

**NOTES ON *EVOLVULUS PURPUSII* (CONVOLVULACEAE)
OF NORTHEASTERN MEXICO,
WITH A KEY TO THE *EVOLVULUS* SPECIES OF THE CHIHUAHUAN DESERT REGION**

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ABSTRACT

A review of the described species of *Evolvulus* (Convolvulaceae) recognizes 16 as “good” species that are present or probably present in Mexico, although one or more additional undescribed species are likely. Seven of these species are documented for the Chihuahuan Desert region (CDR) of Mexico and the southwestern USA, including *E. purpusii* Ooststr. The latter species has been little studied and therefore a full description and discussion is included. Some material included in *E. purpusii* by van Ooststroom (1934) is here proposed to fall within the variation of the widespread *E. sericeus* Sw. The status of *E. arizonicus* A. Gray is discussed and a key to the species of the CDR is presented.

RESUMEN

Una reseña de las especies descritas del género *Evolvulus* (Convolvulaceae) reconoce a 16 especies como “buenas” especies que están presentes o probablemente presentes en México, aunque es probable que hay una o más especies no descritas adicionales en México. Siete de estas especies están documentadas para la región del Desierto Chihuahuense (CDR) de México y el suroeste de los EUA, entre ellas *E. purpusii* Ooststr. Esta última especie ha sido poco estudiado y, por lo tanto, se incluye una descripción completa y una discusión. Una parte del material que van Ooststroom (1934) incluyó dentro de su concepto de *E. purpusii* se propone aquí que cae dentro de la variación de *E. sericeus*, una especie de amplia distribución. Se discute la situación de *E. arizonicus* A.Gray y se presenta una clave para las especies de la CDR.

The genus *Evolvulus* (Convolvulaceae) was last monographed in its entirety in 1934 by Simon Jan van Ooststroom, who treated it as a genus of 97 species with numerous infraspecific taxa. All of these species occur on the New World, especially in relatively open habitats in tropical and subtropical areas, with two species extending into the Old World. Most recent authors follow van Ooststroom and state that the genus has about 100 species (e.g., Rzedowski and Carranza 2023; Santos et al. 2023), but there is no recent monograph to give a better estimate. With 74 species being documented for Brazil (Santos et al. 2023), that country appears to be the center of diversity for the genus.

For Mexico, Rzedowski and Carranza (2023) stated that there are 17 species in the country but listed only 16. In the process of preparing a manuscript on the *Evolvulus sericeus* complex by Bob Harms for publication (Harms and Wendt 2023), the current author reviewed the taxonomy of the Mexican species of the genus as context and background. Reviewing the published information on the taxonomy of *Evolvulus* in Mexico, starting with van Ooststroom (1934) and up through the work of Bob Harms (Harms 2014; Harms and Wendt 2023), and studying relevant herbarium material, I also estimate that there are 16 “good” named species of *Evolvulus* in Mexico, as outlined in the following paragraphs, but in a couple of cases they are not the same species as listed by Rzedowski and Carranza.

Van Ooststroom (1934) divided *Evolvulus* into 7 sections, but only one of these includes Mexican species, sect. *Alsinoidei* Meisn. This section he divided into two subsections based on the presence or absence of a pedunculate inflorescence, subsections with the obvious names *Pedunculati* Ooststr. and *Epedunculati* Ooststr.

Evolvulus subsect. *Pedunculati* includes 5 Mexican species: *E. alsinoides* (L.) L., *E. arizonicus* A. Gray, *E. convolvuloides* (Willd.) Stearn, *E. filipes* Mart., and *E. tenuis* Mart. ex Choisy. All five species are listed by Rzedowski and Carranza (2023). The status of *E. arizonicus* is discussed below.

The rest of the Mexican species are in *Evolvulus* subsect. *Epedunculati*, including 10 species documented for Mexico and one probably present in the country. The following 10 are documented for Mexico: *E. cardiophyllus* Schltld., *E. discolor* Benth., *E. hallieri* Ooststr., *E. nummularius* (L.) L., *E. ovatus* Fern., *E. pohlii* Meisn., *E. prostratus* B.L. Rob., *E. purpusii* Ooststr., *E. rotundifolius* (S. Wats.) Hall.f., and *E. sericeus* Sw. Rzedowski and Carranza (2023) listed all of these species except *E. discolor*, which was shown to be distinct from *E. sericeus* by Harms and Wendt (2023). On the other hand, *E. choapanus* J.A. McDonald of subsect. *Epedunculati* was shown by Harms and Wendt (2023) to be a synonym of *E. sericeus* and is thus here excluded. The final species of subsect. *Epedunculati* listed by Rzedowski and Carranza is *E. nuttallianus* Schult. Although various specimens from Mexico have been determined as this species, Harms (in Harms and Wendt 2023) found numerous specimens of *E. discolor* misidentified as *E. nuttallianus* and failed to find any Mexican specimens of *E. nuttallianus* in the material he studied, even though he saw collections of that species from relatively close to the Mexican border in western Texas. Felger et al. (2012) also stated that its presence in the mountains of southeastern Arizona near the border with Sonora make it likely that it occurs in Sonora but did not actually find specimens from Sonora. It is thus probable but not certain that this species occurs in extreme northern Coahuila, Chihuahua, and/or Sonora, but it does not seem to be widespread in Mexico, as listed by Rzedowski and Carranza. It is thus likely that *E. nuttallianus* is an eleventh Mexican species in subsect. *Epedunculati*.

Of 16 Mexican species of *Evolvulus* listed above as present or potentially present in Mexico, all except 2 are included in one or more relatively recent floristic treatments or taxonomic papers that include both descriptions and keys for the species (McDonald 1993; Carranza 2008, 2015; Austin et al. 2012; Felger et al. 2012; Harms 2014; Harms and Wendt 2023). The 2 species not included in any of these floras or treatments are two fairly narrowly endemic species from northeastern Mexico described by van Ooststroom (1934), *E. purpusii* Ooststr. and *E. hallieri* Ooststr. *Evolvulus hallieri* is mentioned and keyed in a treatment of the Convolvulaceae of the municipio of Victoria, Tamaulipas (Fernández-Puga et al. 2019), the type locality of the species, but little other information after van Ooststroom (1934) exists for either species. In trying to work up a workable preliminary key to the Mexican species of subsect. *Epedunculati* and reviewing extensive material of *Evolvulus* from several herbaria (NMC, NMCR, SRSC, TEX/LL, UNM) and limited material from others (F, GH, MO, US, and online images of MEXU specimens), I found several specimens referable to each species, and specifically several specimens of *E. purpusii* from within the geographical area of the Chihuahuan Desert Region (CDR) as defined by Johnston (1974).

