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A NEW PERENNIAL SPECIES OF *GILIA* (POLEMONIACEAE) FROM UTAH

Frank J. Smith¹ and Elizabeth C. Neese²

ABSTRACT.—*Gilia tenuis* Smith & Neese is a previously undescribed species from Emery and Sevier counties, Utah, apparently closely related to *G. caespitosa* Gray and *G. subnuda* Torr. ex Gray. It is distinguished from these species by its possession of a combination of characters including perennial, multicapital habit, lobed basal leaves, and small, pale blue flowers.

Gilia tenuis Smith & Neese, sp. nov.

Species haec ab *Gilia caespitosa* Gray differt corollis sublazulinis corollae tubo angustis et foliis lobis; ab *G. subnuda* Torr. ex Gray differt corollis sublazulinis corollis parvis et habitu perenni.

Caespitose, perennial herb 5–15 cm tall from a woody-based, multicapital caudex, in age the plants mound-forming, the old stems clothed with marcescent leaf bases; herbage densely glandular puberulent throughout and with sand grains adhering; *leaves* principally basal, the basal ones crowded, 4–32 mm long, 1–7 mm wide, spatulate, obovate, or oblanceolate, irregularly toothed to pinnately lobed or a few sometimes entire, the lobes and apex broadly acute to obtuse or rounded and with an inconspicuous mucro, the cauline ones few, bractlike, to 18 mm long, mostly entire; *inflorescence* paniculate, openly branched from near base, the slender branchlets spreading-ascending; *flowers* perfect, borne in few-flowered, bracteate, cymose clusters near ends of branchlets, sessile or with pedicels to 9 mm long; *calyx* 4–5 mm long, to 6 mm long in fruit, or (in late-season flowers) as short as 3 mm, exceeding the capsule at maturity, the lobes narrowly attenuate, about as long as tube, the lobes and midrib green, the intercostal membrane hyaline, ruptured by maturing capsule; *corolla* narrowly funnelform, delicate, concolorous, pale blue (yellowish in bud), glabrous or sparsely glandular, the tube 9–13 mm long and 1–3 mm in diameter, the lobes 4–6 mm long and 3–5 mm wide when well pressed; *filaments* short, unequally inserted in tube; anthers blue, the upper 3 clearly exerted but surpassed by corolla

lobes, the lower two included and borne about midway in tube; *style* exerted, about equaling or slightly surpassing anthers; *capsule* ca 3 mm long; *seeds* about 2 mm long, few per capsule, narrowly elliptic or oblong, slightly mucilaginous when wet.

TYPE: USA, UT, SEVIER CO., head of Mussentuchit Creek, .9 mi (1.5 km) west of Emery Co. line, 6.8 air miles (11 km) south of Fremont Junction, T25S R5E S1 NW 1/4, at 1,900 m elevation; semibarren minor ridge of fine, pale sand, Dakota Formation, with scattered pinyon, juniper, and other "mound plants," 14 May 1987, *Elizabeth Neese, F. J. Smith, & Lisa Shaw 18025* (Holotype: BRY; isotypes: RM, NY, UC, UT, UTC).

PARATYPES: SEVIER CO.: head of Mussentuchit Creek, .9 mi (1.5 km) west of Emery Co. line, 6.8 air miles (11 km) south of Fremont Junction, T25S R5E S1 NW 1/4, at 1,900 m elevation, 3 June 1986, *Frank Smith & Lisa Shaw 2790* (UTC, NY); do, 10 August 1986, *Elizabeth Neese 17633* (BRY, NY, RM, PO); do, 1 July 1987, *Elizabeth Neese 18135* (MO, UC); T25S R5E S1 SW 1/4, on road to Last Chance Canyon, east side of Limestone Cliffs, 1,858 m elevation, 22 May 1987, *Kaye Thorne & Duane Atwood 5201* (BRY); do, 22 May 1980, *Duane Atwood 7516*. EMERY CO.: San Rafael Swell, T25S R8E S22; rim above (north of) Chimney Canyon, pinyon-juniper community, 1,800 m elevation, 22 May 1987, *Duane Atwood & Kaye Thorne 12709* (BRY); San Rafael Swell, 6,000 ft elevation, 6 June 1932, *Walter Cottam* (UTC).

