THE STATUS OF *CHAMAESARACHA CONIODES* AND *C. CORONOPUS* (SOLANACEAE)

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ABSTRACT

An isotype of *Chamaesaracha coniodes* at the Gray Herbarium has been examined by several workers and bears a number of different annotations, some indicating that the species is synonymous with *C. coronopus*. All evidence indicates the types of *C. coniodes* and *C. coronopus* are referable to distinct species. The present contribution is meant to clarify the distinctions between the two. Averett (2005) described *C. darcyi*, which had earlier been included with *C. coniodes* by Averett (1973), and Henrickson (2009) subsequently described two additional species, *C. texensis* and *C. arida*, from western populations formerly treated within the boundaries of either *C. coniodes* or *C. coronopus* by Averett (1973) and Rydberg (1896). *Chamaesaracha texensis* and *C. arida* are maintained here within *C. coniodes* and *C. coronopus*, respectively; discussions of all these taxa are provided.

KEY WORDS: *Chamaesaracha arida, Chamaesaracha coronopus, Chamaesaracha coniodes, Chamaesaracha darcyi, Chamaesaracha texensis,* Solanaceae

Examining specimens during the summer of 2008 at the Gray Herbarium, I noted that an isotype of *Chamaesaracha coniodes* (basionym: *Solanum coniodes*) had been annotated as *Chamaesaracha coniodes* by James Henrickson. On that label he also wrote "= *Chamaesaracha coronopus* as used by Averett." The annotation is not dated but, judging from its position to other annotations on the sheet, it was made prior to 1997.

There are actually three specimens on the GH sheet (Fig. 1), two isotypes (*Berlandier 1494* [=*234*]) and a syntype (*Berlandier 1463* [=*203*]) of *Chamaesaracha coniodes*. Turner, presumably following Henrickson's lead, annotated all three specimens as *C. coronopus* in 1997. I reannotated the two isotypes and the syntype at GH as *C. coniodes* in 2008. In my opinion, *C. coronopus* and *C. coniodes* are clearly separate and distinct species.

Henrickson has annotated specimens at MO as "*Chamaesaracha coronopus* var. *coniodes*" further indicating his belief that *C. coniodes* (Moric. ex Dunal) A. Gray and *C. coronopus* (Dunal) A. Gray are conspecific.

Subsequently, Henrickson (2009) formally recognized western populations of what was previously considered to be *Chamaesaracha coniodes* as a new species, *C. texensis,* but made a specific point of maintaining *C. coniodes* as a distinct species. He did not indicate what he considered to be the geography of the reduced *C. coniodes*.

In that same paper Henrickson proposed a second new species, *Chamaesaracha arida*, for western populations that Averett (1973) and all previous workers had included within *C. coronopus*. While Henrickson made no specific statement to the effect, it appears that he no longer considers *C. coniodes* to be a synonym of *C. coronopus*.

Concerned that Henrickson's newly described species and various herbarium annotations might cause confusion, and in anticipation of a more comprehensive revision of *Chamaesaracha* (in prep.), I provide here a brief account of *C. coniodes*, *C. coronopus*, and the two newly described species.

CHAMAESARACHA CORONOPUS (Dunal) A. Gray, Bot. Calif. 1: 54. 1876. *Solanum coronopus* Dunal in DC., Prodr. 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* exsicc. *1513* (holotype: G-DC!, isotype: K!).

Chamaesaracha arida Henrickson, Phytologia 91: 186. 2009. **TYPE**: **USA**. **New Mexico**. Santa Fe Co.: ca. 19 mi S of Santa Fe on Hwy 85, 15 Jun 1968, *J.E. Averett & A.S. Tomb 339* (holotype: TEX!; isotypes: MO!, GH!).

Averett (1973) noted the type locality of *Chamaesaracha coronopus* to be in the vicinity of Laredo, Texas, incorrectly citing Berlandier's collection number *1494*. I subsequently corrected this (Averett 1974) and included an informal insert in my distributed reprints. Only a single collection was cited by Dunal in his protologue, this being *Berlandier* exsicc. no. *1513*. The isotype at Kew notes the locality as "Rio Medina," which on Berlandier's route would be in present-day southern Bexar Co., Texas.