Although the promised *Flora of the Chihuahuan Desert Region* by Marshall C. Johnston and James S. Henrickson has yet to be officially published, a loose-leaf printed draft of most family manuscripts has been available for almost 30 years at several USA and Mexican herbaria for use, comment, correction, and addition by botanists. The treatment of *Evolvulus* in that manuscript does not include *E. purpusii* (or, for that matter, *E. arizonicus*). The purpose of this paper is to provide, based on specimens in herbaria in the USA, an updated description of *E. purpusii*, provide information on its geographical distributions and document its occurrence in the CDR, and provide a revised key to the species of *Evolvulus* in the CDR, including the taxonomic modifications presented in Harms (2014) and Harms and Wendt (2023).

***Evolvulus arizonicus* in the Chihuahuan Desert Region**

In Bob Harms' opinion (in Harms and Wendt 2023, p. 34, note 1), "a case for treating *Evolvulus. alsinoides* and *E. arizonicus* as distinct species has yet to be made," noting variation and overlap in key differentiating characters. On the other hand, Austin (1990) looked specifically at this

problem and maintained the two as good separate species in Arizona, and this has been followed in other recent treatments of the genus for parts of the southwestern USA and northwestern Mexico (e.g., Austin 1998; Felger et al. 2012, Allred et al. 2020). Felger et al. (2012, with Austin as a co-author) noted that *E. arizonicus* “is easier to recognize in living material than on some herbarium specimens,” presumably due to the shrinkage and contortion of dried corollas noted by Austin (1990). Key characters used to distinguish the species have been corolla diameter, sepal length, sepal pubescence, stem pubescence, and leaf shape (Austin 1990, 1998; Felger et al. 2012; Allred et al. 2020). As defined by van Ooststroom (1934), *E. alsinoides* is a very wide-ranging and variable species of the warm regions of the world, while the larger-flowered *E. arizonicus* is restricted to the southwestern USA, northwestern Mexico, and Argentina.

I here accept Austin’s recognition of *Evolvulus arizonicus* at species rank. A superficial review of herbarium material of *E. alsinoides* and putative *E. arizonicus* from throughout the Chihuahuan Desert region and bordering areas indicates that corolla and sepal sizes are the most dependable key differences between the two taxa, but there is a strongly correlated geographical pattern. Specimens of this complex are quite consistent in having small flowers throughout most of the Chihuahuan Desert. Large-flowered material is found only along the northwestern margin of the desert in New Mexico and westward into Arizona, Sonora, and western Chihuahua, areas where typical small-flowered material also occurs. The couplet distinguishing these two species in the CDR key below is modified from Austin (1990) and Allred et al. (2020). Both of these latter authors inferred in their keys that, in addition to flower size, stem pubescence could be used to distinguish the species in the geographical areas covered by their treatments, but my observations of specimens from throughout the Chihuahuan Desert and northwestern Mexico indicate that there is a complete overlap in this character. Thus, while specimens with stem pubescence that includes numerous long spreading hairs are almost surely *E. alsinoides*, specimens with stems with only appressed hairs can be either species, based only on that character. *Evolvulus alsinoides* is also more variable in leaf shape; leaves of the two species can be essentially identical in shape, but the length/width ratio of *E. alsinoides* ranges to much broader.

Austin (1990) has noted that some specimens from areas of sympatry of the two flower types show intermediacy in flower size, possibly due to hybridization. I have seen material from the Organ Mountains region of New Mexico with large sepals but small corollas (e.g., *Wooton s.n.*, NMC no. 21196) and collections from the Sierra Madre of western Chihuahua (e.g., *Laferriere 2036-TEX*, *Spencer 1407-TEX*) with large flowers but broad leaves and numerous long stem hairs. There thus appears to be some morphological intergradation at least locally. Arguments thus can be made about the correct taxonomic rank for the large-flowered taxon, but there seems little doubt that it represents a good taxon and thus I choose to follow Austin in treating it at species rank until further studies are done.

***Evolvulus purpusii* and its presence in the Chihuahuan Desert Region**

Van Ooststroom described *Evolvulus purpusii* in 1934 based on one collection each from Coahuila and San Luis Potosí, designating the San Luis Potosí specimen (*Purpus 5401*, details below) as the type. The Coahuila paratype specimen (*Endlich 830*, from the Sierra de la Paila) was deposited at B and was presumably destroyed in World War II; I have not seen duplicates. Van Ooststroom distinguished typical *E. purpusii* from typical *E. sericeus* (that is, *E. sericeus* var. *sericeus*) for the most part by leaf size and shape, pubescence, and flower color. Comparing the two by combining his key and his descriptions, typical *E. sericeus* is a usually ascending or upright plant (but sometimes prostrate), the upper and middle leaves 6–25X0.5–5 mm with usually some or all over 4 times as long as wide (but lower leaves often broader), leaf apices acute to obtuse, leaf bases attenuate to acute, pubescence of the lower leaf surface “sericeo-villous or sericeo-lanate” (if the latter, the leaf apices mostly acute), and white, pale blue or pale lilac corollas. On the other hand, *E. purpusii* is characterized by prostrate habit, smaller leaves that are uniform throughout, ovate to oblong-ovate, and 4–8X2.5–4 mm, leaf apices obtuse, leaf bases rounded, pubescence of the lower leaf surface sericeo-lanate, and

intensely blue corollas. I have seen other similar specimens from the Mexican part of the eastern CDR and eastward in the Sierra Madre Oriental (specimens listed below). It appears to me to be a well-defined species (based on the characters given in the key below) and I here present a fuller description of the species:

EVOLVULUS PURPUSII Oorstst., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 145. 1934. **TYPE:** MEXICO. San Luis Potosí. Minas de San Rafael, Jul 1911, *Purpus 5401* (holotype: GH [image!]; isotypes: F [image!], L [image!], MEXU [image!], MO!, NY [image!], US!). Map 1, Figs. 1–8. The Minas de Rafael are located near 22°13' N and 100°15' W, according to Sousa Sanchez (1969).