Gilia tenuis occurs in south central Utah a short distance from the closely related, narrowly endemic *G. caespitosa*. Figure 1

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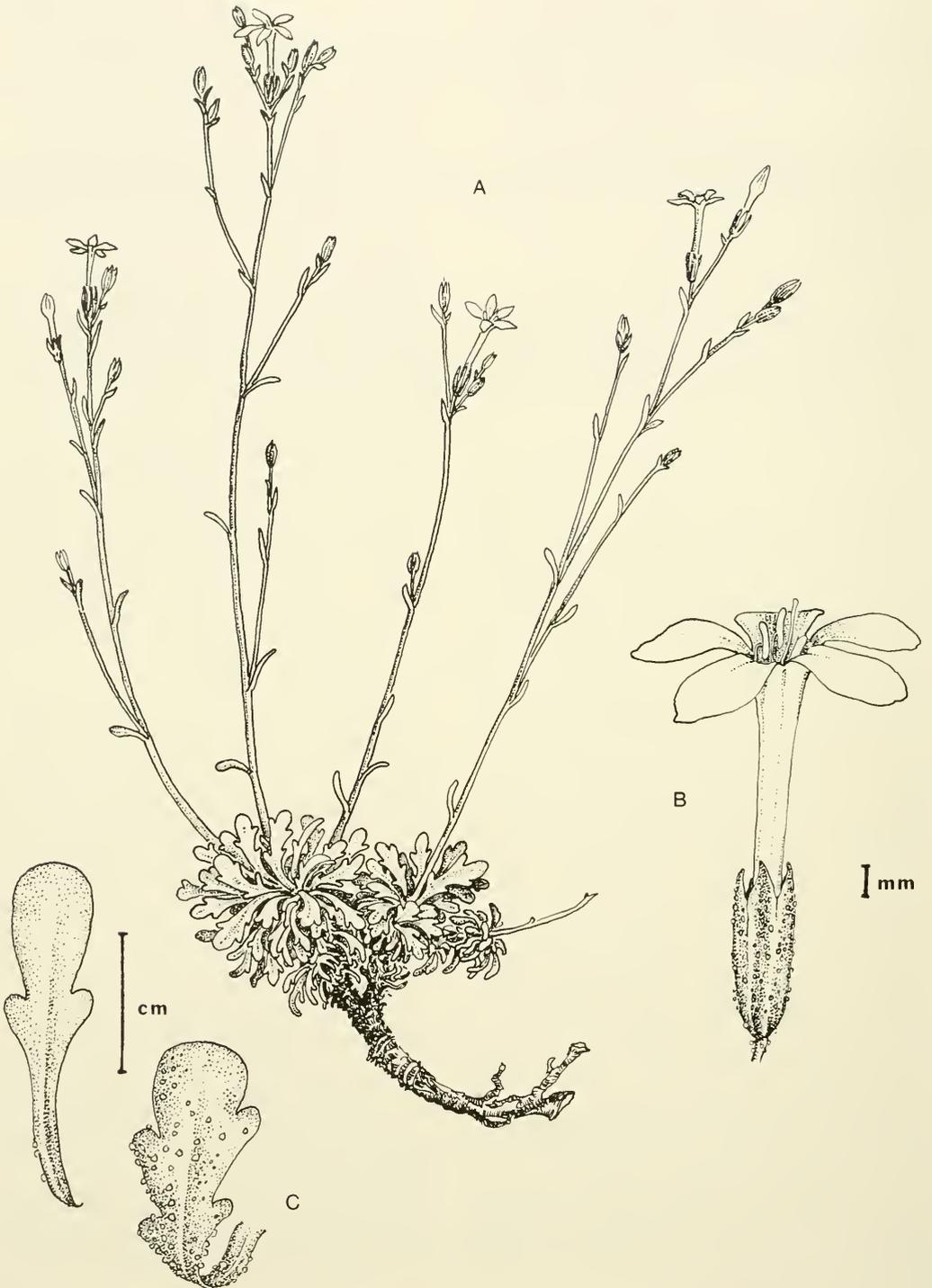


Fig. 1. *Cilia tenuis*: A, habit; B, flower; C, leaf close-up.

