern and southwestern elements as a new species, *C. texensis*. However, the leaves of the type of **C. coronopus** are 4-6 times as long as wide (as they typically are in **C. arida**) and essentially glabrous as are most of the populations in south Texas; those of **C. coniodes** are densely pubescent; hairs on the type of the latter are dense and are described as stellate but might best be described as short-dendritic or branching; further, the leaves of the type are ca 2.5 times as long as wide, and lack the deep lobed margins found in **C. coronopus**. In short, the types of **C. coronopus** and **C. coniodes** differ in leaf shape and pubescence, but share yet other features.

Finally, it should be noted that variation in **C. conoides** is likely compounded by hybridization with **C. sordida**, the two taxa sympatric over much of their distributions; likely contaminants in Texas include: Coke Co., *Hansen 5732*; Garza Co., *Averett 357*; San Saba Co., *Henderson 8*; Tom Green Co., *Watson 192*; Webb Co., *Crockett 6431*[all LL-TEX].

CHAMAESARACHA CORONOPUS (Dunal) A. Gray, Bot. Calif. 1: 54. 1876. **Map 3**

Solanum coronopus Dunal in DC., Prod. 13: 54. 1852.

Withania coronopus (Dunal) Torr., Bot. Mex. Bound. Surv. 155. 1859.

Saracha coronopus (Dunal) A. Gray, Proc. Amer. Acad. Arts 10: 62. 1874.

TYPE: USA. TEXAS: Bexar Co., "inter Laredo et Bejar [San Antonio]," Mar (?) 1828, *Berlandier exs. 1513* (holotype G-DC!). Averett (1973) noted the holotype as having been collected in the vicinity of Laredo, Texas, by Berlandier, citing his collection number *1494*; he subsequently corrected this (Averett, 1974) and by the inclusion of an informal insert in his distributed reprints. Only a single collection was cited by Dunal in his prologue, this being *Berlandier exs. 1513*. Averett did examine an isotype at K, noting that the locality on that sheet gave the locality as "Rio Medina," which on Berlandier's route would be in present-day Bexar Co., Texas.

My concept of **C. coronopus** includes those specimens of **Chamaesaracha** having a predominantly small habit, narrow leaves that are typically 4-6 times as long as wide, more deeply and regularly lobed than those of **C. arida**, and a pubescence of mostly slender branched hairs. In Dunal's original description the type is said to have glabrous or glabrate stems and sub-glabrous peduncles, but he notes the calyx to be pilose. Branched hairs are not mentioned in Dunal's prologue.

It should be noted that Henrickson, early on, (by annotation at LL_TEX) treated **C. coronopus** as consisting of two intergrading taxa: var. *arida* and var. *coronopus*; Averett (1973) treated these as but elements of a widespread variable **C. coronopus**; Averett (2005) subsequently removed **C. darcyi** from the complex, a taxon of north-central Texas and Oklahoma, but treated **C. arida** within his concept of **C. coronopus**, noting that "I see little justification for the recognition of *C. arida* as a separate species but, with further analyses, it plausibly might be recognized at the varietal level." With the exclusion of **C. arida** (as treated herein) and **C. darcyi**, **C. coronopus** is largely restricted to southern Texas and closely adjacent Mexico.

In southern Texas the occasional hypothetical hybrid between **C. conoides** and **C. coronopus** may be found, the two taxa being sympatric throughout most of the region.

CHAMAESARACHA CRENATA Rydb., Mem. Torrey Bot. Club 4: 368. 1896. **Maps 4a, 4b**

TYPE: MEXICO. COAHUILA: Mpio. Parras De La Fuente, Jun 1880, *Palmer 923* (holotype US!; isotypes GH!, K!, NY!).

Chamaesaracha villosa Rydb., Mem. Torrey Bot. Club 4: 368. 1896.

TYPE: MEXICO. COAHUILA: Mpio. Escobedo, 24 mi NE of Monclova, Sep 1880, *Palmer 924* (holotype US!; isotypes GH!, K!, NY!).