PERENNIAL HERBS with usually a stout vertical rootstock gradually enlarging upward to a crown of 6 mm or more diam. from which arise numerous thinner stems at or below the soil surface; stems prostrate, sometimes forming loose mats, to 2.6 dm long, 0.6–1.1 mm diam., leafless dark basal portion occasionally thicker, this portion often branched but distal leafy parts little to not branched. **PUBESCENCE OF STEMS AND LOWER LEAF SURFACES** white to pale golden-tan, typically the latter restricted to the younger more distal lvs and stem portions, sericeous to shaggy-sericeous, the trichomes bifurcate with the much longer branch to 2 mm or more, this distally directed and mostly loosely appressed, the 2 branches meeting in a V-shape at the lf surface or on a very short common stipe [trichome morphology and base quite difficult to see even at magnification due to hair density]. **LEAVES** distichous, patent or slightly reflexed when mature, mid-lvs spaced at 2–7 mm, typically evenly spaced and not overlapping; **BLADE** elliptic to ovate to broadly so, 3.5–10 X 2.5–8.5 mm, l/w ratio 1-2, apex rounded or obtuse to a small downturned channeled apiculum, base equilaterally to slightly inequilaterally rounded, mature blades flat and all facing the same direction (adaxial surface facing skyward *in situ*), apical developing lvs conduplicate; lower surface densely sericeous to shaggy sericeous, surface usually entirely obscured, upper surface glabrous or occasionally with very scattered hairs, the lower surface pubescence extending beyond the blade margin to form an obvious halo when lf viewed adaxially and often forming a coma at tip; blade somewhat thickened, midvein usually obvious adaxially and sunken in the lower half, visible secondary venation obscure or represented by 1(2) faint pairs of ascending veins arising from midvein at base of blade proper or up to 1 mm above, these veins not visible distally; **PETIOLE** broad, concave, 0.5–1.5 mm long, broadly attached to stem. **INFLORESCENCE** mostly 1-fld, occasionally 2- or rarely to 4-fld; **PEDUNCLE** essentially absent, occasionally to 0.6 mm; **PEDICEL** 0.8–3.5 mm, straight, ascending, hairy; **BRACTEOLES** 2, 1.5–4 mm, subulate to lanceolate to narrowly lance-elliptic, adaxially glabrous, abaxially sericeous. **FLOWERS:** **SEPALS** persistent in fr, 3–5 mm (excluding pubescence), ovate to elliptic to lance-ovate, l/w ratio 2–3.5, tip acute to acuminate, usually spreading to reflexed in fr, abaxially hairy with pubescence like stem; **COROLLA** 8–13 mm diam., rotate to broadly short-funnelform, very shallowly 10-lobed, medium to dark blue to purple with a white star in throat, interpical areas (as defined by Harms in Harms and Wendt, 2023, i.e., the areas exposed in bud) with line of pubescence externally, corolla otherwise glabrous; **STAMENS** with filaments 1.3–2 times as long as anthers, inserted ca. 1 mm above base of corolla, anthers oblong to sagittate, 0.8–1.2 mm long; **OVARY** globose, ca. 1 mm tall, styles 2, each 2-branched, branches united ca. 0.6–1.2 mm, free branches (incl. stigmas) 2.5–3.5 mm, exceeding anthers. **CAPSULE** globose, glabrous, exceeding the calyx, 2–4 mm diam., pale greenish to pale tan, somewhat translucent, valves usually 4; **SEEDS** 4 or occasionally fewer, seed-body typically quarter-circular in cross-section, ca. semi-circular in longisection, 1.5–2 X 1–1.4 mm, testa brown before maturity, at maturity dark brown to essentially black, the surface not shiny due to very minutely scabrous surface.

Distribution and habitat. Northern and northwestern Coahuila southeastward into the northern Sierra Madre Oriental of Nuevo León, Tamaulipas, and San Luis Potosí (Map 1). 1000–2000 m elevation on limestone substrates, in *matorral submontano*, desert/*submontano* intergrades, and dry pine-oak, piñon-juniper-oak, and similar dry low woodlands. Documented from the CDR in Coahuila

and San Luis Potosí (4 specimens marked with asterisks below, plus the apparently destroyed paratype mentioned above from the Sierra de la Paila, Coahuila).

Additional specimens and online images examined of *Evolvulus purpusii*. MEXICO. Coahuila. Ca. 26 road km W of Ocampo, at top of rocky limestone ridge along roadway, 27°17.31'N, 102°36.30'W, elev. 5100 ft, 20 Sep 2004, *Henrickson 24046** (TEX); ca. 30 (air) mi WNW of Cuatro Ciénegas, in the limestone Cañón los Pozos, ca 3-4 mi W of Rancho Cerro de la Madera along trail to Cañón Desiderio, 27°08'N, 102°28'W, elev. 1400 m, 1 May 1977, *Henrickson & Lee 15938b** (TEX); Zacate, Múzquiz, 17 Jul 1936, *Marsh 510* (GH, TEX-2); Cañón de Ybarra, the principal canyon at the NW end of the calcareous Sierra del Pino, 22-23 Sep 1941, *Stewart 1897** (GH). **Nuevo León.** Mpio. Rayones, Galeana to Rayones + 19 km, 20 Oct 1990, *Hinton 20834* (TEX); Mpio. Zaragoza, Cerro Viejo, elev. 1685 m., 22 Sep 1993, *Hinton 23404* (TEX). **San Luis Potosí.** Mpio. Guadalcázar, El Quelital, ca. 6 km al NE de El Quelital, sobre el camino a Buenavista en vereda hacia el Cerro Gordo (El Quelite está a 27 km al E de Guadalcázar), 22°34'30"N, 100°09'29"W, elev. 1350 m, 22 Sep 1996, *Gómez Hinostrosa CGH 0316* (MEXU-image!); Estación microondas "Pastoriza", ca 22 km S of Matehuala, 23°25'05"-23°25'25"N, 100°38'50"-100°39'00"W, elev. 1550-1650 m, 19 May 1973, *Johnston, Wendt & Chiang 11109C** (LL); Mpio. Guadalcázar, Los Aguajitos, 11 km al NE de Guadalcázar hacia Pozo de Acuña, 22°37'30"N, 100°19'00"W, elev. 1640 m, 8 Aug 1996, *Torres Colín RTC14609* (MEXU-image!, TEX); Mpio. Guadalcázar, Aguaje de Los García, por la Cueva del Gato, 22°36'32"N, 100°26'44"W, elev. 2000 m, 18 Jul 1998, *Torres Colín RTC15249* (MEXU-image!, TEX); Mpio. Guadalcázar, Cerro El Calvario, cerros al SW de Guadalcázar al final de la calle Ocampo, 22°36'50"N, 100°23'11"W, elev. 1068 m, 17 Aug 2011, *Torres Colín 16931* (MEXU-image!). **Tamaulipas.** Along Hwy 70 between Palmillas and Tula, elev. 5950 ft, 10 Nov 1971, Boutin 3382 (MEXU-image!); Mpio. Tula, "Las Huertas," 13.5 km al NE de Palmillas, elev. 1600 m, 7 Jul 1985, *Hiriart, Juárez & Molczadski 915* (MEXU-image!).

In addition to flower color, van Ooststroom appeared to place significant emphasis on the type of pubescence of *Evolvulus purpusii*, with the sericeo-lanate (which he also called silky-woolly) pubescence of that species contrasting with the usually sericeo-villous pubescence of *E. sericeus*. This apparently was part of the reason he included an additional specimen as a second "form" of *E. purpusii* ("form b," discussed below) and yet another as possibly related to *E. purpusii*. The latter specimen is from the mountains near San Vicente, east of Jaumave in the Sierra Madre Oriental of Tamaulipas (*von Rozynski 457a*, US!) and differs markedly from *E. purpusii* in its erect habit and larger and narrower leaves pubescent on both sides. My observations indicate that pubescence is not a strong differentiating character between *E. sericeus* and *E. purpusii*, with the former being quite variable in this character, as even van Ooststroom noted in his key. I am not sure of the correct specific disposition of the von Rozynski specimen, but I am confident that it is not *E. purpusii*. In 1962, van Ooststroom saw and annotated (as *Evolvulus* cf. *purpusii*) an extremely similar second specimen from the same general area (San Lucas, Tamaulipas, *Viereck 135* [US!]), and this and the von Rozynski specimen may well represent an undescribed species.

