A Reevaluation of the Mexican Species of Glandularia (Verbenaceae)

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A Reevaluation of the Mexican Species of *Glandularia* (Verbenaceae)

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Abstract: Umber (1979) provided a brief overview of *Glandularia* for North America. In this treatment he recognized 21 taxa as occurring in Mexico (excluding the widely cultivated *G. pulchella*), 19 species, with two of these (*G. bipinnatifida* and *G. elegans*) possessing varietal categories. From among these I can recognize only 15 species *G. amoena*, *G. bajacalifornica* (including *G. shrevei*), *G. bipinnatifida* (including 3 varieties), *G. brachyrhynchos*, *G. delticola*, *G. elegans* (without designated varieties), *G. gooddingii*, *G. lilacina*, *G. polyantha*, *G. pumila*, *G. quadrangulata* (including *G. racemosa* and *G. verecunda* , these believed to be forms having nutlets without apical appendages), *G. teucriifolia* (including *G. rinconensis*), *G. tumidula*, and *G. turneri* Nesom, the latter described after Umber's treatment. Additionally, one new species from southern Nuevo Leon and closely adjacent Zacatecas, *G. alejandrana* B. L. Turner, is proposed and illustrated. A key to all of the species is provided, along with maps showing their distributions.

Keywords: *Verbenaceae*, *Glandularia*, Verbena, Mexico

Umber (1979) provided a much-abbreviated systematic overview of *Glandularia*, a generic segregate from the difficult genus *Verbena*. The two genera are apparently monophyletic groupings, chromosomes of the former based on $x = 5$, the latter on $x = 7$ Schnack and Covas (1944). Additionally, *Glandularia* appears to be centered in North America (mainly Mexico), with a few ancestral introductions into South America, while the reverse holds for the genus *Verbena* (sensu stricto). Nevertheless, Moldenke (1980) and yet others (e.g., Nash and Nee, 1984) have not accepted the generic status of *Glandularia*, preferring to retain this as but a subgenus of *Verbena* (stricto lato).

I have accepted *Glandularia* as a distinct genus in my treatment of the group for Texas (Turner, 1998), most of which also occur in Mexico. In order to understand variation in the Texas material I have had to preoccupy myself with the Mexican taxa, going over much of the taxonomic grounds covered by Umber (1979). My systematic conclusions differ considerably from those of Umber, but more field work in Mexico needs to be done so as to verify or reject our differing hypothetical treatments. My field work in Texas suggests strongly that Umber's treatment of *G. bipinnatifida* and *G. quadrangulata* for that state is fundamentally flawed, as noted in Turner (1998) and as commented upon in the present. I am less certain about my treatment of *G. teucriifolia* of southern Mexico, and those taxa of *Glandularia* growing in Baja California.

I have not reiterated herein the generic description and typifications for the various taxa of *Glandularia*, this being adequately covered by Umber.

Convenient Key to Mexican *Glandularia*

1. Plants of Baja California.
   2. Stems and foliage moderately to densely pilose throughout, the vestiture 1.5–2.0 mm high. 8. *G. gooddingii*

2. Stems and foliage sparsely pubescent, variously pubescent but not densely pilose throughout, the vestiture mostly 0.5–1.5 mm high.
   3. Fruits readily splitting at maturity into 4 nutlets; cavity at base of nutlets well developed. 3. *G. bajacalifornica*
   3. Fruits tardily splitting at maturity into 4 nutlets; cavity at base of nutlets lacking or nearly so. 9. *G. lilacina*

1. Plants not in Baja California.
   4. Nutlets decidedly ovoid, widest well above the base, or else the nutlets ca. 4 mm long and terminated with ovate appendages.
      5. Nutlets subcylindric, broadened at the very base and terminated by large ovate appendages. 11. *G. quadrangulata*
      5. Nutlets ovoid, narrowed apically, not surmounted with appendages.
         6. Stems and foliage glandular throughout; Sierra de San Carlos, Tamaulipas. 5. *G. brachyrhynchos*
         6. Stems and foliage variously pubescent but not glandular throughout; Coahuila. 14. *G. tumidula*
   4. Nutlets not ovoid or terminated with appendages, subcylindric and peanut-like in shape mostly 2.5–3.5 mm long.
      7. Leaves finely dissected, the ultimate segments linear, mostly 0.3–1.0 mm wide; cultivated and/or naturalized species (only a few collections known from Mexico, all cultivated). *G. pulchella* (not treated)
      7. Leaves coarsely dissected, the ultimate segments lanceolate to ovate, 1 mm wide or more; native species.
         8. Corolla lobes, when expanded, mostly (2–)3–4(–5) mm across.
            9. Vestiture of stems mostly composed of numerous glandular trichomes, among which often occur a scattered array of longer eglandular hairs. 11. *G. pumila*
            9. Vestiture of stems mostly pilose with eglandular hairs, among these an occasional array of short-glandular hairs.
               10. Corollas white; north central Mexico. 12. *G. quadrangulata*
               10. Corollas pale pink to lavender.
                11. Corollas dark-lavender; stems to some degree glandular-pubescent. 4. *G. bipinnatifida* (small-flowered forms)
                11. Corollas pink to pale-lavender; stems not noticeably glandular-pubescent.
                12. Midstem leaves mostly 1.0–2.8 cm long, sessile or nearly so. 12. *G. quadrangulata* (exappendiculate forms)
                12. Midstem leaves mostly 3–6 cm long, usually with well-defined petioles. 6. *G. delticola*
         8. Corolla lobes, when expanded, mostly 5–18 mm across.
            13. Plants stiffly erect perennials with ascending leaves, those at midstem 10–11 cm long, known only from northern Michoacan and the state of México. 2. *G. amoena*
            13. Plants variously erect to recumbent with spreading leaves, but not stiffly erect with ascending leaves; widespread throughout Mexico.
               14. Nutlets 3.5–4.0 mm long; corolla tubes 15–20 mm long. 7. *G. elegans*
               14. Nutlets 2.0–3.2 mm long; corolla tubes 8–15(–18) mm long.
                15. Vestiture of spreading eglandular hairs 1.5–2.0 mm high, beneath this a vestiture of short glandular hairs; Sonoran Desert regions. 8. *G. gooddingii*
                15. Vestiture various, mostly 0.5–1.5 mm high; widespread, in the Sonoran desert regions.
                16. Leaves not deeply dissected, the lobes only rarely incised to 1/2 the distance to midribs; northeastern Mexico. 10. *G. polyantha*
                16. Leaves deeply dissected, the lobes mostly incised to 4/5 the distance to midribs, or nearly so.
                17. Nutlets black at maturity, mostly 2.8–3.4 mm long, at the base having a well-developed cavity.
                18. Stems and foliage sparsely pilose with spreading hairs, not at all glandular;

subalpine areas of Cerro Potosí, Nuevo León. 15. *G. turneri*

18. Stems and foliage variously pubescent, glandular pubescent or not, absent from Cerro Potosí (cf. Fig. 4). 4. *G. bipinnatifida*

17. Nutlets tan at maturity (occasionally black), mostly 2.0–2.8 mm long, without a well-developed cavity at base.

19. Tap-rooted, seemingly annual or short-lived perennial, procumbent herbs 5–15 cm high, not rooting at nodes; southern Nuevo León and adjacent Zacatecas. 1. *G. alejandrana*

19. Rhizomatous or stoloniferous, usually prostrate perennial herbs 5–30 cm high, rooting at nodes; central and southern Mexico. 13. *G. teucriifolia*

1. **Glandularia alejandrana** B. L. Turner, sp. nov. Figs. 1, 2, 3.

