Aliso: A Journal of Systematic and Floristic Botany

Volume 17 | Issue 1 Article 4

1998

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Porter, J. Mark (1998) "Aliciella, A Recircumscribed Genus of Polemoniaceae," *Aliso: A Journal of Systematic and Floristic Botany*: Vol. 17: Iss. 1, Article 4.
Available at: https://scholarship.claremont.edu/aliso/vol17/iss1/4

Aliso, 17(1), pp. 23–46
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ALICIELLA, A RECIRCUMSCRIBED GENUS OF POLEMONIACEAE

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ABSTRACT

Recent phylogenetic analyses within Polemoniaceae have provided evidence that the current circumscription of *Gilia* recognizes and gives taxonomic status to a polyphyletic assemblage of species. As a first step in rectifying this problem, the genus *Aliciella* Brand (Polemoniaceae) is resurrected and recircumscribed to include *Gilia* section *Giliandra* and *Gilia* subgenus *Gilmania* sensu Mason & Grant, a monophyletic (=holophyletic) group as here described. Twenty–one recombinations are proposed: *Aliciella cespitosa, A. formosa, A. haydenii, A. haydenii* subsp. *crandallii, A. heterostyla, A. humillima, A. hutchinsifolia, A. latifolia, A. latifolia* subsp. *imperialis, A. leptomeria, A. lottiae, A. mcvickerae, A. micromeria, A. nyensis, A. pentstemonoides, A. pinnatifida, A. ripleyi, A. sedifolia, A. stenothyrsa, A. subnuda,* and *A. tenuis.* A taxonomic key and brief descriptions are given for these species. Problems or confusions regarding the types are addressed, and six lectotypes are designated.

Key words: Polemoniaceae, *Aliciella, Gilia,* taxonomy, lectotypes.

INTRODUCTION

The genus *Gilia* has been a perpetual taxonomic problem within Polemoniaceae. The circumscription of this genus has changed radically over the last 100 years. As pointed out by Mason and Grant (1948), all of the herbaceous genera of the Polemoniaceae, with the exception of *Polemonium* and *Phlox,* have been placed in *Gilia.* Gray (1870, 1886) maintained one of the broader interpretations of the genus. While recognizing it was "certainly a polymorphous . . . genus" (Gray 1870: 262), he included the currently recognized genera *Langloisia, Loeseliastrum, Gymnosteris, Leptodactylon, Linanthus, Navarretia, Ipomopsis* and *Eriastrum* within *Gilia.* Subsequent students of the family began a process of identification, segregation and elevation to generic status of more or less cohesive groups within Gray's *Gilia.* For example, Brand (1907) recognized the genera *Navarretia, Gymnosteris, Langloisia, Aliciella.* Wherry (1945) recognized *Leptodactylon, Linanthus, Ipomopsis* and *Eriastrum* in addition to all of those adopted by Brand, except *Aliciella.* The most recent comprehensive classification of the family (Grant 1959) has similarly maintained all these segregate genera, except *Aliciella.* Even so, *Gilia* remains in disarray—confusing and polyphyletic.

The polyphyly of *Gilia* is not unexpected, given the taxonomic history of the genus *Gilia.* Even if the genera removed from *Gilia* sensu Gray were morphologically cohesive, there is no reason to expect that the remaining species should be morphologically or phylogenetically unified. In fact, had the broadest circumscription of *Gilia* represented a monophyletic (=holophyletic) group, it is very likely that after removal of the large number of taxa (even had they been monophyletic), the remainder of *Gilia* would be, at best, paraphyletic.

Recent phylogenetic analyses of the Polemoniaceae based on both morphological (Porter 1993) and molecular data (sequences of internal transcribed spacer regions of nuclear ribosomal DNA [Porter 1993, 1996] and the chloroplast gene *matK* [Johnson and Soltis 1995; Johnson et al. 1996]) bear on this issue. These data provide evidence that *Gilia* is polyphyletic (Fig. 1). Insofar as I am concerned in this paper, the species currently treated as section *Giliandra* Gray (as circumscribed by Grant 1959) of *Gilia,* along with *G. latifolia* S. Wats. and *G. ripleyi* Barneby (*Gilia* subgen. *Gilmania,* sensu Mason & Grant 1948, not Grant 1959), have been shown to be more closely related to a clade that includes *Loeselia, Langloisia, Loeseliastrum, Ipomopsis* and *Eriastrum* than any are to other members of *Gilia* sections *Gilia, Arachnion, Kelloggia, Campanulastrum* or *Saltugilia* (Porter 1993, 1996; Johnson and Soltis 1995; Johnson et al. 1996). However, the group here circumscribed as the genus *Aliciella* (*Gilia* sect. *Giliandra* + subgenus *Gilmania*) is inferred to be monophyletic (Porter 1993, 1996; Johnson unpubl.).

The recognition of monophyletic groups in classification has considerable advantage over other types of groups (paraphyletic or polyphyletic). In particular, monophyletic groups accurately and unambiguously reflect patterns of common ancestry that are the product of evolutionary diversification. That is, all of the members of a monophyletic group share a unique,