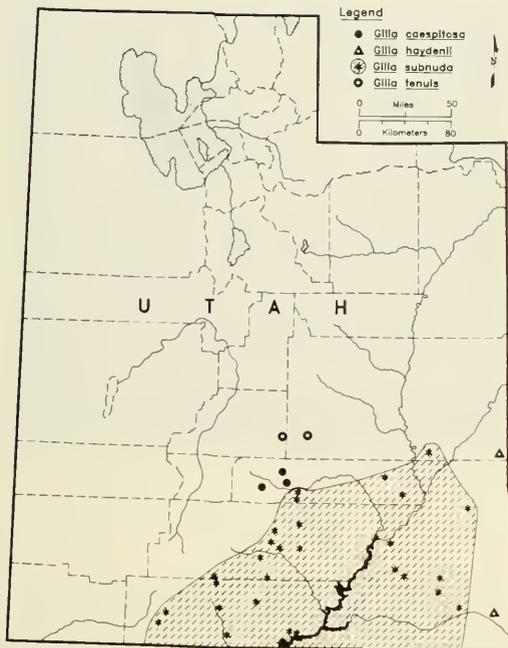


Fig. 2. Map showing distribution of *Gilia tenuis* relative to *G. subnuda*, *G. caespitosa*, and *G. haydenii* in Utah.

illustrates details of morphology and habit. Figure 2 shows the distribution of *G. tenuis* relative to the distributions in Utah of other members of the section *Giliandra*, with which it is allied (see discussion). *Gilia tenuis* occupies open habitats of pinyon-juniper woodland, where it grows on sparsely vegetated, fine-textured, pale, poorly cemented Jurassic and lower Cretaceous sandstones. The following key, which segregates *G. tenuis* from closely allied species that occur in Utah, is modified from the *Gilia* key in A Utah Flora (Welsh et al. 1987). It can be inserted on page 458 beginning with lead 10:

- 10(1). Plants perennial from a branching caudex 10a
- Plants annual or biennial, a caudex not developed 11
- 10a(10). Flowers red; plants from western Wayne County *G. caespitosa* Gray
- Flowers pale blue; plants from western Emery and eastern Sevier County *G. tenuis* Smith & Neese
- 11(10). Overall corolla length 1.5–4.5 cm or more .. 12
- Overall corolla length 0.2–1 cm (to lead 15)
- 12(11). Basal leaves obovate-spatulate, merely dentate; corollas usually carmine; plants of south-eastern Utah *G. subnuda* Torr. ex Gray

- Basal leaves variously shaped but definitely pinnatifid, flowers variously colored; distribution various 13
- 13(12). Basal leaves with a rachis 2–4 mm wide; flowers pink-purple (bluish on drying), funnelform, 1.5–2 cm long; plants of eastern Grand and San Juan counties *G. haydenii* Gray
- Basal leaves with the rachis commonly less than 2 mm wide; flowers scarlet, salmon, pink, white, or blue; distribution various (to lead 14)

DISCUSSION

The existence of this perennial *Gilia* was brought to our attention by a collection made during inventory of rare plant taxa occurring on lands administered by the Bureau of Land Management, Richfield District. Subsequent field investigation and examination of additional herbarium material show *Gilia tenuis* to occur in three small populations in the Muddy Creek and Last Chance Creek drainage system near the Emery/Sevier county line. The earliest known collection was taken from Emery County in 1932 by Walter Cottam, preeminent Utah ecologist and botanist whose collections span more than 50 years. That specimen, labeled simply “dry wash, San Rafael Swell” and identified only as “*Gilia*,” was filed at UTC with specimens of *G. subnuda*. The taxon was again collected in 1980, when Duane Atwood and Bob Thompson took material (Atwood 7516, BRY) from Sevier County near Last Chance Creek (Duane Atwood, personal communication); that specimen, incorrectly labeled as being from Cathedral Valley, was also filed with *G. subnuda*. The taxon was independently discovered by the senior author near the head of Mussentuchit Creek, a small tributary of Last Chance Creek, during the 1986 rare plant study mentioned above; fruiting material was collected later that season and type material the following spring. Subsequent collections were made by Duane Atwood and Kaye Thorne from both the Last Chance Creek station and the west base of the San Rafael Swell overlooking Muddy Creek. The latter station may coincide with that of the early Cottam collection.

