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TAXONOMIC OVERVIEW OF *GILIA*, SECT. *GILIASTRUM* (POLEMONIACEAE) IN TEXAS AND MEXICO

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ABSTRACT

A taxonomic treatment of *Gilia* sect. *Giliastrum* is rendered for Texas and México. Five species are recognized as occurring within Texas: *G. incisa*, *G. insignis*, *G. ludens*, *G. rigidula*, and *G. stewartii*; and seven species occur in México: *G. gypsophila*, *G. incisa*, *G. insignis*, *G. palmeri*, *G. purpusii* (including *G. platyloba*), *G. rigidula*, and *G. stewartii*. One new species, **G. gypsophila** B.L. Turner *sp. nov.*, is described and illustrated. Chromosomal data are reviewed for the sect. *Giliastrum* as a whole, and distribution maps of the Texas and Mexican taxa are provided. Complete synonymy is given for all of the taxa concerned, along with appropriate taxonomic comments.

KEY WORDS: Polemoniaceae, *Gilia*, *Giliastrum*, México, Texas

The sect. *Giliastrum* of *Gilia* was first erected by Brand (1907) to accommodate *Gilia rigidula* Benth. *in* DC. and its allies. He placed the section in his subgenus *Benthamiophila*, which in today's nomenclature must be called subgenus *Gilia* since it contains the type element of *Gilia*. Brand recognized five species under his concept of *Giliastrum*: *G. incisa* Benth. *in* DC., *G. foetida* Gill. *ex* Benth., *G. palmeri* S. Wats., *G. purpusii* K. Brandegee (not to be confused with *G. leptantha* Parish subsp. *purpusii* [Mlkn.] A. & V. Grant) and *G. rigidula*, the latter divided into two subspecies (*rigidula* and *insignis* Brand), one of these (*rigidula*) further divided into two varieties (*acerosa* A. Gray and *rigidula*).

Grant & Grant (1956) provided a conspectus of the subgenus *Gilia* in which they recognized four sections: *Arachnion*, *Gilia*, *Gilmania*, and *Saltugilia*. The sect. *Giliastrum* was not included in the subgenus at that time, but Grant (1959) subsequently modified their 1957 infrageneric treatment of *Gilia* to include five sections: *Gilia*, *Giliandra*, *Arachnion*, *Saltugilia*, and *Giliastrum*

(which included the sect. *Gilmania* of Grant & Grant 1957). So construed, *Giliastrum* was said to contain eleven North American species and at least one, and possibly more, South American species.

Following Grant's (1959) broad overview of sect. *Giliastrum*, two new species were added to the section by Shinners (1963), *Gilia perennans* Shinners, which I treat as synonymous with *G. incisa*, and *G. ludens* Shinners, which is recognized. Two Mexican taxa, *G. insignis* (Brand) Cory & Parks and *G. stewartii* I.M. Johnst., both of which occur in Texas, are recognized here as specifically distinct and *G. platyloba* I.M. Johnst. is treated as synonymous with the Mexican species, *G. purpusii*. I have also added a newly described species *G. gypsophila*.

Five species of the sect. *Giliastrum* are now recognized as occurring in Texas, and seven in México. Altogether, the sect. *Giliastrum* currently contains approximately seventeen species, most of these native to North America, but at least a few are confined to South America, as noted in the chromosomal account that follows.

CHROMOSOME NUMBERS

Chromosome numbers are available for only eight of the approximately seventeen species of the sect. *Giliastrum*, as noted in Table 1. Most of the species have chromosome numbers on a base of $x = 9$, with the exception of *Gilia insignis* ($2n = 12$) which apparently has an extant base number of $x = 6$. Indeed, if the latter were thought to be the ancestral base number for the section, one might view the remainder of the taxa as being either hexaploids ($2n = 18$) or dodecaploids ($2n = 36$).

Grant (1959), because of the frequency and phyletic distribution of species having numbers on a base of $x = 8$ and 9, inferred that the base number of the family as a whole was $x = 9$; the relatively few taxa with $x = 6$ were thought to be derived via aneuploid reduction. This might be the case for *Gilia insignis* because, except for the anomalous count of $2n = 20$ for *G. rigidula* var. *acerosa*, all of the taxa counted to date appear to be on a base of $x = 9$. Regardless, the base number of $x = 6$ found in *G. insignis* strongly suggests that it is best treated as a distinct species, the rank accorded the taxon by Shinners (1963), Wherry (1966) and yet others (Henrickson, in prep.) than as a subsp. of *G. rigidula* as originally proposed by Brand.

KEY TO TEXAS AND MEXICAN SPECIES OF *GILIA* SECT. *GILIASTRUM*

1. Corollas mostly 4-7(-8) mm long; basal-most leaves frequently simple or deeply serrate. ..... *G. incisa*

1. Corollas mostly (7-)8-20 mm long; basal-most leaves variously dissected or pinnately lobed. ..... (2)

2. Calyx lobes united for 1/3 their length or less. ..... (3)

2. Calyx lobes united for 1/3 their length or more. ..... (4)

3. Corollas mostly (7-)8-9 mm long. ..... *G. stewartii*

3. Corollas mostly 10-13 mm long. ..... *G. purpusii*

4. Leaves simple or merely 3-parted, the blades or their divisions linear, when 3-parted the terminal lobe 3-5 times as long as the lateral lobes; Baja California. ..... *G. palmeri*

4. Leaves not as described in the above; not in Baja California. .. (5)

5. Corollas mostly 18-22 mm long, at anthesis broadly flaring, 22-32 mm across the expanded lobes. ..... *G. insignis*

5. Corollas mostly 10-18 mm long, at anthesis 15-20 mm across the expanded lobes. ..... (6)

6. Perennial, stiffly erect much-branched suffruticose herbs, the basal leaves scarcely persisting, the stem leaves numerous and usually acerose or pungently pointed. ..... *G. rigidula*

6. Annual or weakly perennial sparsely branched herbs, the basal leaves usually persisting, the stem leaves not especially acerose or pungent. ..... (7)

7. Plants with primary stems stiffly erect and somewhat zigzag; basal leaves coriaceous with deeply incised simple lobes, their apices acute; gypseous soils of Nuevo León, México. ..... *G. gypsophila*

7. Plants not as described in the above; basal leaves mostly pinnately lobed or dissected, the ultimate units mostly broadly ovate to oblanceolate in outline; southcentral Texas. ..... *G. ludens*

Gilia gypsophila B.L. Turner, *sp. nov.*, Figure 1. TYPE: MEXICO. Nuevo León: 14 km N of Rancho las Estacas, on road to Rancho Lechuguillal (26° 28′ 30″ N, 100° 50′ W), gypsum flat, 680 m, 16 Mar 1973, *M.C. Johnston, T.L. Wendt, & F. Chiang 10222* (HOLOTYPE: LL!).