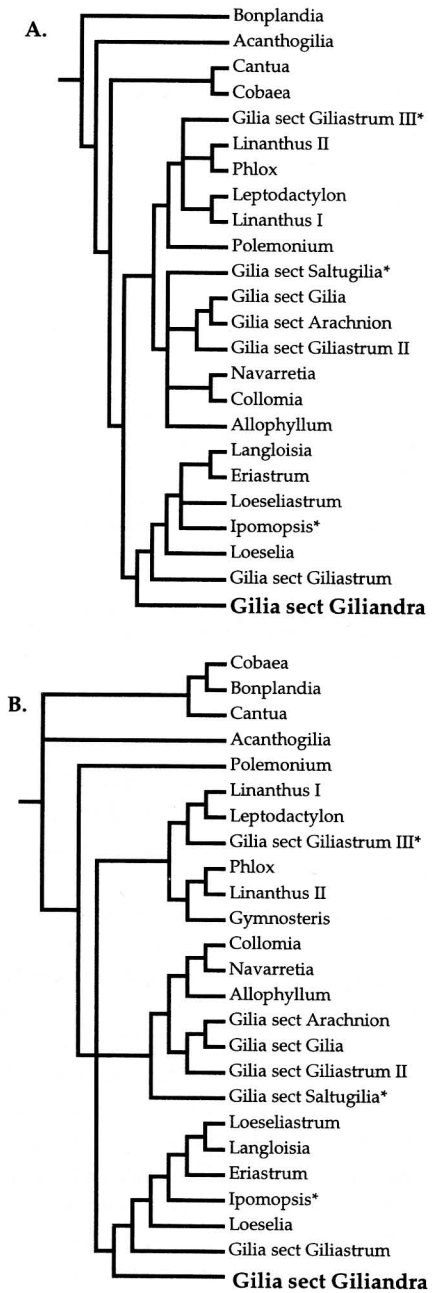

Fig. 1. Hypothesized relationships of *Aliciella* (formerly *Gilia* section *Giliandra*) within Polemoniaceae, deduced from nuclear ribosomal internal transcribed spacer-ITS and chloroplast *matK* DNA sequences. The trees presented display as resolved only those clades that each of the two data sources unambiguously support. The ITS tree (A.) is derived from Porter (1996) and is taken from the strict consensus of the set of 1080 most parsimonious trees. The *matK* tree (B.) is derived from Johnson et al. (1996) and represents the strict consensus of three most parsimonious trees from their matrix two. In both tree A and B *Linanthus* and *Gilia* sect. *Giliastrum* are not monophyletic, falling into two and three clades, respectively. The multiple clades are denoted with Roman numerals. The asterisks denote terminal taxa that were not monophyletic (=holophyletic) in both Johnson et al.'s and Porter's strict consensus trees. *Gilia* sect. *Giliandra* is monophyletic in both ITS and *matK* analyses and is indicated in bold.

common ancestor, not shared by any species outside of that group and include all of the descendants of that ancestor (Hennig 1966). If character evolution is an important consideration, monophyletic groups are needed to accurately provide the context for evaluation of character change and the frequency of character evolution. *Gilia* is unfortunately not monophyletic. Because *Gilia* is polyphyletic as currently circumscribed, the only characters that distinguish it are either pleisiomorphic traits or homoplastic features (Porter 1993; Johnson and Soltis 1995), rather than homologous characters (synapomorphies).

MATERIALS AND METHODS

This study is based upon data derived from three principal areas, phylogenetic analyses, herbarium studies, and literature sources. The phylogenetic analyses involving *Aliciella* are from three data sources: nuclear ribosomal (Porter 1993, 1996), chloroplast *trnL–F* region (Tommerup and Porter 1996) DNA sequences, and morphological data (Porter 1993). In addition, comparative morphological studies of herbarium collections were used, including both empirical evidence and quantitative analysis (not presented).

RESULTS AND DISCUSSION

There are at least two approaches to recircumscribing *Gilia* such that it will reflect the known and/or extant members of a monophyletic group. One course is to expand the current circumscription such that all of the recognized members of *Gilia* are included in a single monophyletic group. However, to do so, nearly all of the currently recognized genera of Polemoniaceae would have to be included in the same genus, including *Phlox* and *Polemonium.* This would result in a circumscription even broader than the classification of Gray. Indeed, such a circumscription would be the undoing of *Gilia,* for the name would be preempted by *Polemonium,* which has priority.

An alternative to expanding *Gilia* is to recognize the unrelated lineages, previously referred to as *Gilia,* as either segregate genera or members of other currently recognized genera with which they share recent common ancestry. This is the more desirable of the two options. Such a course will result in minimal nomenclatural change and potential confusion, while also maximizing the information content of the classification. It is my purpose to reassign *Gilia* section *Giliandra, G. latifolia* and *G. ripleyi* to Brand's genus, *Aliciella.* In doing so I will recircumscribe *Aliciella.* This recircumscription includes a revised description of the genus, key to species and brief descriptions of its members. However, the treatment here is by no means monographic. It does, however, furnish a more complete overview of *Aliciella* than a listing of new com-

binations can provide. In addition, clarification of the complexities of species boundaries in the annual members of the "*Gilia*" *leptomeria* complex are beyond the scope of this paper. A key to genera of Polemoniaceae would also be both desirable and an important contribution in the context of this recircumscribed genus, however, this will instead be forthcoming, so that additional revisions currently in progress can be included.

Aliciella, as here circumscribed, is composed largely of rosette-forming annuals, biennials and herbaceous perennials of the western United States and adjacent Mexico. The greatest diversity of nonannual species occurs in the Colorado Plateau region. By contrast, diversity of the annual species is highest in the southern Great Basin and adjacent Mojave Desert. All of the members of this genus display a reduction in mucilage formation of the seed coat. As a result, when wetted, the seeds lack the densely mucilaginous seed coat that is characteristic of many members of Polemoniaceae. In addition, all members of *Aliciella* show no anthocyanin production in the glandular trichomes characteristic of many species of *Gilia.* The nonannual members of *Aliciella* are very distinctive in terms of architecture and floral morphology and quite unlike the true Gilias. By contrast, the annual members (with the exception of *A. latifolia*) possess a remarkably convergent morphology relative to *Gilia* sect. *Arachnion,* and have frequently been confused with the "cobweb-by gilias." However, the annual members of *Aliciella* lack nonglandular trichomes, characteristic of *Gilia* sect. *Arachnion.*

Research into the phylogenetic relationships within *Aliciella* is ongoing. However, a phylogeny for *Aliciella* is desirable, particularly for classification within the genus. A proposed phylogeny is presented in Fig. 2. This phylogenetic tree is not the result of any single cladistic analysis, but is based in part on molecular (nrDNA ITS sequences) and morphological cladistic analyses of Porter (1993) and also unpublished data. Subgeneric and sectional classification within *Aliciella* and the node based phylogenetic definitions can be interpreted with reference to taxon inclusion, using Fig. 2.