Suffruticose, perennial, herbs 10-30 cm high. Stems more or less fractiflex, arising from a large ligneous tap-root, moderately to densely pubescent with simple or elongate dendritic trichomes 2-3 mm long, under this a moderate to sparse display of very short glandular hairs, less often with mostly short glandular hairs. Leaves alternate, gradually reduced upwards, those at mid-stem mostly 3.5-7.0 cm long, 2.5-4.5 cm wide; petioles 1-2 cm long, rather abruptly grading into the blades; blades ovate, pubescent like the stems, irregularly crenate to nearly entire. Flowers 1-3 on peduncles mostly 1-3 cm long. Calyx 3.5-5.0 mm long,

densely pubescent like the stems. Corollas rotate, 1.0-2.5 cm across, pale yellow to yellow. Stamens exerted for ca 4-5 mm; anthers yellow. Style exerted ca 5.5 mm. Capsule orbicular, ca 7 mm across. Seeds ca 2 mm across, adorned with an irregular reticulation of raised ridges. Chromosome number, $2n = 12$ pairs.

Averett (1973) recognized *C. villosa* and *C. crenata* as distinct species, but acknowledged that they were closely related and that

The two species are largely allopatric, but their ranges overlap in Coahuila and in Trans-Pecos, Texas (Fig. 9). In the latter area, particularly in Big Bend National Park and around Lajitas (Brewster and Presidio Co.), the two species are often difficult to distinguish and hybridization is suspected [and occasional sheets are annotated as such, e.g. *Averett & Sikes 237*]. At the extremities of their ranges, however, the two species are fairly clear and they can be distinguished by the characters given in the key to species.

I agreed with Averett's assessment early on, but additional collections and fieldwork in Mexico suggest the overlap of the two is considerable and difficult to distinguish. Indeed, collections from Mpio. Parras, Coahuila, the type area of ***C. crenata***, are as "villose," or more so, than *C. villosa* itself. In short, I now believe that the recognition of a single, highly variable, robust species is the preferred treatment. This assessment agrees with that of Henrickson (2009) who combined *C. villosa* and ***C. crenata***, taking up the former name for the "inclusive species," for reasons unspecified, both published at the same time. In my opinion the proper name for the duo, if synonymized, should be ***C. crenata***, its author publishing *C. villosa* as an afterthought, or footnote to the former, this on the same page.

Averett (2010a), however, retained both taxa. After reviewing again their taxonomic history, he summed up the matter, as follows: "since the two taxa are distinct in and around their type localities and in all but a few populations in Trans-Pecos, Texas, I believe the continued recognition of *C. crenata* and *C. villosa* is warranted." This logic I follow not, for the types concerned are quite similar in southern Coahuila, Mexico, although most collections from Mpio. Parras (from whence the type of ***C. crenata***) are more densely villous than those of the reputed *C. villosa*.

Chamaesaracha crenata (including *C. villosa*) is largely confined to the Trans-Pecos, Texas and north central Mexico. With additional collections, especially from Mexico, and rethinking the status of *C. villosa*, my distribution of the species differs somewhat from that pictured by Averett for both ***C. crenata*** and *C. villosa*. In particular, I believe that some of the south Texas sites of ***C. crenata*** represent occasional robust plants of ***C. coniodes***, which also is frequently difficult to distinguish without a chromosome count.

Some further discussion of *Chamaesaracha villosa* may be warranted. The species is typified by material collected northeast of Monclova, Coahuila, and is characterized by its relatively robust habit, large leaves and a dense vestiture of very long, mostly flagelliform forked or branched trichomes. Beneath this upper story of elongate hairs there occurs a much shorter under-story of short glandular trichomes, sometimes dense, sometimes sparse. Scudday (1965) first noted such populations in Presidio Co., Texas that he compared to *C. villosa*; similar variation occurs only along the Rio Grande River in western Texas; I view all such collections as ***C. crenata***.

CHAMAESARACHA DARCYI Averett, Monogr. Syst. Bot. Missouri Bot. Gard. 104: 350. 2005.

Map 5

TYPE: USA. TEXAS: Palo Pinto Co.: "At campground area, Lake Possum Kingdom on Hwy 36. Red sandy soil," 27 Jun 1969, *Averett & Bierner 474* (TEX).

