CONVOLVULACEAE OF SONORA, MEXICO. II: *CUSCUTA*

Mihai Costea

Department of Biology
Wilfrid Laurier University
75 University Avenue W
Waterloo, ON, N2L 3C5, CANADA
mcostea@wlu.ca

Richard S. Felger

Herbarium, University of Arizona
P.O. Box 210036, Tucson, Arizona 85721, U.S.A.
and Sky Island Alliance, P.O. Box 41165
Tucson, Arizona 85717, U.S.A.
rfelger@ag.arizona.edu

Daniel F. Austin

Arizona-Sonora Desert Museum
2021 N. Kinney Road, Tucson, Arizona 85743, U.S.A.
and Herbarium, University of Arizona
P.O. Box 210036, Tucson, Arizona 85721, U.S.A.
dr_ipomoea@yahoo.com

Thomas R. Van Devender

Sky Island Alliance, P.O. Box 41165
Tucson, Arizona 85717 and Herbarium
University of Arizona
P.O. Box 210036, Tucson, Arizona 85721, U.S.A.
VanDevender@skyislandalliance.org

J. Jesús Sánchez-Escalante

Universidad de Sonora
Dept. de Investigaciones Científicas y Tecnológicas
Rosales y Niños Héroes, Centro
Hermosillo, Son, 83000, MÉXICO
jsanchez@guayacan.uson.mx

ABSTRACT

This article is the second part of a comprehensive floristic and taxonomic study of the Convolvulaceae occurring in the state of Sonora, Mexico in which we examine the parasitic genus *Cuscuta* (dodder). We document for the first time 21 species belonging to subgenus *Grammica*, the largest and most complicated taxonomically infrageneric group of *Cuscuta*. Sonoran dodders represent about a third of the total number of species found in Mexico, and the diversity of species is most similar to that of the Baja California Peninsula and Arizona (12 and 11, respectively species in common), followed by New Mexico (nine species in common). The best represented in Sonora is the *C. umbellata* clade, with seven of the nine North American species growing in this geographical area. Two species, *C. campestris* and *C. indecora*, are invasive agricultural pests that have likely been introduced in Sonora with contaminated alfalfa seeds. We revise the nomenclature and typification of all the taxa. Dichotomous identification keys, detailed descriptions, phenology, host range, local and global geographic distribution data are provided.

RESUMEN

Este artículo es la segunda parte de un estudio florístico y taxonómico detallado de la familia Convolvulaceae del Estado de Sonora, México en el cual examinamos el género parasítico *Cuscuta* (fideo). Documentamos por primera vez 21 especies pertenecientes al subgénero *Grammica*, el grupo infragenérico de *Cuscuta* taxonómicamente más grande y complicado. Las especies sonorenses representan alrededor de un tercio del total de especies encontradas en México, y la diversidad de especies es mas similar a la de la Peninsula Baja California y Arizona (12 y 11 especies en común, respectivamente), seguida por Nuevo México (nueve especies en común). La mejor representada en Sonora es el clado *C. umbellata*, con siete de las nueve especies norteamericanas creciendo en esta área geográfica. Dos especies, *C. campestris* y *C. indecora*, son plagas agrícolas invasoras que han sido introducidas a Sonora a través de semillas de alfalfa contaminadas. Revisamos la nomenclatura y tipificación de todos los taxones. Se proporcionan claves de identificación dicotómicas, así como descripciones detalladas, y datos de fenología, distribución de hospederos y distribución geográfica tanto local como mundial.

KEY WORDS: *Cuscuta*, floristic diversity, ecology, geographic distribution, Mexico, Sonora, vegetation, typification

INTRODUCTION

This is the second part of a comprehensive study regarding the Convolvulaceae of Sonora (Felger et al. 2012). In the first part, we included a general introduction, information about the growth forms, cases of endemism/rare species, species diversity, and types of vegetation for all the genera/species. The first part also provided identification keys, and extensive taxonomic and floristic data for all the Convolvulaceae genera except *Cus-*

cuta (dodder). Since the diversity of dodder species and their association with certain vegetation types were presented together with the other Convolvulaceae (Felger et al. 2012), this article concludes the monographic study of this botanical family in Sonora with a taxonomic and floristic account of the genus *Cuscuta*.

Cuscuta is nearly cosmopolitan and comprises over 200 species (Costea 2007–onwards). Although some dodders are agricultural pests (Costea & Tardif 2006), more numerous *Cuscuta* species require conservation measures (Costea & Stefanović 2009). Roughly 75% of species are native to the Americas and about 30% to Mexico and southern USA (Stefanović et al. 2007). We have documented 21 species of *Cuscuta* in the flora of Sonora, a number that is higher or comparable to that of the neighboring areas to the north and west (Arizona, the two Baja California states, California, and New Mexico; see table 1, Felger et al. 2012). Interestingly, while the species diversity of the other Convolvulaceae genera increases towards southern Mexico and Central America, dodder species richness declines sharply in these geographical areas (Felger et al. 2012). The 21 species that occur in Sonora belong to nine of the 15 clades of subgenus *Grammica*, the most complex infrageneric taxon of *Cuscuta* (Stefanović et al. 2007). The best represented in Sonora is the *C. umbellata* clade (clade "L") with seven of the nine North American species growing in Sonora (*C. desmouliniana*, *C. legitima*, *C. leptantha*, *C. odontolepis*, *C. polyanthemos*, *C. tuberculata*, and *C. umbellata*). This strongly suggests that Sonora is part of the genetic center of origin for this clade, which has a complicated evolutionary history shaped by reticulate evolution (Costea & Stefanović 2010). The other eight clades of subg. *Grammica* are represented in Sonora by one species (*C. salina*, clade "A"; C. *tinctoria*, clade "G"; *C. corymbosa* var. *grandiflora*, clade "J", *C. indecora*, clade "M"; *C. campestris*, clade "B"; *C. vandevenderi*, clade "N"), two species (*C. azteca* and *C. chinensis* var. *applanata*, Clade "H"; *C. americana* and *C. macrocephala*, clade "I"), or three species (*C. boldinghii*, *C. costaricensis*, and *C. erosa*, clade "K").

CUSCUTA L., Sp. Pl. 124. 1753. [Based on the Aramaic and Hebrew triradical root of the verb K-S-Y (כָּסָה Kaph, שׁ Shin, י Yodh), יָשַׂךְ, which means "to cover" (Costea & Tardif 2004)].

Common names.—Dodder; fideo

Herbaceous **vines.** Stems filiform, yellow or orange, trailing or dextrorsely twining and attached to the host by numerous small haustoria, glabrous. **Leaves** reduced to minute, alternate scales. **Inflorescences** monochazial clusters further grouped in cymose inflorescences that are often confluent. **Flowers** 4–5-merous, small, always ± fleshy when fresh, thick or membranous-thin when dry, white, white-cream, sometimes yellowish or reddish. Conic-cylindrical papillae present or absent on the pedicels, perianth and ovary/capsule; laticifers visible or not in the calyx, corolla, ovary/capsules, translucent, white, yellow or orange, isolated or arranged in rows especially in the midveins of the calyx and corolla lobes, round, ovoid or elongated. Calyx gamosepalous; lobes basally overlapping or not, sometimes with multicellular projections (*C. chinensis* var. *applanata*, *C. boldinghii*). Corolla gamopetalous with lobes imbricate in bud, sometimes with a subapical cusp or horn-like multicellular appendage (*C. boldinghii*, *C. costaricensis*, *C. erosa*). Stamens alternating with the corolla lobes. Pollen 3-colpate (sometimes 4- or 5-colpate in the same anther), tectum imperforate to reticulate. Infrastaminal scales commonly present, scale-like appendages dentate or fringed, bridged and adnate to the corolla tube base, forming a corona alternating with the corolla lobes. Ovary superior, 2-locular, each locule with 2 anatropous ovules. Styles 2, terminal, distinct or united, equal or unequal. Stigmas spherical to linear (only distinct unequal styles with spherical stigma in the species from Sonora). **Fruits** capsules, indehiscent (sometimes opening irregularly between the styles) or circumscissile by a ± regular line near the base. **Seeds** 1–4 per capsule, 3-angled or dorsoventrally compressed; endosperm nuclear; embryo uniformly slender, 1–3-coiled, without cotyledons, consisting mostly from the hypocotyl; seed coat alveolate when dry and papillate when hydrated (rarely not alveolate/papillate with cells ± rectangular, puzzle-like arranged).

Cuscuta campestris and *C. indecora* are weeds, the former subcosmopolitan, the latter widespread in North and South America. Both species have been likely introduced to Sonora with contaminated legume seeds (e.g., alfalfa; Costea & Tardif 2006). Another species, *C. tinctoria*, may also have been introduced to Sonora on the cultivated tree *Schinus terebinthifolia*. Although none of the *Cuscuta* spp. are endemic to Sonora, many occur

only here and in adjacent geographical areas (Table 1, Felger et al. 2012). The diversity of *Cuscuta* species in Sonora is most similar to that of the Baja California Peninsula and Arizona (12 and 11, respectively common species), followed by New Mexico (9 common species), while only three of the Sonoran species occur in California (Table 1, Felger et al. 2012).

Selected references.—Stefanović et al. (2007), Welsh et al. (2010), Wright et al. (2011, 2012), Yuncker (1932, 1965).

Identification of most *Cuscuta* spp. is a lengthy process because rehydration of flowers, dissection, and examination under a microscope are usually necessary. Measurements of floral parts were done on rehydrated herbarium material. Length of flowers was measured from the base of calyx to the tip of straightened corolla lobes. The texture of flowers and the color of calyx were noted on dry herbarium material. Observation of papillae and laticifers requires magnifications of at least 100 ×. Examination of seed surface requires magnifications of at least 150 ×. In describing the stem, the following categories based on stem diameter were used (Yuncker 1921): "slender" with the diameter of 0.35–0.4 mm, "medium" with the diameter of 0.4–0.6 mm, and "coarse" when diameter is greater than 0.6 mm. The geographical distribution, both in Sonora and Mexico, is based on herbarium specimens.

The host range is also based on herbarium labels as well as observations by Richard Felger; hosts observed in other geographical areas are included when they are present in Sonora.

SEM images of the flowers for some species are provided to help identification. The vouchers are indicated ("SEM") in the lists of typical collections examined. Pictures were taken with the scanning electron microscopes Hitachi S-570 and LEO 1530 FE-SEM at 15 KV. Samples were coated with 30 nm gold using an Emitech K 550 sputter coater. Numerous images for all the species, including the types, with details of dissected flowers are available from Digital Atlas of *Cuscuta* (Costea 2007–onwards). All specimens cited have been seen by Costea and are at ARIZ unless otherwise indicated. For citation of herbarium specimens see Felger et al. (2012). Plants not native to flora area are marked with an asterisk (*).

1. Capsules indehiscent.
   2. Corolla lobes with inflexed apices. Often weeds in alfalfa and other crops.
      3. Perianth membranous; calyx yellow, shiny-reticulate when dry, with obtuse to rounded apices. Capsules globose-depressed to depressed, 1.3–2.8 × 1.9–3.8 mm; not thickened or risen around the large interstylar aperture ____ **C. campestris**
      3. Perianth fleshy; calyx brownish not shiny reticulate when dry, with acute lobes. Capsules globose to subglobose, thickened and risen around the medium interstylar aperture_____ **C. indecora**
   2. Corolla lobes straight. Not weeds.
      4. Stamens equaling to longer than corolla lobes. Capsules globose-depressed to globose-obovoid with 3–4 seeds _____**C. vandevenderi**
      4. Stamens shorter than corolla lobes. Capsules elliptical-ovoid with 1 seed_____**C. salina** var. **salina**
1. Capsules circumscissile near the base (the line of dehiscence is readily detectable even at the base of young ovaries; at this stage, the carpellary wall will tear along the dehiscence line when light pressure is applied).
   5. Corolla lobes with a subapical horn-like projection.
      6. Bracts broadly triangular, 3–3.5 mm long. Flowers 4.2–5.5 mm long; calyx lobes acuminate, without a subapical dome- or horn-like protuberance_____ **C. costaricensis**
      6. Bracts ovate to lanceolate, 0.75–2 mm long. Flowers 2.5–4.5 mm long; calyx lobes obtuse, truncate to acute with a subapical, dome- or horn-like protuberance.
         7. Calyx lobes orbicular to oblong-obovate, apex nearly truncate not exceeded by the subapiacal dome-like appendage. Seeds 0.94–1.45 × 0.8–1.38 mm _____ **C. erosa**
         7. Calyx lobes ovate, oblong to slightly spathulate, apex obtuse to acute, exceeded by the apical horn-like appendage. Seeds 0.75–1.1 × 0.7–0.9 mm_____**C. boldinghii**
   5. Corolla lobes without subapical projections.
      8. Calyx lobes round to wider than long, with obtuse or rounded apex.
         9. Flowers 2.5–4.2 mm long. Capsules globose-ovoid to ovoid. Seeds 1 per capsule _____**C. americana**
         9. Flowers 4.5–6.5(–7) mm long. Capsules globose to globose-depressed. Seeds usually more than 1 per capsule.
            10. Calyx lobes not or barely overlapping_____ **C. corymbosa** var. **grandiflora**
            10. Calyx lobes broadly overlapping.
               11. Flowers 5–6.5 mm long; corolla lobes mostly erect ca. ¼ of the corolla tube; stamens included, filaments 0.1–0.3 mm long; infrastaminal scales ca. ⅔ as long as the corolla tube _____ **C. macrocephala**
               11. Flowers 4–5.2 mm long; corolla lobes initially erect, later reflexed, ± equaling the tube; stamens exerted, filaments 0.8–1.2 mm long; infrastaminal scales equaling corolla tube_____ **C. tinctoria**
      8. Calyx lobes triangular-ovate to lanceolate, longer than wide with obtuse, acute to acuminate apex.

12. Calyx ¼–¾ of the corolla tube.
    13. Inflorescences dense, paniculiform-glomerulate; pedicels to 1 mm long. Calyx lobes basally overlapping _____ **C. odontolepis**
    13. Inflorescences loose, umbelliform or racemiform; pedicels 2–15 mm long. Calyx lobes not basally overlapping.
        14. Flowers 5–7.5 mm long; corolla lobes ca. ½ the tube _____ **C. polyanthemos**
        14. Flowers 2.5–4.5(–5) mm long; corolla lobes equaling the tube.
            15. Flowers 5-merous; calyx lobes carinate and/or with multicellular protuberances on the midveins; corolla lobes erect _____ **C. tuberculata**
            15. Flowers 4-merous; calyx lobes not carinate, without multicellular protuberances on the midveins; corolla lobes spreading to reflexed _____ **C. leptantha**
12. Calyx equaling or somewhat longer than corolla tube.
    16. Inflorescences umbellate.
        17. Papillae present on the pedicels, calyx and corolla lobes; infrastaminal scales ca. ¾ of the corolla tube _____ **C. desmouliniana**
        17. Papillae absent on the pedicels and calyx (sometimes present of the adaxial face of corolla lobes); infrastaminal scales equaling or slightly longer than the corolla tube.
            18. Flowers 4.0–5.5(–6.0) mm long; calyx lobes acuminate _____ **C. legitima**
            18. Flowers 2–3 mm long; calyx lobes obtuse to acute _____ **C. umbellata** var. **umbellata**
    16. Inflorescences glomerulate or dense paniculiform.
        19. Flowers thick, brown-reddish when dry; infrastaminal scales oblong, distally truncate and superficially denticulate, bifid or irregularly fringed with a few fimbria _____ **C. dentatasquamata**
        19. Flowers membranous, creamy-yellow upon drying; infrastaminal scales distally rounded and uniformly fringed.
            20. Calyx lobes not carinate or weakly so (carina not visible without a microscope), with acute lobes; styles 0.4–0.7 mm long _____ **C. azteca**
            20. Calyx lobes carinate, with obtuse to rounded lobes; styles 0.8–1.8 mm long _____ **C. chinensis** var. **applanata**

Cuscuta americana L., Sp. Pl. 1:124. 1753. Type: U.S.A.: "Habitat in Virginia," *Kalm s.n.* (conserved, 170.5, photos S-LINN!, Reveal et al. 1990).