As noted above, van Ooststroom listed only two collections as "typical" *Evolvulus purpusii*. However, he also referred another collection to the new species as "form b" (the typical form being "form a"): *Purpus 5443* (Figs. 9,10) from near the type locality in San Luis Potosí (east of the CDR in the Sierra Madre Oriental), which differed from typical material in having the upper leaf surface pubescent and the leaves somewhat larger (6–11(17) X 3–5(–6.5) mm; van Ooststroom, 1934). I have examined material of *Purpus 5443* from San Luis Potosí as well as two similar specimens from the CDR in the general Saltillo area in Coahuila (*Warnock & Barkley 14-726-M*; *I.M. Johnston 7661* [Figs. 11, 12]); collection details given below). All differ from typical *E. purpusii* in not only the hairy upper leaf surface but also larger average leaf size and the broadly cuneate (not rounded) leaf base. Using the key in Harms and Wendt (2023), these might key to *E. discolor* based on the pubescence of the upper leaf surface, but based on that same key and article, the venation found in the above mentioned specimens is clearly like that of *E. sericeus* (which is like that of *E. purpusii*) and quite unlike that of *E. discolor*.

Harms and Wendt (2023) noted that *Evolvulus sericeus* can have the upper leaf surface either glabrous or hairy, but they also claimed that all material of that species from the southwestern USA and northern Mexico, whether of var. *sericeus* or var. *cymosus* R.T. Harms, has the upper leaf surface glabrous. The “form b” specimens listed above and shown in Figs. 9–12 do not seem to fit within *E. purpusii* and are certainly not *E. discolor*. None of the three collections has flower color information, thus the previously mentioned corolla color distinction between *E. sericeus* and *E. purpusii* is not helpful in placing these specimens taxonomically. The TEX herbarium has several specimens from the Tehuacán valley of Puebla that are quite similar (listed below), and the data on these note that the flowers are greenish-yellow, pale lilac, or blue, which is again inconclusive but suggests that not all are dark blue. Although the vast majority of *E. sericeus* specimens from the southwestern USA and northern Mexico have many long and very narrow leaves, very unlike the “form b” specimens, scattered specimens from throughout the range of *E. sericeus* var. *sericeus* in Texas and Mexico have many or mostly broader leaves quite like those of form b and differ from the form b specimens mostly by the strigose upper leaf surfaces of the latter. Given that *E. sericeus* var. *sericeus* is known to have strigose upper leaf surfaces in other parts of its extensive New World range (van Ooststroom 1934; Harms and Wendt 2023), and given that the CDR specimens seen occur along the eastern edge of the CDR, like typical var. *sericeus*, it seems best to treat these specimens as members of that taxon and admit that Harms and Wendt (2023) may have erred in their claim that all *E. sericeus* in the region has glabrous upper leaf surfaces. Carranza (2015) also treated the Tehuacán collections mentioned above and cited below as *E. sericeus*, although he treated that species within a much broader circumscription (including *E. discolor* within it) than Harms and Wendt (2023) and the present work.

Specimens examined of "form b" from the CDR: MEXICO. Coahuila. Torreón-Salttillo highway, 8 mi W of Saltillo, prostrate on rocky hillside, 15 Sep 1938, *I.M. Johnston 7661* (US); at top of winding road 30 mi SW of Monterrey, gravel hilltop, grassland and small shrub area, rare, 1 Dec 1945, *Warnock & Barkley 14-726-M* (TEX).

Specimens examined of "form b" from E or S of the CDR: MEXICO. Puebla. Mpio. Tehuacán, Meseta de San Lorenzo, subiendo por el camino que viene de El Riego, fl. amarillo verdosas, 7 Aug 1981, *Chiang, Dávila, & Villaseñor 2258* (TEX); 10.5 km por la desviación a San Luis Atolotitlán, de la carr. Tehuacán -- Huajuaján de León, 7 km al NW de Los Reyes Metzontla, elev. 1780 m, fl. lila pálido, 30 Jul 1983, *Chiang, Dávila, Gómez & Engleman 2395* (TEX); Mpio. Tehuacán, 4.4 km al E de San Pablo Tepetzingo, fl. azul, 24 Jul 1979, *Chiang, Medrano, Jaramillo & Dávila F-103* (TEX). **San Luis Potosí.** Minas de San Rafael, Agua del Medio, Jul 1911, *Purpus 5443* (MEXU-image!, MO, US).

Key to the *Evolvulus* species and varieties of the Chihuahuan Desert Region

The following key includes all *Evolvulus* species known to occur in the Chihuahuan Desert Region (CDR), as defined by Johnston (1974). It incorporates the species concepts of Harms (Harms 2014; Harms and Wendt 2023) and the work presented in the current paper.

1. Inflorescence with obvious slender peduncles > 1 cm AND upper leaf surface pubescent.
 2. Corolla (10–)12–22 mm wide; flowering sepals 3–4 mm long; stems with appressed or incurved distally directed hairs and sometimes with very scattered longer spreading hairs to ca. 1.5 mm; NW edge of CDR **E. arizonicus**
 2. Corolla 5–10 mm wide; flowering sepals 2–3 mm long; stems pubescence as above, or often also with abundant long spreading hairs up to 4 mm long; widespread **E. alsinoides**
1. Inflorescence with very short and stout peduncle or no peduncle or, when peduncles >1 cm, then upper leaf surface glabrous.
 3. Leaf not distichous, phyllotaxis often 2/5; upper leaf surface hairy (or rarely both surfaces glabrous); documented only from the USA part of the CDR.