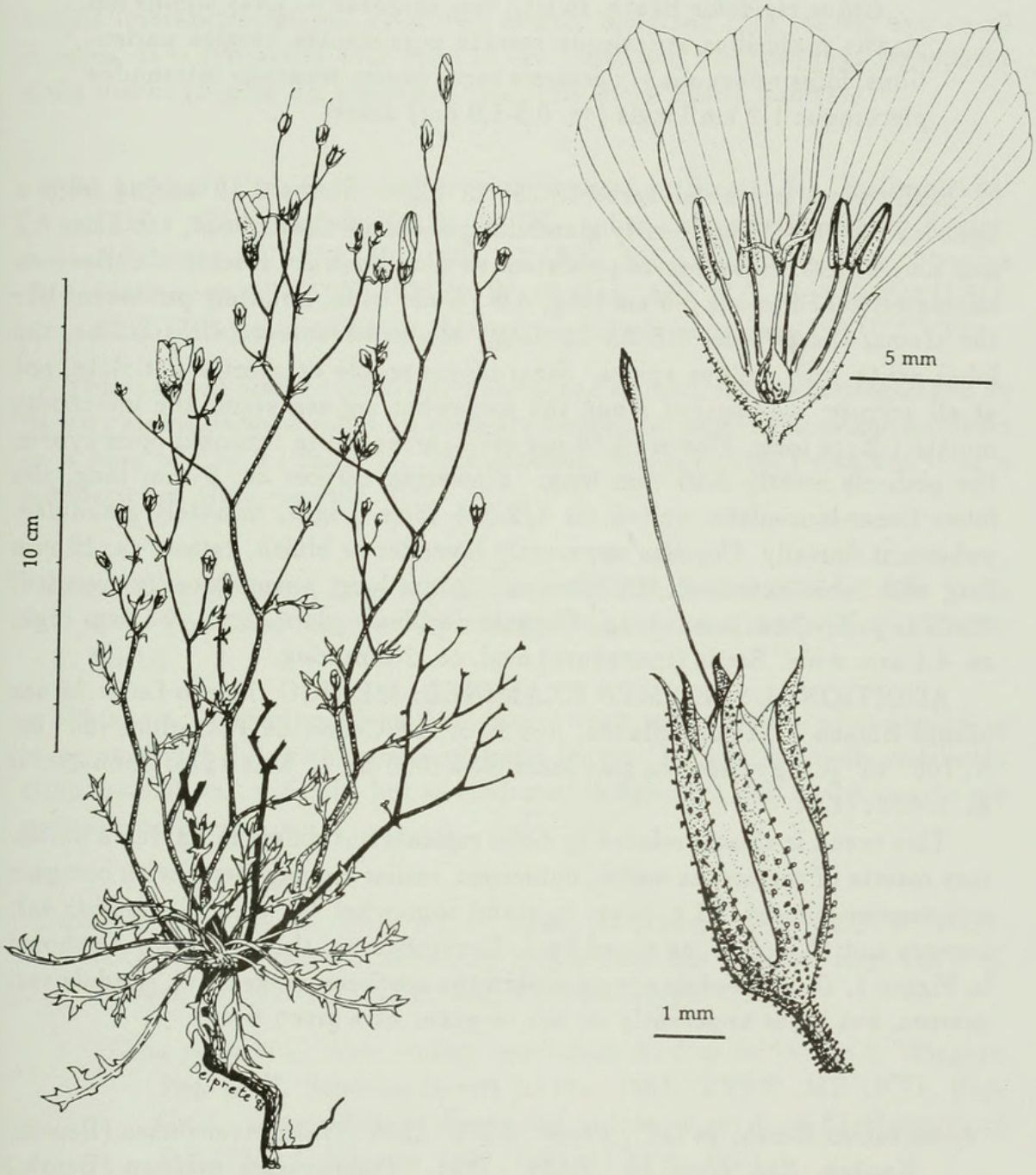

Figure 1. *Gilia gypsophila*, from holotype.

Giliae rigidulae Benth. *in* DC. var. *acerosae* A. Gray similis sed plantis majoribus strictisque rosulas persistentes basales parientibus, foliis midcaulis vix acerosis secus caules separatis internodiis plerumque 1-2 cm longis (vs. 0.3-1.0 cm) differt.

Stiffly erect perennial herbs 15-25 cm high. Stems 2-10 arising from a ligneous tap root, prominently glandular-pubescent throughout, the hairs 0.2 mm long or less. Basal leaves persistent as a well-defined rosette of coriaceous laciniately lobed leaves 3-5 cm long, 0.6-1.6 cm wide, minutely pubescent like the stems, the petioles 1.5-2.5 cm long; blades oblanceolate in outline, the lobes acute with callous apices. Stem leaves sessile or shortly petiolate, not at all acerose, well-spaced along the somewhat zig-zag stem, the internodes mostly 1-2 cm long. Flowers 3-10 per stem, arranged in terminal open cymes; the pedicels mostly 5-20 mm long. Flowering calyces ca. 5 mm long, the lobes linear-lanceolate, united for 1/2-3/5 their length, minutely glandular-pubescent dorsally. Corollas apparently lavender or bluish, rotate, ca. 16 mm long with lobes extended, the lobes ca. 12 mm long, apices broadly rounded. Anthers yellow, ca. 2 mm long. Capsule decidedly globoid, ca. 4-5 mm high, ca. 4.1 mm wide. Seeds (immature) oval, ca. 2 mm long.