Stems medium, yellow-orange. **Inflorescences** glomerulate or dense paniculiform, often confluent. Pedicels 0.2–1 mm long, bracts 1 at bases of clusters, 0–1 at the base pedicels, 1.2–2.2 mm long, ovate to lanceolate, margins entire, apex acute. **Flowers** 5-merous (Fig. 1d), 2.5–4.2 mm long, thick, white when fresh, brownish upon drying. Papillae absent. Laticifers not visible or barely visible in the calyx and corolla lobes, isolated, elongated. Calyx 2.4–3.3 mm long, brownish, cylindric, ¾ to equaling corolla tube, divided ca. ¼ the length, tube 1.5–2.4 mm long, lobes 0.5–0.9 mm long, basally overlapping, broadly ovate, not carinate, margins entire, apex rounded to obtuse. Corolla 2–3.3 mm long, tube 1.7–2.5 mm long, cylindric, lobes 0.5–0.8 mm long, usually erect, sometimes slightly spreading, ⅓–¼ of the corolla tube, broadly ovate, margins entire, apex obtuse, ± cucullate to straight. Stamens included, shorter than the lobes; anthers 0.25–0.4 × 0.25–0.4 mm, broadly ovate to subround, filaments 0.1–0.3 mm long. Infrastaminal scales 1.4–1.8 mm long, ¾–⅘ the length of corolla tube, bridged at 0.7–0.8 mm, triangular to oblong, short-fringed, fimbriae 0.05–0.15 mm. Styles 1.5–2.2 mm long, equal to longer than the ovary, uniformly filiform. **Capsules** circumscissile, 1.8–3 × 0.8–2 mm, globose-ovoid to elliptic, not thickened or risen around the small interstylar aperture, not translucent, capped by the withered corolla. Seeds 1 per capsule, 1.42–1.57 × 1–1.19 mm, subglobose to ellipsoid, seed coat cells obscurely alveolate/papillate.

Sonora.— Relatively common and widespread; Sonoran Desert except the more arid regions, coastal and foothills thornscrub, tropical deciduous forest, oak woodland, and occasionally a weed in *Citrus* groves; ca. 10–1050 m. Flowering throughout the year but especially September–December. Parasitizes a wide variety of woody and herbaceous genera in Sonora including *Acalypha californica, Aloysia sonorensis, Bursera* including *B. microphylla*, *Celtis pallida*, *Citharexylum flabellifolium*, *Colubrina viridis*, *Cottsia* (*Janusia*) including *C. gracilis*, *Coursetia glandulosa*, *Haematoxylum brasilleto*, *Haplophyton cimicidum*, *Havardia mexicana*, *Jatropha cardiophylla*, *Karwinskia humboltdiana*, *Krameria bicolor* (*K. grayi*), *Lantana velutina, Lysiloma divaricatum*, *Marsdenia edulis*, *Melochia tomentosa, Mimosa*, *Prosopis glandulosa*, *Sebastiania biloculare, Senna* including *S. pallida*, *Solanum hindsianum, Vachellia constricta*, and *Vallesia laciniata*.

General distribution.—Florida; most of Mexico: Baja California (norte) and Sur, Chiapas, Colima, Guer-

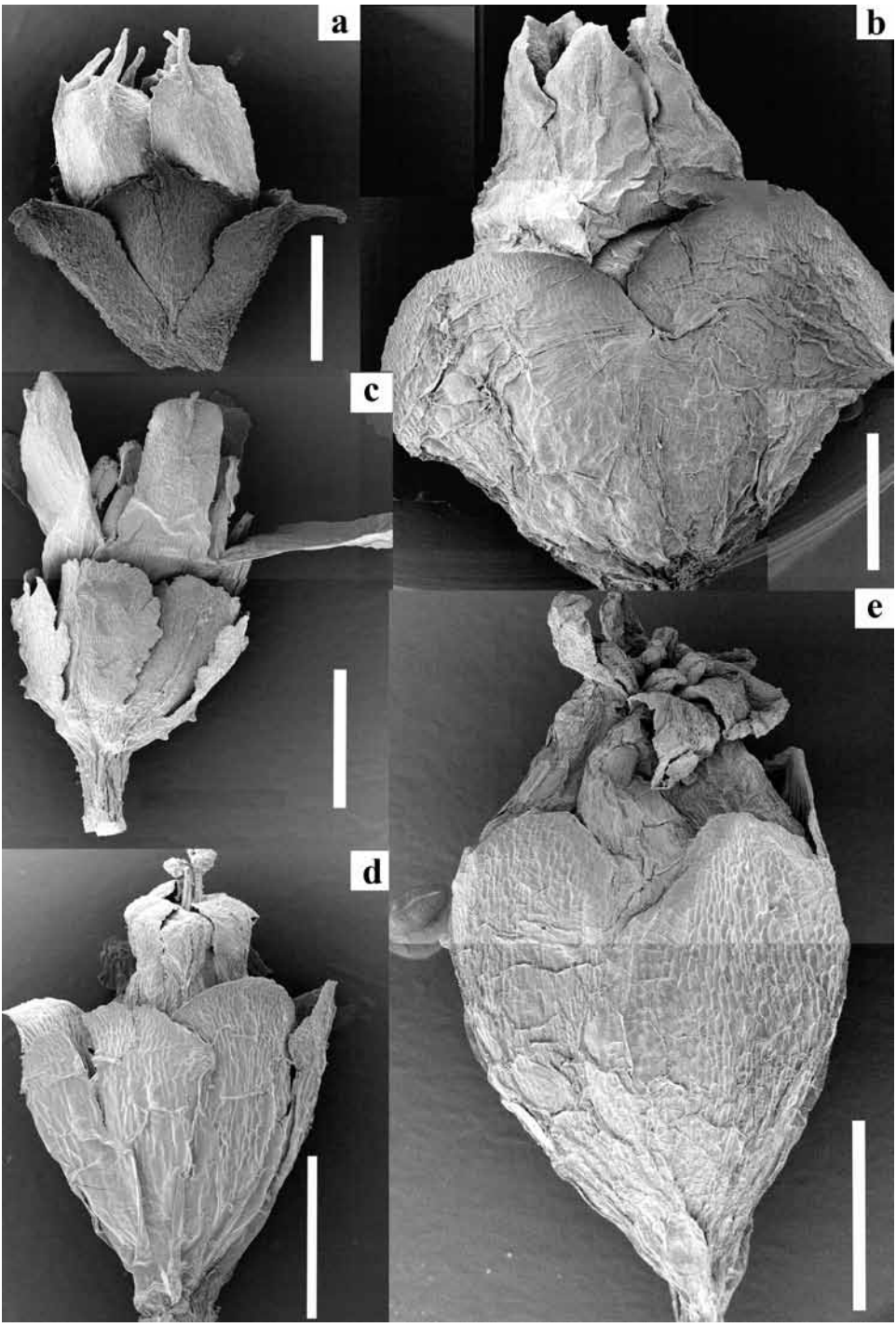

Fig. 1. Morphology of flower, **a.** *Cuscuta boldinghii* (scale bar = 0.75 mm); **b.** *Cuscuta macrocephala* (composite image resulted from the stiching of 4 photos; scale bar 1.3 mm); **c.** *Cuscuta erosa* (scale bar = 1.2 mm); **d.** *Cuscuta americana* (scale bar = 0.9 mm); **e.** *Cuscuta corymbosa* var. *grandiflora* (composite image resulted from the stiching of 2 photos; scale bar = 1.3 mm).

rero, Edo. México, Jalisco, Michoacán, Nayarit, Oaxaca, Puebla, Sinaloa, Veracruz, Yucatán; West Indies; Central and South America.

Selected reference.—Austin (1982).

Mpio Álamos: Álamos, 27°01'N, 108°56'W, 400 m, 20 Sep 1993, *Van Devender 93-823A* (ARIZ, UC, UCR, ARIZ, UC); Álamos, 27°01'N, 108°50'W, 400 m, 11 Mar 1994, *Van Devender 94-59* (ARIZ, UC); Arroyo el Mentidero at El Chinal Rd, 11.3 km S of Álamos, 26°54'45"N, 108°55'05"W, 240 m, 15 Mar 1994, *Van Devender 93-1321*; 15 Mar 1994, *Van Devender 94-176* (ARIZ, ASU, UC; ARIZ, MEXU, UC, UCR). **Mpio Altar:** 10 mi N of Dátil, on *Acacia paucispina* [= *A. constricta*], 2 Nov 1935, *Shreve 492-G*. **Mpio Cucurpe:** Palm Canyon, 17.7 mi SE of Magdalena, Cerro Cinta de Plata, *Van Devender 2 Oct 1976*. **Mpio Guaymas:** Cerro Vigía, 305 m, 9 Jan 1965, *Felger 11803*; 2 km by road W from Puente el Tigre at Mex Hwy 15, 70 m, 30 Dec 1985, *Felger 85-1538*; SE of mouth of Nacapule Canyon, 13 Jan 1965, *Felger 11963*; 5 mi N of Algodones, 10 Nov 1964, *Felger 11362*; near San Carlos Bay, 24 Oct 1939, *Gentry 4723*. **Mpio Hermosillo:** half way between Punta Chueca and town of Bahía Kino, on *Krameria grayi*, *Moser & Moser*, 2 Jan 1972. **Mpio Huatabampo:** 1.6 km N Cerrillos at rocky hills at turnoff to Manuel Caudillo, 9 km SE Melchor Ocampo, 26.4667ºN, 109.125ºW, thornscrub, 19 Oct 1994, *Friedman 413-94* (ASU). **Mpio Soyopa:** Arroyo Los Garambullos, 0.5 km SE of Río Yaqui bridge on MEX 16, 3.3 km S, 1.5 km E of Tónichi, 28°34'10"N, 109°33'00"W, 180 m, 29 Sep 2000, *Van Devender 2000-745* (ARIZ, HCIB, MEXU, USON, WLU) [SEM]; 0.6 km N of MEX 16 on road to Tónichi, just E of Río Yaqui, foothills thornscrub, 28°34'33"N, 109°33'02"W, 270 m, 7 Jan 2001, *Van Devender 2001-16* (ARIZ, USON, WLU). **Mpio Villa Pesqueira:** S foot of Sierra Pinta, ca. 33 mi S of Moctezuma, ca. 29°35'N, 110°01'W, 730 m, 15 Sep 1996, *Shortman 96-71*. **SONORAN ISLANDS. Tiburón:** N base of Sierra Kunkaak, 23 Oct 2007, *Felger 07-98*; Canyon at NE base of Sierra Kunkaak, 24 Nov 2006, *Wilder 06-428*; Top of Sierra Kunkaak Segundo, E peak of Sierra Kunkaak, 25 Nov 2006, *Wilder 06-495*.

Cuscuta azteca Costea & Stefanov., Org. Divers. Evol. 11:381. 2011. TYPE: MEXICO. SAN LUIS POTOSÍ: 1877, *Schaffner 780* (HOLOTYPE: GH!; ISOTYPES: CAS, F!, K!, NY!). *Cuscuta potosina* W. Schaffn. ex S. Watson var. *globifera* W. Schaffn. ex Yunck., Illinois Biol. Monogr. 6(2–3):40. 1921.

Stems slender, orange-yellow. **Inflorescences** glomerulate, often confluent. Pedicels 0.4–1.3 mm long. Bracts 1 at the base of clusters and 0–1 at the base of pedicels, ovate to lanceolate, 1.2–1.8 mm long, margins entire, apex acute. **Flowers** (Fig. 3c) 5-merous, 2–2.6 mm long, membranous, white when fresh, creamy-brownish when dried, papillae absent. Laticifers visible in the corolla and ovary/capsule, isolated, elongated. Calyx 1.4–1.7 mm long, straw-yellow, membranous, finely reticulate and shiny, cupulate, equaling corolla tube, divided ca. ⅔ the length, tube 0.3–0.5 mm long; lobes 0.8–1.3 mm long, not basally overlapping or only slightly so, ovate, not carinate but occasionally with a few multicellular protuberances along midveins, margins entire, apex acute. Corolla 1.5–2.1 mm long, the tube 0.8–1.2 mm long, campanulate but becoming globose in fruit; lobes 0.8–1.2 mm long, erect to spreading, shorter to equaling the tube, ovate-triangular, margins entire or with a few irregular teeth, apex acute, straight to slightly incurved. Stamens exserted, shorter than corolla lobes; anthers 0.25–0.3 × 0.25–0.3 mm, ovate to subround, filaments 0.3–0.6 mm long. Infrastaminal scales 0.9–1.3 mm long, equaling to longer than corolla tube, bridged at 0.1–0.25 mm, oblong, fringed in the distal ½, fimbriae 0.15–0.3 mm long. Styles 0.4–0.7 mm long, shorter than the ovary, evenly filiform. **Capsules** circumscissile, 1.2–2.5 × 1–1.8 mm, depressed-globose, not thickened or risen around the small interstylar aperture, translucent, loosely surrounded or capped by the withered corolla. **Seeds** 3–4 per capsule, 0.8–1 × 0.7–0.9 mm, angled, broadly elliptic to sub-round; seed coat cells alveolate/papillate.

Sonora.—Infrequent in east-central and southeastern Sonora in tropical deciduous forest and pine-oak forest; 370–1920 m. Flowering September–November. Potential herbaceous hosts include *Ayenia*, *Cosmos*, *Dalea*, *Evolvulus,* and *Heterosperma*.

General distribution.—Arizona, New Mexico; Chihuahua, Coahuila, Distrito Federal, Durango, Guanajuato, Edo. México, Hidalgo, Morelos, Oaxaca, Puebla, Querétaro, San Luis Potosí.

Selected reference.—Costea et al. (2011a).

Mpio Álamos: El Guayabo crossing of Río Cuchujaqui, 2.6 km NE of Sabinito Sur, 14 km (by air) E-SE Álamos, tropical deciduous forest on slopes, *Taxodium-Salix* gallery forest along stream, 27°00'05"N, 108°47'08"W, 370 m, 21 Nov 1993, *Steinmann 93-349* (ARIZ, ASU, UC, UCR). **Mpio Yécora:** Restaurant Puerto de la Cruz, 14 km W of Yécora on MEX 16, NE base of Mesa del Campanero (El Enmedio), 28°22'30"N 109°01'42"W, 1920 m, 6 Sep 1996, *Van Devender 96-451* (ARIZ, USON, WLU) [SEM].

Cuscuta boldinghii Urb., Repert. Spec. Nov. 16:38. 1919. TYPE: NETHERLANDS ANTILLES: Bonaire, *Boldingh 7379* (HOLOTYPE: at B was apparently destroyed during the Second World War; ISOTYPES: K!, NY!, U (photo!, flowers not dissected)).

Cuscuta ceratophora Yunck., Illinois Biol. Monogr. 6(2–3):28. 1921. Type: MEXICO. Guerrero/Michoacán: 8 Oct 1898, *Langlassé 438* (holotype: US!; isotypes: F!, GH!, K!, NY!, P (not seen)).