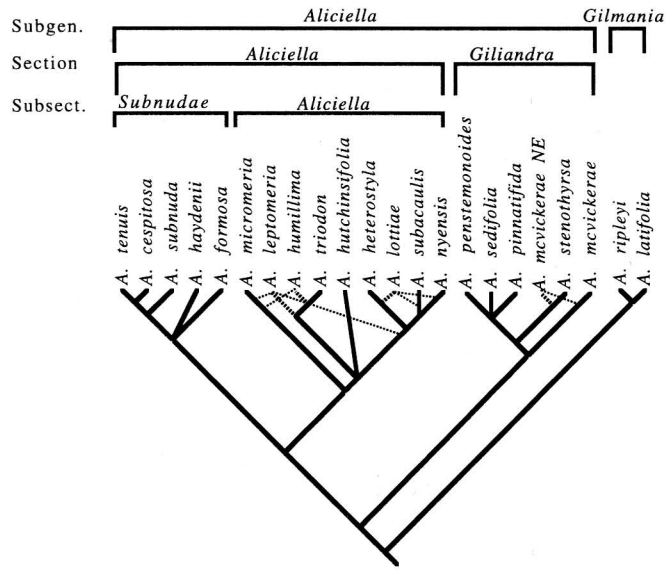

Fig. 2. Phylogenetic tree depicting hypothesized relationships between species of *Aliciella.* The tree illustrates the relationship between the proposed phylogeny and the intrageneric classification presented. The dashed lines represent proposed reticulate evolution (hybridization).

Classification

Aliciella A. Brand.

Aliciella A. Brand, *Helios* **22**: 78. 1905. Type species: *Aliciella triodon* (A. Eastwood) A. Brand.

Gilia sect *Giliandra,* A. Gray, *Proc. Amer. Acad. Arts* **8**:276. 1870. Type species: *Gilia stenothyrsa* A. Gray.

Gilia ser. *Pinnatifidae* Rydb., Fl. Rocky Mts., ed. 1, 691. 1917. Type species: *Gilia calcarea* M. E. Jones.

Gilia ser. *Leptomeriae* Rydb., Fl. Rocky Mts., ed. 1, 692. 1917. Type species: *Gilia leptomeria* A. Gray.

Gilia subgen. *Gilmania* Mason & Grant, *Madroño–o* **9**:205. 1948. Type species: *Gilia latifolia* S. Wats. *Gilia* subgen. *Gilia* sect. *Gilmania* (Mason & Grant) V. Grant & A. Grant (in part, excluding *Gilia stellata* A.A. Heller and *G. scopulorum* M. E. Jones) *El Aliso* **3**: 299.

Taprooted perennials, biennials, or annuals, monocarpic, somewhat woody at the base or herbaceous, mostly glandular pubescent with uniserate trichomes bearing multicellular terminal glands, rarely also with uniserate nonglandular trichomes; Leaves entire, or once-pinnatifid, the lobes sometimes dentate, or twice-pinnatifid, leaf tips cuspidate, mucronate or aristate, often forming a basal rosette, cauline leaves either ±gradually or abruptly reduced in size, but ultimately reduced and entire with cuspidate or mucronate tips; Inflorescence cymose, composed of 3–, 2– or 1–flowered units, secondary branches generally overtopping the primary axis; Calyx composed of herbaceous costae and hyaline intercostal regions, glandular; Corolla salverform to funnelform, concolored, bicolored or tricolored, glandular or glabrous externally, glabrous internally, corolla veins often anastomosing at the base of the lobes and rarely also in the lobe, ±actinomorphic; Stamens 5 (3–5 in *Aliciella micromeria*), epipetalous, the filaments becoming free in the corolla tube or the sinuses of the corolla lobes, filaments smooth and glabrous or papillose below the anther; Pollen zonocolporate or zonoporate, pertectate striate–reticulate or reticulate, blue, yellow, or cream colored; Ovary glabrous; Seeds not (or only slightly) becoming mucilaginous when wetted. n = 8, 9, 16, 17, 18, 25.

Aliciella can be explicitly defined phylogenetically as the most recent common ancestor of *Aliciella triodon* A. Brand and *A. latifolia,* and all of the descendants of that common ancestor. The genus *Aliciella*

corresponds very closely to Grant's (1959) *Gilia* section *Giliandra* (aside from the addition of *A. latifolia* and *A. ripleyi*). Grant was the first systematist to recognize the relationship between these species, including the annuals.