TYPE: MEXICO. NUEVO LEON: Mpio. Galeana, Rancho Aquililla, "Llano", 1850 m, 4 Aug 1997, *Hinton et al. 27025* (HOLOTYPE: TEX; ISOTYPES: CAS, F, GH, MEXU).

G. teucriifoliae similis sed herba annua multo minor, 5–15 cm. alta, rhizomate nullo; foliis multo subtilius dissectus in segmenta angustior necnon corollis violascentibus vel lavandulaceis (nec atropupureis) diversa.

Procumbent or recumbent annual or rarely short lived perennial (?) HERBS 5–15 cm high. STEMS coarsely strigose with ascending eglandular hairs. Stems leafy throughout, the leaves not much reduced upwards and much exceeding the internodes. MIDSTEM LEAVES ternately dissected, mostly 1.5–2.5(–3.0) cm long, 1–2 cm wide; petioles 0.5–1.5 cm long, narrowly winged; ultimate divisions of the leaves mostly linear-oblanceolate, 0.5–1.5 mm wide. FLOWERS arranged in terminal corymbose spikes, the latter mostly 1–2 cm long and about as wide. Bracts lanceolate to narrowly ovate, ca. 1/2 as long as the subtended calyces. Calyces 5–7 mm long, the lobes 0.5–1.0 mm long. Corollas "light pinkish-purple" to "lavender" or "purple", 8–10 mm long, the lobes 1.5–4.0 mm long (quotes indicate label data). NUTLETS black, ca. 2 mm long, ca. 0.75 mm wide at the base, ca. 0.6 mm wide at the apex, the commisere ca. 0.3 mm wide at midpoint, ca. 1.5 mm long.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. **NUEVO LEON:** 3 mi E of Entronque Galeana, 21 Jul 1958, *Correll & Johnston 19961* (LL); ca 7 km E of San Roberto Junction, 19 Mar 1987, *Ginzbarg 650* (TEX); Tanque Solis, Cerro El Gallo, 1950 m, 28 May 1987, *Hinton et al. 19126* (TEX); San José del Alamito to El Coyote, "grassy gypseous llano", 1780 m, 15 Jul 1998, *Hinton et al. 27199* (TEX), 27202 (TEX); 0.6 mi S of San José del Alamito, 1830 m, 18 Sep 1988, *Nesom 6744* (TEX). **ZACATECAS:** 18 mi W of Concepción del Oro, 2200 m, 30 Aug 1971, *Henrickson 6295* (LL); ca. 85 air miles NE of Zacatecas (ca 23°45′N, 101°50′W), 7100 ft, 13 Sep 1971, *Henrickson 6698* (LL).

Umber (1979) included at least some of the above cited specimens (e.g., *Henrickson 6698*) in his concept of *Glandularia rinconensis*. I treat *G. rinconensis* as synonymous with *G. teucriifolia*. The latter, as compared with *G. alejandrana*, is a much larger, coarser plant having rhizomatous rootstocks and prostrate stems which root at the nodes. In addition the corollas are dark purple, the leaves are larger with broader segments, and the vestiture of the stem is pilose with longer hairs (to 1 mm high).

George B. Hinton, who provided much of the stimulus for recognition of this species by making numerous collections and field observations (including the photographs making up Fig. 2), suggested that I name this taxon for his lovely wife Alejandra, an eponym which suits the plant concerned, it too a sweet breath of beauty for the lovely land inhabited.

Two of the above collections (*Ginzbarg 650, Nesom 6744*) note the species to occur as scattered prostrate plants in prairie dog towns.

FIG. 1. *Glandularia alejandrana*, holotype.

FIG. 2. *Glandularia alejandrana* habit (holotype): (top) pale lavender phase; (bottom) lavender phase.

2. GLANDULARIA AMOENA (Paxton) Umber, Syst. Bot. 4: 101. 1979. Fig. 3.

Verbena amoena Paxton, Paxton's Mag. Bot. 7: 3. 1840.
Verbena grandiflora Sessé & Moç., Pl. Nov. Hisp. ed. 1, 6. 1887.

This taxon is known to me by only two collections, both cited by Umber: the type (*Sessé & Moçiño 99*; Puruandiro, Michoacan) and *Pringle 13434* from the state of México, hills near Lechería (TEX, US). Umber notes this species to be "unique" and readily recognized by its coarse habit and bipinnatifid subauriculate leaves. In vegetative appearance it much resembles the common roadside weed, *Ambrosia psilostachya* DC. (Asteraceae). The large flowering heads and rather soft eglandular vestiture also distinguish the species.

3. GLANDULARIA BAJACALIFORNICA (Moldenke) Umber, Syst. Bot. 4: 99. 1979. Fig. 3.

Glandularia shrevei (Moldenke) Umber, Syst. Bot. 4: 99. 1979.
Verbena bajacalifornica Moldenke, Phytologia 2: 22. 1941.
Verbena shrevei Moldenke, Phytologia 2: 26. 1941.

I cannot distinguish *Glandularia shrevei* from *G. bajacalifornica*, although Umber (1979) retained both, distinguishing the latter (in his key) as follows:

1. Glandular hairs scarce on all plant parts; infructescence congested. *G. bajacalifornica*
1. Glandular hairs conspicuous on all plant parts; infructescence elongated. *G. shrevei*

The two putative species occur in relatively close proximity in Baja California Sur, and my examination of photographs of their types (LL) and comparison of Moldenke's description of these, strongly suggests that only a single variable species is involved.

4. GLANDULARIA BIPINNATIFIDA (Nutt.) Nutt., Trans. Amer. Phil. Soc., n.s. 5: 184. 1837. Fig. 4.

Umber (1979) recognized two varieties under this taxon, a typical *Glandularia bipinnatifida* var. *bipinnatifida* and var. *brevispicata*. I recognize three morphogeographical varieties, as shown in Fig. 4 and by the key that follows (Umber's var. *brevispicata* treated as a synonym of the earlier var. *ciliata*):

1. Bracts at base of calyces as long as the calyces; mid-grass biome of the centralU.S.A., extending into northern Coahuila, Mexico. 4a. *G. bipinnatifida* var. *bipinnatifida*
1. Bracts at base of calyces 1/2–4/5 as long as the calyces; short-grass and desert-grass biomes of the southwestern U.S.A. and Mexico.
   2. Calyx and upper stems clearly adorned with both glandular and non-glandular hairs; central and northeastern Mexico. 4b. *G. bipinnatifida* var. *ciliata*
   2. Calyx and upper stems without glandular trichomes or nearly so; northwestern Mexico. 4c. *G. bipinnatifida* var. *latilobata*

4a. GLANDULARIA BIPINNATIFIDA var. BIPINNATIFIDA. Fig. 4.

