
New Taxa and a New Combination in *Tidestromia* (Amaranthaceae) from North America

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ABSTRACT. A new species and a new subspecies of *Tidestromia* are described and illustrated. *Tidestromia valdesiana*, restricted to Coahuila, Mexico, is characterized by the absence of an involucre and tepals lanceolate, aristate at the apex with a prominent midnerve and subulate trichomes. *Tidestromia lanuginosa* subsp. *eliassoniana* is characterized by having trichomes with the terminal cell projections either irregular (as those of the subsp. *lanuginosa*) or spreading, and microspinulose pollen, which is unique within the genus. A distribution map for the two recognized subspecies of *T. lanuginosa* is provided. The new combination *T. suffruticosa* var. *oblongifolia* is proposed, and *T. oblongifolia* subsp. *cryptantha* is reduced to synonymy under the former; both names are lectotypified.

RESUMEN. Se describen e ilustran una especie y una subespecie nuevas de *Tidestromia*. *Tidestromia valdesiana*, endémica de Coahuila, México, se caracteriza por los tépalos lanceolados de ápice aristado con la vena media prominente y tricomas subulados, así como por no tener involucre. *Tidestromia lanuginosa* subsp. *eliassoniana* se caracteriza por tener tricomas con proyecciones de las células terminales irregulares (como en la subsp. *lanuginosa*) o patentes, así como polen microespínuloso que es único en el género. Se incluye un mapa de distribución de las dos subespecies reconocidas de *T. lanuginosa*. Además se propone la combinación nueva *T. suffruticosa* var. *oblongifolia*, reduciéndose como sinónimo *T. oblongifolia* subsp. *cryptantha*; ambos nombres son lectotipificados.

Key words: Amaranthaceae, Froelichiinae, Gomphreneae, North America, pollen, *Tidestromia*.

Tidestromia Standley is a small genus of six species in the Amaranthaceae, subfamily Gomphrenoideae, tribe Gomphreneae, subtribe Froelichiinae (Schinz, 1893), occurring in North American deserts (Standley, 1916; Robertson, 1981; Eliasson, 1988; Henrickson, 1993), frequently on salty, gypsaceous, and calcareous soils. *Tidestromia* has been circumscribed by having the flowers arranged in small axillary glomerules and leaves that subtend

the inflorescence becoming hard and more or less connate in age, thus forming an involucre (Standley, 1916; Eliasson, 1988). The pollen in *Tidestromia* has been considered unique among Amaranthaceae (Eliasson, 1988; Borsch, 1998). It differs from that of other genera by being metareticulate, with mesoporia continuously narrowed distally (triangular in cross section), tectate, with perforations concentrated close to the apertures (Borsch, 1998). Although psilate pollen has been considered diagnostic of *Tidestromia*, Martin and Drew (1970) described ornamented pollen of *T. lanuginosa* (Nuttall) Standley, which was never taken into consideration for the taxonomy of the genus.

Tidestromia has trichomes with a single row of cells (uniseriate) with the upper cells usually with sinuous interlocking junctions, thick cellulose walls, and usually with projections. As was indicated by Carolin (1983), one subtype of this uniseriate trichome has projections, if they occur, apparently at random, and the other subtype, which we are calling candelabriform in this paper, is characterized by large projections arranged in a whorl in the center of the cells. In *Tidestromia*, while the size of the projections is characteristic of a particular trichome, there are trichomes whose cells have projections of differing size. We found also notable differences in the apical cells of the trichomes.

In an ongoing revision of *Tidestromia*, observations on the habit, the nature of the pubescence, characters of the trichomes, tepals and involucre, as well as pollen micromorphology led us to recognize an undescribed species and to propose a new subspecies of *T. lanuginosa*. We also propose a new combination for *T. suffruticosa* (Torrey) Standley, and we designate lectotypes for two names.

Tidestromia valdesiana Sánchez-del Pino & Flores Olvera, sp. nov. TYPE: Mexico. Coahuila: Mpio. Parras, ejido el Durazno, xerophytic scrub on limestone mesa, 25°27'20"N, 102°06'36"W, 1635 m, 15 Oct. 2000, I. Sánchez-del Pino 93, H. Flores Olvera & C. Gómez-Hinostroza (holotype, MEXU; isotypes, ANSM, MO, NY, TEX). Figures 1, 2A, 3A, 3C.