KEY TO THE SPECIES

1. Filaments of stamen papillose below the anther (at lease the longest filament); leaves hollylike, the teeth aristate; pollen yellow (Subgenus *Gilmania*) 2
– Filaments of stamen smooth below the anther; leaves various but not holly-like, leaf lobes mucronate but not aristate; pollen white, cream, blue or yellow (Subgenus *Aliciella*) 3
2. Plants perennial; internal and external corolla lobe (adaxial and abaxial surfaces) similar in color, magenta 20. *A. ripleyi*
– Plants annual; internal and external corolla lobe (adaxial and abaxial surfaces) dissimilar in color, magenta internally (adaxially), pale pink externally (abaxially) . . 19. *A. latifolia*
3. Anthers exserted well beyond the corolla tube, the filaments nearly equalling or exceeding the corolla lobes, filaments inserted in the sinus of the corolla lobes or equally inserted in the corolla tube 4
– Anthers not exserted, filaments much shorter than the corolla lobes, the filaments inserted in the sinus of the corolla lobes, or unequally inserted on the corolla tube with one or two anthers only slightly exserted 12
4. Seeds small, mostly 0.5–0.9 mm long; corolla with pink to magenta lobes; annual; restricted to Nye County, Nevada (Sect. *Aliciella,* Subsect. *Aliciella*) 5
– Seeds larger, mostly 1.5–2.0 mm long; corolla blue to white; plants biennial, short-lived or long-lived perennial, only as far west as Lincoln County, Nevada (Sect. *Giliandra*) 6
5. Flowers heterostylous, corolla pink, the veins purple, corolla tube gradually expanded . . . . . 13. *A. heterostyla*
– Flowers not heterostylous, corolla magenta, the veins not apparent, corolla tube abruptly expanded . . . . 12. *A. nyensis*
6. Basal leaves, stems and branches glandular puberulent, basal leaves also with 2-celled barrel-shaped trichomes 7
– Basal leaves, stems and branches mostly glabrous and somewhat glaucous, a few sparse, coarse glands, basal leaves lacking 2-celled barrel-shaped trichomes . . . . . 2. *A. mcvickerae*
7. Inflorescence mostly thyrsoid, elongate with very short lateral branches, rarely with open inflorescences; corolla white, rarely blue to lavender; capsule 4–6 mm long; plants of the Uintah Basin of Utah and adjacent Colorado, and northern San Rafael Swell, Utah . . . . . 5. *A. stenothyrsa*
– Inflorescences open, lateral branches generally elongate; corolla blue to lavender; capsule 2.5–4 mm long; plants of the Rocky Mountains and western Great Plains 8
8. Leaves entire 9
– Leaves pinnatifid 10
9. Leaves terete and succulent; plants apparently biennial; corolla lobes longer than the tube; alpine on volcanic tuff . . . . . 3. *A. sedifolia*
– Leaves laminar, linear-lanceolate, sometimes pinnatifid; plants perennial, with a branching, more or less woody caudex; corolla lobes shorter than the tube; cliff walls in mixed conifer woodland . . . . . 4. *A. pentstemonoides*
10. Plants appearing biennial, with well-developed basal rosettes of many leaves; densely glandular; all of the basal leaves pinnatifid; widespread and variable in habitat . . . 11
– Plants long-lived perennial, with a branching caudex and few-leaved rosettes; sparsely glandular; usually some basal leaves entire; restricted to cliff walls in west-central Colorado . . . . . 4. *A. pentstemonoides*
11. Trichomes of basal leaves and stems multiseriate, cauline leaves generally entire, lateral branches long, the lower ones frequently longer than the primary axis, producing an open, diffuse architecture . . 2. *A.* cf. *mcvickerae* (NE phase)
– Trichomes of basal leaves and stems uniseriate, cauline leaves pinnatfid, lateral branches shorter than the primary axis, producing a rather dense, ovoid branching architecture . . . . . 1. *A. pinnatifida*
12. Seeds 1.5–2.0 mm long, plants biennial to perennial, rarely flowering the first year (Sect. *Aliciella,* Subsect. *Subnuda*) 13
– Seeds 0.5–0.9 mm long, plants annual (Sect. *Aliciella,* Subsect. *Aliciella*) 17
13. Filaments free from corolla tube at about mid-tube length, not evenly inserted; basal leaves with only glandular trichomes 14
– Filaments free from the corolla near the sinuses of the corolla lobes, or if free in the upper part of the corolla tube, then evenly inserted; basal leaves with crisp, white nonglandular trichomes in addition to glandular trichomes . . . 16
14. Corolla blue to white; loosely tufted perennial; restricted to the western San Rafael Swell, Utah . . . . . 10. *A. tenuis*
– Corolla crimson (some herbarium mounts fading to yellow) 15
15. Tufted perennials, stems mostly less than 13 cm tall, basal leaves 0.4–2.5 cm long and 0.8–4.2 mm wide, restricted to near Teasdale and Fruita, Utah . . . . . 9. *A. cespitosa*
– Biennial to short-lived perennials, the stems loose, not tufted, mostly much taller than 15 cm, basal leaves 1.5–9.5 cm long and 5–25 mm wide; eastern Utah and northern Arizona . . . . . 8. *A. subnuda*
16. Plants with a much-branched woody caudex; leaves linear and entire; restricted to northwestern New Mexico . . . . . 7. *A. formosa*
– Plants with 1–3 rosettes, lacking a woody caudex; leaves spatulate to lanceolate, dentate to more frequently pinnatifid; NW New Mexico, SW Colorado, SE Utah and NE Arizona . . . . . 6. *A. haydenii*
17. Corolla tube somewhat constricted near the orifice, not flaring, ±salverform 18
– Corolla tube flaring at the orifice, not at all constricted, ±funnelform 20
18. Corolla lobe tridentate, the central lobe generally longest . . . . . 18. *A. triodon*
– Corolla lobe somewhat truncate but clearly cuspidate . . 19
19. Pedicels appearing dimorphic, the terminal one shorter than the calyx, the axillary one longer; branches ascending; fruit elliptic or oblong . . . . . 14. *A.* cf. *leptomeria*
– Pedicels all much longer than the calyx; branches widely spreading, often at about 90° fruit globose . . . 17. *A. humillimus*
20. Flowers mostly 7.0 mm or more, magenta in color but sometimes drying blue; flowers dimorphic and populations heterostylous; restricted to Nye Co., Nevada . . . . . 13. *A. heterostyla*
– Flowers generally less than 7.0 mm, white, pale pink or streaked with purple, filaments much shorter than corolla lobes; flowers monomorphic 21
21. Corolla mostly 2.0–3.5 mm long, pedicels all much longer than the calyx, arcuate; branches widely spreading, often at about 90°; fruit globose . . . . . 16. *A. micromeria*
– Corolla mostly 4.5–7.0 mm long; pedicels dimorphic, the terminal one shorter than the calyx, the axillary one appearing longer, straight and ascending, not arcuate; branches ascending; fruit ellipsoid or oblongoid 22