Verbena bipinnatifida Nutt., J. Acad. Nat. Sci. Philadelphia 2: 123. 1821.
Verbena ambrosifolia Rydb. ex Small, Fl. southeastern U.S., ed. 1, 1011. 1903.
Verbena demareei Moldenke, Amer. Midland Naturalist 24: 752. 1940.

The typical variety is largely confined to the central grasslands of the U.S.A., extending into northcentral Coahuila, Mexico (Fig. 4). It grades into *Glandularia bipinnatifida* var. *ciliata* in the western part of its range, as noted by Turner (1998).

4b. GLANDULARIA BIPINNATIFIDA var. CILIATA (Benth.) B. L. Turner, Lundellia 1: 7. 1998. Fig. 4.

Verbena ciliata Benth., Pl. Hartw. 211. 1839.
Verbena wrightii A. Gray, Syn. Fl. N. Amer. 2: 237. 1878.
Verbena pubera Greene, Pittonia 5: 136. 1903.
Verbena ciliata var. *pubera* (Greene) L. M. Perry, Ann. Missouri Bot. Gard. 20: 332. 1933.
Verbena wrightii f. *albiflora* Moldenke, Phytologia 11: 497. 1965.
Glandularia wrightii (A. Gray) Umber, Syst. Bot. 4: 92. 1979.
Glandularia bipinnatifida var. *brevispicata* Umber, Syst. Bot. 4: 88. 1979.
Verbena bipinnatifida var. *brevispicata* (Umber) Moldenke, Phytologia 45:99. 1980.

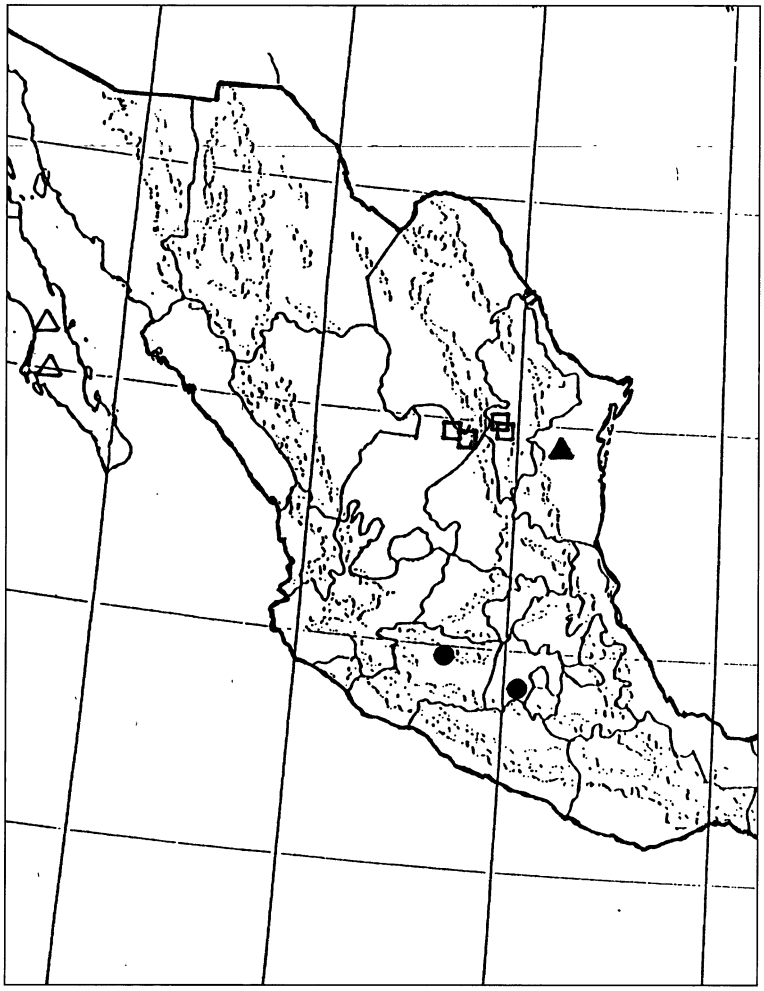

FIG. 3. Distribution of *Glandularia* species: *G. alejandrana* (open squares), *G. amoena* (closed circles), *G. bajacalifornica* (open triangles), *G. brachyrhynchos (closed triangle).*

As noted by Turner (1998), Umber recognized *Glandularia wrightii* as a distinct species, distinguishing this from his concept of *G. bipinnatifida* (s.l.) by a number of trivial characters. Perry (1933) also recognized *G. wrightii* as a distinct species but perceptively noted that "The main characters [which separate the two] appear to be the glandular somewhat viscid pubescence of the calyx, the very short acute-subulate calyx-teeth, and the somewhat compact spikes. "These are the very characters that distinguish *G. bipinnatifida* var. *ciliata* from var. *bipinnatifida*. She noted, in addition, that "On account of its strong variability, this species has been difficult to define." Careful examination of plants belonging to this complex from throughout the southwestern U.S.A. and Mexico has convinced me that the more western glandular elements of *G. bipinnatifida* (including *G. wrightii*, the type from near El Paso, Texas) belong to but a single widespread taxon, *G. bipinnatifida* var. *ciliata*, the latter varietal name legitimized with the description of *Verbena ciliata* var. *longidentata* Perry.

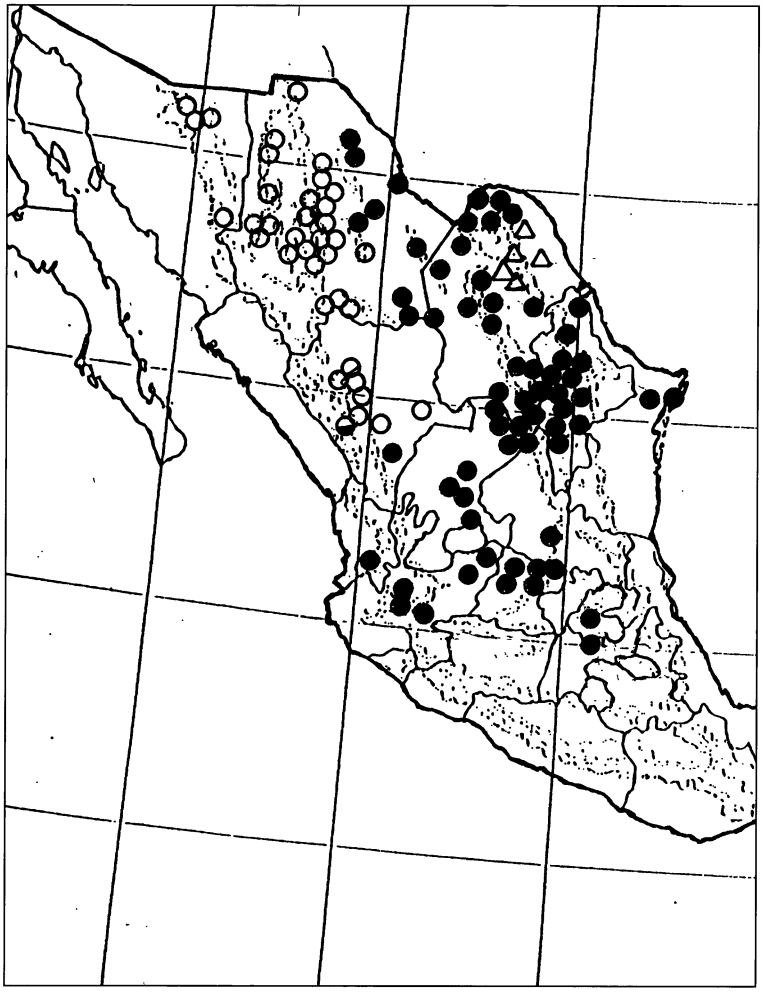

FIG. 4. Distribution of *Glandularia bipinnatifida*: var. *bipinnatifida* (open triangles), var. *ciliata* (closed circles), var. *latilobata* (open circles).