Stems slender, yellow-orange. **Inflorescences,** glomerulate or dense-paniculiform, globose-isolated or confluent. Pedicels 0.2–0.6 mm long. Bracts 1 at the base of clusters, 0–2 at the base of pedicels, 0.75–1.8 mm long, ovate to lanceolate resembling sepals, margins entire, apex acuminate to attenuate. **Flowers** 5-merous (Fig. 1a), 2.5–4 mm long, membranous, creamy when fresh, brown when dried. Papillae absent. Laticifers not visible. Calyx 2.3–2.8 mm long, brownish, not reticulate, shiny, campanulate, ca. as long as the corolla tube, divided ½–⅔ the length; tube 0.6–1.1 mm long; lobes 1.3–1.8 mm long, overlapping, ovate, oblong to obovate, not carinate, margins entire or finely serrulate-denticulate, apex acute or obtuse with a subapical horn-like projection, 0.3–0.6 mm long, prolonging beyond the apex. Corollas 2.2–3.2 mm long, tube 1.2–1.6 mm long, campanulate; lobes 1.2–1.8 mm long, ca. as long as the tube, spreading to reflexed, ovate to lanceolate, margins entire to irregular denticulate, apex obtuse but with a subapical horn-like straight projection 0.3–0.7 mm long (like the calyx lobes). Stamens exserted, shorter than corolla lobes, 0.4–0.5 × 0.2–0.3 mm; filaments 0.5–0.9 mm long; anthers ovate to elliptic. Infrastaminal scales 1.2–1.6 mm long, equaling corolla tube, bridged at 0.5–0.7 mm, oblong to broadly ovate, rounded, sparsely short-fringed, fimbriae 0.04–0.15 mm long. Styles 0.9–2 mm long, longer than the ovary, stout and subulate, wider at the base and tapering toward the stigma. **Capsules** circumscissile, 1.8–2.3 × 1.8–2.3 mm, globose, not thickened or risen around the small interstylar aperture, not translucent, capped by the withered corolla. **Seeds** 1–4 per capsule, 0.75–1.1 × 0.55–0.65 mm, angled, subround, ovate to broadly elliptic, seed coat cells ± polygonal [not alveolate/papillate] and puzzle-like arranged.

Sonora.—Southern parts in coastal thornscrub and tropical deciduous forest; 20–260 m. Flowering September–January. In Sonora recorded on *Dicliptera resupinata* and *Euphorbia albomarginata*. Potential hosts from elsewhere in Mexico include *Acalypha*, *Aeschynomene, Bouchea, Dalea, Desmodium, Euphorbia, Hamelia, Phyllanthus, Salvia, Tephrosia,* and *Wedelia*.

General distribution.—Baja California Sur, Chiapas, Edo. México, Jalisco, Guerrero, Michoacán, Sinaloa, Tabasco, Tamaulipas, Veracruz, Yucatán; West Indies; Guatemala, Honduras, Costa Rica; Venezuela.

Selected reference.—Costea et al. (2011b).

Mpio Álamos: Güirocoba crossing of Río Cuchujaqui, 12.3 km (by air) S-SE of Álamos, 26°56'15"N, 108°53'W, 260 m, on *Dicliptera resupinata,* 28 Jan 1992, *Van Devender 92-31* (ARIZ, UC). **Mpio Huatabampo:** 2.3 km NE of Las Bocas, ca. 50 km (by air) S of Navojoa, dense coastal thornscrub, 26°37'53"N, 109°19'36"W, 20 m, on *Euphorbia albomarginata*, 22 Sep 1994, *Van Devender 94-692* (ARIZ, ASU, UC, UCR) [SEM].

***Cuscuta campestris** Yunck., Mem. Torr. Bot. Club 18:138. 1932. Type: U.S.A. Texas: wet prairies, [no date], *Lindheimer 126* (holotype: MO!; isotype: MO!).

Cuscuta pentagona Engelm. var. *calycina* Engelm., Amer. J. Sci. 45:76. 1843 [1845]. Type: *Lindheimer 126* (lectotype: Yuncker 1921) MO!; isolectotype: MO!). *Cuscuta arvensis* Beyr. ex Engelm. var. *calycina* (Engelm.) Engelm., Trans. Acad. Sci. St. Louis 1:495. 1859.

Stems medium, yellow to orange. **Inflorescences** dense, corymbiform-glomerulate. Bracts 1 at the base of clusters, 0–1 at the base of pedicels, 0.9–1.5 mm long, membranous, ovate, ovate-triangular to lanceolate, margins entire, apex acute. Pedicels 0.3–2.5(–3.5) mm long. **Flowers** (4–) 5-merous, 2–3.6 mm, membranous. Papillae absent. Laticifers evident in the calyx, corolla, and ovary/capsule, isolated or arranged in rows, round, ovoid or elongated. Calyx 1.6–2.1 mm long, yellow, reticulate, shiny, cupulate, ca. as long as corolla tube, divided ⅖–⅗ the length, the tube 0.5–0.9 mm long; lobes 1–1.4 mm long, overlapping, ovate triangular, not carinate, margins entire, apex obtuse to rounded. Corolla 2–3.5 mm long, white-creamy when fresh, creamy or golden-yellow when dried, the tube (1.1–)1.5–1.9 mm, campanulate, not saccate; lobes 1.4–1.8 mm long, spreading, triangular to triangular-lanceolate, ca. as long as the tube, margins entire, apex acute to acuminate, inflexed. Stamens exserted, shorter than corolla lobes; anthers broadly elliptic to subround, (0.3–)0.4–0.5 × 0.3–0.4 mm, filaments 0.4–0.8 mm long. Infrastaminal scales 1.5–2 mm long, equaling or exceeding corolla tube, bridged at 0.3–0.5 mm, oblong-ovate to spatulate, rounded, uniformly dense fimbriate, fimbriae 0.3–

0.4(–0.5) mm long. Styles evenly filiform, 0.5–1.6 mm long, shorter to ca. as long as the ovary. **Capsules** indehiscent, globose-depressed to depressed, 1.3–2.8 × 1.9–3.8 mm, not thickened or risen around the large interstylar aperture, sometimes translucent; persistent corolla enveloping ⅓ or less of the capsule base. **Seeds** 4 per capsule, angled, subrotund to broadly elliptic, 1.12–1.54 × 0.9–1.1 mm, seed coat cells alveolate/papillate, hilum region subterminal. $2n = 56$.

Sonora.—Collected from a relatively undisturbed area in Arizona close to the border with Sonora, in oak-grassland at ca. 1040 m, and from agricultural fields in coastal thornscrub in southern Sonora at ca. 10 m. Flowering June–September. Host species in Arizona and Sonora include *Artemisia, Bidens laevis, Brassica nigra*, *Lotus*, *Polygonum, Rumex, Senna, Thelesperma*, and *Xanthium*. *Cuscuta campestris* may be more common both in Sonora and elsewhere in Mexico than the scarce herbarium vouchers suggest. Weeds are less collected compared to native plants in Mexico.

General distribution.—Subcosmopolitan; widespread in Canada and USA; Chihuahua, Durango, Guanajuato, Jalisco, Michoacán, Morelos, San Luis Potosí; Central and S America; Europe, Asia, Africa, Australia. This species is perhaps the most widespread and successful weed of the genus worldwide (Costea & Tardif 2006).

Selected references.—Costea et al. (2006a), Costea and Tardif (2006).

Mpio Etchojoa: Los Tejabanes, Etchojoa, weed in a crop of *Carthamus tinctorius*, *Sainz 12 Jun 2010* (WLU). **ARIZONA. Santa Cruz Co.:** Sycamore Canyon, Pajarito Mountains, *Van Devender 13 Aug 1977*.

Cuscuta chinensis Lam. var. **applanata** (Engelm.) Costea & Stefanov., Org., Divers. Evol. 11:383. 2011. TYPE: U.S.A. ARIZONA: 1851–1852, *Wright 1623* (LECTOTYPE: MO!; ISOLECTOTYPES: K!, NY!, US!). *Cuscuta applanata* Engelm., Trans. Acad. Sci. St. Louis 1:479. 1859.

Stems slender, yellow to creamy. **Inflorescences** glomerulate to dense paniculiform, often confluent. Pedicels 0.4–3 mm long. Bracts 1 at the base of clusters, 0–1 at the base of pedicels, 0.9–2.5 mm long, ovate to subround, carinate, margins entire, apex obtuse to rounded. **Flowers** 5-merous (Fig. 3a), 2.5–3.5 mm long, membranous, white-creamy when fresh, creamy-yellow upon drying. Papillae absent. Laticifers evident in the bracts, calyx, corolla, anthers, and ovary, isolated or in rows, ovoid to elongated. Calyx 1.5–2 mm long, straw-yellow, reticulate and shiny, shallowly cupulate, ca. as long as the corolla tube, divided ca. ½ to the base; tube 0.6–0.8 mm long; lobes 0.8–1 mm long, basally overlapping, broadly triangular-ovate, carinate (Fig. 3b) and with irregular multicellular protuberances along midveins, margins entire, apex obtuse to rounded. Corolla 2–3.3 mm long, tube 1–1.5 mm long, campanulate but becoming globose in fruit; lobes 0.9–1.3 mm long, spreading, ca. as long as the tube, ovate-lanceolate, margins entire, apex obtuse to rounded, ± incurved (but not inflexed). Stamens ± exserted, shorter than the lobes; filaments 0.4–0.8 mm long; anthers 0.4–0.6 × 0.4–0.5 mm, broadly ovate to surround. Infrastaminal scales 1.2–1.8 mm long, equal or longer than corolla tube, bridged at 0.2–0.4 mm, obovate, long fringed, fimbriae 0.2–0.4 mm. Styles 0.8–1.8 mm, equal or longer than the ovary, evenly filiform. **Capsules** circumscissile, 1.2–2.5 × 0.8–1.6 mm, depressed-globose and slightly angular, not thickened or risen around the small interstylar aperture, translucent, surrounded by the withered corolla. **Seeds** (1–) 3–4 per capsule, 0.85–1.2 × 0.8–1.1 mm, angled, broadly-elliptic, seed coat cells alveolate/papillate.

Sonora.—Apparently uncommon, with three records from the northern and central part of the state; desert grassland, Sonoran Desert, and tropical deciduous forest; 700–1350 m. Flowering August–September. Potential hosts, mostly herbaceous, include *Amaranthus*, *Ambrosia*, *Anisacanthus*, *Bahia*, *Bahiopsis*, *Baileya*, *Boerhavia*, *Chamaecrista*, *Chamaesaracha*, *Croton*, *Dalea, Ipomoea*, *Parthenium*, *Sanvitalia*, *Solanum*, *Tiquilia, Tragia*, *Viguiera*, and probably others.

General distribution.—Arizona, New Mexico, Texas, Utah; Aguascalientes, Chihuahua, Coahuila, Durango, Guanajuato, Hidalgo, Oaxaca, Querétaro, Puebla, San Luis Potosí, Zacatecas.

Selected reference.—Costea et al. (2011a).

Mpio Ónavas: Rancho La Mula, 28.2 km SE of Río Yaqui on MEX 16 (KM 195 E of Hermosillo), 28°28'50"N, 109°22'W, 790 m, tropical deciduous forest, on *Chamaecrista nicitans*, 30 Aug 2000, *Van Devender 2000-506* (ARIZ, WLU). **Mpio Santa Ana** [probably]: flats 2.5 mi S of Llano [probably Estación Llano], 15 Sep 1934, *Wiggins 7221* (CAS, US). **Mpio Santa Cruz:** 0.8 km S of Santa Cruz on road to San Lázaro,

desert grassland, 31°11'23"N, 110°36'22"W, 1340 m, on *Ambrosia confertiflora*, 17 Aug 2001, *Van Devender 2001-710* (ARIZ, USON, WLU) [SEM].

Cuscuta corymbosa Ruiz & Pav. var. **grandiflora** Engelm., Trans. Acad. Sci. St. Louis 1:483. 1859; Syst. Arrang. Sp. Cuscuta 33. 1859. (Engelmann published the same name in both publications, the same year). Type: COLOMBIA, [from Popayán?]: *Humboldt 2002*, ex herb *Willdenow 3157* (lectotype here designated: B!; fragment at MO!). Engelmann (1859) did not mention any herbarium collection for var. *grandiflora*, but he indicated as synonyms for this variety two species, *C. popayanensis* Kunth and *C. cymosa* Willd., and he further stated that both were "founded on the same specimen" collected by Humbold "New Granada, Humboldt." In the Willdenow herbarium exists only the specimen mentioned above. A "New Granada" collection of Humboldt could not be located. *Cuscuta popayanensis* Kunth, Nov. Gen. Sp. [H.B.K.] 3:123. 1818. *Cuscuta cymosa* Willd. ex Roem. & Schult., Syst. Veg., ed. 15 bis [Roemer & Schultes] 6:205. 1820.

Cuscuta inclusa Choisy, Mém. Soc. Phys. Genéve 9:275, pl. 2, f. 2, 1842. Type: MEXICO. Toluca: 1827, *Berlandier 1103* (lectotype: G!; isolectotype: F!).

Cuscuta patens Benth., Bot. Voy. Sulphur 35. 1844. Type: MEXICO. Baja California Sur: Magdalena Bay, *Bentham s.n.* (K!).

Cuscuta laxiflora Benth., Bot. Voy. Sulphur 138. 1844. Type: MEXICO. Guerrero: Acapulco, *Bentham s.n.* (K!).

Stems medium, orange. **Inflorescences** dense, corymbiform or umbellate, often confluent. Pedicels 2–6 mm long. Bracts 1 at the base of clusters, absent at the base of pedicels, 0.5–1 mm long, ovate lanceolate, margins entire, apex acute. **Flowers** 5-merous (Fig. 1e), 4.5–6.5(–7) mm long, membranous, white when fresh, creamy brownish when dried, papillae absent. Laticifers barely visible in the calyx and corolla lobes, isolated, ovoid to elongate. Calyx 2–2.5 mm long, straw-yellow to brownish, membranous, finely reticulate, not shiny, cylindric campanulate, ½–¾ as long as the corolla tube, divided ca. ¼ its length; tube 1.1–2 mm long; lobes 0.4–0.75 mm long, not overlapping or only slightly so, rounded, not carinate, margins entire. Corolla 4–6 mm long; tube 3–5 mm long, cylindric, becoming dilated in the lower ½; lobes 1–1.5 mm long, initially erect, later spreading, ⅓–¼ of the corolla length, ovate, margins entire, apex obtuse to rounded, ± incurved. Stamens included, shorter than the corolla lobes; filaments 0.1–0.3 mm long; anthers 0.5–0.6 × 0.3–0.4 mm, subround to elliptic. Infrastaminal scales 1.5–2 mm long, ½–¾ as long as the corolla tube, bridged at 0.2–0.35 mm, forming oblong ridges with fringed margins, fimbriae 0.4–0.15 mm long. Styles 2.4–4.2 mm long, much longer than the ovary, evenly filiform. **Capsules** circumscissile, 2–2.9 × 2.2–2.6 mm, globose to slightly depressed, not thickened or risen around the small interstylar aperture, translucent, surrounded by the withered corolla. **Seeds** 2–4 per capsule, 1.1–1.3 × 0.7–0.9 mm, slightly angled, broadly elliptic, sometimes with a longitudinal groove on the ventral face; seed coat cells alveolate/papillate.

Sonora.—Locally in Gulf Coast of the Sonoran Desert in a large, ecologically pristine canyon in the Guaymas region opposite Isla San Pedro Nolasco and in foothills thornscrub in east-central Sonora; also on Islas San Pedro Nolasco and San Esteban; ca. 5–450 m. Flowering December–April. Probably more widespread in the state. Parasitic especially on *Colubrina viridis* and *Vaseyanthus insularis* (Felger et al. 2011); also on *Abutilon californicum*, *Acalypha californica*, *Cottsia linearis* (*Janusia linearis*), *Mirabilis laevis* var. *villosa*, *Perityle californica,* and Poaceae.

General distribution.—One of the most common species in Mexico, where it is sometimes weedy. Baja California Sur, Chiapas, Colima, Durango, Edo. México, Guerrero, Guanajuato, Hidalgo, Jalisco, Michoacán, Morelos, Nayarit, Sinaloa, Tamaulipas, Veracruz; also in Central and South America.

Selected references.—Felger and Wilder (2011, 2012), Yuncker (1932).