4. Blades of mid leaves mostly or all linear, length/width ratio > (6–)8:1; pubescence light to moderate, hairs strongly appressed, straight and distally directed with no or few hairs ascending or spreading; hairs slightly to notably denser on upper leaf surface than on lower; hairs strongly asymmetrical with weaker fork ca. 0.25 mm long; on deep sands in SE NM and adjacent Texas **E. arenarius**
4. Blades of mid leaves elliptic, length/width ratio < (8–)6:1; pubescence most commonly quite dense, hairs generally distally directed but usually with abundant hairs irregularly ascending to spreading, giving a notably shaggy appearance, infrequently less dense and more uniform; hairs denser on lower leaf surface or both surfaces about the same; hairs less strongly asymmetrical with weak fork >0.25 mm long; on diverse substrates throughout US portion of CDR **E. nuttallianus**
3. Leaves distichous; upper leaf surface glabrous or hairy, lower leaf surface always hairy; throughout CDR.
5. Plant prostrate; lvs glabrous above (or with extremely scattered long hairs), all more or less perpendicular to stem, 3.5–10 mm long, 2–8.5 mm wide, 1–2 times as long as wide, broadly elliptical to ovate, all essentially the same in shape, apex broadly rounded to a minute downturned canaliculate apiculum, base broadly rounded to slightly cordate to an abrupt very short petiole-like base; midvein of leaf-blade obvious and often sunken above, lateral venation weak, when visible (or viewed with transmitted light) with one or more pairs of lateral veins diverging from the midvein at apex of petiole-like base or above; corolla deep blue or purple; known in the CDR only from Coahuila **E. purpusii**
5. Plant prostrate, ascending or erect; lvs glabrous to strigose above, variable in orientation but at least some (usually most) ascending, typically many > 1 cm long and many > 2 times as long as wide, ovate or elliptic to lanceolate or linear, the distal leaves typically narrower than the basal, apex often acute or acuminate, at least some leaves clearly broadly to narrowly cuneate at base; corolla white to pale lavender or pale blue, when darker blue than leaf with 1–more pairs of strong lateral veins arising from extreme base of leaf at point of attachment to stem (strong magnification and transmitted light may be necessary).
6. Petiole with 1 or more pairs of strong secondary veins from point of attachment to the stem, running briefly parallel to midvein (transmitted light and rehydration of dried specimens usually needed); multiple stems arising from a branched crown above an underground vertical subligneous rhizome > 2 mm wide that extends as far as 8 cm down to the taproot; mid leaves consistently falcate (may not be apparent with pressed specimens); adaxial surface of leaf blade glabrous or pubescent; corolla white to pale lavender to dark blue or purple; widespread in the CDR **E. discolor**
6. Petiole with only the primary vein, the leaf blade with a pair of secondary veins arising from at or above the apex of the petiole, with pinnate venation above the midpoint; multiple stems < 2 mm wide at the base becoming lignescent only above ground, often branched below ground, arising as narrow vertical rhizomes from thicker horizontal rhizomes; mid leaves slightly recurved, never strongly falcate; adaxial surface of leaf blade glabrous or very rarely pubescent; corolla white to very pale blue or lavender; along the eastern edge of the CDR in Mexico. (*E. sericeus*).
7. Inflorescence peduncle absent or occasionally to 2 mm **E. sericeus var. sericeus**
7. Inflorescence peduncle 3–20 mm long **E. sericeus var. cymosus**

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Map 1. Known distribution of *Evolvulus purpusii* (blue symbols). Base map © Google 2024, data attribution Google, Data SIO, NOAA, U.S. Navy, NGA, GEBCO, Landsat/Copernicus, INEGI, Data LDEO-Columbia, NSF, NOAA. The "gap" in Coahuila/Nuevo León is interpreted here as reflecting a lack of collections.

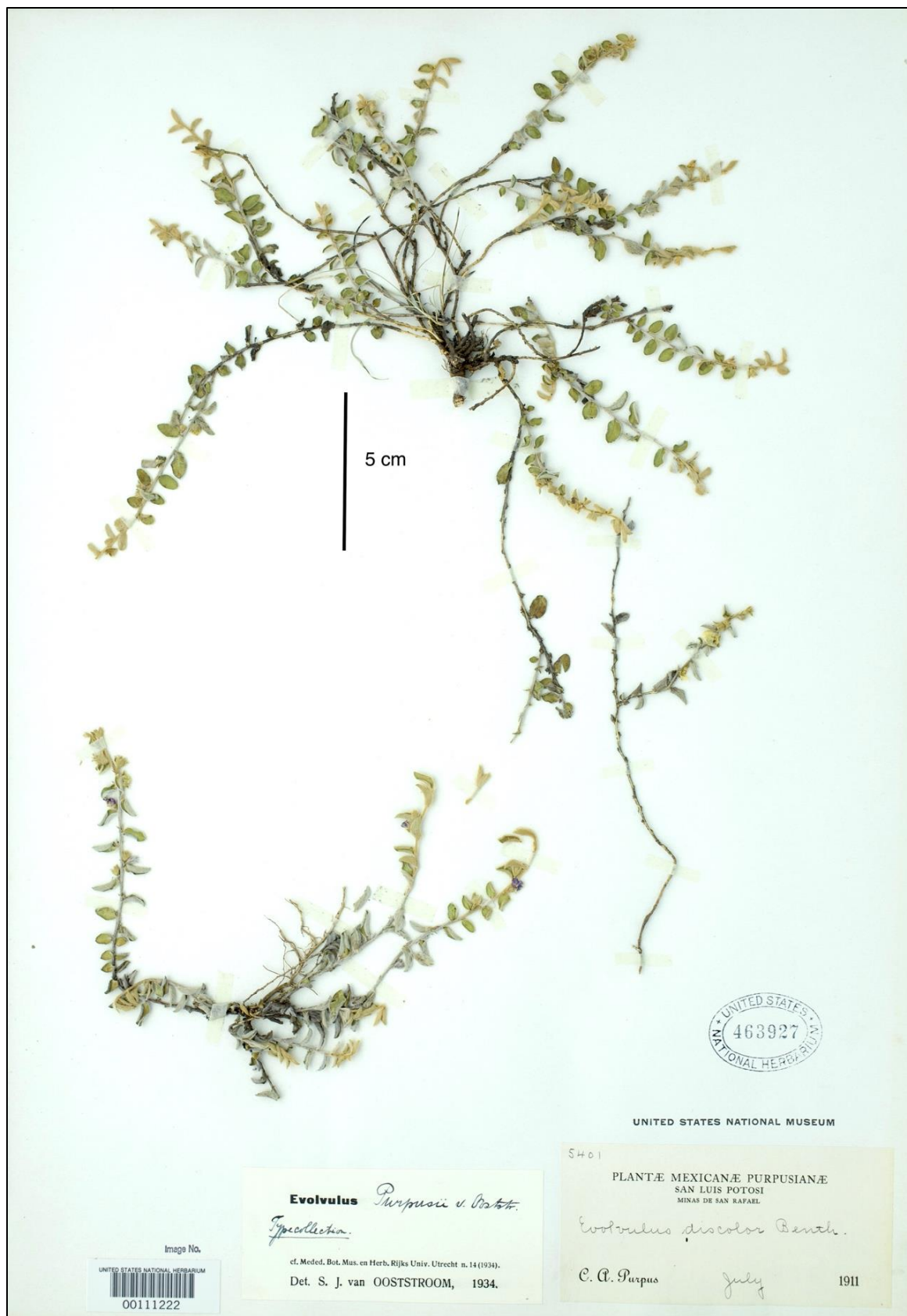


Figure 1. Isotype of *Evolvulus purpusii* at US, Purpus 5401 from San Luis Potosí; see detail in Figure 2.



Figure 2. Detail of US isotype of *Evolvulus purpusii* (see Figure 1).