22. Basal leaves pinnate-pinnatifid, in depauperate specimens dentate but with a narrow rachis; glandular trichomes on the basal leaves with long uniserate stalks 23
– Basal leaves dentate, in exceptionally large specimens the teeth again coarsely toothed, but the rachis broad; glandular trichomes on the basal leaves (at least the abaxial surface) with short uniserate stalks 24
23. Corolla with glandular hairs on the external tube . . . . . 11. *A. hutchinsifolia*
– Corolla glabrous externally . . . . . 14. *A. leptomeria*
24. Upper surface of basal leaves glandular; corolla lobes lanceolate . . . . . 14. *A. leptomeria*
– Upper surface of basal leaves bright green and glabrous; corolla lobes very narrowly lanceolate . . . . . 15. *A. lottiae*

I. Aliciella Subgenus Aliciella

Subgenus *Aliciella* is phylogenetically defined as the most recent common ancestor of *Aliciella triodon* A. Brand and *A. stenothyrsa* (A. Gray) J. M. Porter, and all of the descendants of that ancestor.

A. Section **Giliandra** (A. Gray) J. M. Porter, comb. nov.

Gilia sect. *Giliandra* A. Gray, *Proc. Amer. Acad. Arts* **8**: 276. 1870. TYPE.—*Gilia stenothyrsa* A. Gray (see Grant 1959).

Gilia ser. Pinnatifidae Rydb., Fl. Rocky Mts. ed. 1: 691. 1917. TYPE.—*Gilia calcarea* M. E. Jones (see Grant 1959).

Section *Giliandra* is phylogenetically defined as the most recent common ancestor of *Aliciella pinnatifida* and *A. stenothyrsa* and all of the descendants of that ancestor.

1. **Aliciella pinnatifida** (Nutt. ex Gray) J. M. Porter, comb. nov.

Gilia pinnatifida Nutt. ex Gray, *Proc. Amer. Acad. Arts* **8**: 276. 1870, (basionym). *Navarretia pinnatifida* (A. Gray) Kuntze, *Revisio, Gen. Pl.* **2**: 433. 1891. *Gilia viscosa* Woot. & Standl, *Contr. U.S. Natl. Herb.* **16**: 161. 1913. TYPE:—U.S.A. New Mexico: (without location, but presumably near Santa Fe) 1847, *A. Fendler 655* [lectotype: (here designated) GH!].

Gilia pinnatifida Nutt. ex Gray var. *integrescens* Brand, Pflanzen. IV. Fam. 250: 117. 1907. TYPE.—U.S.A. Colorado: Uncompahgre Range, *C. Purpus 657* [holotype: B (destroyed; no lectotype designated as no duplicates of the Purpus collection are known and no subsequent collections of this taxon have been made).

Biennial to short-lived perennial, 10–60 cm tall, stems glandular pubescent, simple and erect but often becoming thyrsoid or diffusely branching in flower. Basal leaves forming a rosette, once-pinnatifid, 1.4–7.0 cm long, the rachis 1–2.5(–3.5)mm wide, the segments, 8–18, linear to narrowly oblong, entire to rarely lobed, glandular puberulent, usually with 2–celled barrel-shaped trichomes, to glaucous, cuspidate or mucronate. Cauline leaves gradually reduced in size, ultimately entire, bifid to trifid, 8–20 mm long, glandular puberulent. Inflorescence cymose-paniculate, ultimately becoming sympodial, floral bracts entire, linear and cuspidate. Calyx cylindrical to ovoidal, 2.5–5.5 mm long, tube 2.7–4.5 mm long at anthesis, glandular, the lobes ⅓ or less the length of the calyx. Corolla (5.0–) 6.5–12.0 mm long, white to blue or lavender, often with a yellow eye, corolla glabrous externally, salverform to narrowly campanulate; the tube longer than the calyx, 3.0–6.5 mm long, lobes oval to orbicular 2.0–5.0 mm long. Stamens affixed in the upper tube, the free portion nearly as long as the fused portion, anthers 0.7–1.8 mm long, exserted, filaments often declinate and sternotribal. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 2.5–5.0 mm long. Seeds 1–several per locule, ca. 1.5 mm long, lenticular to angular, narrowly and often incompletely winged. $2n=16$ (Grant 1959).

Aliciella pinnatifida occurs on dry, sandy or gravelly soils, often associated with stream beds, eroding slopes, outcrops or other openings in grasslands, sagebrush, pinyon-juniper woodlands, ponderosa pine forests and spruce forests, mostly at 1650–3500 m (5400–11,500 ft) elevation, from southern Wyoming, Colorado, northern New Mexico, and northeastern Utah to western Kansas and western Nebraska. Flowering frequently begins in May and continues through September (or rarely as late as October).

This species is characterized by deeply pinnatifid leaves in a dense basal rosette, an open inflorescence, and blue to white corollas that appear somewhat bilaterally symmetric due to the exserted, declinate anther filaments. Although it has frequently been suggested that the flowers are concolorous, in fact they generally possess a distinct yellow "eye" associated with the orifice of the corolla tube, giving them a bicolored appearance.

The designated lectotype contrasts with the cited type of Cronquist (1984). Cronquist identified the GH collection by Nuttall as the holotype; however, Gray cites several collectors, including Parry, Nuttall, Fendler and Geyer. All these collections must be considered syntypes. The only specific collections (collector and number) cited are *Geyer 42* and *25*. Neither of the Geyer specimens can be found in the Gray Herbarium. The sheets annotated by Gray include *Fendler 655, Vasey 455, Parry 282, Nuttall s.n., Hall & Harbour 456,* and *Fremont s.n.*. Of these, only the Fendler, Nuttall, and Hall and Harbour are mentioned directly or indirectly by Gray. The Hall and Harbour collection is problematic in that rather than mentioning the collection directly, Gray cites a publication within which the specimen is cited. I am selecting the lectotype from the two remaining collections. Although the Nuttall collection may seem a logical choice, it presents problems because it lacks flowers, a diagnostic feature of this species. In addition, the collection locality is vague (Lewis River), referring to three different rivers

in the mid 1800s. By contrast the Fendler collection is clearly consistent with Gray's description, possessing flowers, fruit and a basal rosette. Furthermore, even though the collection locality is general (New Mexico), it is not vague. Fendler's collections were frequently made at or near Santa Fe, where the species still occurs. Therefore, because *Fendler 655,* observed and cited by Gray, is morphologically consistent with his description, remains identifiable, and possesses a collection locality that is less ambiguous, I select it as lectotype.