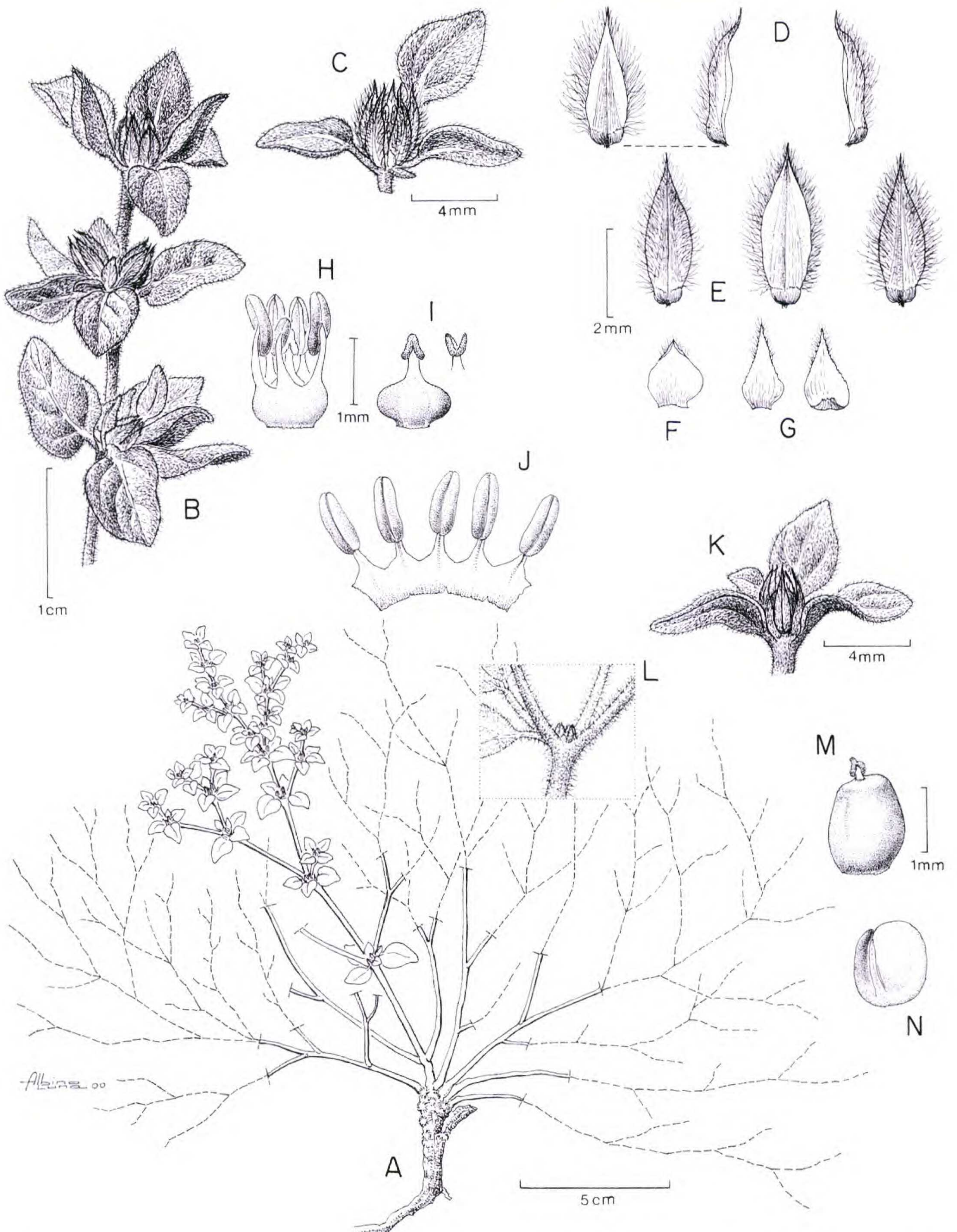


Figure 1. *Tidestromia valdesiana* Sánchez-del Pino & Flores Olvera. —A. Habit. —B. Flowering branch. —C. Leaf and involucre leaves surrounding the inflorescence. —D. Inner tepals, abaxial and lateral views. —E. Outer tepals, abaxial view. —F. Bract. —G. Bracteoles. —H. Sexual verticils. —I. Pistil. —J. Androecium. —K. Leaf and involucre leaves in fruit. —L. Inflorescence. —M. Utricle. —N. Seed. Drawn from the holotype (Sánchez-del Pino 93 et al., MEXU).

Herba perennis rhizomatosa, caulibus ascendentibus vel decumbentibus, plerumque base gemmis lanatis, dense lanuginosa, trichomatibus omnino vel partim candelabriformibus; inflorescentia plerumque per duo folia involucralia inclusa, his ad maturitatem non induratis nec connatis, involucre non formantibus, vel raro inflorescentia foliis involucralibus carens ad nodos ubi duo vel plures rami orientes; tepala lanceolata, apice aristata, trichomatibus barbatis subulatisque, nervo mediano conspicuo.

Herbaceous perennial from rhizome, up to 22 cm tall, canescent, richly lanuginose, trichomes completely or partially candelabriform. Stems gray-green or red, ascending or decumbent, usually bearing woolly to conspicuously woolly gemmae at the base. Leaves alternate, gray-green, sometimes red-shaded, ovate to widely ovate, $0.8\text{--}2.2 \times 0.7\text{--}2.0$ cm, thick, veins prominent beneath; apex acute or obtuse, base cuneate, cordate or attenuate; petioles up to 1 mm long. Inflorescence reduced to a few, mostly 3 flowers; surrounded by two involucral leaves that do not become indurate or connate with age, thus not forming an involucre, or rarely involucral leaves absent; involucral leaves gray-green, sometimes red, ovate, broadly ovate, or lanceolate, $0.1\text{--}0.6 \times 0.1\text{--}0.7$ mm, thick, veins prominent beneath, apex acute or obtuse, base cuneate or attenuate; petiole up to 0.3 cm long, densely lanuginose. Flowers 4.5–5.5 mm long; bracts widely depressed ovate, 2.5×1.5 mm, lanuginose above to glabrous, apex obtuse or rounded; bracteoles ovate, $1.9\text{--}2.2 \times 1.2\text{--}1.5$ mm, lanuginose above to glabrous, apex acute; tepals yellow-tinged, lanceolate, $4\text{--}4.5 \times 1\text{--}2$ mm, coriaceous, apex aristate, midrib prominent, thicker at the base, densely lanuginose; trichomes subulate, barbed; staminal cup 0.6–0.9 mm long, filaments 1 mm long, anthers 0.8–1.2 mm long, pseudostaminodia short or absent; ovary 0.8–1.2 mm long and wide, style 2–3 mm long, stigma bifid, deltoid, dark brown, 0.3–0.4 mm long. Utricle $2.1 \times 1.4\text{--}1.6$ mm. Seeds red-brown, $1.5\text{--}1.7 \times 1.4$ mm. Pollen psilate (Fig. 2A).