Chamaesaracha coronopus is the type species of the genus; leaves characteristically are essentially glabrous or with sparse branched hairs and vary from 4–11 times as long as broad, averaging ca. 6. Leaves from the type itself are ca. 4.5 times as long as wide. In Dunal's original description, the species is said to have glabrous or glabrate stems and subglabrous peduncles, which is consistent with the type and with the populations in south Texas and northern Mexico.

Henrickson distinguished *Chamaesaracha arida* from *C. coronopus* (Dunal) A. Gray [mistakenly citing the authors as (Moric. ex Dunal) A. Gray] by leaves with short, scattered, broad-based, forked to branched hairs, and having linear to linear-lanceolate leaves with undulate, toothed, or pinnately lobed leaves. Only a brief Latin description was provided, without any comment about the geographic distribution of the proposed species or how it compares to *C. coronopus*. Henrickson noted that he studied type material of *C. coniodes* but not that he saw type material of *C. coronopus*.

Most, but not all, of the western populations of *Chamaesaracha coronopus*, as treated by Averett (1973), do have the short, branched hairs that 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.

CHAMAESARACHA CONIODES (Moric. ex Dunal) Britt., Mem. Torrey Bot. Club 5: 287. 1895. *Solanum coniodes* Moric. ex Dunal in DC., Prodr. 13: 64. 1852. **LECTOTYPE** (Averett 1973): **USA**. **Texas**. Frio Co.: "Cañada Verde inter Laredo et Bejar [San Antonio]," Feb-Mar 1828, *Berlandier* exsicc. *1494* (= *234*) (G-DC; isolectotypes: GH!, K!).

Chamaesaracha texensis Henrickson, Phytologia 91: 187. 2009. **TYPE**: **USA**. **Texas**. Kinney Co.: open rocky soil near the Nueces River, Hwy 334, 17 Apr 1957, *D.S. Correll 15965* with *Rollins & Chambers* (holotype: LL, photo!).

Dunal, in his protologue, cited two exsiccatae numbers by Berlandier, *1463* and *1494*. The

specimens probably were collected near San Miguel Creek in what is now southeastern Frio County, the latter number, *1494*, in March of 1828. Both collections are on the type sheet at GH.

Chamaesaracha coniodes, as treated by Averett (1973) and Rydberg (1896) is a wide spread species ranging from south Texas and adjacent Mexico into west Texas and north to Oklahoma, Colorado, and Kansas. The species is one of the more variable of the genus, exhibiting essentially all forms of vestiture found in the genus as well as a variety of leaf shapes. Plants vary in stature from robust to relatively small.

Unfortunately, type material of *Chamaesaracha coniodes* possesses a fairly dense covering of dendritic hairs which is atypical of the species. Populations of *C. coniodes* typically have simple, unbranched trichomes with an understory of glandular hairs. Averett, and apparently also Rydberg, was aware that the type collection of *C. coniodes* had branched hairs. Rydberg specifically noted the occurrence of branched hairs but further noted that, "The most common form is very hirsute, often glandular viscid, but not at all stellate."

In other characters, most populations are comparable to type material and to a few other populations in south Texas. While dendritic hairs are atypical in this species, they are not unknown and appear in seemingly random populations in this and other species. Indeed, in most of the species one or more populations with an atypical vestiture can be found.

Regarding *Chamaesaracha texensis*, Henrickson (2009) stated that after examining type material of *Chamaesaracha coniodes*, he concluded the type was a different taxon from the western populations of what Averett and Rydberg had included in *C. coniodes*. He described the latter as *C. texensis*. However, rather than distinguishing the species from *C. coniodes*, he contrasted the taxon in his diagnosis with *C. sordida*, another distinct taxon, which he noted, is diploid (n = 12) while most of the populations he includes in *C. texensis* are tetraploid (as was noted by Averett 1973). The recognition of *C. texensis* would leave *C. coniodes* consisting of only a few populations in what looks to be simple populational variation. I see little reason to recognize *C. texensis* as distinct from *C. coniodes*.