Representative specimens.—U.S.A. COLORADO. Boulder Co.: Near summit of Flagstaff Mountain, W of Boulder, 13 Aug 1947, *Robbins 2683* (RSA). Chaffee Co.: South Cottonwood Gulch, 9 July 1892 *Sheldon 517* (US). Clear Creek Co.: Along Hwy 103 W of Jct with Hwy 5, 8 Aug. 1973, *Atwood & Higgins 5729* (BRY). Costilla Co.: 13 mi N of Ft. Garland, ¡ mi S of Russell, 3 July 1948, *Parker & McClintock 7001* (US, RSA). Douglas Co.: 12 mi sw of Sedalia, 5 Aug. 1958, *Waterfall 14955* (US, RSA). Eagle Co.: Trail Gulch, ca. 1 mi SE of the Colo. R., hills of the Eagle Valley Evaporate Formation, T35N, R86W, Sect. 35, 12 July 1987, *Anderson 87–72* (BRY). Fremont Co.: Canyon of the Arkansas R., above Ca–on City, 28 June 1950, *Ripley & Barneby 10175* (RSA). Gilpin Co.: ¼ mi W of Tolland Schoolhouse, 1 July 1960, *Welsh 1370* (BRY). Grand Co.: T2N, R81W, Sect. 36, W side Muddy Cr., 3 mi NNW of Kremmling, 11 July 1985, *Neese & Graham 17165* (BRY). Gunnison Co.: T47N, R2W, S9, along Hwy 149, 12 mi S of Hwy 50 (15 mi SW of Gunnison), 14 July 1984, *Neese 15879* (RSA, BRY). Hinsdale Co.: parking lot of the Riverside Cabin, J-Bar Horseshoe Ranch, a couple of mi SW of Cathedral, 20 July 1962, *Barrel & Spongberg 391–62* (US). Jackson Co.: N of Walden, between airport and Michigan R., 16 July 1969, *Atwood 1979* (US, BRY). Jefferson Co.: Turkey Creek Canyon on Hwy 285, SW of Morrison, 24 July, 1954, *Grant & Grant 9479* (RSA). Larimer Co.: 4.8 mi W of Logcabin and near Parvin Lake, 20 Aug. 1950, *Robbins 3559* (RSA). Mineral Co.: 4.8 mi SW of Creede, 21 July 1954, *Grant & Grant 9470* (RSA). Park Co.: US Hwy 24, 0.3 mi W of Wilkerson Pass, 25 Aug 1950, *Robbins 3381* (RSA). Ouray Co.: Ouray, Horsethief Trail, 25 July 1915, *Osterhout 5365* (BRY). Saguache Co.: along Hwy 50, 2.0 mi E of Gunnison Co. line, 1 July 1984, *Wilken & Painter 14043* (RSA, BRY, NY, RM, CSU). Teller Co.: Florissant Fossil Beds Nat'l Mon., 6 Aug. 1973, *Van Royen 10539* (US). Colorado Springs, 22 May 1878 *Jones 95* (POM, US). Crested Butte, 6 July 1901, *Baker 338* (POM).—KANSAS. Hamilton Co.: Syracuse, 28 July 1893, *Thompson 153* (US). —NEBRASKA. Sands of the Platte, near House Creek, 1 Aug 1891, *Rydberg 246* (US).—NEW MEXICO. Union Co.: slopes of Capulin Mtn., 17 Aug, 1952, *Waterfall 10831* (RSA, BRY). Santa Fe Co.: Santa Fe Canyon, near Santa Fe, 1 July 1929, *Mathias 581* (POM).—WYOMING. Albany Co.: N of Boswell Campground, SE of Mt. Home, on Hwy 280, 15 July 1969, *Atwood 1974* (US, BRY). Carbon Co.: Little Beaver Creek, ca 11 mi SE of Encampment, 1 Sept. 1974, *Dorn 2325* (US).

2. **Aliciella mcvickerae** (M. E. Jones) J. M. Porter, comb. nov.

Gilia *mcvickerae* M. E. Jones, *Proc. Cal. Acad. Sci. II.* **5**: 712. 1895, (basionym). TYPE.—U.S.A., UTAH, Marysvale, 2 June 1894, *M. E. Jones 5378,* [lectotype (here designated): POM!].

Gilia calcarea M. E. Jones, *Contr. W. Bot.* **8**: 36. 1898; *Gilia pinnatifida* Nutt. ex A. Gray var. *calcarea* (M. E. Jones) A. Brand, Pflanzen. IV. Fam. 250: 117. 1907. TYPE.—WYOMING: Green River, 23 June 1896, *M. E. Jones 10072* [lectotype (here designated): POM!]