Umber placed *Verbena ciliata* var. *longidentata* in synonymy under his broad concept of *Glandularia bipinnatifida*, but since the former name is typified by material from near Matamoros, Mexico (Tamaulipas) it is more likely that this name is synonymous with *G. polyantha* Umber, the latter essentially endemic to the more lowland, Gulf Coastal regions of southern Texas and Mexico. At least I know of no collections of *G. bipinnatifida* from this region, although Umber shows several such collections from this area. I take the latter to be but misidentifications of *G. polyantha*, to judge from his annotation labels (LL-TEX).

Umber (1979) also placed *Verbena andrieuxii* Schauer in synonymy under *Glandularia bipinnatifida*, but examination of a photograph of the type at LL (also examined by Umber!), and comparison of recent collections from the state of Oaxaca, Mexico, from whence the type, leads me to place the name concerned in synonymy with the pubescent phase of *G. teucriifolia*.

Finally, it should be noted that Umber's *Glandularia bipinnatifida* var. *brevispicata* (the type from Otero Co., New

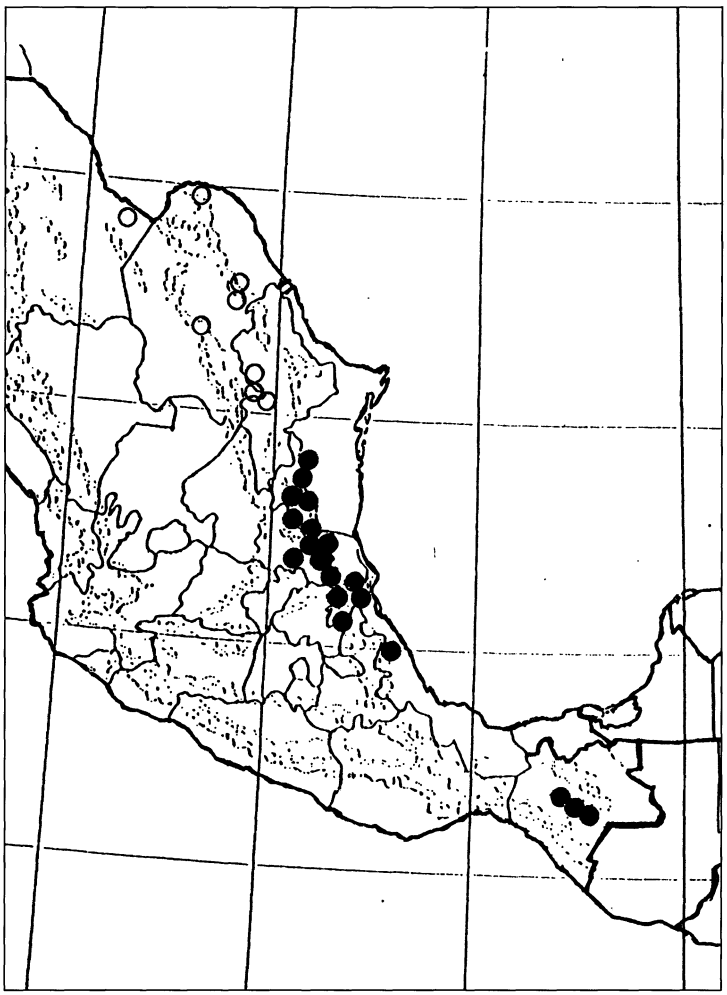

FIG. 5. Distribution of *Glandularia delticola* (closed circles); *G. verecunda* (open circles).

Mexico) is, in my opinion, but a regional variant of *G. bipinnatifida* var. *ciliata*, if that. His description of the short spikes, calyx teeth, viscid inflorescence, ascending habit, dark foliage, and acrid-smelling flowers, applies to my concept of *G. bipinnatifida* var. *ciliata* (except for the acrid-smelling flowers, which I cannot evaluate). Umber (in his Fig. 7) also maps specimens of his var. *brevispicata* as occurring in the Central Plateau region of northern Mexico, all of these referable to *G. bipinnatifida* var. *ciliata* in my treatment.

4c. **Glandularia bipinnatifida** var. **latilobata** (L. M. Perry) B. L. Turner, comb. nov. Fig. 4.

Verbena bipinnatifida var. *latilobata* L. M. Perry, Ann. Missouri Bot. Gard. 20: 325.1933. TYPE: MEXICO. **SONORA:** "between San Pedro and Fronteras," 20–24 Sep 1890, *Hartman 906* (holotype: GH).

Verbena ambrosifolia Rydb. ex Small f. *eglandulosa* Perry, Ann. Missouri Bot. Gard. 20: 328. 1933.

Glandularia chiracahensis Umber, Syst. Bot. 4: 92. 1979.

Verbena chiracahensis (Umber) Moldenke, Phytologia 45: 470. 1980.