Distribution and habitat. This is a narrowly endemic species of the Chihuahuan Desert Region, known only from the type locality in Coahuila, Mexico, at 1635–1700 m. It is locally common restricted to calcareous sites. *Tidestromia valdesiana* is restricted to the limestone mesa where it grows with *Agave lechuguilla* Torrey, *Dasyllirion* sp., *Fouquieria* sp., and *Larrea* sp. Flowers have been observed from September to November. *Tidestromia suffruticosa* is sympatric with *T. valdesiana*.

Etymology. *Tidestromia valdesiana* is named in honor of Javier Valdés Gutiérrez, whose support and enthusiasm motivated our interest in the study of the xerophytic flora of Mexico.

Discussion. *Tidestromia valdesiana* is the only species in the genus with lanceolate tepals having an aristate apex, prominent midnerve, and subulate trichomes (Fig. 3A). These trichomes have small projections mostly reflexed with a barbed appearance. This last character is also present in *T. tenella* I. M. Johnston, restricted to Coahuila, Mexico, but its trichomes are round-tipped (Fig. 3B). *Tidestromia valdesiana* is unique in the genus in that the two leaves surrounding the inflorescence do not become indurate and connate in age and do not form an involucre. An extreme condition in this species is the absence of leaves surrounding some inflorescences borne at nodes where two or more branches originate (Fig. 1L). *Tidestromia valdesiana* is similar to *T. gemmata* I. M. Johnston, which is considered conspecific with *T. suffruticosa* (Torrey) Standley (Sánchez-del Pino, 2001). Although both species are perennial herbs, usually with gemmae at the base, the gemmae densely woolly, and hirsute vestiture due to the abundance of trichomes partially candelabriform with the terminal cells lacking projections (Fig. 3C), they differ by other vegetative and reproductive characters. *Tidestromia suffruticosa* is suffrutescent, without a rhizome; it has ovate tepals with an acute or obtuse apex, midnerve not prominent, in addition to completely or partially candelabriform trichomes (Fig. 3D), and with projections at random (Fig. 3E). The inflorescence in this species is always surrounded by two involucral leaves that become indurate and connate with age forming an involucre.

Paratypes. MEXICO. **Coahuila:** Mpio. Parras, Ejido Mesa del Durazno, *Capó 1978* (ANSM), *Capó 1979* (ANSM), *I. Sánchez-del Pino 94 et al.* (CAS, MEXU, TEX).

Tidestromia lanuginosa* subsp. *eliassoniana

Sánchez-del Pino & Flores Olvera, subsp. nov.

TYPE: Mexico. Sonora: Mpio. Guaymas, 15 km N of Guaymas on the road to Hermosillo, 1 Nov. 1985, *B. Bartholomew 3654*, *L. R. Landrum*, *H. W. Li & T. S. Ying* (holotype, MEXU; isotypes, ASU, CAS, GH). Figures 2B, 2C, 3G–I, 4, 5.

A subspecie *lanuginosa* differt pollinis granis exina microspinulosa, cellula terminali trichomatium caulium, foliorum et foliorum involucralium duarum classium: communi, irregulariter ramificanti, et atypica, ramis patentibus.

Stems light brown to gray-green, generally red; stems, leaves, and involucral leaves covered by completely candelabriform trichomes, with the terminal cell projections either irregular, as those of the subspecies *lanuginosa*, or spreading. Leaves