CHAMAESARACHA DARCYI Averett, Monogr. Syst. Bot. Missouri Bot. Gard. 104: 350. 2005. **TYPE**: **USA**. **Texas**. Palo Pinto Co.: near Lake Possum Kingdom along Hwy 36, 27 Jun 1969, *J.E. Averett & M. Bierner 474* (holotype: TEX!; isotypes: GH!, MO!).

Averett recognized this species to account for an eastern group of populations largely restricted to the Rolling Plains of north-central Texas but extending eastward to the Cross Timber regions of Texas and adjacent Oklahoma. The species is very close to *Chamaesaracha 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 also is disjunct from populations in south Texas with a similar vestiture and east of populations with unbranched simple trichomes. Unfortunately, the chromosome number of *C. darcyi* (tetraploid, n = 24) is known from only one population, the type.

Discussion.

Vestiture is an important character in the taxonomy of several of the genera surrounding *Chamaesaracha* such as *Solanum* (Seith & Anderson 1982) and *Physalis* (Seithe & Sullivan 1990). Within *Chamaesaracha*, pubescence 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*. Similar genetic variation may account for some of the variability observed among the species of *Chamaesaracha*. Nevertheless,

leaf and stem vestiture is fairly, but almost never completely, consistent within a taxon and remains an important and useful character in separating the several taxa of the genus. However, pubescence must be used in conjunction with other characters, especially leaf shape. Except for *C. rzedowskiana* Hunziker, no species of *Chamaesaracha* exhibits a unique character but, rather, each possesses a syndrome of characters.

In summary, *Chamaesaracha coniodes,* including *C. texensis,* is densely pubescent, whether with dendritic or unbranched trichomes. The leaves average ca. 2.5 times as long as wide and lack the deep lobed margins found in *C. coronopus,* including *C. arida*. The leaves of the latter are elongate-linear and average about 6 times as long as wide. In addition, they are sparsely pubescent to glabrate, including the type. In short, the types of *C. coronopus* and *C. coniodes* differ in leaf shape and vestiture and clearly represent distinct species, a fact recognized by every previous worker.

Whether the western populations of either *Chamaesaracha coronopus* or *C. coniodes* are separated from the south Texas populations, is a matter for further study. However, as noted in the introduction, pubescence may be under relatively simple genetic control and variability of such traits is observed among and between populations of most of the species. A different vestiture, without other characters, would provide little support for the recognition of either *C. arida* or C. *texensis*.

The recognition of *Chamaesaracha darcyi* as a separate species also may be questionable. The populations concerned are disjunct from similar populations in south Texas having dendritic hairs and largely isolated from all other species. They are, however, quite similar in leaf shape and vestiture to the type of *C. coniodes*. In short, additional study may suggest varietal status for *C. darcyi*.

In Henrickson's 2009 paper, he considered *Chamaesaracha villosa* and *C. crenata* to be conspecific and proposed the use of *C. villosa* for the combined taxon. The status of *C. villosa* and *C. crenata* is more fully discussed in a separate paper (Averett 2010).

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LITERATURE CITED

Averett, J.E. 1973. Biosystematic study of *Chamaesaracha* (Solanaceae). Rhodora 75: 325–365.

Averett, J.E. 1974. Typification of *Chamaesaracha coronopus*. Rhodora 76: 311.

Averett, J.E. 2005. A new species of *Chamaesaracha* (Solanaceae). Monographs Syst. Bot. 104: 349–350.

Averett. J.E. 2010. A new species of *Chamaesaracha* (Solanaceae) from Mexico and the separation of *C. crenata* from *C. villosa*. Phytologia 92: 435–441.

Henrickson, J. 2009. New names in *Chamaesaracha* (Solanaceae). Phytologia 91: 186–188.

Oppenheimer, D.G. et al. 1997. Essential role of a kinesin-like protein in *Arabadopsis* trichome morphogenesis. Proc. Natl. Acad. Sci. U.S.A. 94: 6261–6266.

Seithe, A. and G. Anderson. 1982. Hair morphology and the relationships of species in *Solanum* sect. *Basarthrum.* Pl. Syst. Evol. 139: 229–256.