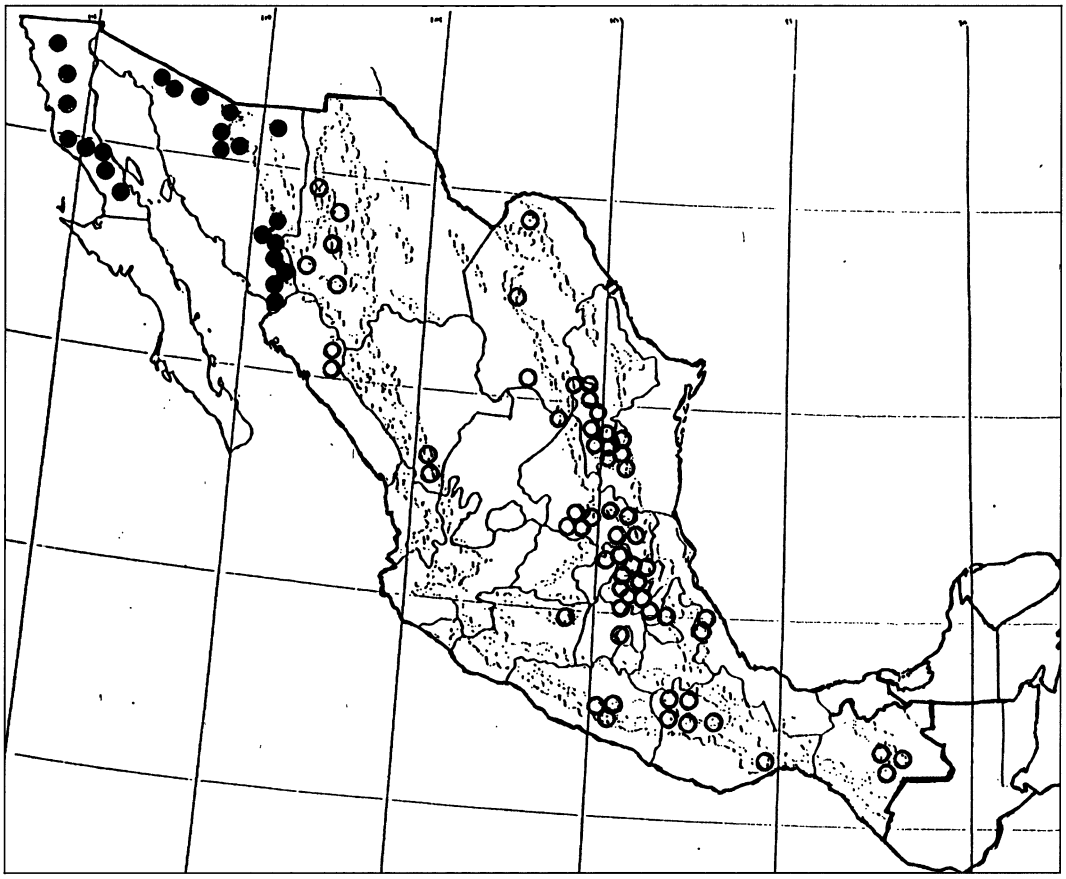

FIG. 6. Distribution of *Glandularia elegans* (open circles); *G. gooddingii* (closed circles).

This taxon is similar to var. *ciliata* but lacks the glandular pubescence of that taxon. It grades into var. *ciliata* to the south and southeast (Fig. 4).

5. GLANDULARIA BRACHYRHYNCHOS G. L. Nesom & Vorobik, Sida 13: 31. 1988. Fig. 3.

Nesom and Vorobik (1988) gave an excellent account of this species, noting its close relationship to *Glandularia tumidula*. When originally described it was known only by type material (Tamaulipas: Mpio. San Carlos, 8 km N of San Carlos, *Nesom 6084*, holotype: TEX). Since then several new acquisitions have been made, as follows: TAMAULIPAS. Mpio. San Carlos, ca. 5 mi S of San Carlos, *Nesom 6273* (TEX); 17 km al sur de San Carlos, *L. Hernández 2253* (TEX); 25 km de San Carlos hacia San Nicolás, *M. Hernández 2132* (TEX).

6. GLANDULARIA DELTICOLA (Small) Umber, Syst. Bot. 4: 98. 1979. Fig. 5.

Verbena delticola Small ex L. M. Perry, Ann. Missouri Bot. Gard. 20: 314. 1933.
Verbena cameronensis L. I. Davis, Nature Leaflet 1: 1. 1941.
Verbena lundelliorum Moldenke, Phytologia 2: 24. 1941.

My concept of this taxon is about the same as that of Perry (1933), Umber (1979) and Nash and Nee (1984). It is superficially similar to *Glandularia polyan-*

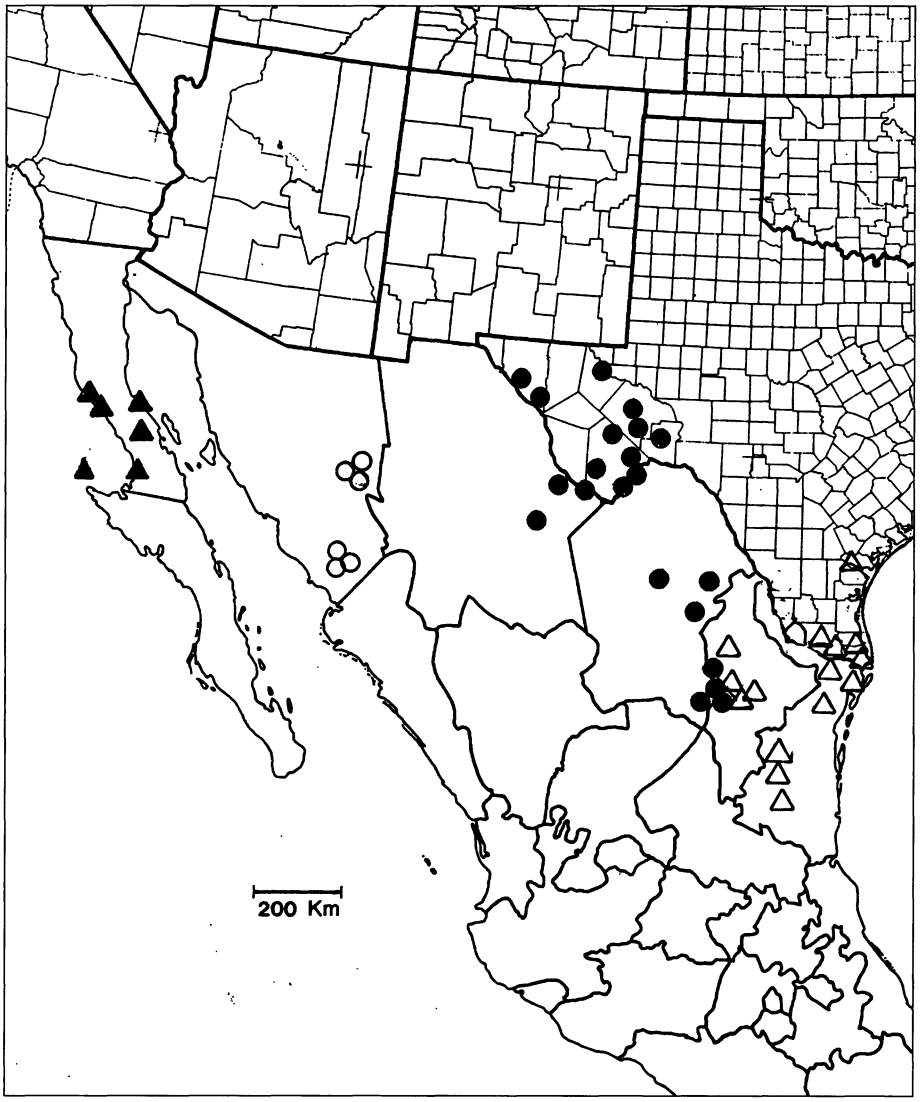

FIG. 7. Distribution of *Glandularia* species: *G. lilacina* (closed triangles), *G. polyantha* (open triangles); *G. pumila* (open circles), *G. racemosa* (closed circles).

tha but readily distinguished from the latter by its much smaller corollas and seemingly prostrate habit, as noted by Umber.

This species is typified by a Ferris and Duncan collection (*3161*) from near Brownsville, Texas, near the northwesternmost portions of its distribution. Umber mapped relatively few Mexican sites for the species, one of these from the Pacific Coast of Guerrero, this not cited. My distribution map (Fig. 5) suggests that the species is largely confined to the sierras of the Gulf Coast.

7. GLANDULARIA ELEGANS (H.B.K.) Umber, Syst. Bot. 4: 94. 1979. Fig. 6.

Verbena elegans H.B.K., Nov. Gen et Sp. 2: 273. 1818.
Verbena elegans var. *asperata* L. M. Perry, Ann. Missouri Bot. Gard. 20: 319. 1933.