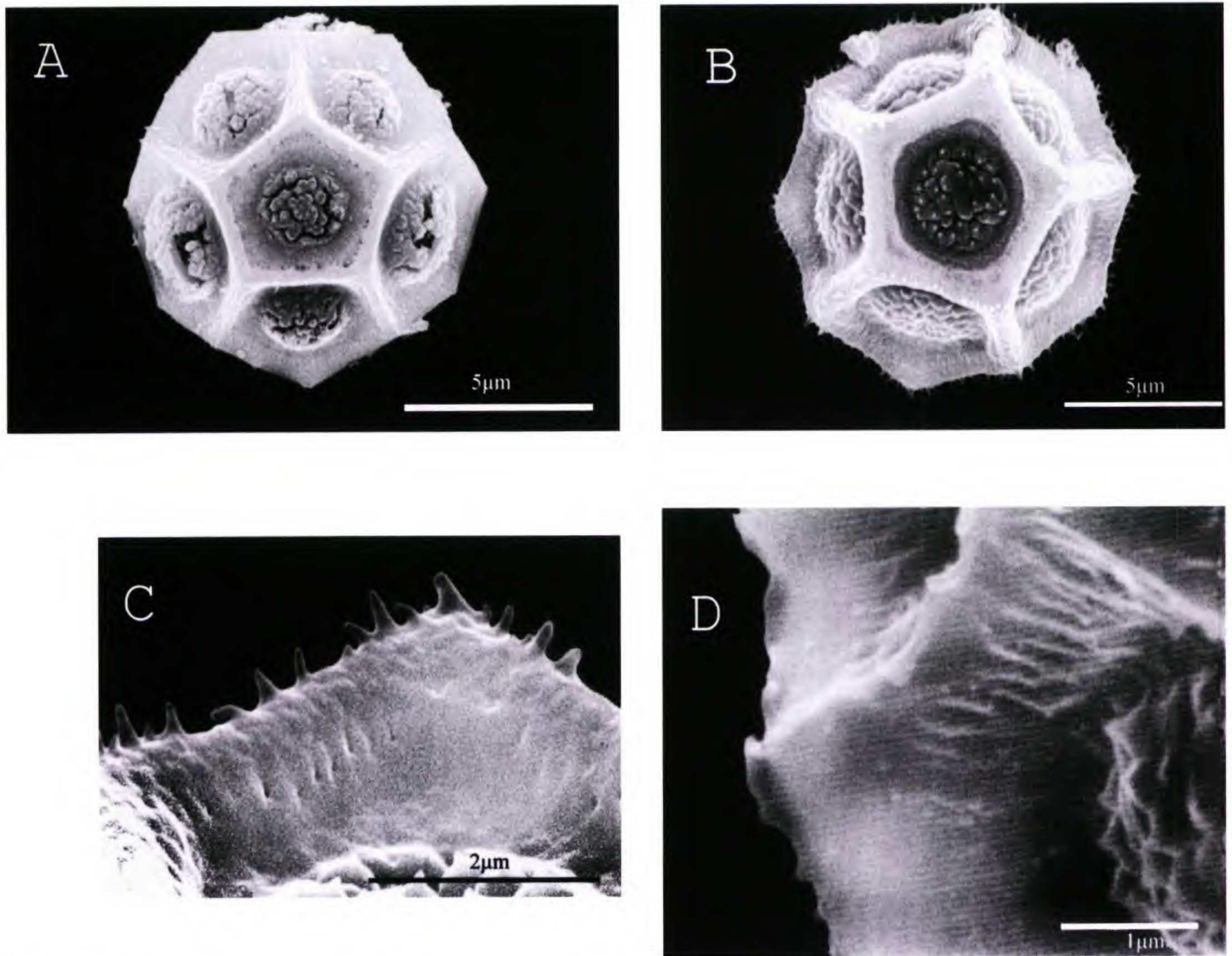


Figure 2. SEM photomicrographs of pollen grains. —A. *Tidestromia valdesiana* (Capó 1978, ANSM). —B, C. *Tidestromia lanuginosa* subsp. *eliassoniana* (Bohrer 1189, ARIZ). —D. *Tidestromia suffruticosa* var. *suffruticosa* (Sánchez-del Pino 77 et al., MEXU).

widely obovate or generally ovate-trullate or lanceolate; apex acute or rarely obtuse. Pollen microspinulose (Fig. 2B, C).

Distribution and habitat. *Tidestromia lanuginosa* subsp. *eliassoniana* is known from the southwestern United States in Utah, California, Arizona, and New Mexico, to northwestern Mexico in Sonora, Chihuahua, Baja California Sur, and Sinaloa (Fig. 5). It occurs in primary and disturbed vegetation in grassland, xerophytic scrub, coastal thorn scrub, thorn forest, and tropical deciduous forest, dwelling on roadsides or in cultivated fields, from sea level

to 1463 m. The soils throughout its distributional range are alluvial, sandy to clayey, gravelly, limestone, silty, igneous, salty, or gypseous.

Etymology. *Tidestromia lanuginosa* subsp. *eliassoniana* is named in honor of Uno H. Eliasson in recognition of his contributions to the taxonomy of Amaranthaceae, including pollen morphology.

Discussion. *Tidestromia lanuginosa* is the most widely distributed species of the genus. It is characterized by having, on the secondary branches, an involucre formed by involucral leaves in which the petiole becomes indurate with age and connate with

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Figure 3. SEM photomicrographs of trichomes. —A. Subulate barbed trichome of *Tidestromia valdesiana* (Capó 1978, ANSM). —B. Round-tipped barbed trichome of *T. tenella* (Villarreal 4459 et al., ANSM). —C. Partially candelabriform trichome of *T. valdesiana* (Capó 1978, ANSM). —D. Partially candelabriform trichome of *T. suffruticosa* (Chiang 9277, NY). —E. Trichome with projections at random of *T. suffruticosa* (Johnston 10674, MEXU). —F. Trichome with the terminal cell projections irregular of *T. lanuginosa* subsp. *lanuginosa* (Ekman 9861, GH). —G. Trichome with the terminal cell projections spreading of *T. lanuginosa* subsp. *eliassoniana* (Bartholomew 3654 et al., CAS). —H. Uniseriate macroform osteolate conical trichome of *T. lanuginosa* subsp. *eliassoniana* (Clark 8499, ARIZ). —I. Uniseriate macroform osteolate T-shaped trichome of *T. lanuginosa* subsp. *eliassoniana* (Clark 8499, ARIZ).