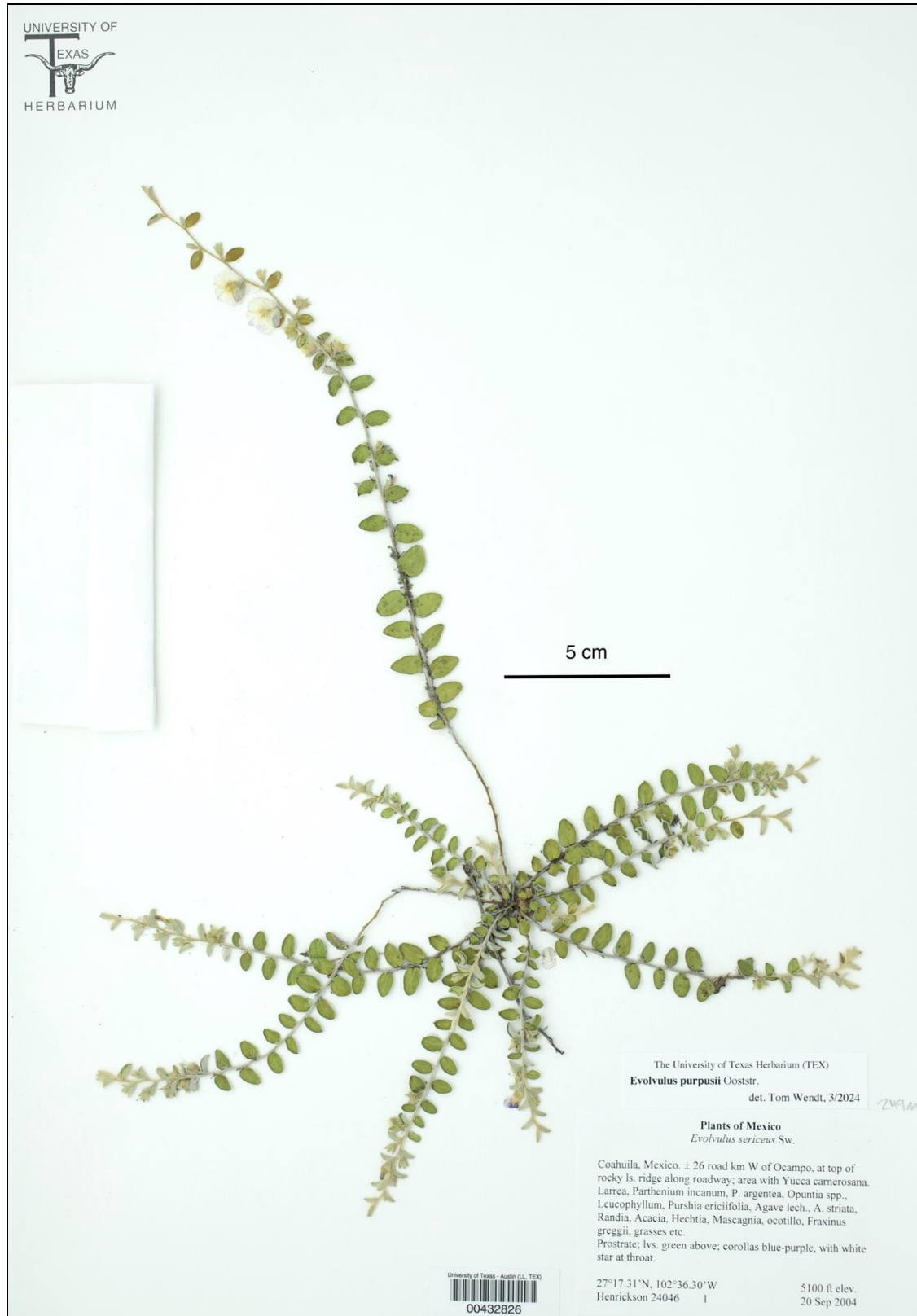


Figure 3. *Evolvulus purpusii* in the Chihuahuan Desert Region of Coahuila: *Henrickson 24046* (TEX). See [Figure 4](#) for detail.



Figure 4. Detail of *Henrickson 24046* (TEX) from Coahuila; see Figure 3.



Figure 5. *Evolvulus purpusii* in the Chihuahuan Desert Region of Coahuila: Stewart 1897 (GH).



Figure 6. *Evolvulus purpusii* from E of the CDR in northern Coahuila: Marsh 510 (GH) from WNW of Múzquiz, Coahuila.



Figure 7. *Evolvulus purpusii* from the Sierra Madre Oriental of Nuevo León: Hinton 23404 (TEX).