Mpio Guaymas: Cañón las Barajitas, Sierra el Aguaje, 28°03'27"N, 111°09'27"W, 90 m, 19 Feb 1995, *Felger 95-208*. **Mpio Soyopa:** 0.6 km N of MEX 16 on road to Tónichi just E of Río Yaqui, 28.5758°N, 109.5505°W, 270 m, foothills thornscrub, on *Janusia linearis*, 7 Jan 2001, *Van Devender 2001-16*. **SONORAN ISLANDS. San Esteban:** N side of island, on *Vaseyanthus insularis*, 21 & 22 Dec 1966, *Felger 15405*; 10 Apr 1968, *Felger 17550*; Steep N slope of NE peak, 28°42'N, 112°35'W, 450 m, on *Mirabilis laevis* var. *crassifolia*, 26 Apr 1966, *Moran 13052*. **San Pedro Nolasco:** NE side of Island, 18 Jan 1965, *Felger 12082* [SEM]; NE side of island, N-facing slope, on shrubs and herbs, many on *Perityle californica*, also on *Vaseyanthus insularis*, 18 Jan 1965, *Felger 12082*; NE side, halfway to summit, 150 m, abundant at all elevations, mostly on *Vaseyanthus insularis*, also on grasses and many shrubs, 28 Nov 2006, *Felger 06-91*; Steep granitic slope, 16 Dec 1951, *Gentry 11354*.

Cuscuta costaricensis Yunck., Mem. Torrey Bot. Club 18:227. 1932. Type: MEXICO. Durango: Santiago Papasquiaro, Aug 1896, *Palmer 412* (holotype: US!; isotypes: B!, GH!, K!, MO!).

Cuscuta odontolepis Engelm. var. *fimbriata* Yunck., Illinois Biol. Monogr. 6(2–3):38–39. 1921.

Stems slender to medium, yellow or orange. **Inflorescences** dense, glomerulate, often confluent. Pedicels 0–1.5 mm long. Bracts 1 at the base of clusters, 0–1 at the base of pedicels, 3–3.5 mm long, broadly triangular (broader than long), margins entire, apex cuspidate. **Flowers** 5-merous (Fig. 2c), 4.2–5.5 mm long, membranous, white when fresh, creamy-white when dried. Papillae present on the calyx and corolla lobes. Laticifers visible in the corolla lobes, anthers and infrastaminal scales. Calyx 3.2–3.5 mm long, straw-yellow, reticulate, not shiny, campanulate, equaling the corolla tube, divided ⅔–¾; tube 1–1.5 mm long; lobes 1.5–2.1 mm long, basally overlapping, broadly ovate-triangular, not carinate, margins entire, apex cuspidate. Corolla 3.5–4.5 mm long; tube 2–3 mm long, campanulate; lobes 1.5–2 mm long, erect to reflexed, ½–⅓ the tube, ovate, overlapping at base, margins entire, apex rounded or obtuse but appearing cuspidate because of a subterminal dorsal cusp, 0.1–0.3 mm long, prolonging beyond the apex. Stamens barely exserted, shorter than corolla lobes; filaments 0.3–0.6 mm long; anthers 0.5–7 × 0.45–0.55 mm, elliptic. Infrastaminal scales 2–2.8 mm long, reaching filament bases, bridged at 0.4–0.6 mm, oblong-obovate, dense and long fringed, fimbriae 0.2–0.4 mm long. Styles 3–3.5 mm long, longer than the ovary, evenly filiform. **Capsules** circumscissile, 2.5–4 × 2–3.1 mm, depressed globose, thickened at the apex and with a large interstylar aperture, translucent or not, loosely surrounded and capped by the withered corolla. **Seeds** 3–4 per capsule, 1–1.2 × 0.6–0.8 mm, angled, broadly elliptic; seed coat cells alveolate/papillate.

Sonora.—East-central and southeast parts of the state in oak woodland and pine-oak forest; 1250–2100 m. Flowering August–October. Parasitic on herbaceous hosts; documented in Sonora on *Anoda*, *Cologania*, *Desmodium*, *Jaltomata procumbens*, and *Tagetes micrantha*; elsewhere in Mexico on *Heterosperma*, *Melampodium*, *Milleria*, *Salvia*, *Simsia*, and *Xanthocephalum*.

General distribution.—Chihuahua, Durango, Edo. México, Guanajuato, Jalisco, Michoacán; Guatemala, Costa Rica.

Selected reference.—Costea et al. (2011b).

Mpio Álamos: Rancho Santa Bárbara, 42.3 km E-NE of Álamos, 27°07'08"N, 108'43'18"W, 1250 m, oak woodland, on *Tagetes micrantha* and *Desmodium*, 2 Oct 2006, *Reina–G. 2006-1049* (ARIZ, WLU). **Mpio Yécora:** ca. 2 km NW of Yécora on old road to Santa Rosa, 28°22'33'N, 108°56'24"W, 1560 m, 5 Sep 1996, *Wiens 96-125* (WLU [SEM]); 8.5 km W of Restaurant Puerto de La Cruz on MEX 16 (km 257 E of Ciudad Obregón), N side of Mesa del Campanero, pine-oak forest, 28°22'15"N, 109°03'59"W, 1460 m, 22 Sep 1997, *Van Devender 97-990* (WLU); Río Yepachic near junction with Arroyo Hondo, ca. 2 km (by air) W of Chihuahua border, oak woodland with canyon riparian forest, 28°27'10"N, 108°32'15"W, 1380 m, 27 Sep 1998, on *Cologania*, *Van Devender 98-1789* (ARIZ, WLU); Yécora, 28°21'48"N, 108°55'56"W, 1556 m, 16 Sep 2006, locally common on *Salvia* and *Jaltomata procumbens*, *Reina-G. 2006-888* (ARIZ, USON, WLU).

Cuscuta dentatasquamata Yunck., Bull. Torrey Bot. Club 49:107. 1922. TYPE: MEXICO. SONORA: Los Pinitos, [27.4°N, 110.2°W, 6100 ft], 12 Oct 1890. *Hartman 119* (HOLOTYPE: GH!; ISOTYPE: US!).

Stems medium to slender. **Inflorescences** dense, glomerulate or compact-paniculiform, often confluent, pedicels 0.4–2 mm long. Bracts 1 at the base of clusters, 0–1 at the base of pedicels, 1.2–1.75 mm long, ovate-triangular to lanceolate, margins entire, apex acute to acuminate. **Flowers** 5-merous, 2.6–3.8 mm long, thick, yellowish when fresh, reddish-brown when dried. Papillae absent. Laticifers not visible. Calyx 2.3–2.6 mm long, reddish-brown, not reticulate or shiny, thick, campanulate, somewhat longer than corolla tube, divided ca. ½ the length; tube 1–1.4 mm long; lobes 1–1.4 mm long, not basally overlapping or only slightly so, triangular, carinate or with irregular multicellular protuberances along mid-veins, margins entire or irregular, apex acute. Corolla 2.5–3.4 mm long; tube 1.2–1.6 mm long, campanulate, latter ± globose; lobes 0.7–1.2 mm long, erect or spreading, ca. ⅓ as long as the tube, triangular, margins entire, apex acute straight or incurved. Stamens exerted, shorter than corolla lobes; filaments 0.3–0.4 mm long; anthers 0.25–0.4 × 0.25–0.35 mm, broadly elliptic to sub-round. Infrastaminal scales 1.2–1.5 mm long, reaching filament bases, bridged at ca. 0.5 mm, oblong, distally truncate and scarcely denticulate, bifid or irregularly fringed, fimbriae, 0.05–0.2 mm long. Styles 0.6–1.4 mm long, equaling or longer than the ovary, uniformly slender to slightly subulate. **Capsules** circumscissile, 3–4 × 1.8–2.9 mm, depressed-globose, moderately thickened but not risen around the small interstylar aperture, usually translucent, surrounded by the withered corolla at the base. **Seeds** 2–4 per capsule, 1.3–1.4 × 0.8–1.4 mm, angled, subround; seed coat alveolate/papillate.

Sonora.—This species is known in Sonora only from the type collection and flowers at least in October.

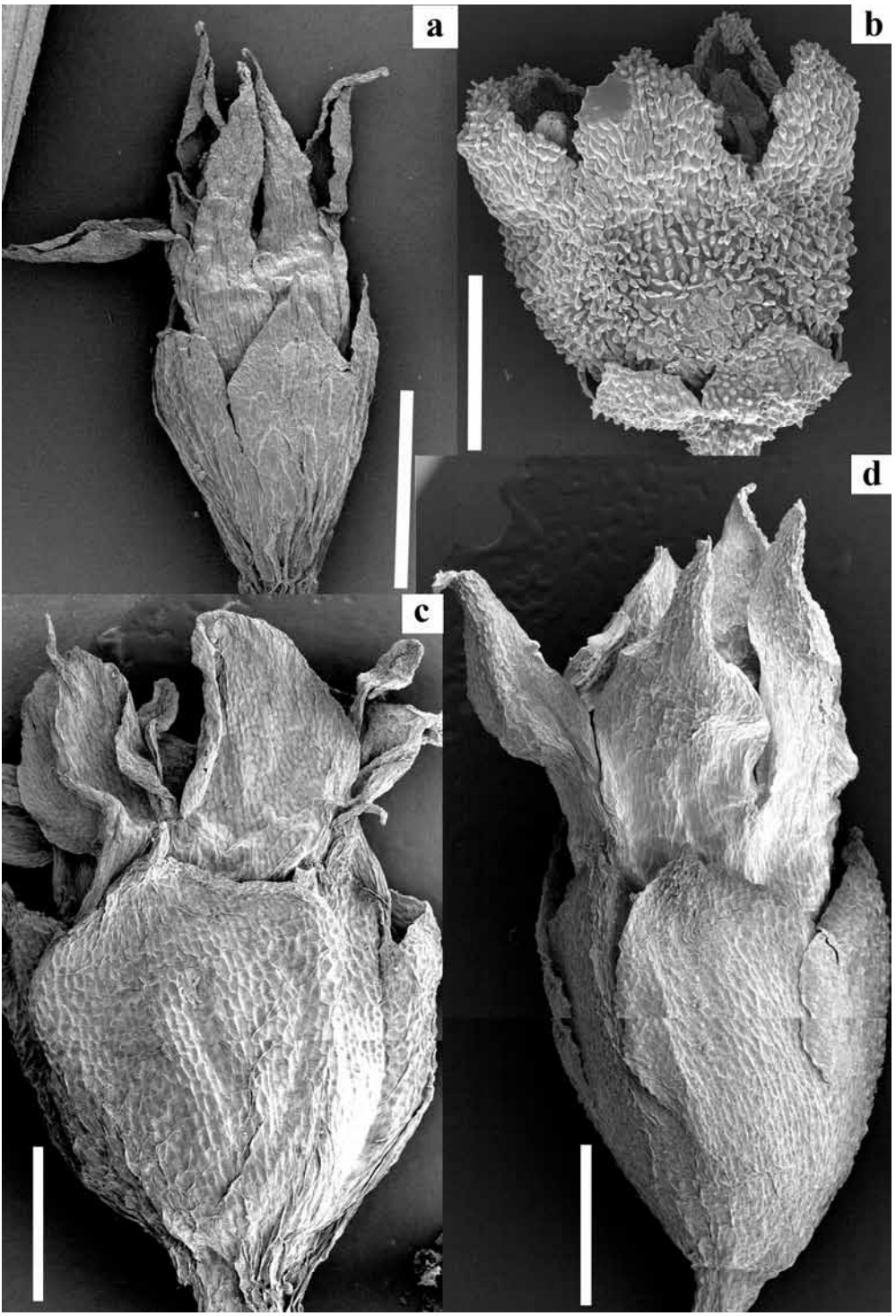

Fig. 2. Morphology of flower, **a.** *Cuscuta salina* var. *salina* (scale bar = 1.36 mm); **b.** *Cuscuta indecora* var. *indecora* (scale bar = 1 mm); **c.** *Cuscuta costaricensis* (scale bar = 1.15 mm); **d.** *Cuscuta odontolepis* (composite image resulted from the stiching of 2 photos; scale bar = 1.15 mm).

The type locality is in pine-oak forest and the host plant is *Bouvardia ternifolia*. In addition to the type collection, *C. dentatasquamata* is recorded from a canyon in southern Arizona mountains in oak woodland and should be sought elsewhere with *Bouvardia* in southern Arizona and northern Sonora mountains.

General distribution.—Arizona; Chihuahua, and Sonora; apparently very rare.

Selected reference.—Yuncker (1932).

ARIZONA. Pima Co: Florida Canyon, Santa Rita Experimental Range, Santa Rita Mountains, 7 Oct 1934, *Kearney 10580!*

Cuscuta desmouliniana Yunck., Illinois Biol. Monogr. 6(2–3):40–41. 1931. TYPE: MEXICO. SONORA: hills near Altar, 26 Aug 1884, *Pringle 105* (HOLOTYPE: NY!; ISOTYPES: ARIZ!, ASU!, G!, GH!, IND, MEXU!, MO!, NY!, US!).

Cuscuta desmouliniana var. *attenuiloba* Yunck., Illinois Biol. Monogr. 6(2–3):41. 1921. Regarding *Pringle 105,* Yuncker (1921, p 41) mentioned: "this specimen seems to be a mixture of the following two distinguishable varieties ("typical" and "attenuiloba").

Cuscuta umbellata var. *dubia* Yunck., Illinois. Biol. Monogr. 6(2–3):43. 1921. TYPE: MEXICO. SONORA: Guaymas, 22 Feb 1904, *Palmer 1209* (HOLOTYPE: US!).

Stems slender, yellow-orange. **Inflorescences** loose, umbellate, often confluent. Pedicels 1–5 mm long. Bracts 1 at the base of clusters and 0–1 at the base of pedicels, 0.6–1 mm long, ovate-lanceolate, margins entire, apex acute. **Flowers** 5-merous (Fig. 3d), 2–3 mm long, membranous, white when fresh, creamy-white when dried. Papillae usually present on the pedicels, calyx, abaxial and adaxial epidermis of corolla lobes, and sometimes on the ovary/capsule. Laticifers not visible or hardly so in the midveins of corolla lobes, elongate. Calyx 0.6–1.2 mm long, brownish-yellow, ± reticulate or shiny, campanulate, equaling or somewhat longer than the corolla tube, divided ⅓–½ the length; tube 0.25–0.5 mm long; lobes 0.5–0.76 mm long, not overlapping, triangular-ovate to lanceolate, weakly to distinctly carinate, with small dome-like multicellular projections on the midveins, margins irregular, ± revolute at the base and forming angled sinuses (especially when lobes are triangular ovate), apex acute to acuminate. Corolla 1.5–2.9 mm long; tube narrow-campanulate, 0.8–1.5 mm long; lobes 1–1.5 mm long, initially erect, later spreading or reflexed, slightly longer than the tube, lanceolate, margins entire sometimes involute upon drying and appearing very narrow, apex acute, ± incurved. Stamens short-exserted, shorter than corolla lobes; filaments 0.4–0.7 mm long; anthers 0.4–0.6 × 0.2–0.3 mm, ovate to oblong. Infrastaminal scales 0.6–1 mm long, ca. ¾ of the corolla tube, bridged at 0.1–0.2 mm, oblong to spathulate, short-fringed, fimbriae 0.05–0.15 mm long. Styles 1.2–2.1 mm long, longer than the ovary, evenly filiform. **Capsules** circumscissile, 1.5–2 × 0.9–1.7 mm, globose, to globose-depressed, slightly thickened and risen, or with a few protuberances around the inconspicuous interstylar aperture, translucent, capped by the withered corolla (Fig. 3e). **Seeds** 2–4 per capsule, 0.75–0.9 × 0.7–0.8 mm, angled, subrotund to broadly elliptic; seed coat cells alveolate/papillate.

Sonora.—Common in the Sonoran Desert, especially on sandy flats, valley floors, and bajadas, and in coastal and foothills thornscrub; near sea level–300 m. Recorded on herbaceous hosts including *Amaranthus watsonii*, *Boerhavia* (including *B. coccinea, B. triquetra*), *Euphorbia* subgenus *Chamaesyce* (especially *E. polycarpa*), *Pectis* (including *P. coulteri, P. papposa),* and occasionally on *Tumamoca macdougalii*.

General distribution.—Baja California (norte) and Sur, Sinaloa.

Selected reference.—Costea and Stefanović (2010).