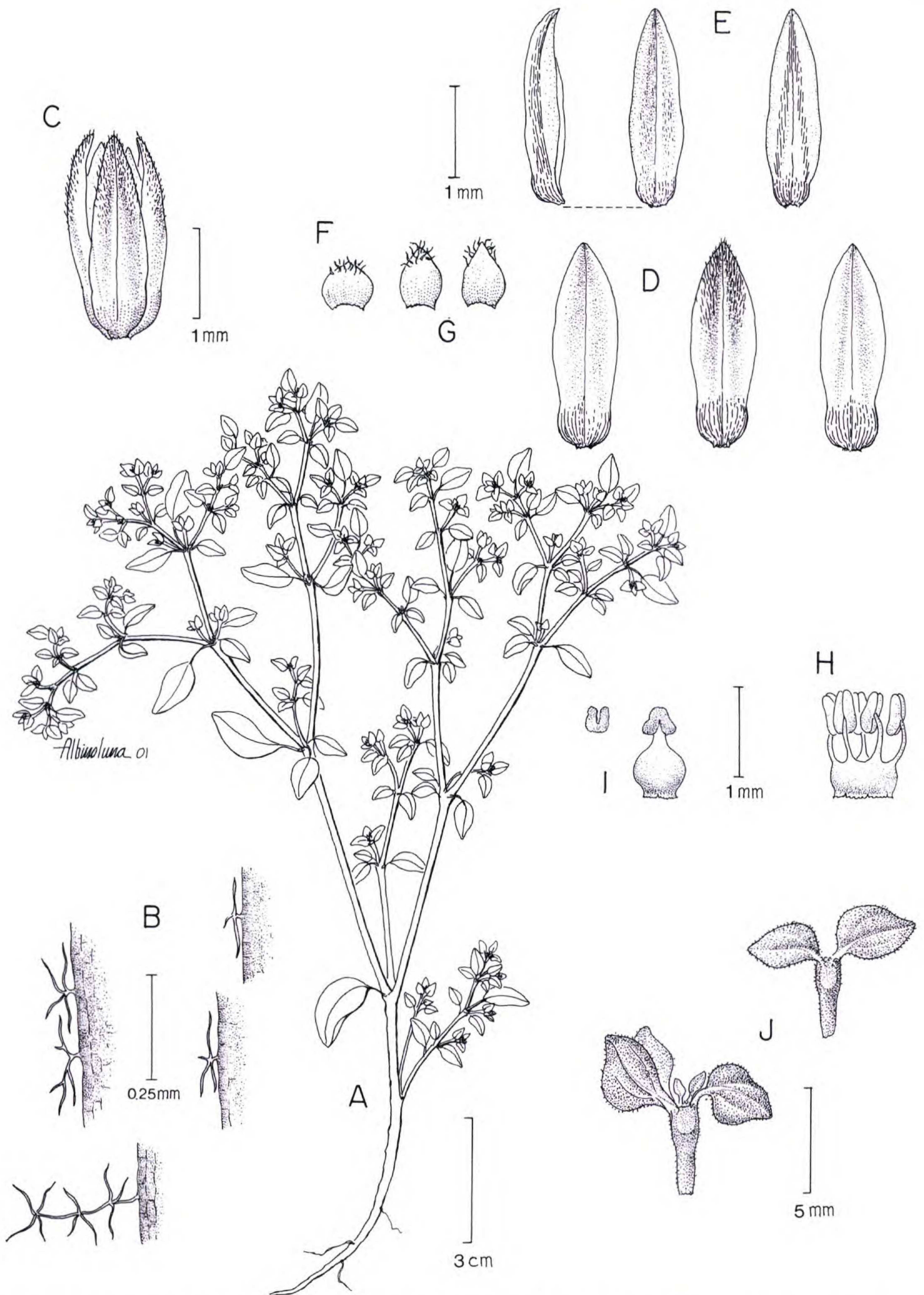


Figure 4. *Tidestromia lanuginosa* subsp. *eliassoniana* Sánchez-del Pino & Flores Olvera. —A. Habit. Drawn from Wiggins & Rollins 131, GH. —B. Trichomes. —C. Flower. —D. Outer tepals, abaxial view. —E. Inner tepals, abaxial and lateral views. —F. Bract. —G. Bracteoles. —H. Androecium. —I. Pistil. —J. Leaf and involucral leaves in fruit. B–J, drawn from the holotype (Bartholomew 3654 *et al.*, MEXU).

the stem or with the leaf petiole and the stem. This is an annual species, with leaves and involucre leaves chartaceous or less commonly fleshy, stems usually gray-green or red to yellow-green in the field, usually richly lanuginose to glabrate, and completely candelabriform trichomes. The tepals present this type of trichome as well as trichomes with small projections that occur in some cells. Due to the wide morphological variation of the species, some authors (Steyermark, 1932; Cory, 1936; Correll & Johnston, 1970; Robertson, 1981) recognized two varieties: *T. lanuginosa* var. *lanuginosa* and variety *carnosa* (Steyermark) Cory. Nevertheless, we agree with Johnston (1943), who recognized *T. carnosa* as a distinctive species. This species has the involucre on the secondary branches formed by the connation of involucre leaf bases with or without the leaf base, but never with the stem. In addition, the young parts and the tips of the leaves are glabrous or slightly pubescent; the stems, leaves, and involucre leaves are fleshy and yellow-green in the field.