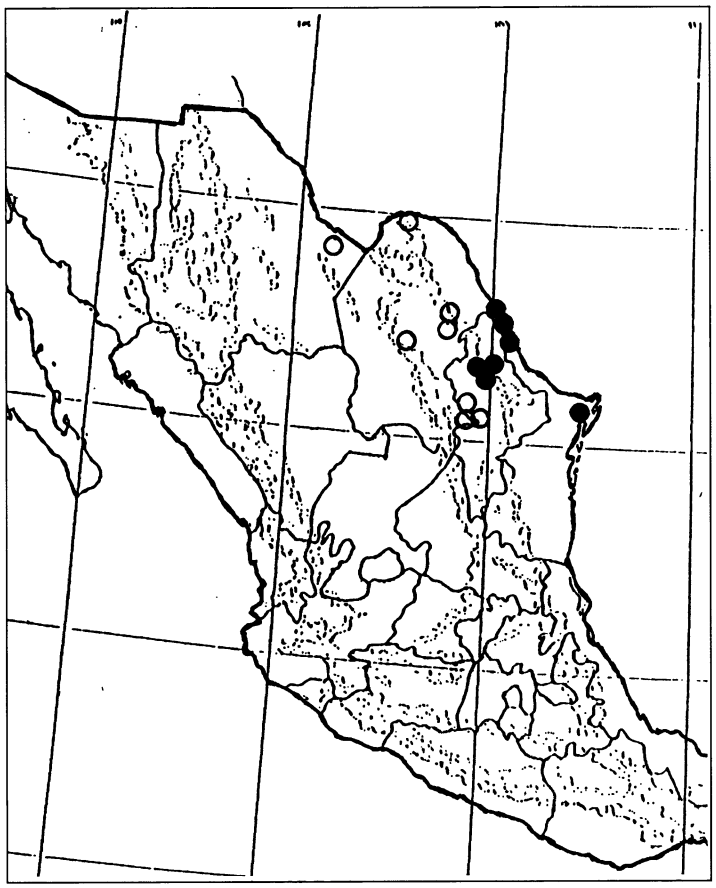

FIG. 8. Distribution of *Glandularia quadrangulata* nutlets with appendages (closed circles); G. *quadrangulata*, nutlets without appendages (open circles).

Glandularia elegans var. *asperata* (L. M. Perry) Umber, Syst. Bot. 4: 95. 1979.

This is a widespread species in Mexico occurring from Chihuahua to Chiapas (Fig. 6). Umber recognized *Glandularia bipinnatifida* var. *asperata* (type from San Antonio, Coahuila), distinguishing this from var. elegans by its fewer-flowered inflorescence and calyx with colorless glandular hairs (vs. purple or purplish). His map showing the distributions of these two taxa strongly suggests that var. *asperata* is but a form that crops up sporadically throughout the range of the species, at least that has been my conclusion after examination of a broad suite of sheets from this area. Nesom (1992) has discussed the taxonomy and distribution of *Glandularia elegans* in considerable detail.

8. GLANDULARIA GOODDINGII (Briq.) Solbrig, Madroño 15: 50. 1959. Fig. 6.

Verbena gooddingii Briq., Annuaire Conserv. Jard. Bot. Geneve 10: 103. 1907.
Verbena verna var. *fissa* A. Nelson, Amer J. Bot. 18: 477. 1931.

My concept of this taxon is about the same as that of Umber, the species extending into northwestern Mexico from the southwestern U.S.A., where it is apparently much more common (Fig. 6).

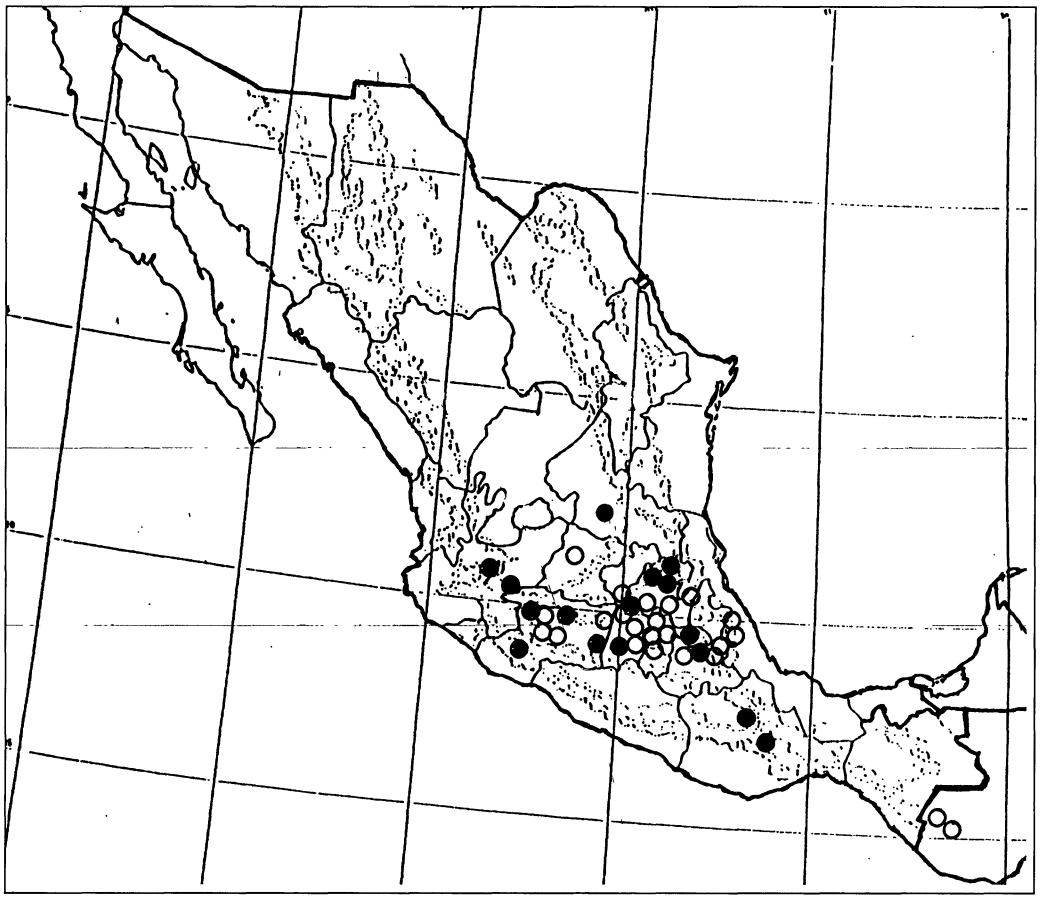

FIG. 9. Distribution of *Glandularia teucriifolia*: hirsute forms (closed circles), glabrous or sparsely pubescent forms (open circles).

9. GLANDULARIA LILACINA (Greene) Umber, Syst. Bot. 4: 101. 1979. Fig. 7.

Verbena lilacina Greene, Bull. Calif. Acad. Sci. 1: 210. 1885.
Verbena harbisonii Moldenke, Phytologia 1: 438. 1940.
Verbena setacea L. M. Perry, Ann. Missouri Bot. Gard. 20: 339. 1933.
Glandularia setacea (L. M. Perry) Umber, Syst. Bot. 4: 101. 1979.