ADDITIONAL SPECIMEN EXAMINED: MEXICO. Nuevo León: Minas Manto Blanco y Sabana Blanca, just N of the Cañon de Potrerillos (26° 04′ N, 100° 45′ W), gypsiferous clay loam, 950-1000 m, 17 Mar 1973, *Johnston et al. 10250c* (LL).

This taxon is clearly related to *Gilia rigidula* but differs in having a persistent rosette of coriaceous leaves, numerous, rather zig-zag stems with elongate midstem internodes. It appears to stand somewhat between *G. rigidula* var. *acerosa* and *G. ludens*, as noted by J. Henrickson on the paratype. As shown in Figure 1, *G. gypsophila* occurs within the southern range of *G. rigidula* var. *acerosa*, but these apparently do not co-occur at a given site.

Gilia incisa Benth. *in* DC., *Prodr.* 9:312. 1845. *Navarretia incisa* (Benth.) Kuntze, *Rev. Gen. Pl.* 2:433. 1891. *Polemonium incisum* (Benth.) Kuntze, *Rev. Gen.* 3:203. 1898. TYPE: U.S.A. Texas: Central Texas, 1835, *T. Drummond 463* (HOLOTYPE: K; Isotypes: GH,TEX!).

Gilia lindheimeriana Scheele, Linnaea 21:753. 1848. TYPE: U.S.A. Texas: Comal Co., vicinity of New Braunfels, 1844-1850, *F. Lindheimer* (holotype not located).

Gilia perennans Shinners, Sida 1:174. 1963. TYPE: U.S.A. Texas: Culberson Co., Guadalupe Mts., McKittrick Canyon, 18 Aug 1946, *D.S. Correll 13958* (HOLOTYPE: SMU).

This is a widespread variable species but readily distinguished by its mostly simple unbranched stems, relatively weakly dissected thin leaves, and small corollas. It is sympatric with most of the Texas and Mexican taxa, except for *Gilia ludens* (Figure 2), preferring relatively moist shady habitats.

Gilia insignis (Brand) Cory & Parks, Texas Agr. Exptl. Sta. Bull. 550:85. 1938. *Gilia rigidula* Benth. *in* DC. subsp. *insignis* Brand *in* Engler, *Pflanzenr.* IV. 250:147. 1907. TYPE: MEXICO. Coahuila: Jimulco Station, ca. 25° 07′ N, 103° 20′ W, 16 May 1885, *C.G. Pringle 248* (LECTOTYPE [selected here]: B, destroyed; Isolectotypes: GH!,UC!,VT!).

This is a well-marked relatively widespread species, readily distinguished by its wiry stems, large corollas on elongate peduncles, and chromosome numbers on a base of $x = 6$ (Table 1). Nevertheless, Wherry (1966) retained it as a subspecies of *Gilia rigidula*.

Gilia ludens Shinners, Sida 1:174. 1963. TYPE: U.S.A. Texas: Jim Wells Co.: 4 mi W of Alice, 10 Apr 1955, *L.H. Shinners 19581* (HOLOTYPE: SMU).

This is a relatively well-marked taxon what with its somewhat sprawling or recumbent habit with persistent basal leaves. It is superficially similar to *Gilia rigidula* var. *rigidula*, but as indicated in figures 4 and 6, the two do not normally co-occur.

Gilia palmeri S. Wats., Proc. Amer. Acad. Arts 24:61. 1889. TYPE: MEXICO. Baja Calif. Norte: Stony ridges near Los Angeles Bay, 1887, *E. Palmer 593* (HOLOTYPE: GH; Photoholotype: CAS!).

Gilia palmeri S. Wats. subsp. *spectabilis* A. Day *in* Shreve & Wiggins, *Veg. & Fl. Sonoran Desert* 2:1164. 1964. TYPE: MEXICO. Baja Calif. Norte: Hills of Sierra del Volcán, 4 mi E of El Marmol, 13 Feb 1935, *I. Wiggins 7570* (HOLOTYPE: DS!).

A very distinct member of the sect. *Giliastrum*, not likely to be confused with another. Very large-flowered populations have been recognized as subsp. *spectabilis*, but there appears to be much variation in corolla size both within and among populations, to judge from collections at CAS.

Gilia purpusii K. Brandegee, Zoe 5:179. 1904. TYPE: MEXICO. Coahuila: Viesca, ca. 25° 20′ N, 102° 26′ W, Mar 1904, *C.A. Purpus 533* (HOLOTYPE: CAS!).