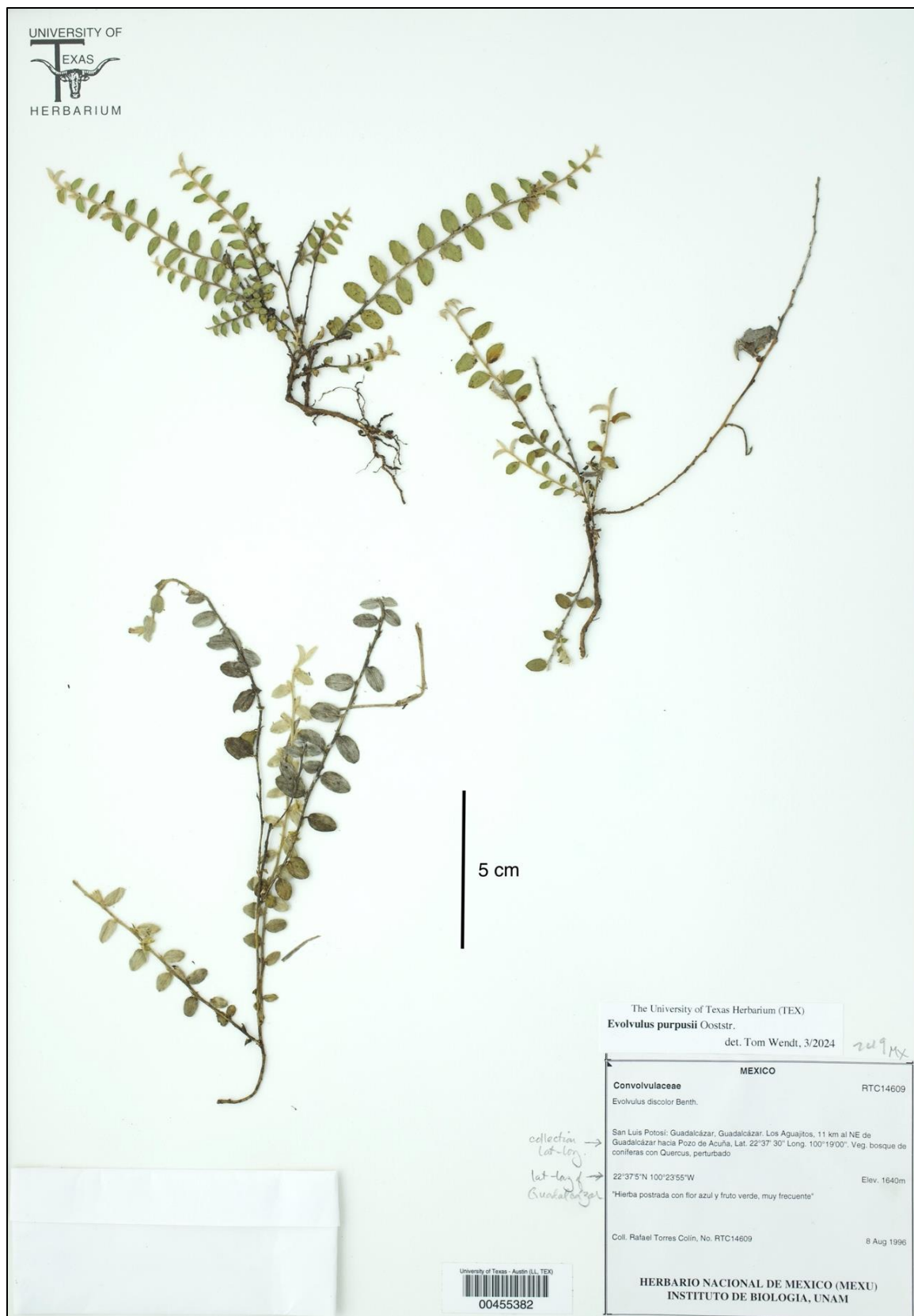


Figure 8. *Evolvulus purpusii* from the Sierra Madre Oriental of the Guadalcázar area of San Luis Potosí, about 50 km N of the type locality: Torres Colín RTC 14609 (TEX).

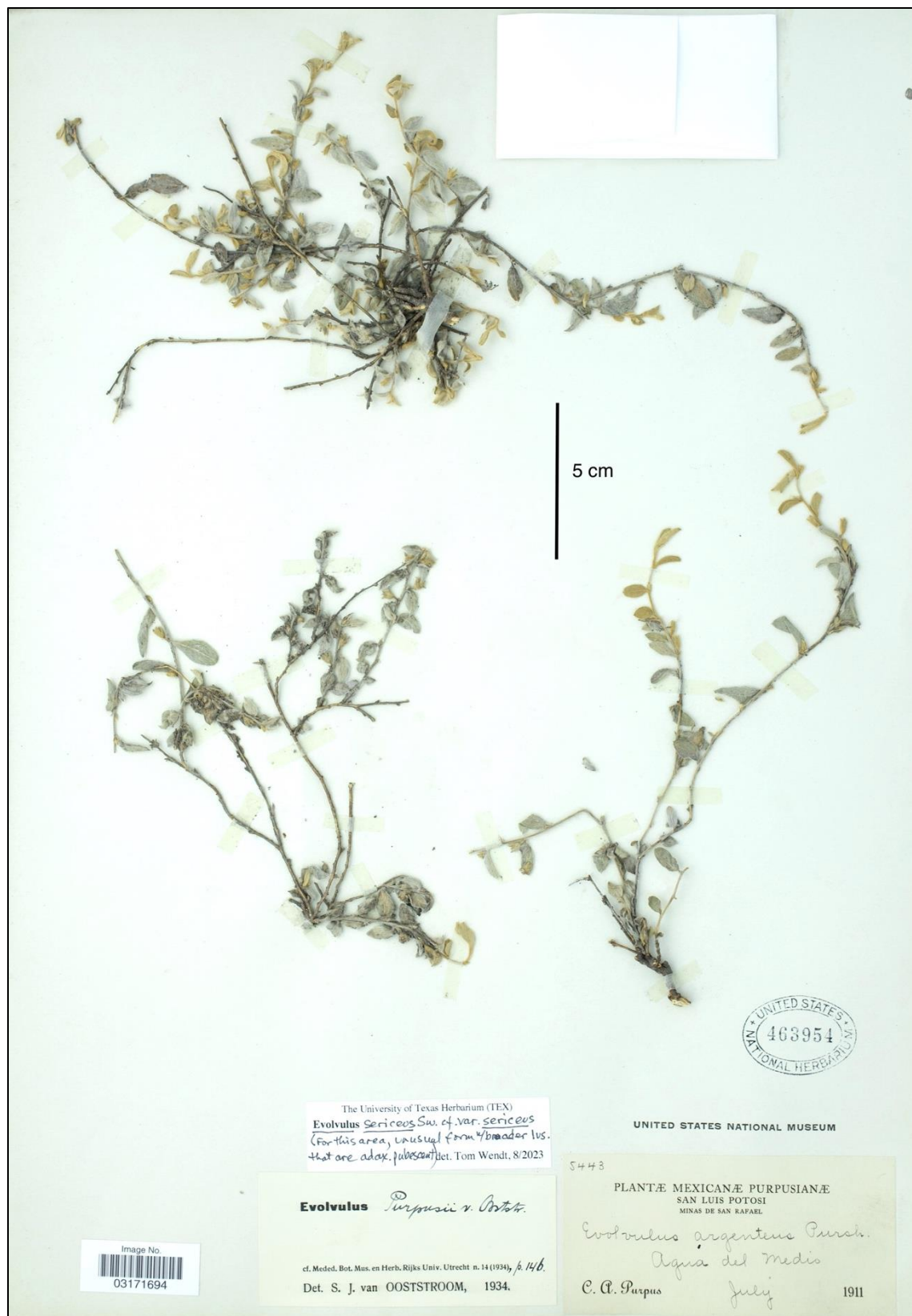


Figure 9. *Evolvulus* collection cited by van Ooststroom (1934) as *E. purpusii* “form b” and here treated as *E. sericeus*: Purpus 5443 (US) from San Luis Potosí. See Figure 10 for detail.



Figure 10. Detail of *Purpus* 5443 (US). See Figure 9.