This taxon is confined to Baja California (Fig. 7). I agree with Umber's circumscription of the taxon, including his submergence of *Verbena harbisonii* in this.

10. GLANDULARIA POLYANTHA Umber, Syst. Bot. 4: 98. 1979. Fig. 7.

Verbena ciliata var. *longidentata* L. M. Perry, Ann. Missouri Bot. Gard. 20: 331. 1933.
Verbena polyantha (Umber) Moldenke, Phytologia: 98. 1979.

As noted by Umber (1979), plants of this newly described species (the type from Cameron Co., Texas) were long placed under *Glandularia delticola*. Except for its distinctive leaves it might with some justification be treated as part of the *G. bipinnatifida* complex. Indeed, Perry (1933) treated at least some of the specimens

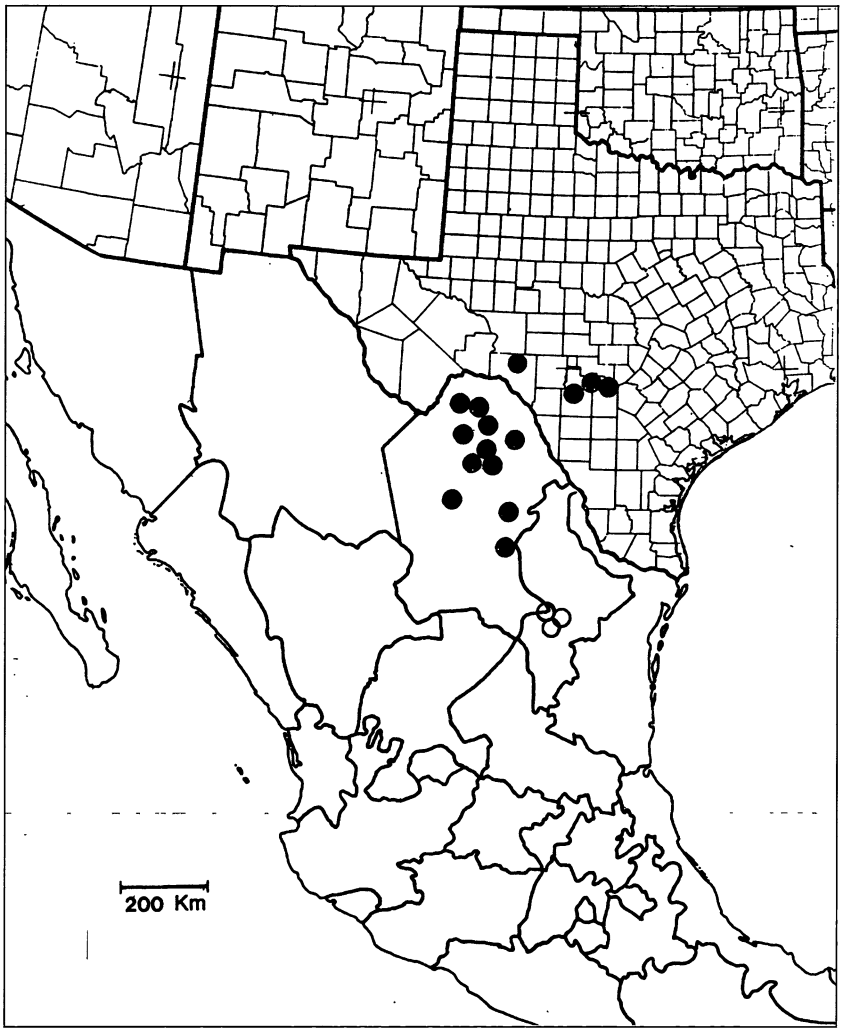

FIG. 10. Distribution of *Glandularia tumidula* (closed circles); *G. turneri* (open circles).

positioned by Umber in *G. polyantha* as belonging to her concept of *Verbena ciliata* var. *longidentata*; the type of the latter is from Matamoros, Mexico and has most of the attributes of Umber's *G. polyantha*, except for its more deeply divided leaves. *Glandularia polyantha*, as I conceive it, is largely confined to northeastern Mexico and southernmost Texas (Fig. 7).

11. GLANDULARIA PUMILA (Rydb.) Umber, Syst. Bot. 4: 94. 1979. Fig. 7.

Verbena pumila Rydb., Fl. southeastern U. S., ed. 1, 1010. 1903.
Verbena inconspicua Greene, Pittonia 5: 137. 1903.

My concept of this taxon is about the same as that of Umber, except that he recognized the species as occurring in southern Texas. I take most of the latter to be misidentifications of exappendiculate forms of *Glandularia quadrangulata* (cf. discussion under the latter). *Glandularia pumila* is known to Mexico by relatively few collections, these mostly centered in southern Sonora (Fig. 7).

12. GLANDULARIA QUADRANGULATA (A. Heller) Umber, Syst. Bot. 4: 100. 1979. Fig. 8.

Verbena quadrangulata A. Heller, Contr. Herb. Franklin Marshall Coll. 1: 84. 1895.
Verbena racemosa Eggert, Torreya 2: 123. 1902.
Verbena pulchella Greene, Pittonia 5: 136. 1903.
Helleranthus quadrangulatus (A. Heller) Small, Fl. southeastern U. S. ed. 2. 1011. 1913.
Verbena pumila f. *albiflora* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 4: 256. 1929.
Glandularia racemosa (Eggert) Umber, Syst. Bot. 4: 94. 1979.
Glandularia verecunda Umber, Syst. Bot. 4: 99. 1979.
Verbena verecunda (Umber) Moldenke, Phytologia 45: 99. 1980.

My concept of this taxon is about the same as that of Umber, except that I recognize the species as occurring in two forms: a typical form having nutlets with well-defined ovate appendages, and an atypical form lacking such appendages. The two forms occur together over a broad region and may occur in the same population, as noted by Umber on his collection number 3 (TEX),which he identified as a *Glandularia verecunda*): "indistinguishable from *G. quadrangulata* except for the seeds." I treat both *G. verecunda* and *G. racemosa* as synonyms of *G. quadrangulata*; the plants from south Texas which Umber identified as *C. verecunda* I take to be exappendiculate forms of *G. quadrangulata*; exappendiculate forms from the western part of its range were treated by Umber as *G. racemosa*. This variation in nutlet shape has also plagued nearly all previous workers, as noted by Turner (1998).

Both appendiculate and exappendiculate forms of the present species occur in Mexico. Plants of the latter were annotated as *Glandularia verecunda* by Umber (e.g., *Johnston 10209a*, LL; *Johnston 10226e*, LL). As shown in Fig. 8, the species just barely extends into Mexico from a much wider distribution in Texas.

Glandularia quadrangulata, irrespective of its nutlet appendages, is readily recognized by its small annual habit, mostly eglandular sepals, stems, and foliage, small white or pinkish-white flowers, and nutlets which tend to flare at the very base. Umber recognized *G. verecunda* as differing from *G. racemosa* in nutlet shape and size; the latter taxon was said to have nutlets 2.5 mm. long (vs. 3 mm.) with a narrow commissure (ca. 1/2 as wide as the nutlet, vs. 3/4 as wide or more). I find the nutlets to be exceedingly variable over the range of *G. quadrangulata*. Indeed, Umber maps *G. verecunda* as having a bicentric range: mountainous regions of northcentral Mexico and trans-Pecos, Texas, with a secondary center in coastal regions of southern Texas. As noted above, I take nearly all of the latter to be exappendiculate forms of *G. quadrangulata*.