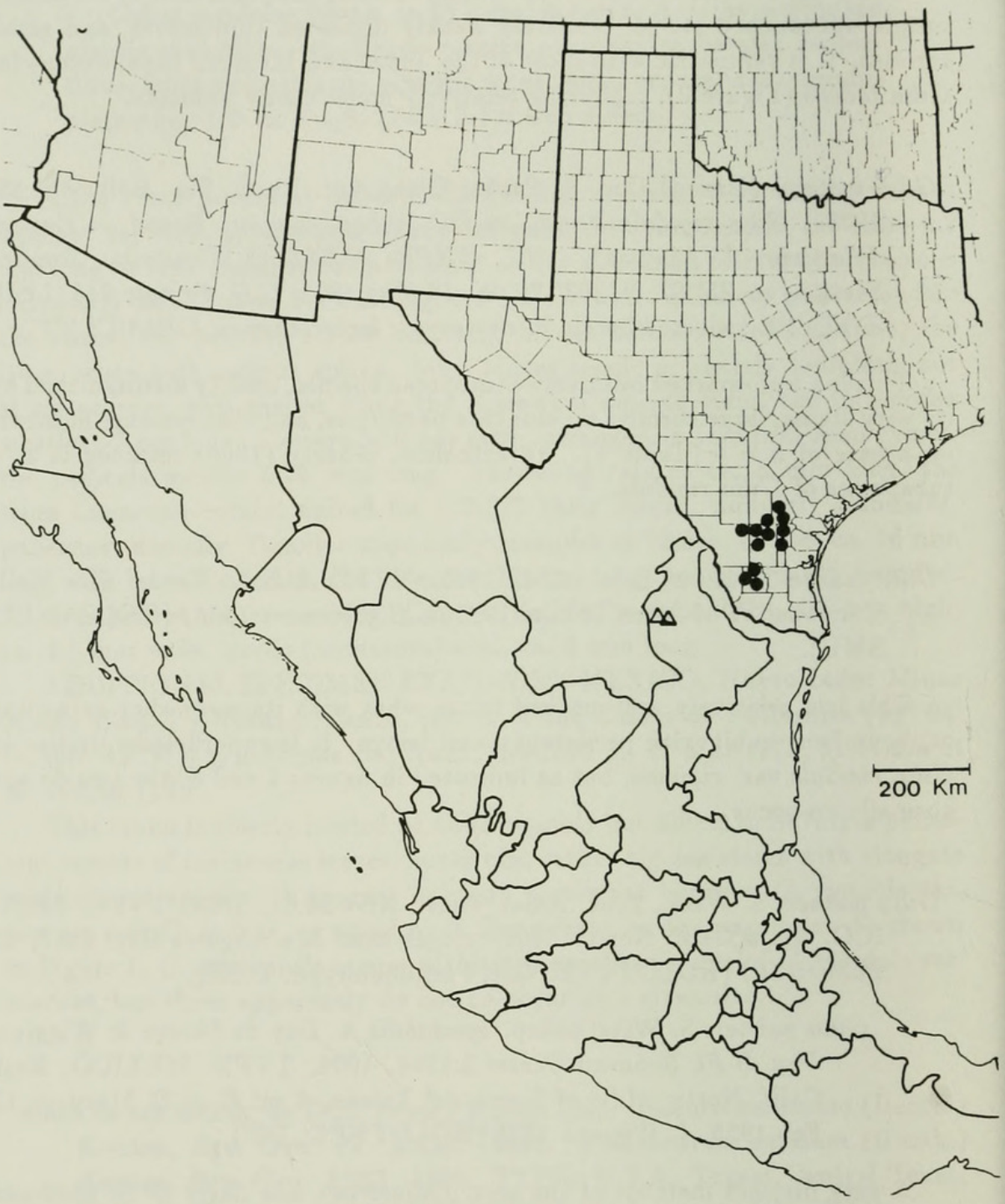

Figure 2. Distribution of *Gilia gypsophila* (triangles), and *G. ludens* (circles).

Table 1. Chromosome numbers in *Gilia* sect. *Giliastrum*.**

Species	Source, reference, and/or voucher	2*n* number
G. campanulata A. Gray	U.S.A. Nevada: Esmeralda Co. (Grant 1959)	18*
G. filiformis Parry	U.S.A. California: Inyo Co. (Grant 1959)	18*
G. foetida Gill. *ex* Benth.	ARGENTINA. Mendoza: Las Heras (Covas & Schnack 1946)	18*
G. incisa	MEXICO. San Luis Potosí: San Luis Potosí (Grant 1959)	18*
G. incisa	MEXICO. San Luis Potosí: Río Verde (Grant 1959)	18*
G. incisa	U.S.A. Texas: Travis Co. (Grant 1959)	18*
G. incisa	U.S.A. Texas: Uvalde Co. (Grant 1959)	18*
G. insignis	MEXICO. Chihuahua: 20 mi NE Carmago (Weedin & Powell 1978)	6 prs
G. insignis	MEXICO. Nuevo León: 5 mi N of Espinoza (Weedin & Powell 1978)	12 prs
G. latifolia S. Wats.	U.S.A. California: Riverside Co. (Grant 1959)	36*
G. rigidula var. *rigidula*	Flory 1937; seed source unknown.	18*
G. rigidula var. *rigidula*	U.S.A. Texas: Edwards Co. (Grant 1959)	36*
G. rigidula var. *rigidula*	U.S.A. Texas: Hayes Co., (Grant 1959)	36*