In populations we studied, a relatively small proportion of the plants form broad mounds that result from old and much-branched caudices. In young individuals the caudex remains unbranched and the plant

simulates a taprooted biennial; this characteristic, in combination with the densely glandular, lobed, basal leaves, results in close superficial resemblance of some specimens of *Gilia tenuis* to red-flowered *G. subnuda*. However, it is well separated from that taxon (in addition to characters mentioned in the diagnosis) by the diminutive habit, the slender stems, the delicate and less densely glandular corollas, and the exerted stamens. It is distinct from red-flowered *G. caespitosa*, in addition to characters given in the diagnosis, by its greater height, more open and freely branched inflorescence, and less densely caespitose habit. *Gilia haydenii*, also a member of section *Giliandra*, is a relatively robust biennial with pink-purple flowers known from a small area in southwestern Colorado and adjacent Utah and New Mexico. As shown in Figure 2, the distributions of *G. tenuis*, *G. caespitosa*, and *G. haydenii* occur near the periphery of the range of the more widely distributed *G. subnuda*. A fifth member of the alliance, *G. formosa* Greene, occurs 400 km to the southwest in San Juan County, New Mexico. It has relatively large, pinkish purple flowers and entire, acute leaves (the flowers of both *G. formosa* and *G. haydenii* become bluish on drying). *Gilia penstemonoides* Jones from west central Colorado shares with *G. tenuis* the characters of small blue flowers and perennial habit, but its affinities lie more toward *G. pinnatifida* Nutt. (Alva Day, personal communication). Additional collections and further study of the section *Giliandra*, most of whose members are uncommon and poorly known, are indicated.

The chromosome number of *Gilia tenuis* was determined to be $2N = 16$. Anther squashes were made from flower buds collected at the type locality, fixed in Carnoy for 24 hours, and then transferred to 70% alcohol and stored at 4 C. Within *Gilia* this chromosome number has been reported for only five other taxa: *G. caespitosa*, *G. penstemonoides*, *G. pinnatifida*, *G. subnuda*, and *G. micromeria* Gray (Grant 1959, Wilken 1979). (Alva Day reports an unpublished count of $2N = 18$ for *G. micromeria*.)

Pollen for SEM micrographs (Fig. 3) was removed from anthers, air-dried, sputter-coated with Au/Pd for three minutes with a Polaron sputter-coater, and examined on an AMR-1000 SEM. *Gilia tenuis* has zonocolporate

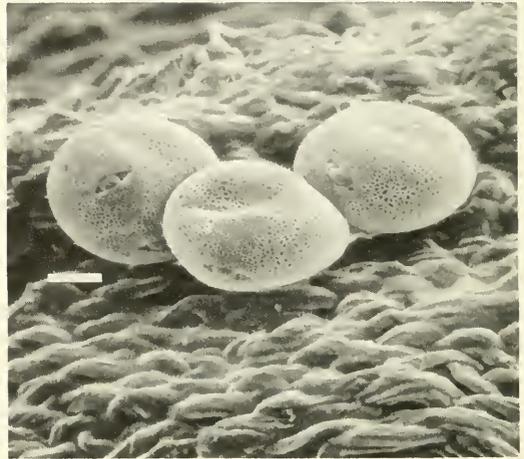


Fig. 3. *Gilia tenuis*: pollen grain. Bar = 10 μ m.

rate, reticulate grains as do *G. caespitosa* and *G. subnuda* (Stuchlik 1967, Wilken 1979). Most *Gilia* pollen grains are zonocolporate with either striato-reticulate or peritectate sexines (Taylor and Levin 1975).

Perennial and biennial species in the section *Giliandra* tend to be large, showy, and with well-exserted stamens, whereas smaller-flowered desert annuals in the section tend to be self-pollinated (Grant and Grant 1965). Although the flowers of *Gilia tenuis* are small and scarcely showy, the exerted stamens indicate that they are probably insect pollinated, and numerous bees and flies were observed visiting the flowers. Monitoring of insect visitors, including collection where possible, was conducted during early morning, at midday, and in late afternoon. Collections include *Lasioglossum* sp. (Halictidae), *Eupeodes volucris* (Syrphidae), and a number of unidentified members of the Anthomyiidae. An unidentified bee with a long proboscis (which may thus be a principal pollinator) was not captured but is believed to belong in the family Anthophoridae.

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