13. GLANDULARIA TEUCRIIFOLIA (M. Martens & Galeotti) Umber, Syst. Bot. 4: 94. 1979. (Fig. 9)

Verbena teucriifolia M. Martens & Galeotti, Bull. Acad. Roy. Sci. Bruxelles 11:322. 1844.
Verbena andrieuxii Schauer in DC., Prodr. 11: 553. 1847.
Verbena exilis Schauer in DC., Prodr. 11: 553. 1847.
Verbena teucriifolia var. *corollulata* L. M. Perry, Ann. Missouri Bot. Gard. 20:335. 1933.
Verbena rinconensis Moldenke, Phytologia 7: 100. 1963.
Glandularia rinconensis (Moldenke) Umber, Syst. Bot. 4: 94: 1979.

Umber recognized *Glandularia rinconensis* as distinct, the type from Temascaltepec, México. He also included under the latter name material from southern Nuevo León, Coahuila and northern Zacatecas that I place in my newly described *G. alejandrana*. My concept of *G. teucriifolia* (the type from Mt. Orizaba, Veracruz) includes material from southcentral Mexico having mostly repent or procumbent stems, the stems and foliage devoid of glandular hairs, and possessing small nutlets (2.0–2.8 mm. long). It is superficially similar to *G. bipinnatifida* var. *ciliata* but is readily distinguished from the latter by its consistently eglandular foliage and smaller nutlets (ca. 2.5 mm long vs. ca. 3.0 mm).

14. GLANDULARIA TUMIDULA (L. M. Perry) Umber, Syst. Bot. 4: 94. 1979. Fig. 10.

Verbena tumidula L. M. Perry, Ann. Missouri Bot. Gard. 20: 322. 1933.

Because of its peculiar ovoid nutlets, this species is unlikely to be confused with another. In early flower, however, it is very similar to *Glandularia bipinnatifida*, and has been identified as such by various authors, especially among Mexican collections. Indeed, Umber himself misidentified a Coahuilan collection of *G. tumidula* as *G. gooddingii*, mapping this as such in his Fig. 8, considerably out of range of the latter, an element of the Sonoran Desert flora.

15. GLANDULARIA TURNERI G. L. Nesom, Phytologia 72: 383. 1992. Fig. 10.

This species is confined to the higher elevations of Cerro Potosí, Nuevo León, and Sierra Coahuilon, Coahuila (Fig. 10). It is closely related to *Glandularia elegans* but, as noted by its author, "immediately different in its glabrous leaves with linear lobes and its short corollas." Umber did not account for the taxon, having not seen material of this at the time of his taxonomic studies.

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NOMENCLATOR OF MEXICAN *GLANDULARIA*

(Names in bold type are treated as legitimate; those not so are treated as synonyms)

Glandularia alejandrana B. L. Turner (**1**)
Glandularia amoena (Paxton) Umber (**2**)
Glandularia bajacalifornica (Moldenke) Umber (**3**)
Glandularia bipinnatifida var. ***bipinnatifida*** (Nutt.) Nutt. (**4a**)
Glandularia bipinnatifida var. *brevispicata* Umber (**4b**)
Glandularia bipinnatifida var. ***ciliata*** (Benth.) B. L. Turner (**4b**)
Glandularia bipinnatifida var. ***latilobata*** (L. M. Perry) B. L. Turner (**4c**)
Glandularia brachyrhynchos Nesom & Vorobik (**5**)
Glandularia chiricahensis Umber (**4c**)
Glandularia delticola (Small) Umber (**6**)
Glandularia elegans (H.B.K.) Umber (**7**)
Glandularia elegans var. *asperata* (L. M. Perry) Umber (**7**)
Glandularia gooddingii (Briq.) Solbrig (**8**)
Glandularia lilacina (Greene) Umber (**9**)
Glandularia polyantha Umber (**10**)
Glandularia pumila (Rydb.) Umber (**11**)
Glandularia quadrangulata (A. Heller) Umber (**12**)
Glandularia racemosa (Eggert) Umber (**12**)
Glandularia rinconensis (Moldenke) Umber (**13**)
Glandularia setacea (L. M. Perry) Umber (**9**)
Glandularia shrevei (Moldenke) Umber (**3**)
Glandularia teucriifolia (M. Martens & Galeotti) Umber (**14**)
Glandularia turneri Nesom (**15**)
Glandularia verecunda Umber (**12**)
Glandularia tumidula (L. M. Perry) Umber (**14**)
Glandularia wrightii (A. Gray) Umber (**4b**)
Helleranthus quadrangulatus (Heller) Small (**12**)
Verbena ambrosifolia Rydb. ex Small (**4a**)
Verbena ambrosifolia f. *eglandulosa* L. M. Perry (**4c**)
Verbena amoena Paxton (**2**)

Verbena andrieuxii Schauer (**13**)
Verbena bajacalifornica Moldenke (**3**)
Verbena bipinnatifida Nutt. (**4a**)
Verbena bipinnatifida var. *latilobata* Perry (**4c**)
Verbena bipinnatifida var. *brevispicata* (Umber) Moldenke (**4c**)
Verbena cameronensis L. I. Davis (**6**)
Verbena chiracahensis (Umber) Moldenke (**4c**)
Verbena ciliata Benth. (**4b**)
Verbena ciliata var. *longidentata* L. M. Perry (**10**)
Verbena ciliata var. *pubera* (Greene) L. M. Perry (**4b**)
Verbena delticola Small ex L. M. Perry (**6**)
Verbena demareei Moldenke (**4a**)
Verbena elegans H.B.K. (**7**)
Verbena elegans var. *asperata* Perry (**7**)
Verbena exilis Schauer (**13**)
Verbena gooddingii Briq. (**8**)
Verbena grandiflora Sessé & Moç. (**2**)
Verbena harbisonii Moldenke (**9**)
Verbena inconspicua Greene (**11**)
Verbena lilacina Greene (**9**)
Verbena lundelliorum Moldenke (**6**)
Verbena polyantha (Umber) Moldenke (**10**)
Verbena pubera Greene (**4b**)
Verbena pulchella Greene (**12**)
Verbena pumila Rydb. (**11**)
Verbena pumila f. *albida* Standl. (**12**)
Verbena quadrangulata A. Heller (**12**)
Verbena racemosa Eggert (**12**)
Verbena rinconensis Moldenke (**13**)
Verbena setacea L. M. Perry (**9**)
Verbena shrevei Moldenke (**3**)
Verbena teucriifolia M. Martins & Galeotti (**13**)
Verbena teucriifolia var. *corollulata* L. M. Perry (**13**)
Verbena tumidula L. M. Perry (**14**)
Verbena verecunda (Umber) Moldenke (**12**)
Verbena verna var. *fissa* A. Nels. (**8**)
Verbena wrightii A. Gray (**4b**)
Verbena wrightii f. *albiflora* Moldenke (**4b**)