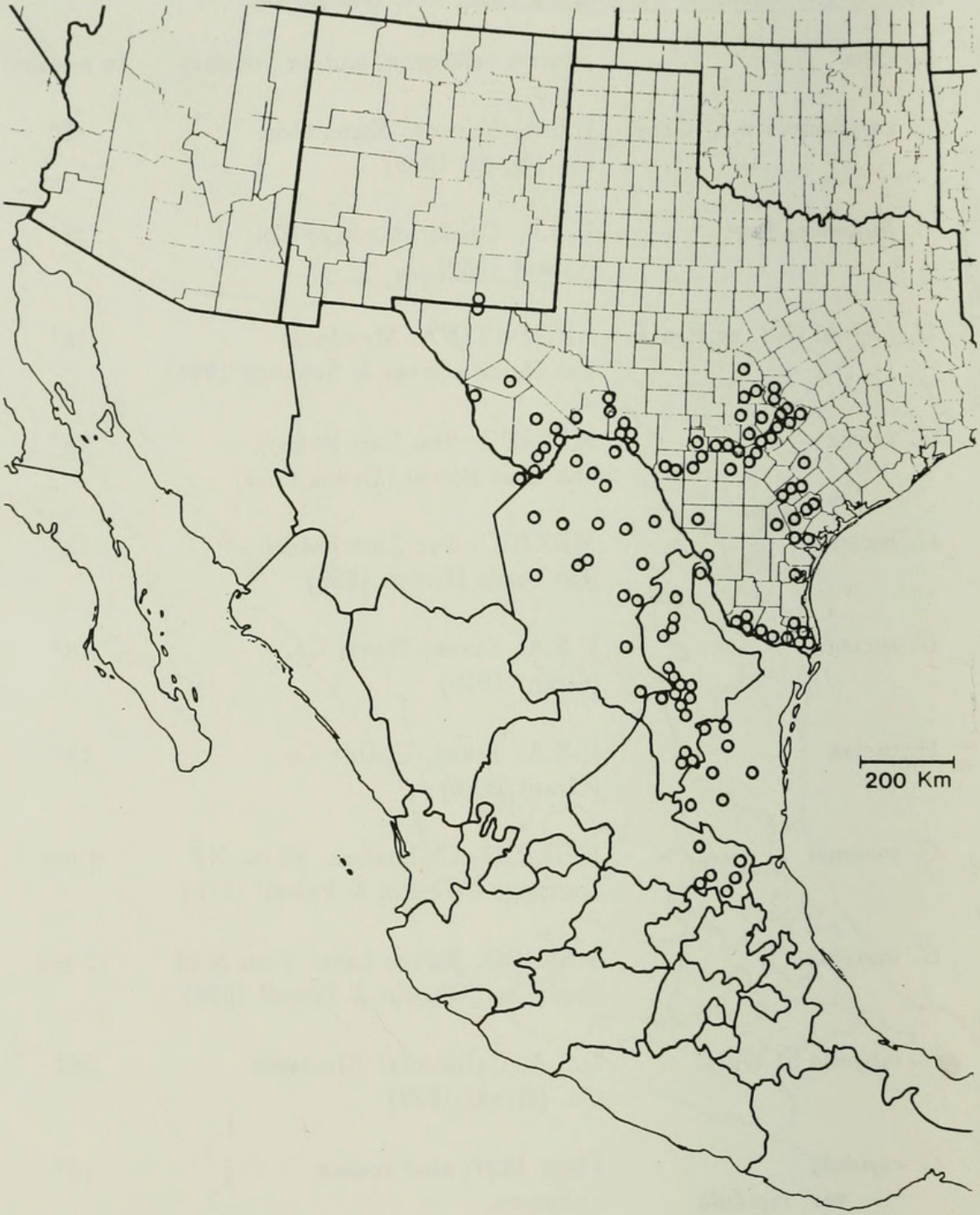

Figure 3. Distribution of *Gilia incisa*.

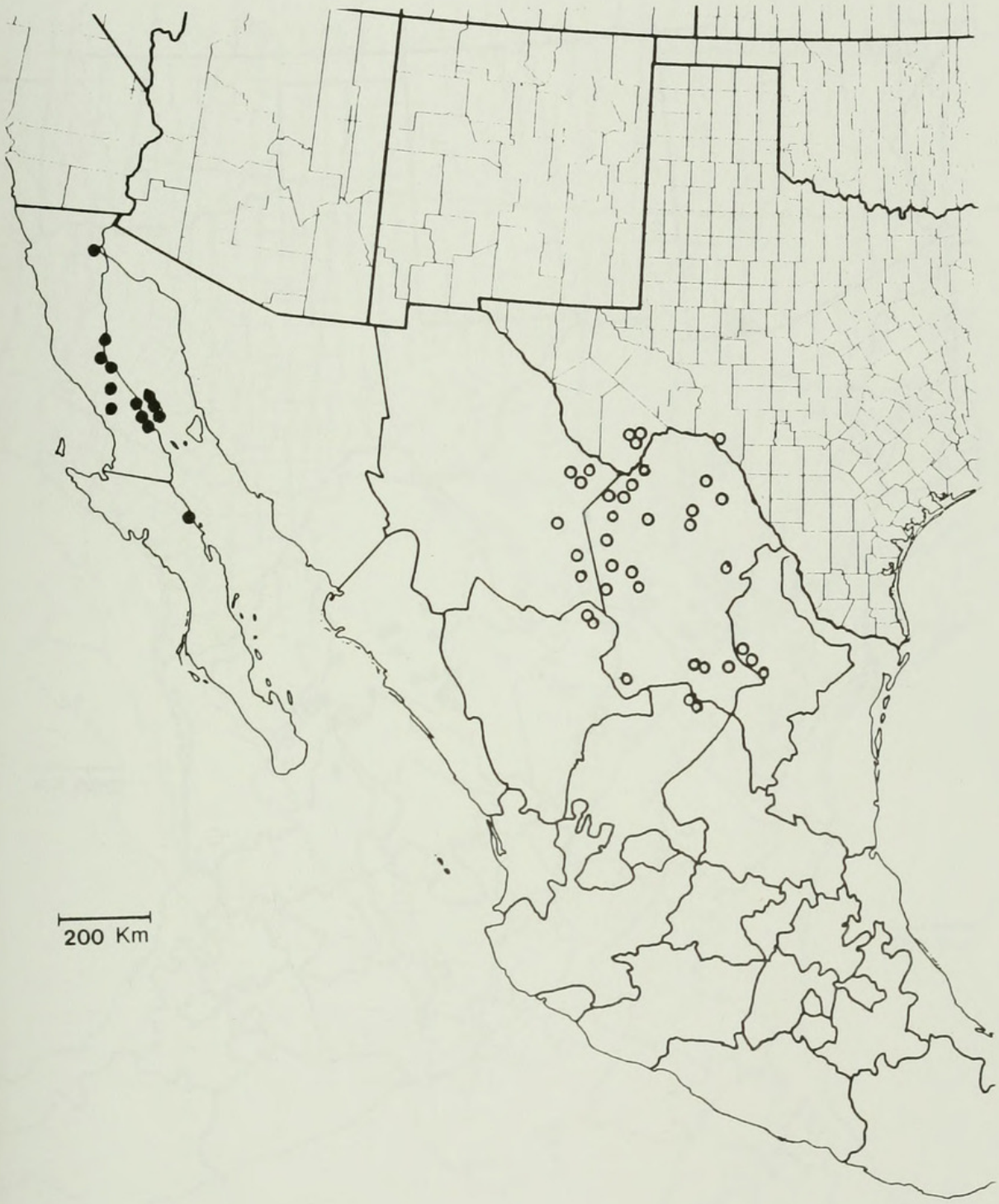

Figure 4. Distribution of *Gilia insignis* (open circles) and *G. palmeri* (closed circles).