Mpio Caborca: 35.2 km W of Caborca on road to Desemboque, desertscrub on sandy flats with *Larrea* and *Olneya*, 30°44'35"N, 112°26'32"W, 63 m, 16 Jan 2002, *Van Devender 2002-23* (WLU). **Mpio Guaymas:** 6 mi NW of Guaymas, 28 Feb 1933, *Shreve 6134*; Old road to Algodones, San Carlos, 27°57'42"N, 111°03'43"W, ca. 35 m, 26 Dec 2000, *Reina-G. 2000-917* (CAS, US, WLU). **Mpio Hermosillo:** 5 mi by road E of Bahía Kino, 19 Oct 1963, *Felger 9046*. **Mpio Huatabampo:** 6.25 km E of Camahuiroa, 1.9 km W of Tierra y Libertad, 26°33'00"N, 109°12'45"W, 25 m, 20 Jan 1995, *Friedman 213-95*. **Mpio Pitiquito:** at coast on N side of headland ca. 10 mi S of Desemboque [San Ignacio], 22 March 1978, *Spellenberg 4943* (NMC). **Mpio Soyopa:** Arroyo Los Garambullos, 1.5 km E of Tónichi, 28°34'10"N, 109°33'00"W, 180 m, 15 Sep 1998, *Van Devender 98-1120* (ARIZ, WLU); 4 Sep1996, *Van Devender 96-360* (ARIZ, NMC, WLU) [SEM]. **SONORAN ISLANDS. Dátil:** NW side of island, 20 Dec 1966, *Felger 15313A*. **Tiburón:** SE side of Agua Dulce Valley, ca. 12 mi S from Tecomate, 28°57'20"N, 112°24.5'W, ca. 280 m, 8 Sep 1974, *Felger 76-T14*; Zozni Cmiipla, bajada to 1 km inland, on *Euphorbia polycarpa, Boerhavia triquetra,* and a few *Tumamoca macdougalii*, 26 Sep 2008, *Felger 08-120.*

Cuscuta erosa Yunck., Illinois Biol. Monogr. 6(2–3):26. 1921. TYPE: MEXICO. SONORA: 1869, *Palmer s.n.* (HOLOTYPE: US!).

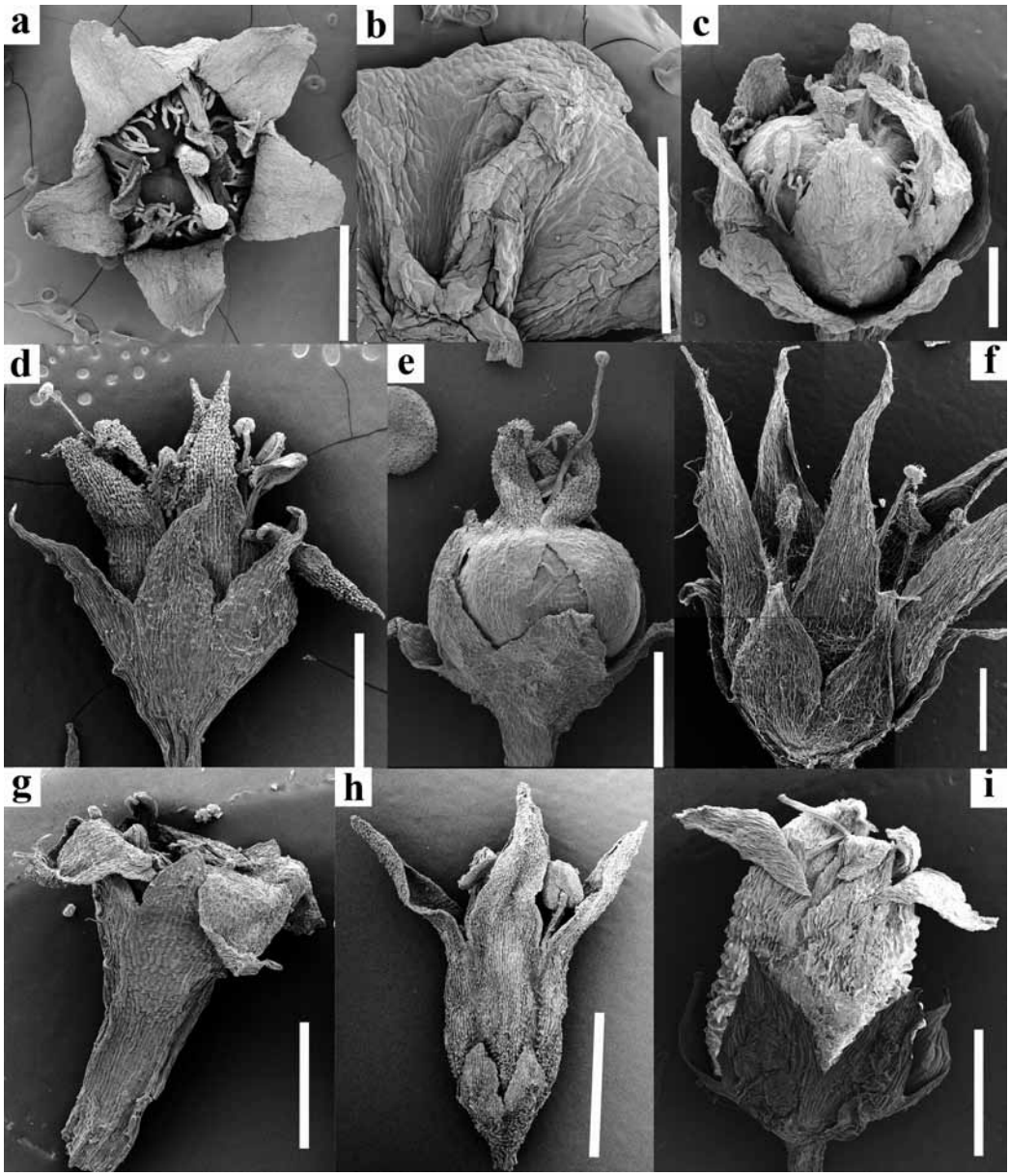

Fig. 3. a–b. *Cuscuta chinensis* var. *applanata* (scale bar = 1 mm), **a.** flower, **b.** calyx lobe; **c.** *C. azteca*, flower (scale bar = 1 mm); **d–e.** *Cuscuta desmouliniana*, **d.** flower, **e.** capsule capped by corolla (scale bars = 1 mm); **f.** *Cuscuta legitima* (scale bar = 1.3 mm); **g.** *Cuscuta umbellata* var. *umbellata* (scale bar 1 mm); **h.** *Cuscuta leptantha* (scale bar = 1.3 mm); **i.** *Cuscuta tuberculata* (scale bar = 1.25 mm).

Stems medium, yellow-creamy to purple. **Inflorescences** loose to moderately dense, paniculiform or corymbiform. Pedicels 1.5–6 mm long. Bracts 1 at the base of clusters and 0–1 at the base of pedicels, 0.8–1.9 mm long, ovate-triangular to lanceolate, margins entire to serrulate-denticulate, apex obtuse to acute, sometimes with a subapical horn-like projection. **Flowers** 5-merous (Fig. 1c), 3.5–4.5 mm long, membranous, creamy to reddish-brown both when fresh and dried. Papillae absent. Laticifers not visible. Calyx 1.5–2.2 mm long, yel-

low, finely reticulate, shiny, cupulate, ¾ to almost equaling corolla tube, divided ½–⅔ of the length; tube 0.5–0.8 mm long; lobes 1.2–1.6 mm long, basally overlapping, oblong-obovate to orbicular, unevenly carinate, margins membranous and minutely erose or denticulate, apex nearly truncate with a dorsal subapiacal dome-like projection, not exceeding the apex. Corolla 3–4 mm long; tube 1.5–2.2 mm long, campanulate, sometimes with horizontal ridges between stamen attachments; lobes 1.2–1.6 mm long, erect to spreading or reflexed, ovate-oblong, margins denticulate, apex obtuse, cucullate, often with a dorsal subapical horn-like appendage, 0.1–0.2 mm long. Stamens exserted, shorter than the corolla lobes; filaments 0.4–1 mm long; anthers 0.7–1 × 0.4–0.5 mm, ovate to oblong. Infrastaminal scales 1.5–2 mm long, ¾ to almost equaling corolla tube, bridged at 0.4–0.6 mm, oblong to almost truncate, dense and long fringed, fimbriae 0.2–0.4 mm long. Styles 1.8–3.2 mm long, longer than the ovary, thick and ± subulate, wider at the base and tapering toward the stigma. **Capsules** circumscissile, 2–2.5 × 2.2–2.5 mm, globose, thickened but not risen around the inconspicuous interstylar aperture, not translucent, carrying the withered corolla about the middle or at the top. **Seeds** 1–4 per capsule, 0.94–1.45 × 0.8–1.38 mm, angled, subround to ovate; seed coat cells alveolate/papillate.

Sonora.—Relatively common in Chihuahuan Desert, foothills thornscrub, and the lower margins of tropical deciduous forest; 450–1250 m. Flowering August–October. Parasitizing herbaceous plants, small shrub, and vining hosts: *Abutilon californicum*, *Amaranthus palmeri*, *Ambrosia confertiflora*, *Anisacanthus thurberi*, *Bidens*, *Boerhavia*, *Carlowrightia*, *Euphorbia*, *Gomphrena sonorae*, *Hymenoclea*, *Ipomoea ternifolia*, *Jatropha cardiophylla*, *Justicia longii*, *Kallstroemia*, *Merremia palmeri*, *Mimosa*, *Portulaca*, *Rhynchosia minima*, *Ruella*, *Russelia*, *Sphinctospermum*, *Talinum paniculatum*, *Tephrosia vicioidies,* and *Tetramerium*.

General distribution.—Arizona; Baja California Sur, Sinaloa.

Selected reference.—Costea et al. (2011b).

Mpio Agua Prieta: ca. 7.5 km (by air) SW of Agua Prieta, ca. 4.5 km NE of Rancho La Calera, Sierra Anibácachi, Rancho La Calera, Chihuahuan desertscrub on limestone, 31°15'34"N, 109°36'34"W, 1233 m, 3 Oct 2004, *Van Devender 2004-1199* (WLU). **Mpio Arizpe:** Puente Agua Caliente, Rancho Agua Caliente, ca. 3 km S-SW of Arizpe on SON 89, foothills thornscrub, 30°19'37"N, 110°11'33"W, ca. 920 m, 18 Aug 2001, *Sánchez NF-172* (WLU). **Mpio Baviácora:** SW edge of Mazocahui on SON 117 to Ures, 29°47'56"N, 109°40'36"W, 620 m, 14 Aug 2006, *Reina-G. 2006-475* (ARIZ, ASU, MO, USON, WLU). **Mpio Cucurpe:** Cucurpe, 30°19'46"N, 110°42'18"W, 880 m, 22 Aug 2001, *Reina-G. 2001-748* (ARIZ, HCIB, WLU). **Mpio Cumpas:** Cumpas, 29°59'47"N, 109°46'33"W, 13 Aug 2006, *Van Devender 2006-462* (WLU). **Mpio La Colorada:** 4 mi E of Willard, between Hermosillo and Colorada, 5 Sep 1941, *Wiggins & Rollins 288* (ARIZ, CAS, DS); 11.5 km, SE of la Colorada on MEX16, 28°46'24"N, 110°30'18"W, 444 m, 15 Aug 2006, *Van Devender 2006-553* (HCIB, TEX, WLU), *Van Devender 2006-555* (ARIZ, USON, WLU). **Mpio Moctezuma:** 18.9 km S-SE of junction with Moctezuma-Huásabas Hwy on road to Tepache, basalt cobble plain with sparse open foothills thornscrub, 29°39'44"N, 109°37'13"W, 635 m, 14 Sep 2006, *Reina-G. 2006-856* (WLU). **Mpio Yécora:** Curea, foothills thornscrub on conglomerate, 28°18'42"N, 109°16'42"W, 490 m, 17 Sep 1998, *Reina-G. 98-1251* (WLU); 2.7 km W-NW of Tepoca on MEX 16, base of steep N-facing cliffs in tropical deciduous forest, 28°27'36"N, 109°15'48"W, 750 m, 30 Aug 2000, *Van Devender 2000-526* (ARIZ, WLU) [SEM].

***Cuscuta indecora** Choisy var. **indecora,** Mém. Soc. Phys. Genéve 9:278. 1842. TYPE: MEXICO [TAMAULIPAS]: Mexicum ad Matamoros, Oct 1830, *Berlandier 2285-865* (HOLOTYPE: G-DC!; ISOTYPES: MO!, P!). *Cuscuta decora* Choisy ex Engelm. var. *indecora* (Choisy) Engelm., Trans. Acad. Sci. St. Louis 1:502. 1859. *Grammica indecora* (Choisy) W.A. Weber, Southw. Naturalist 18:319. 1973. *Epithymum indecorum* (Choisy) Nieuwl. & Lunell, Amer. Midl. Naturalist 4:511. 1916. For more synonymy see Costea et al. 2006b.

Stems slender to medium, yellow to orange. **Inflorescences** loose to dense, paniculiform or corymbiform, confluent. Pedicels 0.5–6 mm long. Bracts 1 at bases of clusters and 0–1 at the base of pedicels, 0.6–1.5 mm long, ovate to lanceolate, margins entire, apex acute. **Flowers** 5-merous (Fig. 2b), 3–5.3 mm long, membranous to thick, translucent-white when fresh, creamy-yellow to dark brown when dried. Dome-like papillae usually present on the pedicels, perianth and ovary. Laticifers visible in the perianth along the midveins and in ovary/capsules, isolated or in longitudinal rows, ovoid to elongated. Calyx 1.2–2 mm long, creamy-yellow to brownish, not reticulate or shiny, cupulate, ca. ½ of the corolla tube, divided ⅓–½ of the length, tube 0.5–1 mm long, lobes 0.5–1.2 mm long, overlapping at the base, triangular-ovate, not carinate, margins entire, apex acute. Corolla 2.5–4.5 mm long, tube 2–3.2 mm long, campanulate, campanulate-cylindric, sub-globose or sub-urceolate, lobes 0.7–1.5 mm long, suberect to erect, ⅓ to equaling the tube, triangular-ovate, margins entire, apex acute, inflexed. Stamens barely exserted or enclosed, shorter than corolla lobes, anthers 0.5–1 × 0.3–0.5 mm, ovate-elliptic to oblong, filaments 0.3–0.7 mm long. Infrastaminal scales 1.5–2.8 mm long, reaching the fila-

ment bases, bridged at 0.5–0.7 mm, obovate to spathulate, rounded, uniformly dense, long fringed, fimbriae 0.2–0.4 mm long. Styles 1–2.5 mm long, ca. as long as the ovary, evenly filiform. **Capsules** indehiscent, 1.9–4(–5) × 2–3.5 mm, globose to subglobose, thickened and risen around the medium large interstylar aperture, semi-translucent, surrounded or capped by the withered corolla. Seeds 2–4 per capsule, 1.42–1.86 × 1.25–1.6 mm, shape heterogeneous on the same plant: dorsoventrally compressed to weakly angled, broadly elliptic to transversely oblique, seed coat cells variable: alveolate/papillate, polygonal (not alveolate/papillose), and puzzle-like arranged, or both kinds present on the same seed. $2n = 30$.

Sonora.—Sonoran Desert and coastal thornscrub; ca. 10–100 m. Flowering August–November(–March). Apparently spreading as a weed of alfalfa (with contaminated seeds); other hosts include *Baccharis*, *Chenopodium*, *Helianthus*, *Heterotheca*, *Ipomoea*, *Pluchea*, *Polygonum*, *Rhynchosia*, and *Tephrosia*.

General distribution.—throughout most of the USA; Aguascalientes, Chihuahua, Coahuila, Edo. México, Jalisco, Michoacán, Nuevo León, Puebla, Querétaro, Sinaloa, Tabasco, Tamaulipas, Veracruz, Zacatecas, Yucatán; West Indies; Central America; South America. As in the case of *C. campestris*, *C. indecora* may be more widely distributed in Mexico than current herbarium data suggest.