Tidestromia lanuginosa is herein proposed to be separated into two subspecies on the basis of pollen and trichome features. *Tidestromia lanuginosa* subsp. *lanuginosa* has the characteristic psilate pollen of the genus as described by previous authors (Eliasson, 1988; Borsch, 1998), whereas *T. lanuginosa* subsp. *eliassoniana* is characterized by the occurrence of microspines on the tectum (Fig. 2B, C), which is unique in the genus but not in the tribe. *Tidestromia lanuginosa* subsp. *eliassoniana* also differs from the other subspecies by having stems, leaves, and involucre leaves with trichomes that have the terminal cell projections either irregular, as in those of the subspecies *lanuginosa* (Fig. 3F), or spreading (Fig. 3G). The collection Clark 8499 (ARIZ) from Arizona has a different type of trichome with cuticle granules and without projections that were described by Reddy et al. (1998) as uniseriate macroform osteolate. Among these, some are conical (Fig. 3H) and others are T-shaped (Fig. 3I), resembling trichomes sometimes present in *T. carnosa* and *T. tenella*. Because this specimen also has microspinulose pollen, the trichomes are considered an extreme variation for subspecies *eliassoniana*.

Based on the known morphological variation of pollen present within genera of the Amaranthaceae, the microspinulose pollen in *T. lanuginosa* subsp. *eliassoniana*, unique within the genus, is of high significance. Preliminary studies indicate that there might be intermediate stages between psilate and microspinulose pollen within *Tidestromia*. We observed parts of the tectum with nanoverrucae of

some samples of *T. suffruticosa* var. *suffruticosa* (Fig. 2D), suggesting the need to do exhaustive palynological studies in the genus. Shifts between completely smooth to sculptured tecta are extremely rare within genera of Amaranthaceae and as currently known otherwise only occur in the genus *Cyathula* (Borsch, 1998).

Because the pollen of all other genera of Gomphreneae is generally microspinulose, it would appear that this is a plesiomorphic condition within the genus *Tidestromia*, but phylogenetic studies are needed to test this. Pollination studies are also needed to test whether the sculptured pollen is related to a shift in pollen dispersal mechanisms potentially related to an increase in the amount of pollen kit.

Tidestromia lanuginosa subsp. *lanuginosa* occurs from the central United States to northern Mexico and the West Indies (Antilles), from Illinois to the Dominican Republic, whereas subspecies *eliassoniana* ranges from the southwestern United States to northwestern Mexico (Sánchez-del Pino, 2001) (Fig. 5).

Paratypes. U.S.A. **California:** Riverside Co., 21 mi. W of Tonopah along I-10, Sep. 1991, *Atwood 17084* (NY). **Utah:** Washington Co., 3 mi. S of Saint George, Sep. 1941, *Gould 1413* (ARIZ, DS, GH, NY, UC). **Arizona:** Cochise Co., Escala San Simon Valley, Aug. 1912, *Gooding 1290* (ARIZ, NY); Coconino Co., along Grand Canyon, airport road, 100 yards W of junction with Arizona 64-180, ca. 8 mi. S of Grand Canyon Village, Sep. 1981, *Saulea 6495 & Saulea* (ASU); Gila Co., near Canyon of the Sallymay, Sierra Ancha foothills, Sep. 1946, *Gould 3883* (ARIZ, NY, UC); Graham Co., hwy. 666, 0.2 mi. E of junction with hwy. 70, Sep. 1968, *Pinkava 13425 et al.* (ASU, NY); Greenlee Co., along U.S. hwy. 70, 8 6/10 mi. E of Solmonville on road to Duncan, Oct. 1942, *Wolf 11414 & Everett* (UC); Maricopa Co., Tempe, on rocky slopes of Double Butte, Sep. 1964, *Fryxell 101* (ENCB, NY); Mohave Co., E of Blythe, Sep. 1929, *Jones 24819* (CAS, GH, MO, NY); Pima Co., Tucson, Oct. 1894, *Toumey 1894* (ARIZ, CAS, GH, NY, UC); Pinal Co., along hwy. 10 between Phoenix and Tucson, Sacaton rest stop, Oct. 1982, *Neese 12529* (ASU, NY); Santa Cruz Co., between Sopori Scool and Arivaca, July 1966, *Tate 278* (ASU); Yuma Co., SE of Alamo Lake, May 1980, *Butterwick 6322 & Hillyard* (ARIZ, ASU). **New Mexico:** Hidalgo Co., 1 mi. N of Rodeo, Aug. 1966, *Cazier 407* (ASU). **MEXICO. Baja California Sur:** Mpio. Mulegé, Bajada 6 mi. SW of Mulegé, Oct. 1962, *Wiggins 17964 & Wiggins* (DS, US). **Sonora:** Mpio. Agua Prieta, Colonia Morelos, region of the Rio de Bavispe, Aug. 1941, *White 4145* (ARIZ, GH, NY); Mpio. Alamos, near Tepistate N of Alamos, Nov. 1939, *Gentry 4838* (ARIZ, NY); Mpio. Altar, Hacienda Oquitoa (Cutting's Ranch) 6 mi. E of Altar, Oct. 1932, *Wiggins 5965* (DS, US); Mpio. Arizpe, across the Rio Bacanuchi from Tauichopa, Tauichopa is 2.7 mi. by road N of Arizpe, Aug. 1958, *Turner 183 & Lowe* (ARIZ); Mpio. Bacoachi, along wash about 14 mi. S of Divisaderos, Sep. 1934, *Wiggins 7474* (DS, GH, US); Mpio. Benjamín Hill, Santa Ana km 145 Hermosillo-San-