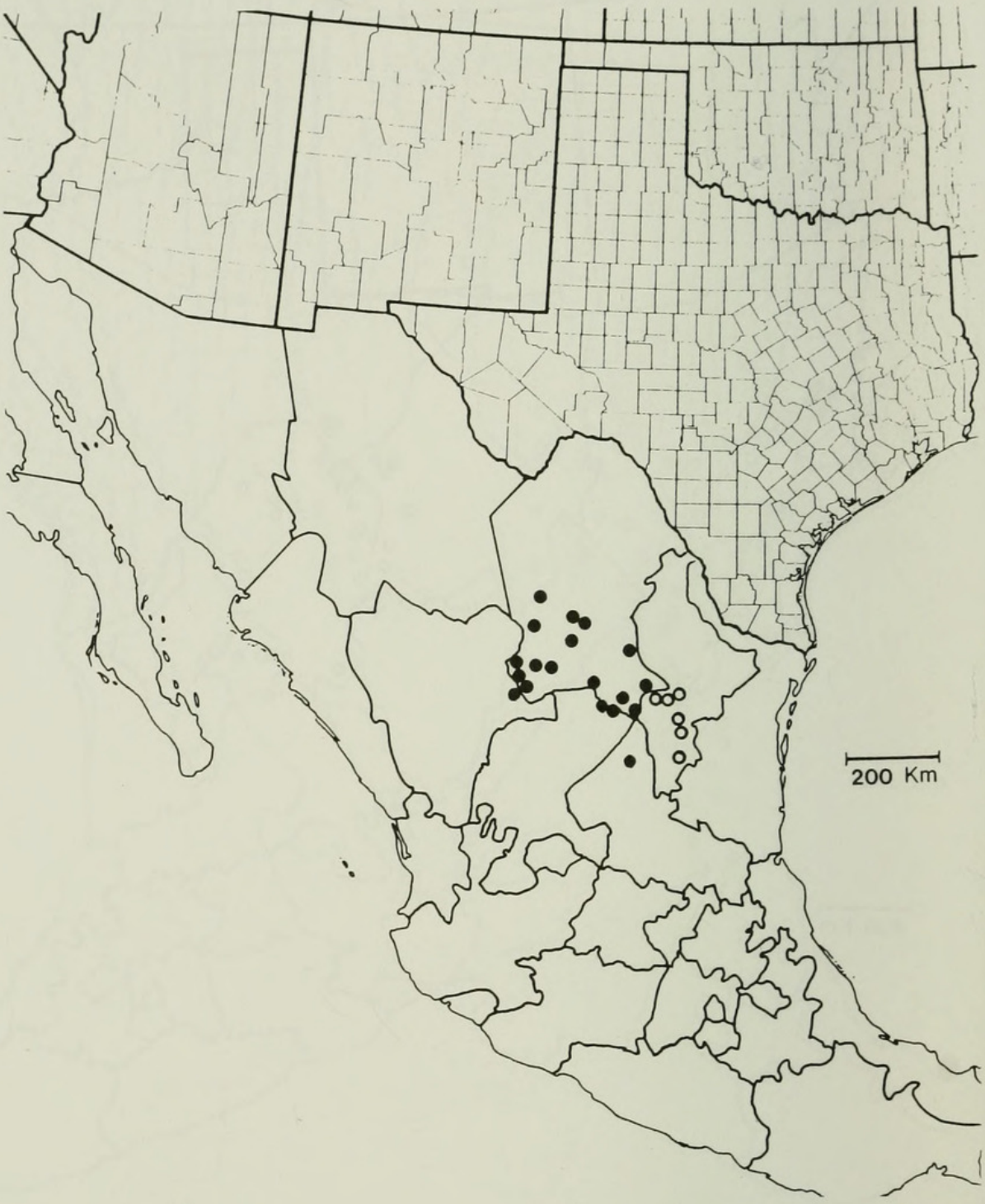

Figure 5. Distribution of *Gilia purpusii*. Typical collections from calcareous soils at lower elevations shown as closed circles; atypical collections from pine forests in gypseous soils at higher elevations shown as open circles.