Selected reference.—Costea et al. (2006b).

Mpio Bácum: Bácum, weed in alfalfa, *Salazar García 9 Aug 2010* ("muestra 2010–01574," WLU). **Mpio Huatabampo:** 5.7 km SW of Ejido 10 de Abril at MEX 15, 1.4 km W of Tierra Y Libertad, ca. 7.4 km (by air) E-NE Camahuiroa, coastal Sinaloan thornscrub, ca. 35 m, 8 Oct 1992, *Van Devender 92-1103,* and 15 Mar 1993, *Van Devender 93-322* (ARIZ, UC, UCR; ARIZ, UC); 2 km W of Tierra y Libertad on N road to Camahuiroa, 26°33'50"N, 109°12'50"W, 24 Nov 1993, *Van Devender 93-1283* (ARIZ, ASU, CAS, TEX, UC, UCR, USON). **Mpio Etchojoa:** Etchojoa, weed in alfalfa, *Sainz 24 Apr 2010* (WLU). **Mpio Fronteras:** Fronteras, ca. 1356 m, 25 Sep 1890, *Hartman 52* (US). **Mpio Navojoa:** Ejido 8 de Febrero, weed in alfalfa, *Ley 21 Aug 2010* ("muestra 2010-01980," WLU). **Mpio San Ingnacio:** Ejido San Ignacio Río Muerto, weed in alfalfa, *Salazar-García 9 Aug 2010* ("muestra 2010-01573," WLU).

Cuscuta legitima Costea & Stefanov., Taxon 59:1795. 2010. TYPE: MEXICO. SONORA: NW side of Río Yaqui at MEX 15 near Esperanza, ca. 9 km N of Ciudad Obregón, 27°35'45"N 109°56'W, ca. 40 m, locally common parasite on *Boerhavia coccinea* (Nyctaginaceae), flowers white, stems yellow, 10 Sep 1994, *Van Devender 94-458* (HOLOTYPE: ARIZ; ISOTYPES: ASU!, MEXU!, UC!, UCR!, WLU!).

Cuscuta californica var. *reflexa* J.M. Coult., Contr. U.S. Natl. Herb. 1:45. 1890; 2:295. 1892; *Cuscuta umbellata* var. *reflexa* (J.M. Coult.) Yunck., Illinois Biol. Monogr. 6(2–3):42. 1921. TYPE: U.S.A. TEXAS: Roma, 1889, *Nealley 338* (HOLOTYPE: US!; ISOTYPE: GH!).

Stems slender, yellow-orange. **Inflorescences** dense to loose, umbelliform, confluent. Pedicels 2–10 mm long. bracts 1 at the base of clusters and 0–1 at the base of pedicels, 2.0–3.6 mm long, broadly triangular-ovate, margins entire, apex acuminate. **Flowers** 5-merous (Fig. 3f), 4.0–5.5(–6.0) mm long, membranous, white when fresh, creamy-white when dried. Papillae absent. Laticifers evident in the bracts, calyx, corolla, tips of infrastaminal scale fimbriae, and ovary, isolated, ovoid. Calyx 2.5–3.2 mm long, straw-yellow, finely reticulate, slightly shiny, campanulate, longer than corolla tube, divided ca. ⅔ the length, tube 0.6–1.0 mm long, lobes 1.5–2.2 mm long, not basally overlapping, ovate-lanceolate, not carinate, margins entire, apex acuminate. Corolla 3.8–5.2(–5.6) mm long, tube 1.6–2.1 mm long, campanulate, lobes 1.8–3.0 mm long, initially erect, later reflexed, longer than the tube, linear-lanceolate, margins entire, apex acuminate, straight. Stamens exserted, shorter than the lobes, anthers 0.50–0.70 × 0.24–0.36 mm, elliptic to oblong, filaments 0.6–1.0 mm long. Infrastaminal scales 1.8–2.2 mm long, equaling or slightly longer than the tube, bridged at 0.2–0.4 mm, spathulate to obovate, uniformly dense-fringed, fimbriae 0.2–0.5 mm long. Styles 0.9–2.5 mm, longer than the ovary, evenly filiform. **Capsules** circumscissile, 2–3 × 1–2 mm, depressed, irregularly thickened and slightly risen around the inconspicuous interstylar aperture, translucent, surrounded or capped by the withered corolla. **Seeds** 2–4 per capsule, 0.9–1.2 × 0.8–0.9 mm, broadly elliptic to subround.

Sonora.—Chihuahuan and Sonoran Deserts, coastal and foothills thornscrub, tropical deciduous forest; 40–1200 m. Flowering August–November. Common but not weedy; hosts herbaceous, including *Allionia incarnata*, *Amaranthus*, *Boerhavia*, *Chamaesaracha*, *Evolvulus*, *Kallstroemia*, *Salsola*, *Solanum*, *Tidestromia lanuginosa*, *Trianthema portulacastrum*, and *Tribulus terrestris*.

General distribution.—Arizona, Kansas, New Mexico, Texas; Baja California (norte), Chihuahua, Coahuila, Tamaulipas.

Selected reference.—Costea and Stefanović (2010).

Mpio Agua Prieta: S edge of Agua Prieta on Mex 17, Chihuahuan desertscrub, 31°18'21"N, 109°34'55"W, 1204 m, 13 Sep 2006, *Van Devender 2006-757* (HCIB, MO, TEX, WLU). **Mpio Álamos:** Capitahuasa, 26°45'35"N, 108°55'W, 160 m, 25 Sep 1993, *Van Devender 93-1123* (ARIZ, UC, UCR). **Mpio Cajeme:** Ciudad Obregón, 29 Sep 1933, *Gentry 272* (ARIZ, MICH); Cerro La Antena, 1 km N of Microondas La Cabana, 27°27'45"N, 109°46'20"W, 200 m, Sinaloan thornscrub, 19 Sep 1994, *Van Devender 94-603* (ARIZ, ASU, MEXU, UC, USON); NW side of Río Yaqui at MEX 15 near Esperanza, ca. 9 km N of Ciudad Obregón, 27°35'45"N, 109°56'W, ca. 40 m, 10 Sep 1994, *Van Devender 94-458* (ARIZ, ASU, MEXU, UC, UCR) [SEM]. **Mpio Hermosillo:** New Year's Mine, 20 mi S of Hermosillo, *Jones 28 Oct 1926* (MO); 27 mi W of Hermosillo, on road to Kino Bay, 28 Aug 1941, *Wiggins & Rollins 133* (ARIZ, CAS, DS). **Mpio Navojoa:** San José de Masiaca; 26°45'N, 109°14'30"W, 70 m, 22 Sep 1994, *Van Devender 94-710, 94-711* (ARIZ, MEXU, UC). **Mpio Puerto Peñasco:** Pinacate Region, MacDougal Crater, 8 Sep 1964, *Felger 10488*; 0.5 km E of MacDougal Crater, 8 Sep 1964, *Felger 10432A, 10435, 10436*; W Pinacate, *Equihua 6 Nov 1982*; Sykes Crater, NW of Pinacate Region, 155 m, 8 Dec 1970, *Felger 20035*; 1 km SWW Papago Tanks, 28 Sep 1964, *Felger 10608*; Rancho Grijalva (Rancho Guadalupe Victoria), 32°00'35"N, 113°34'25"W, 225 m, *Ezcurra 9 Nov 1982*. **Mpio Soyopa:** Tónichi, 28°35'55"N, 109°33'50"W, 200 m, 17 Aug 2006, *Van Devender 2006-627* (ARIZ, NMC, WLU); Arroyo Las Tinajas below ruins of Toledo smelter, near Loma Maderista, 3.5 km S of Tónichi, W side of Río Yaqui, foothills thornscrub, ca. 28°34'03"N, 109°33'25"W, 220 m, 17 Aug 2006, *Van Devender 2006-638* (WLU); Arroyo los Conejos, 3.4 km N of MEX16 on road to San Antonio de la Huerta, 215 m, 28°35'39"N, 109°35'33"W, 225 m, 16 Aug 2006, *Reina-G. 2006-586* (MEXU, WLU), *Reina-G. 2006-606* (WLU), *Reina-G. 2006-612* (WLU).

Cuscuta leptantha Engelm., Trans. Acad. Sci. St. Louis 1:489. 1859. Type: U.S.A. Texas: Oct 1849, *Wright 522* (holotype: MO!; isotype: US!).

Cuscuta palmeri S. Watson Proc. Amer. Acad. Arts 24:64. 1889. Type: MEXICO. Baja California: 1887, *Palmer 544* (holotype: NY!; isotypes US!, GH!).

Stems slender, yellow-orange. **Inflorescences** loose, umbellate, confluent. Pedicels (1–)2–7 mm long. Bracts 1 at the base of clusters and 0–1 at the base of pedicels, 0.75–1 mm long, triangular ovate, margins entire, apex acute. **Flowers** 4-merous (Fig. 3h), 3.5–4.5(–5) mm long, membranous, white when fresh, creamy-white when dried, papillae usually present on the pedicels and perianth. Laticifers not visible. Calyx 1.5–1.8 mm long, straw-yellow, not reticulate or shiny, campanulate, ⅓–½ of the corolla tube, divided ca. ½ the length, the tube 0.5–0.8 mm long, lobes 0.8–1 mm long, not basally overlapping, triangular-ovate, not carinate, margins entire, apex acute. Corolla 3–4 mm long, tube cylindric, 1.5–2.5 mm long, lobes 1.5–2 mm long, initially erect, later spreading or reflexed, as long as the tube, lanceolate, margins entire often involute upon drying and corolla lobes appearing narrow, apex acute ± cucullate. Stamens short-exserted, shorter than corolla lobes, anthers 0.4–0.6 × 0.35–0.45 mm, subround to broadly elliptic, filaments 0.3–0.6 mm long. Infrastaminal scales 1.3–2.1 mm long, ca. ½ of the corolla tube, bridged at 0.4–0.8 mm, oblong, uniformly short-fringed, fimbriae 0.05–0.15 mm long. Styles 1.2–2.1 mm long, longer than the ovary, evenly filiform. **Capsules** circumscissile, 1.5–2 × 1.6–1.9 mm, globose, slightly thicken and risen or with a few protuberances around the inconspicuous interstylar aperture, translucent, capped by the withered corolla. Seeds 2–4 per capsule, 0.75–0.9 × 0.7–0.8 mm, angled, subrotund to broadly elliptic, seed coat cells alveolate/papillate.

Sonora.—Sonoran Desert; 5–150 m. Flowering December–May. Parasitic on *Euphorbia* subgenus *Chamaesyce*, especially *E. polycarpa*.

General distribution.—Texas, New Mexico; Baja California (norte) and Sur, and Sinaloa.

Selected reference.—Costea and Stefanović (2010).

Mpio Hermosillo: 1.5 mi E of Santa Rosa, 15 Feb 1965, *Felger 12575*; 4 mi by road NW of Rancho Noche Buena at ca. 0.5 mi E of crest of "Seri Pass," Sierra Seri, 14 May 1966, *Felger 14035*; Roadside 3.7 mi S of Punta Chueca, 13 Apr 1980, *Bowers 1966*; Playa Esthela, just N of Bahía de Kino, 28°52'28"N, 112°01'20"W, 50 m, 31 Dec 2000, *Van Devender 2000-933* (WLU) [SEM]. **Mpio Pitiquito:** 5.9 mi S of Desemboque Río San Ignacio, 14 Apr 1968, *Felger 17762*; 19.8 mi S of Desemboque Río San Ignacio, 14 May 1966, *Felger 14080*; ca. 1 mi E of 19 mi by road S of Desemboque, vic. 29°20'N, 112°14'W, 18 Feb 1968, *Felger 17205*. **SONORAN ISLANDS. Tiburón:** SW Central Valley, *Felger 17342*; 1 km inland at Zozni Cmiipla, at base and N side of Punta San Miguel, 23 Nov 2006, *Wilder 06-368*; Canyon at base of Capxölim, 24 Nov 2006, *Wilder 06-381*.

Cuscuta macrocephala W. Schaffn. ex Yunck., Illinois Biol. Monogr. 6(2–3):36. 1921. Type: MEXICO. Sinaloa: [no date], *Schaffner s.n.* (holotype: NY!).

Stems orange, coarse. **Inflorescences** dense, paniculiform-glomerulate. Pedicels 0.3–3.2 mm long. Bracts 1 at the base of clusters and 0–1 at the base of pedicels, 1.5–3 mm long, ovate, margins entire, apex obtuse. **Flowers**

5-merous (Fig. 1b), 5–6.5 mm long, thick, creamy-white when fresh, brownish when dried. Papillae absent. Laticifers visible in the calyx and corolla, isolated, ovoid to elongate. Calyx 3.5–4.2 mm long, dark brownish, thick, with membranous reticulate margins, not shiny, campanulate, about equaling the corolla tube, divided ca. ⅓ of its length, tube 1.3–2 mm long, lobes 1.8–2.2 mm long, broader than long, auriculate at base and broadly overlapping and forming angles at sinuses, margins entire, apex rounded. Corolla 4.5–6 mm long, tube 3.8–4.5 mm long, cylindric-campanulate, lobes 0.7–1 mm long, mostly erect, ca. ¼ of the corolla tube, ovate to oblong, margins entire, overlapping at base, apex obtuse to rounded. Stamens included, shorter than corolla lobes, 0.7–1.1 × 0.4–0.6 mm, anthers ovate to oblong-elliptic, filaments 0.1–0.3 mm long. Infrastaminal scales 3–3.3 mm long, ca. ⅔ as long as the corolla tube, bridged at 0.7–1 mm, oblong, densely fringed, fimbriae 0.15–0.3 mm long. Styles 1.4–4.3 mm long, longer than the ovary, evenly thick, or thicker at the base. **Capsules** circumscissile, 2.5–3.6 × 2.4–3.3 mm, globose, slightly thickened around the small interstylar aperture, not translucent, capped by the withered corolla. **Seeds** 2–4 per capsule, 1.4–1.9 × 1–1.3 mm, angled, broadly elliptic, seed coat cells alveolate/papillate.

Sonora.—East part of the state in grassland, foothills thornscrub, tropical deciduous forest, oak woodland; 500–1030 m. Flowering August–October. Parasitic on woody and herbaceous hosts including *Acacia*, *Amaranthus*, *Anisacanthus*, *Cryptostegia*, *Guazuma ulmifolia, Morus microphylla*, *Quercus*, *Platanus, Prosopis*, *Sida*, and *Tecoma*.

General distribution.—Baja California Sur, Sinaloa, Jalisco, Querétaro, Tamaulipas.

Selected reference.—Yuncker (1932).

Mpio Álamos: Rancho Santa Bárbara (E-NE of Álamos), 27°06'34"N, 108'42'58"W, 1070 m, tropical deciduous forest-oak woodland transition, 5 Oct 2006, *Van Devender 2006-1240* (ARIZ, WLU). **Mpio Arivechi:** Arroyo Bámori, 5 km S Bámori on road to Valle de Tacupeto, 28°49'15"N, 109°10'24"W, 536 m, riparian area in foothills thornscrub 15 Sep 2006, *Van Devender 2006-872* (ARIZ, NMC, USON, WLU). **Mpio Cucurpe:** Palm Canyon, 25 km SE of Magdalena on road to Cucurpe, Sierra Babiso (Cerro Cinta de Plata), 30°29'N, 111°46'W, 1300 m, *Van Devender 4-5 Sep 1976,* also *Van Devender 2 Oct 1976*; 17.7 mi SE of Magdalena on road to Cucurpe, 3 Oct 1982, *Starr 175*. **Mpio San Javier:** 1.4 km E of La Barranca on MEX 16, tropical deciduous forest, 28°34'48"N, 109°40'15"W, ca. 640 m, 31 Aug 2001, *Van Devender 2001-758* (WLU). **Mpio Yécora:** Arroyo El Reparo, Rancho Arroyo Hondo, rocky stream canyon with *Guazuma ulmifolia, Morus microphylla*, and *Platanus*, 28°20'50"N, 109°07'17"W, 780–840 m, *Reina-G. 98-1524* (USON, WLU); Arroyo Los Huérigos, 9.3 km E of Tepoca on MEX 16, 3.5 km (by air) W-NW of San Nicolás, *Populus monticola* riparian gallery forest, 28°25'48"N, 109'11'31"W, 650 m, 1 Sep 2001, *Reina-G. 2001-774* (ARIZ, WLU) [SEM].