Seithe, A. and J.R. Sullivan. 1990. Hair morphology and systematics of *Physalis* (Solanaceae). Pl. Syst. Evol. 170: 193–204.

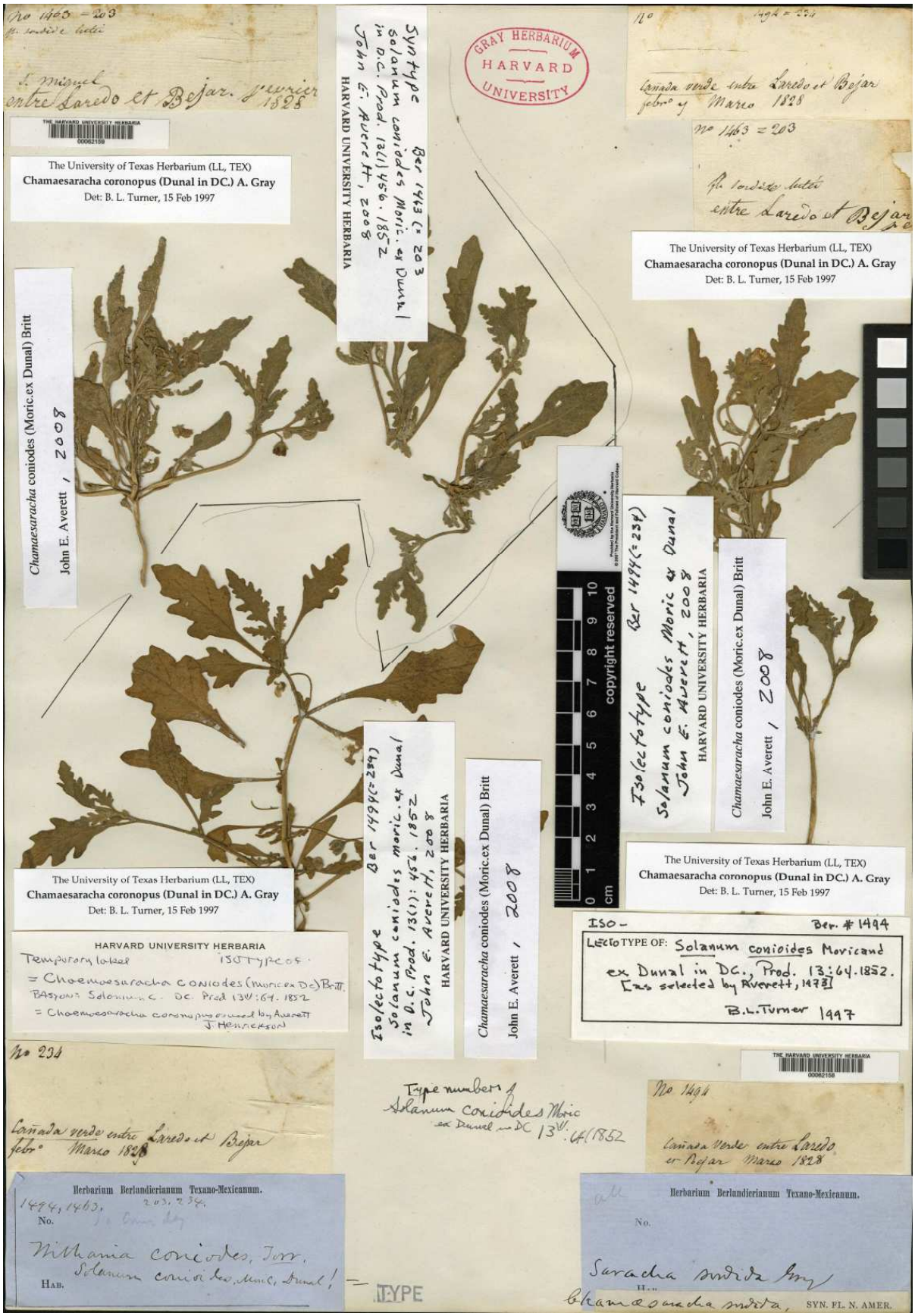

Figure 1. Isotype of *Chamaesaracha coniodes* at the Gray Herbarium.