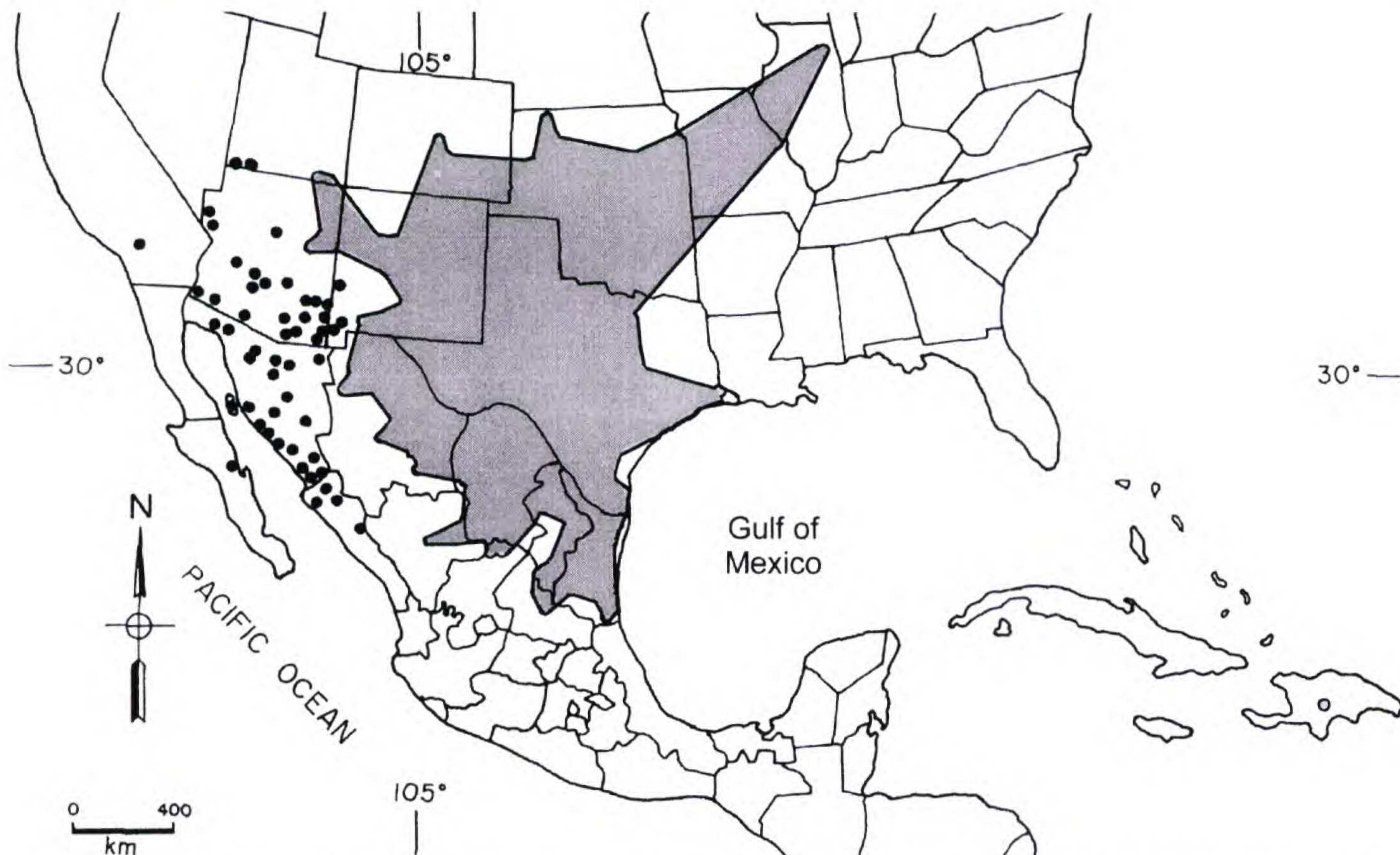


Figure 5. Distribution of *Tidestromia lanuginosa* subsp. *lanuginosa* (line outlining range) and *T. lanuginosa* subsp. *eliassoniana* (●).