Biennial to short-lived perennial, 15–70 cm tall, stems glaucous, glabrous to sparsely and coarsely glandular pubescent with multiseriate to uniseriate glandular trichomes, less commonly finely glandular, simple and erect but usually becoming diffusely branching to the base. Basal leaves forming a rosette, entire to once-pinnatifid, 1.5–8.0 cm long, the rachis 1–3.5(–4.0) mm wide, the segments, 8–18, linear to oblong, entire to lobed, the terminal lobe often larger than the laterals, glaucous, cuspidate or mucronate. Cauline leaves gradually reduced in size, ultimately entire, 1–5 mm long, sparsely glandular puberulent to glaucous. Inflorescence loosely open cymose-paniculate, ultimately becoming sympodial, leaves of the secondary branches and floral bracts mostly entire, linear and cuspidate. Calyx cylindrical to ovoidal, 2.5–4.5 mm long, tube 1.9–3.5 mm long at anthesis, glandular, the lobes ⅓ or less the length of the calyx. Corolla (6.0–)7.0–14.2 mm long, mostly blue to lavender, with or without a yellow eye, corolla glabrous externally, salverform to narrowly campanulate; the tube pale, longer than the calyx, 4.0–9.0 mm long, lobes oval to orbicular 3.0–5.0 mm long. Stamens affixed in the upper tube, the free portion nearly as long as the fused portion, anthers 0.7–1.8 mm long, exserted, filaments declinate or not. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 2.5–5.5 mm long. Seeds 1–several per locule, ca. 1.5 mm long, lenticular to angular, narrowly and often incompletely winged.

This species occurs on dry soils of sandy, clay or gravel, often associated with stream beds, eroding slopes, outcrops or other openings in sagebrush shrublands, shadscale shrublands, pinyon-juniper woodlands, oak-mountainbrush woodlands, or ponderosa pine forests, at 1675–2750 m (5500–9000 ft) elevation, in southwestern Wyoming, Utah, southeastern Nevada. Anthesis generally begins in June (but can occur as early as May) and continues through September.

Although *Aliciella mcvickerae* has largely been ignored in recent floristic treatments (Welsh et al. 1993; Cronquist 1984), it is a well-characterized member of *Aliciella* subgenus *Aliciella* section *Giliandra.* The glaucus, glabrous basal leaves with broad lobes and the open, long-branched habit set this species apart from *A. pinnatifida,* with which it has often been confused. Corolla morphology also differs in that *A. mcvickerae* has a corolla tube that flairs slightly at the orifice and the lobes erect and not widely spreading, whereas, *A. pinnatifida* has a corolla tube that does not flair toward the orifice and the lobes are widely spreading (ca 90° relative to the tube). Molecular phylogenetic analyses (Porter 1993) support that *A. mcvickerae* is the earliest diverging species of section *Giliandra,* possibly a paraphyletic assemblage of populations,

representing the remnants of a once ancestral species of subgenus *Aliciella*; however, such an interpretation must be viewed with skepticism. The apparent paraphyly may be either an artifact of past and current patterns of introgression between members of this alliance or may be the result of lineage sorting of an ancient polymorphism in the gene used to infer relationships. Morphological evidence may support hypotheses involving introgression. For example, populations around the type locality of *Gilia calcarea* and south to the region around Dinosaur National Monument, Utah, referred to in the key as the "NE phase," possess characteristics (e.g., densely glandular basal leaves, more compact inflorescences, larger corollas) somewhat intermediate with *A. stenothyrsa.* DNA sequence data (Porter 1993; unpubl.) were used to infer a closer relationship between this "NE phase" of *A. mcvickerae* and *A. stenothyrsa,* than to other populations of *A. mcvickerae.*

In his description of *Gilia mcvickerae,* Jones cites three collections (*Jones 5378, 5972b,* and *5989m*); however he does not specify a type from among these specimens. Examination of the syntypes reveals that Jones identified his collection number *5378* as the "type set." It is clear that Jones intended that this collection be the type. Because the Jones herbarium is now incorporated within POM, and Jones very likely intended to maintain possession of the type, the POM *Jones 5378* specimen is here designated as the lectotype.

A somewhat similar situation exists with the original description of *Gilia calcarea.* Jones provides a collection locality and a date but does not cite a collection number (or collector, although the collector presumably would have been Jones). Many mounts were found at various herbaria of an unnumbered Jones collection from Green River, 23 June 1896. Many of these mounts (but not all) also bear the word "type." Two duplicates are found at POM. Of all of these duplicates only one possesses a collection number (*Jones 10072*; hand written by Jones). The POM mount of *Jones 10072* is here designated as the lectotype; the other specimens, designated as types by Jones, are isolectotypes.

Representative specimens.—U.S.A. NEVADA. Lincoln Co.: T2N, R70E, Section 13, Eagle Valley, ca 2 mi N of Eagle Valley Campground, 22 Aug 1979, *Thorne & Thorne 783* (UTSU).—UTAH. Beaver Co.: T29S, R6W, Sect. 28, Tushar Mts., Beaver R. Canyon, 25 Aug 1984, *Taye 3186* (BRY). Emery Co.: T17S, R6E, Sect. 24, Cottonwood Canyon, 18 June 1979, *Neese & Welsh 7642a* (BRY). Garfield Co.: T36S, R5W, S2, milepost 122, N of Long Valley Jct., 15 June 1985, *Higgins & Higgins 15804* (BRY). Iron Co.: 5 mi E of Paragonah on the rd to Spry, 21 Aug 1946, *Robbins 2208* (US, RSA). Piute Co.: T27S, R2W, Sec. 33, SW ¼, hillside just S of Willis Spr., Monroe Mtn., Fishlake Nat'l Forest, 14 Aug 1984, *Atwood, Goodrich & Taye 10556* (RSA). Sevier Co.: Fish Creek Canyon, Fish Lake Nat'l Forest, Near Park Area, 29 Sept 1944, *Galway 2141-G* (US). —WYOMING. Sweetwater Co.: Green River, June 23 1896, *Jones 10072* (POM). Fremont Co.: 5–10 mi S of Shoshoni, 22 June 1939, *Craig & Craig 3509* (POM).

3. **Aliciella sedifolia** (Brandegee) J. M. Porter, comb. nov.

Gilia sedifolia Brandegee, *Bot. Gaz.* **27**: 451. 1899, (basionym). TYPE.—U.S.A., Colorado: Uncompahgre Range at 12,000 feet altitude, *Purpus 697,* [holotype: UC!; isotypes: GH!].