Averett, with his original description, gave an excellent account of the taxon, and such need not be expounded upon here except to note his taxonomic appraisal:

[**Chamaesaracha darcyi**] is an eastern group of populations largely restricted to the Rolling Plains of north-central Texas and adjacent Oklahoma. The species is very close to *C. coniodes*, having a dense vestiture of branched, dendritic hairs like those found on the type of *C. coniodes*. However, *C. darcyi* typically has more deeply lobed or toothed leaf margins and a nearly prostrate habit. The species is also disjunct from populations in south Texas with a similar vestiture and east of populations with unbranched simple trichomes.

CHAMAESARCHA EDWARDSIANA Averett, Sida 5: 48. 1972. **Map 6**

TYPE: USA. TEXAS: Travis Co.: 0.5 mi. east of the Pedernales River along highway 620, 15 Jul 1968. *Averett 289* (holotype TEX!; isotypes MO, SMU, US).

This species and its estimated parameters as treated by Averett need no revision, except for its exclusion from Mexico, as noted below. It is closely related to **C. pallida** but can be distinguished from it by having peduncles with predominantly straight glandular hairs (vs. dendritic, eglandular hairs), mostly narrower leaves and by distribution. Occasional plants will display along their peduncles an admixture of both glandular and eglandular dendritic hairs (e.g., Blanco Co., *Watson & Averett 179* (TEX); Concho Co., *Averett 358, 485* (TEX); Crockett Co., *Turner 99-30* (TEX); Kinney Co., *Strother 253* (TEX); Menard Co., *Turner 21-784* (TEX); Schleicher Co., *Turner 98-496* (TEX); Val Verde Co., *Webster 32284* (TEX); I have treated these as hypothetical intermediates.

As noted in the introduction to this paper, pubescence may be under relatively simple genetic control that might account for the variability in vestiture observed among and between populations of **C. coronopus**. Alternatively, occasional hybridization between **C. edwardsiana** and **C. coronopus** may confound the distinctions between these and **C. pallida**, the latter possessing a vestiture resembling that of **C. coronopus**, but having habital features and leaf margins of **C. edwardsiana**.

Vestiture in **C. pallida** varies in similar fashion to that of **C. edwardsiana**, occasional plants of the former will have peduncles mostly without glandular hairs; nevertheless occasionally populations of **C. pallida** (e.g., Brewster Co., *Warnock T283*, TEX) will have plants with glandular peduncles, approaching those of **C. edwardsiana**, but otherwise typical.

Finally, it should be noted that Averett, with his original description, maps ten or more collections of **C. edwardsiana** as occurring in the states of Coahuila and Nuevo Leon, Mexico; I take nearly all such collections to be specimens of **C. pallida**, and these will key as such in the present treatment.

CHAMAESARCHA FELGERI B.L. Turner, **sp. nov.** **Map 7**

TYPE: U.S.A. ARIZONA: Yuma Co., Barry M. Goldwater Military Range, Coyote "Wash" at Camino del Diablo, bottom of Lechugilla Valley, SE of Tinajas Atlas, 1010 ft, "Lowest point on Camino crossing, there is a sheet flow here in the valley bottom but no wash (erosion) has formed." 25 Oct 2004, *Richard C. Felger 04-63* (Holotype: TEX; isotypes: ARIZ, ASU).

Perennial herbs 20-30 cm high, arising from deep seated roots. Stems pubescent with elongate simple or dendritic trichomes 2-3 mm high, beneath these a uniform layer of short, branched trichomes 0.1-0.3 mm high. Mid-stem leaves mostly (7)8-12 cm long, 1-2 cm wide, moderately to sparsely pubescent with stellate hairs (not cottony pubescent), the margins entire (lowermost) to markedly lobate. Flowers one or two to a node, the pedicels mostly 3-4 cm long, pubescent like the stems. Calyces (flowering), 5-6 mm

long, with lobes 2-3 mm. Corollas (flared) 2.5-3.0 cm across, reportedly “cream-yellow,” pale yellow,” or whitish.” Mature fruit not observed.

This novelty resembles *C. arida*, but differs in having larger mid-stem leaves (ca 7-12 cm long vs 3-5 cm), longer hairs on both stems and calyx (ca 2-3 mm long vs 0.5-1.0 mm) and larger, more expanded, corollas (2-3 cm across vs 1-2 cm).