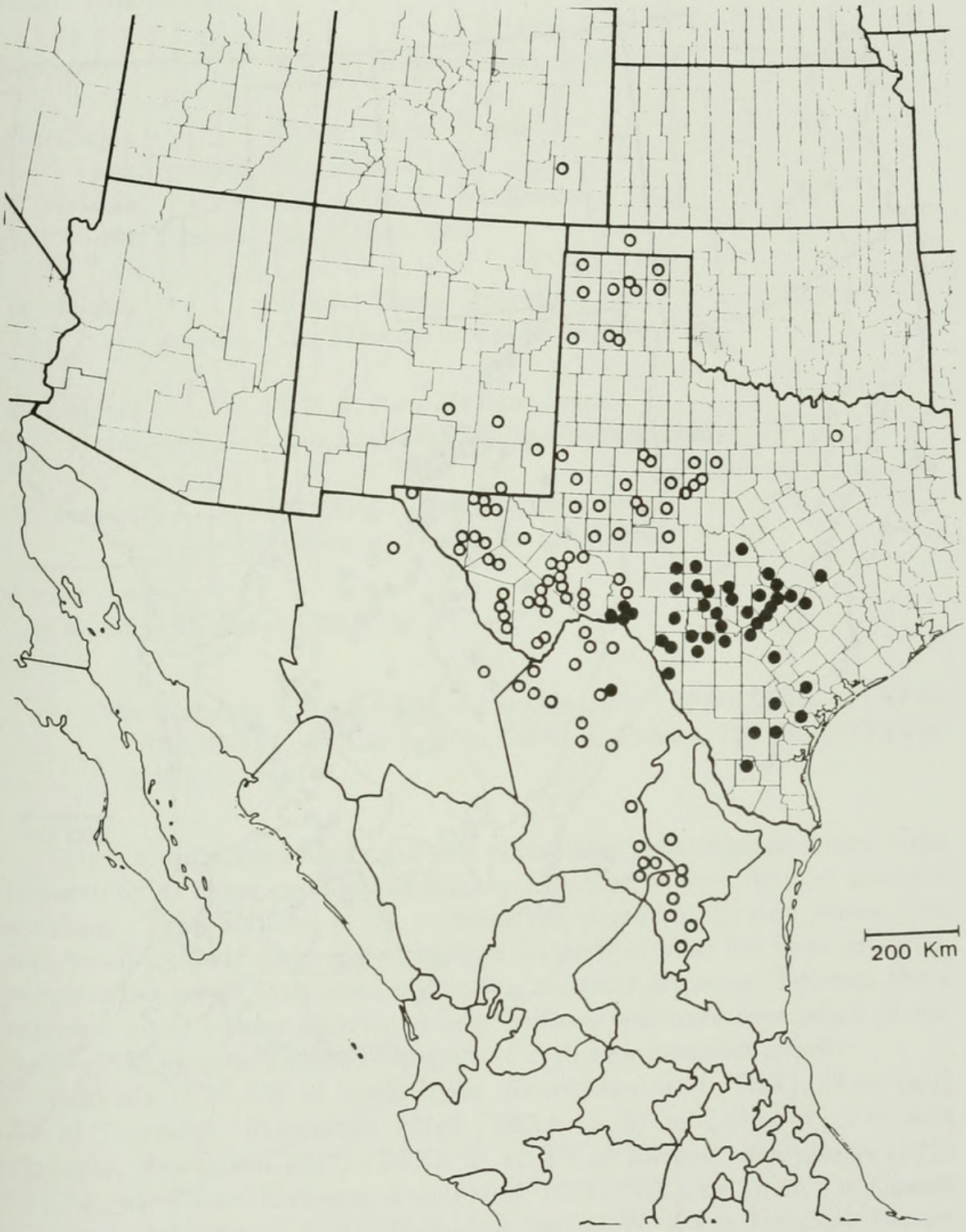

Figure 6. Distribution of *Gilia rigidula* var. *acerosa* (open disks); and var. *rigidula* (closed disks).

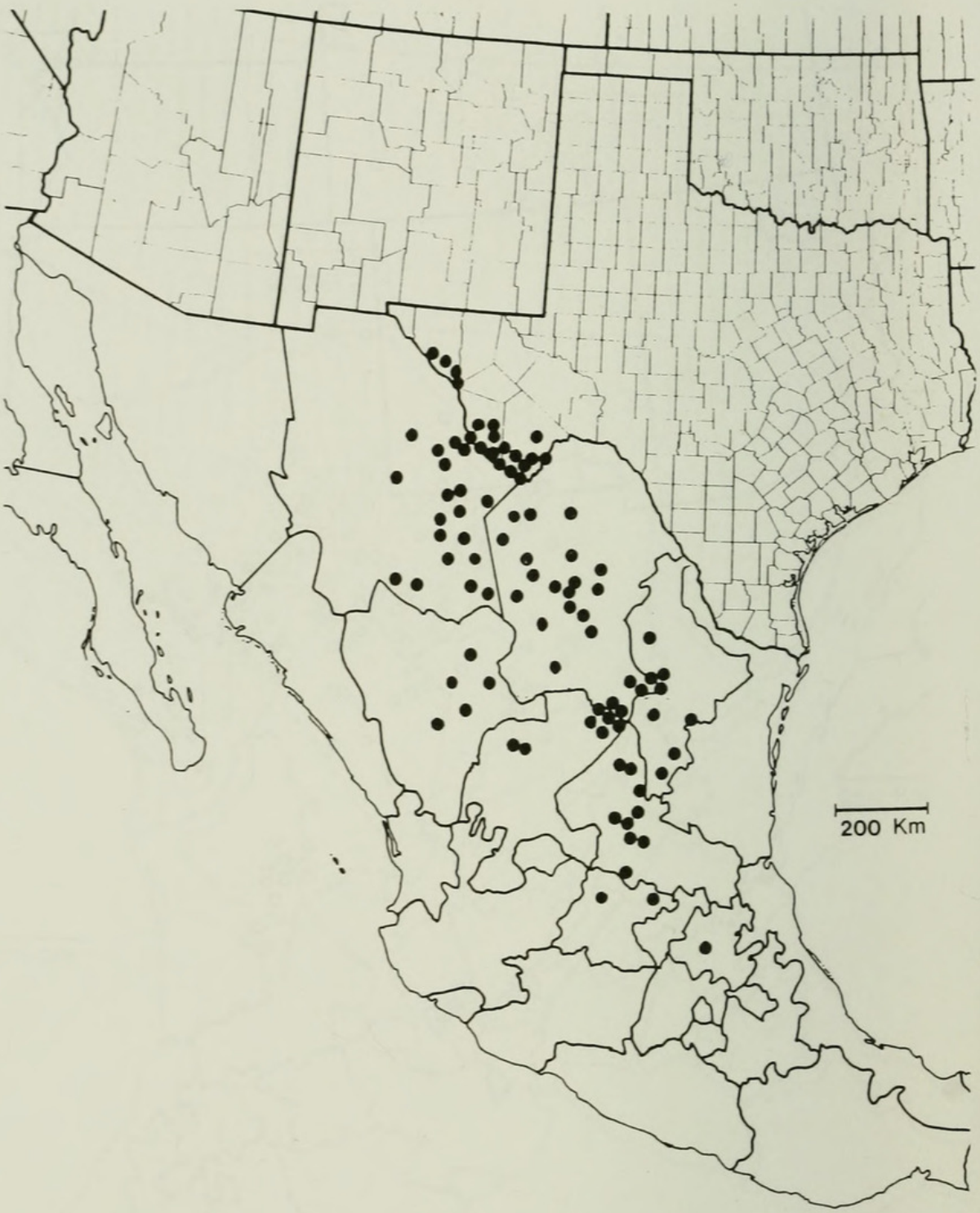

Figure 7. Distribution of *Gilia stewartii*.

Table 1 (continued).

Species	Source, reference, and/or voucher	2*n* number
G. rigidula var. *rigidula*	U.S.A. Texas: Travis Co. (Grant 1959)	36*
G. rigidula var. *rigidula*	U.S.A. Texas: Val Verde Co. (Grant 1959)	36*
G. rigidula var. *acerosa*	U.S.A. Texas: Brewster Co. (Weedin & Powell 1978)	10 prs
G. rigidula var. *acerosa*	U.S.A. New Mexico: Dona Ana Co. (Ward & Spellenberg 1986)	9 prs
G. purpusii	MEXICO. Nuevo León: Mpio. Galeana, *Turner 93-154* (TEX)	9 prs

Mitotic counts.
* As modified by Grant (1959).

Gilia platyloba I.M. Johnst., J. Arnold Arb. 24:95. 1943. TYPE: MEXICO. Coahuila: Saltillo, 1898, *E. Palmer 799* (HOLOTYPE: GH!).