ta Ana, 13.7 mi. (21.9 km) N of Benjamin Hill, Aug. 1985, *Cowan 5524 et al.* (NY); Mpio. Carbó, Potrero 7 rancho La Granada CIPES, Sep. 1984, *Miranda RLG-068* (ANSM, SLPM); Mpio. Cajeme, about 2.2 mi. NE of hwy. 15 (toward a microwave tower), about 6.9 mi. SE of Ciudad Obregon, Sep. 1973, *Stevens 2067 & Fairhurst* (DS, ENCB, GH, MO, NY); Mpio. Guaymas, ca. 15 mi. SE of Guaymas, June 1979, *Webster 17001 & Lynch* (GH, MEXU, MO); Mpio. Hermosillo, 27 mi. W of Hermosillo on the road to Kino Bay, Aug. 1941, *Wiggins 131 & Rollins* (ARIZ, DS, GH, MO, NY, UC); Mpio. Huatabampo, Nescotahuca vicinity 5 km (by air) N-NE of Camahuiroa, 6.7 km N on Bachoco road from Diez de Abril road, 1.9 km S-SW (by air) Nescotahuca, Jan. 1995, *Friedman 179-95 & Zittere* (ASU); Mpio. La Colorada, La Colorada, May 1905, *Clokey 1915* (UC); Mpio. Magdalena, bank of Rio Sasobe, 10 mi. E of Magdalena, Sep. 1934, *Wiggins 7110* (DS, GH); Mpio. Navojoa, turnoff to microwave road on Cerro Prieto, 17 km E of Navojoa on road to Alamos, Mar. 1993, *Van Devender 93-248 et al.* (ARIZ); Mpio. Onavas, Onavas, graphite mine NE of pueblo, Oct. 1986, *Rea 1248* (ARIZ); Mpio. Pitiquito, Pitiquito, May 1925, *Kennedy 7069* (CAS, UC); Mpio. Puerto Peñasco, ca. 7 km N of Puerto Peñasco, at ca. 2 km N of airport, June 1985, *Felger 85-790* (ARIZ, MEXU); Mpio. Soyopa, NE side of Río Yaqui bridge on Mex. 16, just S of Tonichi, Sep. 1996, *Van Devender 96-350 et al.* (ARIZ); Mpio. Ures, along hwy. 14 leading NE out of Hermosillo, ca. 37.5 km SW of Ures, Aug. 1995, *Snow 6593 & Prinzie* (MEXU). **Chihuahua:** along New Mexico–Chihuahua border 0.9 mi. W of monument #3, July 1986, *Worthington 14398* (NY). **Sinaloa:** Mpio. Culiacán, Culiacán, Oct. 1904, *Brandege s.n.* (GH, UC); Mpio. El Fuerte, Valle del Carrizo, street 800, near San Francisco, Aug. 1975, *Rodríguez 1607* (ARIZ, CAS, ENCB, MEXU, MO); Mpio. Salvador Alvarado, on Cerro Tasirogojo, 9 km S Estación Luis, 1 km W

(by air) Francisco Sarabia, 5.5 km (by air) SE Melchor Ocampo, Aug. 1994, *Friedman 210-94 & Espinosa* (ASU); Mpio. Sinaloa, Sinaloa de Leyva ca. 1 km N of Lagunilla, to Santa Fe, Nov. 1990, *Bojórquez 758* (MEXU).

Tidestromia suffruticosa* var. *oblongifolia (S. Watson) Sánchez-del Pino & Flores Olvera, comb. et stat. nov. Basionym: *Cladothrix oblongifolia* S. Watson, Proc. Amer. Acad. Arts 17: 376. 1882. *Tidestromia oblongifolia* (S. Watson) Standley, J. Wash. Acad. Sci. 6: 70. 1916. TYPE: U.S.A. Arizona: Yuma Co., Yuma, 25 June 1881, *Pringle 1881* (lectotype, here designated, GH; isoelectotypes, G, K, NY, US).

Tidestromia oblongifolia subsp. *cryptantha* (S. Watson) Wiggins, Contr. Dudley Herb. 4: 16. 1950. Basionym: *Cladothrix cryptantha* S. Watson, Proc. Amer. Acad. Arts 26: 125. 1891. TYPE: U.S.A. California: San Diego Co., Canso Creek, Nov. 1890, *Orcutt 2186* (lectotype, here designated, GH; isoelectotype, K).

Tidestromia oblongifolia was recognized as a separate species (e.g., Standley, 1917; Correll & Johnston, 1970) based on minor differences in staminodia and leaf characters, which are variable. Also, two subspecies were proposed for *T. oblongifolia* (Wiggins, 1950) based on characters of leaf form and size, and depth of the involucre. We recognize *T. oblongifolia* as conspecific with *T. suffru-*

ticosa and propose two varieties based on characters of leaves and internodes of the secondary branches, which subtend fruiting involucre. *Tidestromia suffruticosa* var. *suffruticosa* has leaves usually ovate, rarely lanceolate, very broadly ovate, or reniform, and internodes usually well defined, not crowded. *Tidestromia suffruticosa* var. *oblongifolia* has leaves usually oblong, rarely ovate-oblong, circular, lanceolate or ovate, and internodes usually reduced, crowded. These varieties are geographically isolated: *T. suffruticosa* var. *suffruticosa* ranges through New Mexico, Texas, Chihuahua, Durango, and Coahuila, whereas *T. suffruticosa* var. *oblongifolia* ranges through California, Baja California, Utah, Nevada, Arizona, and Sonora.

In the protologue of *Cladanthrix oblongifolia* and *C. cryptantha*, Watson cited syntypes. For the former name Watson cited: "on the banks of Colorado, near Chimney Peak (Dr. Newberry) and at Yuma (C. G. Pringle) and in the Mohave Desert (S. B. & W. F. Parish)." Specimens cited for *C. cryptantha* are: *Parry 274* collected in 1881 at Colton, California, and *Orcutt 2186* collected in 1890 at Canso Creek, San Diego County. We chose the best-preserved specimens at GH to lectotypify both these names.

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