ADDITIONAL COLLECTIONS EXAMINED: **USA. ARIZONA: Yuma Co.**, “Pinta sands along Camino del Diablo, Cabeza Prieta National Wildlife Refuge.” 780 ft, “Low dunes with extensive populations of spring ephemerals. Common; perennial from deeply buried roots, the plants often buried in sand,” West Pinta Sands. 780 feet. Low stabilized dunes.” (32 08 N, 113 33 W) 1 Feb 1992, *Felger 92-626* (TEX); near same locality, 16 Jun 1992, *Felger 92-626* (TEX). Cabeza Prieta National Wildlife Refuge, Camino del Diablo, at 2 mi E of western edge of lava flow (32 06 56 N, 113 31 20 W), 28 Nov 2001, *Felger 01-548* (TEX); **ca** same locality, “low, stabilized dunes,” 780 ft, 6 Jun 1992, *Felger 92-262* (TEX). [The latter collection is obviously a depauperate specimen, w/o flowers or fruit, collected out of season.]

The elongate dendritic hairs on the calyces, large leaves and large flowers readily distinguish this species from yet other taxa of *Chamaesaracha*. The novelty appears closely related to the smaller flowered, more eastern, *C. arida*; indeed, two plants from the type locality (cited below) were annotated as such by Henrickson. *Chamaesaracha felgeri* is apparently adapted to deep sandy soils and appears restricted to southern Yuma Co. (and perhaps closely adjacent Mexico). Some workers might wish to recognize this as but an edaphic ecotype of the widespread *C. arida*, this suggested by *Felger 92-626*, which approaches that taxon in pubescence; indeed, Henrickson annotated the latter collection and *Felger 92-26* as *C. coronopus* var. *arida* [now *C. arida*]. I concede that it is possible that the two taxa might come into contact in Yuma Co. and form the occasional hybrid, although I have not examined plants of the latter from the area concerned. Clearly, both taxa are in need of additional field study.

The species is named for the well-known southwestern collector, Richard Felger, who participated in the collection of all the specimens of the taxon known to me.

CHAMAESARACHA GEOHINTONII Averett & B.L. Turner, *Phytologia* 92: 435. 2010. **Map 7**

TYPE: MEXICO. NUEVO LEON: Mpio. Mina, “West of Los Molina,” gypsum hillside, ca 26 04 N, 100 45 W, 943 m, 23 Jun 2007, *Hinton et al. 28619* (Holotype: LL-TEX).

Perennial herbs, 10-20 cm high. Stems slender, presumably from slender rhizomes, densely pubescent with simple glandular-trichomes 0.5-1.5 mm high. Midstem leaves mostly 1.5-3.5 cm long, 1.5-2.0 cm wide; pedicels 1.5-2.5 cm long, pubescent like the stems. Calyces 3-5 mm long, densely pubescent, the lobes broadly lanceolate. Corollas rotate, greenish-yellow, ca 12 mm across. Stamens 5, 3-5 mm long; anthers yellow, ca. 1.5 mm long. Capsules globular, ca 8 mm across. Seeds, brown, tuberculate, ca 22 to a capsule, 2.0-2.2 mm long, 1.5-2.0 mm wide.

According to Averett (2010), *C. geohintonii* is a gypsophilic species, known only by its type, but closely related to *C. crenata* and *C. villosa*.

This taxon is not easily placed among the described species of *Chamaesaracha*. Averett (pers. comm.) favored a relationship to *C. sordida*, while I favored a position near or within *C. crenata*. Regardless, its isolated geographic position and restriction to gypseous soils strongly suggests novel status. The collector describes the plant as occurring in colonies, suggesting a rhizomatous habit. He also describes the fresh flowers as “green,” but in the dry state, on herbarium sheets, these appear greenish-

yellow.

George B. Hinton, from whence the eponym, is the son of the late Jaime Hinton, and grandson of the renown Mexican collector, George B. Hinton, is the only person to have garnered the present novelty, collecting this from an isolated outcrop of gypsum, well known for harboring a number of edaphic endemics (Turner 2008, and citations therein).