Cuscuta odontolepis Engelm., Trans. Acad. Sci. St. Louis 1:486. 1859. TYPE: U.S.A. ARIZONA: Santa Rita Mountains, S of Tucson, 1851–1852, *Wright 1624* (HOLOTYPE: MO!; ISOTYPES: GH!, K!, NY!).

Stems slender, yellowish. **Inflorescences** dense, paniculiform-glomerulate. Pedicels to 1 mm long. Bracts 1 at the base of cymes and 0–1 at the base of pedicels/flowers, membranous, 2–3 mm long, subround to broadly ovate, margins entire, apex acute to short acuminate. **Flowers** (Fig. 2d) 5-merous, 4.5–5 mm long, membranous, white when fresh, creamy-white when dried. Papillae present on the bracts, calyx and corolla lobes. Laticifers not visible. Calyx 2–2.5 mm long, straw-yellow, finely reticulate, not shiny, campanulate, ½–¾ as long as the corolla tube, divided ca. ⅔, tube 0.5–0.9 mm long, lobes 1.3–1.5 mm long, ovate-triangular, outer 2 lobes auriculate, basally overlapping, not carinate, margins entire, apex acute to short acuminate. Corolla 3.5–4.5 mm long, tube 2.2–2.8 mm long, cylindric, lobes 1.6–2 mm long, initially erect, later reflexed, ovate-triangular, margins entire, basally overlapping, apex acute to short acuminate, straight. Stamens barely exserted, shorter than corolla lobes, anthers 0.7–1.1 × 0.25–3 mm long, oblong, filaments 0.3–0.7 mm long. Infrastaminal scales 2–2.5 mm long, ½ to equaling corolla tube, bridged at 0.25–0.5 mm, oblong-spathulate to obovate, rounded, fringed in the distal ½, fimbriae 0.2–0.3 mm long. Styles 2.8–4 mm long, longer than the ovary, evenly filiform. **Capsules** circumscissile, 2.9–4 × 3–3.5 mm, globose to globose-depressed, thickened and raised around the inconspicuous interstylar aperture, translucent, loosely surrounded and capped by the withered corolla. **Seeds** 3–4 per capsule, 1–1.25 × 0.65–0.8 mm, angled, broadly elliptic, seed coat cells alveolate/papillate.

Sonora.—Sonoran Desert, desert grassland, and riparian areas in foothills thornscrub; 500–1300 m. Flowering August–November. Parasitizing on *Amaranthus*.

General distribution.—Arizona and Sonora.

Selected reference.—Costea and Stefanović (2010).

Mpio Arivechi: Arroyo Bámori, 5 km S Bámori on road to Valle de Tacupeto, 28°49'15"N, 109°10'24"W, 536 m, 536 m, riparian area in foothills thornscrub, on *Amaranthus*, 15 Sep 2006, *Van Devender 2006-869* (ARIZ, USON, WLU) [SEM]. **Mpio Cucurpe:** Palm Canyon, 25 km SE of Magdalena on road to Cucurpe, Sierra Babiso (Cerro Cinta de Plata), 30°29'N, 111°46'W, 1300 m, 2 Oct 1976, *Van Devender s.n.* (ARIZ). **Mpio Fronteras:** S edge of Esqueda on SON 17, desert grassland, 30°42'41"N, 109°35'15"W, 1215 m, on *Amaranthus*, 13 Aug 2006, *Van Devender 2006-467* (ARIZ, MEXU, WLU). **Mpio Hermosillo:** vicinity of Hermosillo, Valley of Rio de Sonora, 7 Mar 1910, *Rose 12477* (US).

Cuscuta polyanthemos W. Schaffn. ex Yunck., Illinois Biol. Monogr. 6(2–3):46. 1921. TYPE: MEXICO. SINALOA: Culiacán, *Schaffner s.n.* (HOLOTYPE: NY!).

Stems slender, yellow. **Inflorescences** loose, corymbiform or umbellate, often confluent. Pedicels 4–15(–20 mm) long. Bracts 1 at the base of clusters, 0.8–1.2 mm long, ovate triangular to lanceolate, margins entire apex acute. **Flowers** 5-merous, 5–7.5 mm long, membranous, white both when fresh and dry. Papillae present on the corolla lobes. Laticifers not visible. Calyx 2–2.5 mm long, straw-yellow, not reticulate or shiny, cylindric campanulate, ¼–⅓ of the corolla tube, divided ca. ⅓ the length, the tube 0.4–0.8 mm long, lobes 1.5–2 mm long, not basally overlapping, triangular-ovate to lanceolate, not carinate but with small protuberances in the midveins, margins entire, apex acute. Corolla 5–7 mm long, the tube 4–5 mm long, cylindric, lobes 2–2.5 mm long, initially erect later spreading or reflexed, ½ as long as the tube, triangular lanceolate, margins entire, apex acute to acuminate. Stamens short-exserted, shorter than corolla lobes, anthers 0.6–1 × 0.35–0.45 mm, oblong elliptic, filaments 0.5–0.8 mm long. Infrastaminal scales 2–2.5 mm long, bridged at 0.25–0.4 mm, ½–⅓ of the corolla tube, oblong, sparsely, short-fringed, fimbriae 0.05–0.2 mm long. Styles 4–5 mm long, much longer than the ovary, evenly filiform. **Capsules** circumscissile, 1–2 × 0.8–1.2 mm, globose, thicken and risen around the inconspicuous interstylar aperture, translucent, capped by the withered corolla. **Seeds** 2–3 per capsule, 1–1.2 × 0.7–0.85 mm, angled, subrotund to broadly ovate, seed coat cells alveolate/papillate.

Sonora.—Foothills thornscrub; 635 m. Flowering September and October. Rare; parasitizing *Euphorbia* subgenus *Chamaesyce* spp.

General distribution.—Sonora and Sinaloa.

Selected reference.—Costea and Stefanović (2010).

Mpio Moctezuma: 18.9 km S-SE of junction with Moctezuma-Huásabas Hwy on road to Tepache; basalt cobble plain with sparse open foothills thornscrub, 29°39'N 44"N, 109°37'13"W, 635 m, *Reina-G 2006-809* (WLU).

Cuscuta salina Engelm. var. **salina,** in W.H. Brewer, S. Watson, & A. Gray, Bot. Calif. 1:536. 1876. TYPE: U.S.A. UTAH: Rio Virgen, on *Suaeda*, saline soil, Nov 1885, *Remy s.n.* (LECTOTYPE (Yuncker 1932) MO!; ISOLECTOTYPES: P!, fragment NY!).

Cuscuta californica Hook. & Arn. var. *squamigera* Engelm., Trans. Acad. Sci. St. Louis 1:499. 1859. *Cuscuta squamigera* (Engelm.) Piper, Contrib. U.S. Natl. Herb. 11:455. 1906. *Cuscuta salina* var. *squamigera* (Engelm.) Yunck., Illinois Biol. Monogr. 6(2–3):71. 1921.

Stems slender, orange-yellow. **Inflorescences** dense, corymbiform, often confluent. Pedicels (0.5–) 1–5 mm long. Bracts 1 at the base of clusters and 1(–0) at the base of pedicels, 0.7–1.2 mm long, ovate-lanceolate to lanceolate, margins entire, apex acute to acuminate. **Flowers** 5-merous (Fig. 2a), 2.5–4.5 mm long, membranous, white when fresh, creamy-brownish when dried. Papillae or dome-shaped cells present on corolla lobes. Laticifers conspicuous in the perianth, ovary and the capsule. Calyx 1.5–2.5 mm long, glossy yellow, cylindrical to narrow-campanulate, equaling corolla tube, divided ca. ½ the length, the tube 0.6–1.2 mm long, lobes 0.7–1.5 mm long, ovate-lanceolate to lanceolate, not basally overlapping or slightly so, margins entire, apex acute to acuminate. Corolla 2.2–4 mm long, tube 1.2–2 mm long, cylindric-campanulate to obconical, lobes 1.3–2 mm long, erect to spreading, equaling the corolla tube, ovate-lanceolate to oblong-lanceolate, margins entire, not basally overlapping, apex acute to cuspidate. Stamens exerted when flowers are completely open, shorter than corolla lobes, anthers 0.3–0.7 × 0.3–0.4 mm, broadly oblong to elliptical, filaments 0.3–0.7 mm long. Infrastaminal scales 1–1.8 mm long, nearly equaling corolla length (80–90% of the corolla tube), bridged at 0.2–0.45 mm, oblong to slightly obovate, short-fringed, fimbriae 0.03–0.2 mm long. Styles 0.4–0.9 mm long, shorter than the ovary, uniformly thin. **Capsules** indehiscent, 1.6–2.5 × 1.7–2.2 mm, ovate-elliptic, ± thickened around the intrastylar aperture, surrounded or capped by the withered corolla. **Seeds** 1 per capsule, 1.35–1.55

× 1.25–1.43 mm, ± visible through the pericarp, dorsoventrally compressed, broadly elliptic to subround; surface of seed coat epidermis alveolate when dried and papillate when hydrated.

Sonora.—The species is apparently localized at Sonoyta (400 m) and Quitobaquito (at the Arizona–Sonora border, 335 m). Flowering April–May. Growing on *Suaeda moquinii*.

General distribution.—Arizona, California, Nevada, New Mexico, Utah, Texas; Baja California (norte) on herbaceous hosts (e.g., species of *Frankenia, Salsola, Suaeda, Wislizenia*) from inland salt flats, marshes, and ponds.

Selected references.—Costea et al. (2006c, 2009), Felger (2000).

Mpio de Sonoyta: Sonoyta, 1 km S of international border at Lukeville; disturbed habitat at edge of irrigated fields, 28 Apr 1991, *Felger 91-5* (ARIZ, MEXU).

***Cuscuta tinctoria** Mart. ex Engelm. var. **tinctoria,** Trans. Acad. St. Louis 1:480. 1859. Type: MEXICO. Oaxaca: 1827, *Karwinsky s.n.* (lectotype: MO!; isolectotype: NY!).

Stems medium to rarely coarse. **Inflorescences** dense, corymbiform to sub-glomerulate usually confluent. Pedicels 0.5–2.6 mm long. Bracts 1 at the base of clusters, usually absent at the base of pedicels or flowers, 1.5–3 mm long, oblong to oblong lanceolate, acute to obtuse, margins entire. **Flowers** 5-merous, 4–5.2 mm long, thick, white when fresh, reddish-brownish when dried. Papillae absent. Laticifers visible in the calyx, corolla, isolated or in rows, ovoid to elongated. Calyx 2–3 mm long, reddish-brownish, more or less reticulate, ± glossy, campanulate, equaling corolla tube, divided ⅓–¼ the length, tube 0.5–1 mm long, lobes 1.6–2.2 mm long, broadly overlapping, round to broader than long or occasionally broadly elliptic, not carinate or with multicellular protuberances on the midveins, margins entire, apex rounded. Corolla 3.5–5 mm long, tube 2.3–3 mm long, campanulate, lobes 1.5–2.5 mm long, initially erect, later reflexed, equaling or shorter than the tube, oblong-ovate, overlapping, margin entire, apex rounded, straight. Stamens exerted, shorter than corolla lobes, anthers 0.7–1.1 mm long, oblong-elliptic, filaments 0.8–1.2 mm long. Infrastaminal scales 2.5–3 mm long, equaling corolla tube, bridged at 0.8–1.2 mm, oblong to ovate, uniformly dense-fringed, fimbriae 0.2–0.5 mm long. Styles 1.2–2.1(–3) mm long, longer than the ovary, thick, but uniform. **Capsules** circumscissile, 1.5–3 × 1.8–2.5 mm, globose to depressed-globose, not thickened and/or risen around the small interstylar aperture, translucent, capped by the withered corolla. **Seeds** (2–)4 per capsule, 1.5–2 × 1.2–1.9 mm, angled or slightly dorsoventrally compressed, elliptic-oblong to subround, seed coat cells alveolate/papillate or wrinkled.

Sonora.—This species may be a sporadic introduction. It was collected in northern Sonora in 1994 from a cultivated *Schinus terebinthifolia* tree. On many subsequent visits, however, it was not found again. Ornamental trees and shrubs grown in Sonora are often brought from nurseries in Guadalajara, Jalisco, which points to a potential source for new introductions. Sonoran Desert. Flowering December–January.

General distribution.—Yuncker (1932, 1965) mentioned that *C. tinctoria* is common throughout Mexico to Guatemala. This species is part of the largest and most complicated taxonomically clade in Mexico (clade "G"; Stefanović et al. 2007) and the delimitation of species and their distribution require more study.

Selected reference.—Yuncker (1932).

Mpio Magdalena de Kino: Toll station on MEX 15 bypass at Magdalena, ca. 30°37'N, 110° 57'30"W, 800 m, 29 Dec 1994, *Van Devender 94-1008* (ARIZ, MEXU, USON, WLU) [SEM].

Cuscuta tuberculata Brandegee, Univ. Calif. Publ. Bot. 3:389. 1909. Type: MEXICO. Lower California [Baja California Sur]: Santa Margarita Island, on *Boerhavia*, 6 Mar 1889, *Brandegee 3* (holotype: UC!, isotype: MO!).

Stems filiform, yellow-orange. **Inflorescences** loose, umbelliform or racemiform, confluent. Pedicels 2–3(–5) mm long. Bracts 1 at the base of clusters, usually absent at the base of peduncles, 0.5–0.75 mm long, ovate-lanceolate, margins entire, apex acute. **Flowers** 5-merous (Fig. 3i), 2.5–4 mm long, membranous, white-creamy when fresh, creamy when dried. Papillae present especially at the base of the corolla tube. Laticifers barely visible in the corolla, isolated, ovoid to elongated. Calyx 0.5–1.5 mm long, yellow, not or finely reticulate, ± glossy, cupulate-angular, ⅓–½ as long as the corolla tube, divided almost to the base, tube 0.2–0.5 mm long, lobes 1–1.3 mm long, not basally overlapping, triangular to lanceolate, carinate and/or with multicellular pro-

tuberances on the midveins, margins entire, acute to acuminate. Corolla 2–3.5 mm long, tube 1.5–2.2 mm long, cylindric, lobes 1.2–2 mm long, erect, about equaling the tube, triangular lanceolate, margins entire, apex acute, straight. Stamens barely exserted, shorter to almost equaling corolla lobes, anthers 0.5–0.8 × 0.25–0.3 mm, ovate to oblong, filaments 0.4–0.7 mm long. Infrastaminal scales 0.5–1 mm long, ca. ½ the length of the corolla tube, bridged at 0.3–0.5 mm long, ovate, uniformly short-fringed, fimbriae 0.05–0.15 mm long. Styles 1.5–3 mm long, longer than the ovary, evenly filiform. **Capsules** circumscissile, globose, 1.3–2.2 × 1–2.3 mm, slightly thickened and risen around the small interstylar aperture, translucent, capped by the withered corolla. **Seeds** 3–4 per capsule, 0.6–0.9 × 0.3–0.5 mm, angled or slightly dorsoventrally compressed, elliptic-oblong, seed coat cells alveolate/papillate.

Sonora.—Relatively common in the Sonoran Desert and foothills thornscrub; 100–700 m. Flowering August–November. The host is usually *Boerhavia*, sometimes *Amaranthus* or genera of Euphorbiaceae.

General distribution.—Arizona, New Mexico; Baja California Sur.

Selected reference.—Costea and Stefanović (2010).