This is a widespread highly variable taxon largely distinguished from *Gilia stewartii* by its larger corollas and leaves which tend to have broader ultimate divisions. Type material of *G. purpusii* has pinnately divided leaves with very broad ultimate divisions, while type material of what has been called *G. platyloba* has leaves with relatively narrow ultimate divisions. Between these extremes occur a large number of intermediates scattered over much of the range of the species. Selected examples of such intermediates follow:

Coahuila: 1 mi SW of Las Delicias, *Henrickson 6056* (TEX); 39 mi (air) NE of Tlahualilo, *Henrickson 12192* (TEX); ca. 67 mi (air) SW of Cuatro Cienegas, *Henrickson 12475* (TEX); 27 mi SE of Torreon, *Henrickson 13226* (TEX); near Cuatro Cienegas, *Bacon et al. 1089* (TEX); ca. 15 mi S of Cuatro Cienegas, *Johnston et al. 10335* (LL); a few mi W of Las Delicias, *Stewart 2817* (GH). Durango: Cerro de San Ignacio, *Purpus 4595* (GH).

Most of the specimens of this species which I examined tend to have leaves with relatively narrow segments; otherwise these differ little, if at all, from specimens with broader leaf segments.

I have included under the fabric of *Gilia purpusii*, ten specimens from pine forests of Nuevo León, mostly in the vicinity of Galeana, which were collected

on gypseous soils and which I think belong to a distinct taxon (Figure 5). Such plants have generally more pinnately divided lower leaves with smaller ultimate divisions and their corollas, at least in the field, are decidedly blue, vs. pale blue or lavender as in the more typical elements of *G. purpusii*, the latter occurring at usually lower, more xeric habitats (most often with *Agave lechugilla* and associates). I have counted chromosomes of individuals of the Galeana populations and these are diploid with $n=9$ pairs (*Turner 93-154*, TEX). Additional study of this complex in the field is needed before formal recognition is tendered.

Gilia rigidula Benth. *in* DC., *Prodr.* 9:312. 1845.

Two well-marked regional varieties (Figure 6) are recognized under this taxon, as follows:

1. Leaves with their divisions mostly stiffly linear, acerose; widespread in western Texas, closely adjacent states and México. .....var. *acerosa*

2. Leaves with most or many of their divisions broader, scarcely acerose; central and southern Texas. .....var. *rigidula*

Gilia rigidula Benth. *in* DC. var. *rigidula*. *Giliastrum rigidulum* (Benth.) Rydb., *Fl. Rocky Mts.* 1066. 1917.

Gilia glandulosa Scheele, Linnaea 21:753. 1848. TYPE: U.S.A. Texas: Comal Co.: vicinity of New Braunfels, 1846, *F. Roemer s.n.* (HOLOTYPE: B, probably destroyed).

This taxon is readily distinguished from the following and is largely allopatric with it. Occasional intermediates occur in the regions of overlap.

Gilia rigidula Benth. *in* DC. var. *acerosa* A. Gray, Proc. Amer. Acad. Arts 8:280. 1870. *Gilia acerosa* (A. Gray) Britt., *Man. Bot. N.E. St.* 761. 1901. *Giliastrum acerosum* (A. Gray) Rydb., *Fl. Rocky Mts.* 699. 1917. TYPE: U.S.A. Texas: Pecos Co., Escondido Creek, 30 Jun 1852, *C. Wright 551*, exsic. no. *1645* (LECTOTYPE [selected here]: GH!; Isolectotypes: [2] GH!).

As noted in the above, a distinctive taxon well worthy of recognition. Brand (1907) recognized both *acerosa* and *rigidula* as varieties, but several workers have treated these as distinct species.

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TWO NEW GYPSOPHILIC SPECIES OF *PINGUICULA* (LENTIBULARIACEAE) FROM NUEVO LEON, MEXICO

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ABSTRACT

Two new species of *Pinguicula* are described from southern Nuevo León, México: **P. jorgehintonii** B.L. Turner and **P. hintoniorum** B.L. Turner. Both are believed to be gypsophilous endemics and relate to the recently described *P. esseriana* B. Kirchner, a calciphile from Tamaulipas, México.

KEY WORDS: Lentibulariaceae, *Pinguicula*, México, Nuevo León

Identification of gypsophilous species from Nuevo León, México has revealed the following two novelties, both known only by collections of the Hinton family.

Pinguicula jorgehintonii B.L. Turner, *sp. nov.* TYPE: MEXICO. Nuevo León: Mpio. Aramberri, N of Aramberri, 1145 m, 23 Nov 1993, *G.B. Hinton et al. 24000* (HOLOTYPE: TEX!).

Pinguiculae esserianae B. Kirchner similis sed plantis minoribus (4-6 cm altis vs. 8-11 cm), pedicellis glabris (vs. conspicue pubescentibus), et corollis plus minusve regularibus lobis plerumque brevioribus (5-15 mm longis vs. 15-20 mm) etiam calcaribus brevioribus (5-12 mm longis vs. 15-20 mm).

Annual (?) herbs 4-6 cm high. Leaves of the early rosettes oblanceolate to spatulate, 5-10 mm long, 1.0-1.5 mm wide; leaves of flowering rosettes thin, broadly obovate, 1.2-1.8 cm long, 6-8 mm wide, sparsely pubescent with multiseptate hairs. Pedicels mostly 3-6 cm long, glabrous. Calyces zygomorphic, the lobes acute, 1.0-1.5 mm long, minutely sparsely glandular-pubescent.

on gypseous soils and which I think belong to a distinct taxon (Figure 5). Such plants have generally more pinnately divided lower leaves with smaller ultimate divisions and their corollas, at least in the field, are decidedly blue, vs. pale blue or lavender as in the more typical elements of *G. purpusii*, the latter occurring at usually lower, more xeric habitats (most often with *Agave lechugilla* and associates). I have counted chromosomes of individuals of the Galeana populations and these are diploid with $n=9$ pairs (*Turner 93-154*, TEX). Additional study of this complex in the field is needed before formal recognition is tendered.

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