CHAMAESARACHA PALLIDA Averett, Sida 5: 49. 1972. **Maps 8a, 8b**

TYPE: USA. TEXAS: **Presidio Co.**, 35 mi SW of Marfa on Pinto Canyon Road, 15 Jul 1966, *Averett 155* (Holotype: TEX; isotypes: GH, MO, SMU, US).

This species is very closely related to **C. edwardsiana**, and might be treated under the latter as but varietally distinct (as sheets so annotated by Henrickson at TEX). I believe, however, the two are distinct, their differences equal to those separating other species within **Chamaesaracha**. The characters used in the key to distinguish between these suggest that typical **C. edwardsiana** is confined to the Edwards Plateau region of central Texas, while **C. pallida** is largely confined to the Trans-Pecos, Texas, New Mexico, and north-central Mexico. Averett (1973) used leaf shape and pubescence to distinguish between the two taxa; however, leaf shape and pubescence is very variable in this alliance and reliance upon such characters probably accounts for the overlapping distribution of these two taxa as depicted in Averett's Fig. 6. It is likely that additional collecting in the easternmost part of the distribution of **C. pallida** will show that intergrades commonly occur between the two. Early on, I tentatively identified several likely intermediates between these as occurring in Sterling Co., Texas (*Averett 309*, TEX) and Irion Co. (*Warnock 7700*, TEX) counties, the plants concerned having nearly entire leaves and a peduncular pubescence like that of **C. pallida**; such plants were subsequently accepted as belonging to the latter, having most of its characters, except for leaf shape. Indeed, nearly entire leaves occur sporadically in most species of **Chamaesaracha**, and reliance upon this character alone is likely to result in the occasional misidentification.

Variation in **C. pallida** is undoubtedly confounded by the occasional hybridization between this and **C. sordida**, as attested to by three specimens assembled on the same sheet (Brewster Co., Glass Mts., *Warnock 21201*, TEX): one of these **C. sordida**, the other two hypothetical hybrids or backcrosses with **C. pallida** (Averett, however, annotated the three specimens as distinct species: **C. coniodes**, **C. pallida** and **C. sordida**).

Finally, it should be noted that a case might be made for the recognition of a glabrate variety of **C. pallida**, populations of which occur in western Trans-Pecos, Texas. Both "forms," however, occur in the Guadalupe Mts. of Culberson Co. and elsewhere. Averett was aware of these populations but, at the time, there were only two collections and few have been collected since. Future workers need be aware of such collections. Additional comments on the relationships of the above taxa and their intermediates are discussed under **C. edwardsiana**.

CHAMAESARACHA RZEDOWSKIANA A.T. Hunziker, Contr. Gray Herb. 210: 23. 1980. **Map 7**

TYPE: MEXICO. SAN LUIS POTOSI: **Mpio. Xilitla**, Las Cruces, 600 m, 1 Mar 1959, *Rzedowski 10103* (holotype GH).

This is a very distinct species of **Chamaesaracha**, what with its creeping habit and markedly fractiflex stems; the novelty was known to its author only by type material. I have examined three additional collections, as follows: **QUERETARO. Mpio. Jalpan**, Los Sarros, 50 m, 30 Mar 1993, *Lopez Ch. 546* (TEX); about Tanchanaquito, 450 m, 11 Mar 1993, *E. Carranza et al. 4580* (TEX). **SAN LUIS**

POTISI. Mpio. Aquismon, Mante Tsuled, 27 May 1979, *Alcorn 3065* (TEX). The latter collection is remarkably delicate, with less pubescent foliage and smaller flowers, superficially resembling a species of the genus **Dichondra**. Nevertheless, it has all of the characteristics of **C. rzedowskiana** and would appear to be but an impoverished or perhaps shade form of that species. Hunziker (1980), with his original description, provided an excellent illustration of the species.

There is little material of this species in herbaria and its relationship to other species of **Chamaesaracha** seems obscure. It differs in habit and basic leaf morphology from yet other species of the genus and its range represents a significant disjunction from other elements of the genus.

CHAMAESARACHA SORDIDA (Dunal) A. Gray, Syn. Fl. N. Amer. 1: 232. 1876. **Maps 9a, 9b**
Withania sordida Dunal in DC., Prod. 13: 456. 1852.