Mpio Álamos: Mocúzari (Adolfo Ruiz Cortinez) Dam on Río Mayo, W-NW of Álamos, 27°13'10"N 109°06'30"W, 120 m, 16 Oct 1992, *Van Devender 92-1386* (ARIZ, ASU, CAS, UCR). **Mpio Caborca:** Km 15 on Caborca–El Desemboque [road], 200 m, 25 Aug 1975, *Rodríguez 1642* (G, MEXU, MO, SD). **Mpio Hermosillo:** 8 mi W of Hermosillo, ca. 1 mi NW of the road to Kino Bay, 27 Aug 1941, *Wiggins & Rollins 98* (ARIZ, CAS, DS, MO, RSA); ca. 25 km W of Hermosillo on rd. to Bahía de Kino, Escuela de Agricultura, Universidad de Sonora, 29°01'29"N 111°08'33"W, 10 Aug 2001, *Reina-G. 2001-623* (ARIZ, MEXU, USON, WLU) [SEM]. **Mio Cajeme:** ca. 2.2 mi NE of Hwy 15 (toward a microwave tower), ca. 6.9 mi SE of Ciudad Obregón, 12 Sep 1973, *Stevens 2052b* (CAS, MEXU, MICH). **Mpio La Colorada:** 36 Km, SE of Hermosillo on MEX 16, 28°49'54"N 110°39'25"W, 317 m, 15 Aug 2006, *Van Devender 2006-552* (HCIB, USON, WLU); 4.7 Km E of Tecoripa on MEX 16, 28°37'04"N 109°54'25"W, 410 m, 16 Aug 2006, *Reina-G. 2006-559* (ARIZ, CAS, WLU). **Mpio General Plutarco Elias Calles:** 2.7 mi W of Sonoyta on Mex Hwy 2, 14 Sep 1986, *Felger 86-315*. **Mpio Guaymas:** near San Carlos Bay, 24 Oct 1939, *Gentry 4719*. **Mpio Moctezuma:** 14.1 km S-SE of Moctezuma on road to Tepache, 29°40'53"N 109°38'00"W, basalt cobble plain with dwarf foothills thornscrub, 607 m, 14 Aug 2006, *Reina-G. 2006-544* (MO, TEX, WLU). **Mpio Opodepe:** Querobabi, Plains of Sonora desertscrub, 30°03'14"N 111°01'39"W, 680 m, 20 Aug 2001, *Reina-G. 2001-730* (ASU, HCIB, NMC, WLU). **Mpio Soyopa:** Arroyo Los Garambullos, 0.5 km SE of Río Yaqui bridge on MEX 16, 3.3 km S, 1.5 km E of Tónichi, 28°34'10"N 109°33'00"W, 180 m, 15 Sep 1998, *Van Devender 98-1111* (ARIZ, WLU); 17 Aug 2006, *Van Devender 2006-622* (US, WLU); 17 Sep 2006, *Van Devender 2006-932A* (WLU). **Mpio Puerto Peñasco:** Pinacate Region, Sykes Crater, 400 m, 8 Dec 1970, *Felger 19998*.

Cuscuta umbellata Kunth var. **umbellata,** Nov. Gen. Sp. Pl. 3[folio]:95. 1818. TYPE: [MEXICO]: Crescit in Nova Hispania, inter Querretaro et Salamanca, *Humboldt s.n.* (LECTOTYPE: Yuncker 1932: MO!; ISOLECTOTYPE: P!).

Stems slender, yellow-orange. **Inflorescences** dense to loose, umbelliform, confluent. Pedicels 2–10 mm long. Bracts 1 at the base of clusters, usually absent at the base of pedicels, 0.5–2.0 mm long, triangular-ovate, margins entire, apex acute. **Flowers** 5-merous (Fig. 3g), 2–3 mm long, membranous, white when fresh, creamy-white or dark brown when dried. Papillae sometimes present but only on the adaxial face of corolla lobes. Laticifers evident in the bracts, calyx, corolla, tips of infrastaminal scale fimbriae, and ovary, isolated, ovoid. Calyx 0.8–1.4 mm long, straw-yellow, finely reticulate, slightly shiny, campanulate, equaling the corolla tube, divided ca. ⅔ the length, tube 0.25–0.60 mm long, lobes 0.5–0.9 mm long, not basally overlapping, broadly triangular-ovate, not carinate, margins entire, apex obtuse to acute, initially cucullate, later straight. Corolla 2.0–2.5 mm long, tube 0.6–1.2 mm long, campanulate, lobes 0.8–1.5 mm long, initially erect, later reflexed, equaling or slightly longer than the tube, oblong to lanceolate, margins entire, apex obtuse to acute, straight. Stamens exserted, shorter than the lobes, anthers 0.40–0.60 × 0.24–0.30 mm, elliptic to oblong, filaments 0.4–0.7 mm long. Infrastaminal scales 0.8–1.2 mm long, equaling or slightly longer than the tube, bridged at ca. 0.1 mm, subspathulate to obovate, uniformly dense-fringed, fimbriae 0.15–0.32 mm long. Styles 0.8–1.7 mm long, equaling or longer than the ovary, evenly filiform. **Capsules** circumscissile, 1.0–2.5 × 0.5–1.2 mm, depressed, irregularly thickened and slightly risen around the inconspicuous interstylar aperture, translucent, surrounded or capped by the withered corolla. **Seeds** 4 per capsule, 0.80–1.20 × 0.65–0.80 mm, angled, broadly elliptic to surround, seed coat cells alveolate/papillate.

Sonora.—Sonoran Desert in the western part of the state, ca. 10–430 m. Flowering June–December–March. Potential host plants in northwestern Sonora include *Acleisanthes*, *Allionia*, *Amaranthus*, *Atriplex*, *Boerhavia*, *Gilia*, *Kallstroemia*, *Salsola*, *Suaeda*, *Tidestromia*, *Trianthema*, and *Tribulus*.

General distribution.—Arizona, Colorado, New Mexico, Texas; Chihuahua, Coahuila, Durango, Distrito Federal, Guanajuato, Guerrero, Edo. México, Hidalgo, Jalisco, Michoacán, Nuevo Leon, Oaxaca, Puebla, Querétaro, San Luis Potosí, Tamaulipas, Veracruz; West Indies; Central and South America.

Selected reference.—Costea and Stefanović (2010).

Mpio Guaymas: 1 mi N of Suhuoral [Sahuaral], 19 mi W of Arrieros on rd to Tastiota, on *Atriplex barclayana* and *A. polycarpa*, 3 Sep 1941, *Wiggins & Rollins 254* (CAS, UC). **Mpio General Plutarco Elías Calles:** Quitovac, extremely common, 2 Sep 1980, *Nabhan & Rea 167*; NW side of Sonoyta, Calle 16 de Septiembre, ca. 0.5 km E of Río Sonoyta, slight depression, sandy soil, disturbed, weedy habitat, 4 Oct 1985, *Felger 85-940*.

Cuscuta vandevenderi Costea & Stefanov., Botany 86:679. 2008. TYPE: MEXICO. SONORA: Municipio Yécora, 28°22'40"N, 109°09'W', 850 m, common parasite on *Sida rhombifolia* (Malvaceae); flowers starting white, turning yellowish, 20 Sep 1998, *Van Devender 98–1434* (HOLOTYPE: ARIZ!; ISOTYPES: MEXU!, NY!, WLU!).

Cuscuta gracillima var. *esquamata* Yunck., Illinois Biol. Monogr. 6(2–3):43. 1921. TYPE: MEXICO. BAJA CALIFORNIA: El Taste, 16 Sep 1893, *Brandegee s.n.* (HOLOTYPE: UC!).

Stems thin. **Inflorescences** corymbiform cymes arranged in dense globose inflorescences, 1–3 cm in diameter. Pedicels 0.7–6 mm long. Bracts 1 at the base of clusters, 0.5–0.75 mm long, triangular-ovate, margins entire or denticulate, apex acute. **Flowers** (4–) 5-merous, 2–2.6 mm long, membranous, white turning cream yellowish when fresh, creamy–light brown when dried. Papillae absent. Laticifers prominent in the calyx and corolla, articulated or isolated, rectangular, ovoid to elongated. Calyx 0.9–1.6 mm long, yellow-gray, not shiny, campanulate, divided ½–⅓ mm, tube 0.4–0.8 mm long, lobes 0.5–1.2 mm long, not overlapping to overlapping, triangular to triangular-lanceolate, carinate, margins ± entire to serrulate, apex acute, acuminate to obtuse. Corolla 1.5–2.1 mm long, tube campanulate, 0.9–1.3 mm long, lobes 0.6–1.3 mm long, erect to slightly spreading, triangular, margins entire to irregular, apex obtuse to acute. Stamens equaling to longer than corolla lobes, anthers 0.3–0.5 × 0.3–0.4 mm, subround to broadly elliptic, filaments 0.6–1.5 mm long. Infrastaminal scales 1–1.2 mm long, equaling corolla tube, bridged at 0.4–0.5 mm, oblong–ovate to truncate, densely fringed, fimbriae 0.1–0.2 mm long. Styles 0.8–1.2 mm long, longer than the ovary, uniformly filiform. **Capsules** indehiscent, 1.8–2.4 × 0.8–1.2 mm, globose–depressed to globose–obovoid, slightly thickened but not risen around the relatively large interstylar aperture; persistent corolla surrounding the base of capsules. **Seeds** 3–4 per capsule, 0.9–1.1 × 1–1.2 mm, subrotund, seed coat cells alveolate/papillate.

Cuscuta vandevenderi resembles *C. gracillima* from which it differs through the smaller flowers and indehiscent capsules surrounded by persistent corollas, and the often serrate calyx and corolla lobes. From *C. deltoidea*, which is the closest related species, it can be separated by the indehiscent capsules and denser inflorescences (Costea et al. 2008).

Sonora.—Southeast and central part of the state in tropical deciduous forest, oak woodland, and pine-oak forests (sometimes in openings); 350–1550 m. Flowering September–December. Parasitizing various herbs, e.g., *Ayenia*, *Chamaecrista*, *Cosmos*, *Euphorbia*, *Sida*, and *Evolvulus*.

General distribution.—Sonora and Baja California Sur.

Selected reference.—Costea et al. (2008).

Mpio Álamos: Sierra Tecurahui, 1200–1500 m, 26–28 Oct 1961, *Gentry 19423* (US); 3.9 km above Rancho El Palmarito, 23.9 km, E-NE of Álamos, 27°03'04"N, 108°45'51"W, 516 m, 1 Oct 2006, *Van Devender 2006-983* (WLU); El Guayabo Crossing of Río Cuchujaqui, 14 Km (by air) E-SE of Álamos, 27°00'05"N, 108°47'08"'W, 370 m, 21 Nov 1993, *Steinmann 93-349* (ASU). **Mpio Mazatán:** Sierra de Mazatán, Rancho El Flauta, 29°06'N, 110°12'50"W, 1260 m, 9 Oct 2004, *Reina 2004-1224* (USON, WLU). **Mpio Yécora:** Santa Ana de Yécora; 28°22'40"N, 109°09'W, 850 m, 20 Sep 1998, *Van Devender 98-1434* (ARIZ, MEXU, NY, WLU); Cañada La Ventana (Arroyo El Otro Lado), 2.5 km (by air) E-SE of Yécora, 28°21'38"N, 108°53'55"W, 1520 m, 18 Sep 1998, *Van Devender 98-1334* (WLU) [SEM].

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REFERENCES

Austin, D.F. 1982. 165. Convolvulaceae. In: G.W. Harling and B.B. Sparre, eds. Flora of Ecuador, vol. 15. University of Göteborgand Swedish Museum of Natural history, Göteborg and Stockholm. Pp. 1–98.

Costea, M. 2007–onwards. Digital atlas of *Cuscuta* (Convolvulaceae). Wilfrid Laurier University, Ontario, Canada. https://www.wlu.ca/page.php?grp_id=2147&p=8968&pv=1 (viewed 16 June 2011).

Costea, M. and F.J. Tardif. 2004. *Cuscuta* (Convolvulaceae)—the strength of weakness: a history of its name, uses and parasitism concept during ancient and medieval times. Sida 21:369–378.

Costea, M. and F.J. Tardif. 2006. The biology of Canadian weeds. *Cuscuta campestris, C. gronovii, C. umbrosa, C. epithymum* and *C. epilinum*. Canad. J. Pl. Sci. 86:293–316.

Costea, M., and S. Stefanović. 2009. *Cuscuta jepsonii* (Convolvulaceae), an invasive weed or an extinct endemic? Amer. J. Bot. 96:1744–1750.

Costea, M., and S. Stefanović. 2010. Evolutionary history and taxonomy of *Cuscuta umbellata* complex (Convolvulaceae): evidence of extensive hybridization from discordant nuclear and plastid phylogenies. Taxon 59:1783–1800.

Costea, M., G.L. Nesom, and S. Stefanović. 2006a. Taxonomy of *Cuscuta pentagona* complex. Sida 22:151–175.

Costea, M., G.L. Nesom, and S. Stefanović. 2006b. Taxonomy of *Cuscuta indecora* complex. Sida 22:176–195.

Costea, M., G.L. Nesom, and S. Stefanović. 2006c. Taxonomy of *Cuscuta californica-salina* complex. Sida 22:197–207.

Costea, M., F. Aiston, and S. Stefanović. 2008. Species delimitation, phylogenetic relationships and two new species in the *Cuscuta gracillima* complex (Convolvulaceae). Botany 86:670–681.

Costea, M., M.A.R. Wright, and S. Stefanović. 2009. Untangling the systematics of salt marsh dodders: *Cuscuta pacifica* a new segregate species from *Cuscuta salina*. Syst. Bot. 34:787–795.

Costea, M., I. Spence, and S. Stefanović. 2011a. *Cuscuta chinensis* species complex evidence for long-distance dispersal and one new species. Org. Divers. Evol. 11:373–386.

Costea, M., I.R. Garcia, and S. Stefanović. 2011b. 'Horned' dodders: phylogenetic relationships and two new species within *Cuscuta chapalana* complex (Convolvulaceae). Botany 89:715–730.

Felger, R.S. 2000. Flora of the Gran Desierto and Río Colorado of northwestern Mexico. University of Arizona Press, Tucson.

Felger, R.S., D.F. Austin, T.R. Van Devender, J.J. Sánchez-Escalante, and M. Costea. 2012. Convolvulaceae of Sonora, Mexico. I. *Convolvulus, Cressa, Dichondra, Evolvulus, Ipomoea, Jacquemontia, Merremia,* and *Operculina.* J. Bot. Res. Inst. Texas 6:459–527.

Felger, R.S., B.T. Wilder, and J.P. Gallo-Reynoso. 2011. Floristic diversity and long-term vegetation dynamics of Isla San Pedro Nolasco, Gulf of California, Mexico. Proc. San Diego Soc. Nat. Hist. 43:1–42.

Stefanović, S., M. Kuzmina, and M. Costea. 2007. Delimitation of major lineages within *Cuscuta* subg. *Grammica* using plastid and nuclear DNA sequences. Amer. J. Bot. 94:568–589.

Welsh, M., S. Stefanović, and M. Costea. 2010. Pollen evolution and its taxonomic significance in *Cuscuta*. Pl. Syst. Evol. 285:83–101.

Wright, M.A.R., M. Welsh, and M. Costea. 2011. Diversity and evolution of gynoecium in *Cuscuta* (dodders, Convolvulaceae) in relation to their reproductive biology: two styles are better than one. Pl. Syst. Evol. 296:51–76.

Wright, M.A.R., M.D. ianni, and M. Costea. 2012. Diversity and evolution of pollen and ovule production in *Cuscuta* (dodders, Convolvulaceae) in relation to floral morphology. Pl. Syst. Evol. 2:369–389.

Yuncker, T.G. 1921. Revision of the North American and West Indian species of *Cuscuta*. Illinois Biol. Monogr. 6:91–231.

Yuncker, T.G. 1932. The genus *Cuscuta*. Mem. Torrey Bot. Club 18:113–331.

Yuncker, T.G. 1965. *Cuscuta*. North American Flora, ser. 2, 4:1–51.