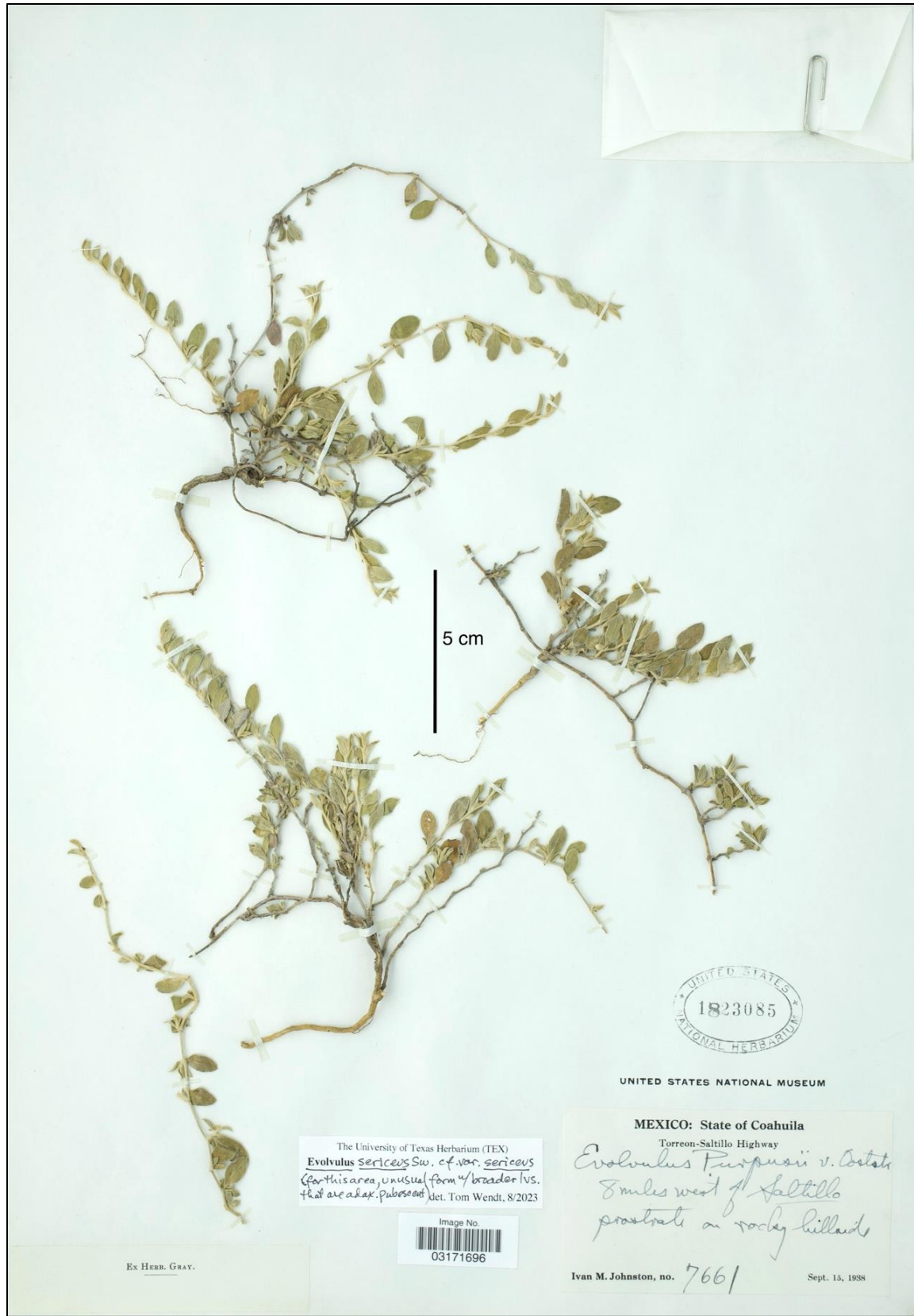


Figure 11. Chihuahuan Desert specimen from Coahuila similar to van Ooststroom's "form b": *I.M. Johnston 7661* (US). See Figure 12 for detail.

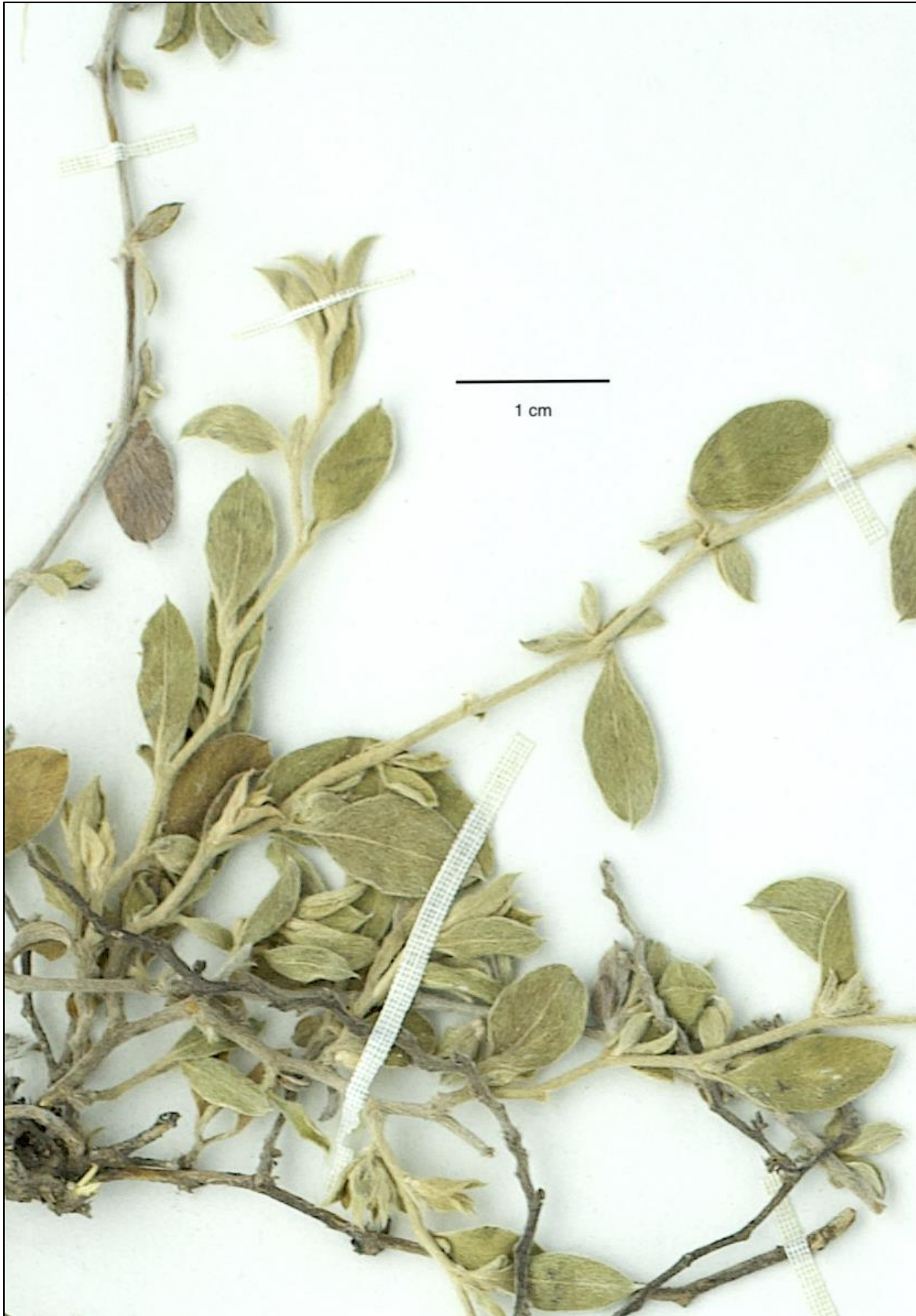


Figure 12. Detail of *I.M. Johnston 7661* (US); see Figure 11.