TYPE: USA. TEXAS: **Webb Co.**, near Laredo, Aug 1829, *Berlandier exs. 2076* (holotype: G-DC, microfiche TEX!; isotypes: GH, NY).

My concept of **C. sordida** is about the same as that of Averett (1973), and this need not be described anew. The species is partially sympatric with **C. conoides**, **C. darcyii**, **C. arida**, and **C. coronopus** and is readily distinguished from these and others by its rather uniform array of short glandular trichomes, the latter always predominating over any display of branched hairs. Branched hairs, however, are not uncommonly found in **C. sordida**, a smidgen of which intermixed with a much more numerous display of glandular hairs occasional occur in this or that population of yet other taxa.

It is possible that such admixtures are due to the occasional hybridization of **C. sordida** with one or more of the other species, but the great mass of the specimens, as shown in Map 6, possess mostly short glandular hairs, but eglandular trichomes are relatively common. Further evidence of hybridization is suggested by chromosome counts. Averett (1973) noted three widely separated triploid populations with chromosome numbers of $n = 18$ (all other counts are $n = 12$) which probably result from crosses with tetraploid ($n = 24$) populations. There was, however, no morphological evidence that another taxon had contributed to these hybrids.

EXCLUDED SPECIES

Chamaesaracha cernua (Donnell Smith) A. T. Hunziker, Contr. Gray Herb. 210: 23. 1980.
Basionym: *Athenaea cernua* Donnell Smith, Bot. Gaz. 48: 297. 1909. [GUATEMALA, Dept. Alta Verapaz, Sasia, 900 m, May 1908, *Tuerckheim II.2245*] Type (US!).

Chamaesaracha potosina Rob. & Greenm., Amer. J. Sci. 50: 161. 1895.
Saracha potosina (Rob. & Greenm.) Averett, Ann. Missouri Bot. Gard. 57: 380-382. 1971 [Type: Mexico. San Luis Potosi: Tamasopo Canyon. Nov 1880, *Pringle 3654* (VT!)], Isotype (GH!)

Hunziker (2001) treated the above taxa, along with **C. rzedowskiana**, as belonging to **Chamaesaracha** sect. *Capsicophysalis*, and notes the section might be treated as a separate genus. The species have a calyx that tightly invests the young ovary, but at maturity the large red berry ruptures the calyx, the latter usually reflexed; **it also** seems to lack the red fruit and deflexed calyx.

Chamaesaracha spruceana (Hunz.) Hunz., Lorentzia 8: 8. 1995.
= *Darcyanthus spruceanus* (Hunz.) Hunz., Bol. Soc. Argent. Bot. 35: 345. 2000.
Basionym: *Physalis spruceana* Hunz., Kurtziana 1: 208. 1961.

Hunziker (2001) relegated this species to the monotypic genus *Darcyanthus*. He suggested that it was most closely allied with **Capsicum** and related genera.

Chamaesaracha viscosa (Schrader) Hunz., Lorentzia 8: 8. 1995.
 = *Schraderanthus viscosus* (Schrader) Averett, Phytologia 91: 55. 2009.
 Basionym: *Saracha viscosa* Schrader, Index Seminum [Goettingen] 5. 1832.
Witheringia viscosa (Schrad.) Miers, Ann. Mag. Nat. Hist., ser. 2, 11: 92. 1853.
Athenaea viscosa (Schrad.) Fernald (Proc. Amer. Acad. Arts 35: 567. 1900.
Jaltomata viscosa (Schrad.) D' Arcy & T. Davis, Ann. Missouri Bot. Gard. 63: 363. 1976 [1977].
Leucophysalis viscosa (Schrad.) Hunz., Kurtziana 21: 283. 1991.

Schraderanthus viscosus, as noted in the synonymy above, has enjoyed a variety of treatments. Averett (2009) placed the species in the monotypic genus **Schraderanthus** and provided a history of its taxonomy.

ACKNOWLEDGEMENTS

My Academic son, John Averett, provided considerable taxonomic input during an early draft of this paper. Jana Kos provided editorial assistance. Distribution maps are largely based upon specimens on file at SRSC and LL-TEX.

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Fig. 1. *Chamaesaracha felgeri* (holotype).