Biennial or monocarpic short-lived perennial, 4–12 cm tall, stems glandular pubescent, simple and erect becoming more or less thyrsoid in flower Basal leaves forming a rosette, linear, entire, 0.6–1.7 cm long, 1.0–2.6 mm wide, glaucous, apparently terete and succulent, cuspidate or mucronate. Cauline leaves gradually reduced in size, becoming bractlike, sparsely to densely glandular puberulent or glaucous. Inflorescence strict, thyrsoid, cymose-panicle, ultimately becoming crowded toward the apex. Pedicels dimorphic, terminal 1.0–2.0 mm long, the lateral 3.0–4.0 mm long. Calyx cylindrical to ovoidal, 3.4–4.5 mm long, tube 2.23.8 mm long at anthesis, bearing dense glandular trichomes to 0.4 mm long, the lobes 1.2–2.0 mm long. Corolla 4.0–8.5 mm long, mostly blue to lavender, corolla glabrous externally, salverform to narrowly campanulate; the tube pale, shorter than the calyx, 1.4–4.3 mm long, lobes oval to orbicular 2.3–4.6 mm long, 1.4–2.0 mm wide. Stamens affixed in the sinus of the corolla lobes, the free portion as long as the fused portion, 1.8–4.3 mm long, glabrous, anthers 0.7–1.8 mm long, shortly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, ca. 1.6 mm long and 1.1 mm wide at the base, the style 3.0–4.2 mm long, stigmatic lobes ca. 0.5 mm long, mature capsule 3.0–6.5 mm long. Seeds 1–5 per locule, ca. 1.5 mm long, lenticular to angular, narrowly winged.

Aliciella sedifolia is apparently restricted to dry, rocky talus of tufaceous sandstone, at or above treeline, 3580–4175 m (11750–13700 ft) on Sheep Mountain, and Half Peak in the Uncompahgre National Forest, Gunnison and Hinsdale Cos., Colorado. Anthesis occurs from July to August, possibly as late as September.

This very rare species of *Aliciella* is currently known from two locations. Following the type collection, this species was not collected for 102 years, until 1995. Due to the infrequency of collection, *A. sedifolia* has long been ignored or considered to be an aberrant form of *A. pinnatifida.* Examination of the type as well as a recent collection verifies that it is morphologically distinct from other members of the Pinnatifida Alliance. Recent molecular phylogenetic analyses provide evidence that the *A. sedifolia* lineage shares common ancestry with *A. pinnatifida* and *A. penstemonoides* (Porter unpubl.). This very distinctive species is char-

acterized by its simple, entire, terete, succulent, sedum-like leaves, small stature, and dark blue corollas with lobes longer than the tube.

In his description, Brandegee identifies *Purpus 697* as the only representative specimen of his *Gilia sedifolia.* Although he was living and writing from San Diego, California at the time, the first set of his collections were housed in the Brandegee Herbarium at Berkeley, California. A single mount of *G. sedifolia* currently resides at UC. There is no notation by Brandegee that this mount is the type, but its presence at UC and the number of plants on the mount (all other mounts bear a single individual) suggests this to be the first set. In addition, the label from this mount provides more detail in the description of habitat than is provided in the original description. I therefore consider the UC mount to be the holotype.

Representative specimens.—U.S.A. COLORADO. Gunnison County: Uncompahgre Range, Sheep Mtn., 11800 ft, July 1893, *Purpus 697* (GH). Hinsdale County: Half Peak, 12 mi SW Lake City, 5 Aug 1995, *Komarek 478* (COLO).

4. **Aliciella pentstemonoides** (M. E. Jones) J. M. Porter, comb. nov.

Gilia pentstemonoides M. E. Jones, *Zoe* **4**: 297. 1893, (basionym). TYPE.—U.S.A. COLORADO. Gunnison Co.: Cimarron, Sept. 1890, *M. E. Jones 9892* [holotype: POM!].

Short- to long-lived monocarpic perennial, 5.5–18 cm tall, stems glandular pubescent, simple and erect but often becoming thyrsoid or diffusely branching in flower. Basal leaves forming a loose rosette, entire to once-pinnatifid, 0.8–5.5 cm long, the rachis 1–6.5(–8.0)mm wide, the lateral segments 0–10, linear to narrowly oblong, entire, sparsely glandular puberulent, cuspidate or mucronate. Cauline leaves gradually reduced in size, ultimately bractlike, glandular puberulent. Inflorescence cymose-paniculate, floral bracts entire, linear and cuspidate. Calyx cylindrical to ovoidal, 3.5–4.5 mm long, tube 2.9–3.5 mm long at anthesis, glandular, the lobes ⅓ or less the length of the calyx. Corolla 5.0–11.0 mm long, blue to lavender sometimes paling to white, often with a white or yellow eye, corolla glabrous externally, salverform to narrowly campanulate; the tube longer than the calyx, 3.0–6.5 mm long, lobes oval to orbicular 2.0–5.0 mm long. Stamens affixed in the upper tube, the free portion nearly as long as the fused portion, anthers 0.7–1.7 mm long, exserted, filaments declinate and sternotribal. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 2.5–5.0 mm long. Seeds mostly (1–)2–4 (8) per locule, ca. 1.5 mm long, lenticular to angular, narrowly and often incompletely winged. $2n=16$ (Grant 1959).

Aliciella pentstemonoides is found in narrow cracks or on shelves, cliffs, and ledges of gneiss, schist, or shale, in black sagebrush communities, ponderosa pine-douglas fir forests and spruce forests, at elevations from 2130 to 2900 m (7000–9500 ft). Endemic to central Colorado, this species is known from ca. 15 populations in Gunnison, Montrose, Ouray, Hinsdale and Mineral Counties. Flowering occurs (May) June through August (rarely as late as September).

Morphological evidence has been used to suggest that introgressive hybridization occurs between *Aliciella pentstemonoides* and *A. pinnatifida* (Grey 1982). Even so, *A. pentstemonoides* is distinct, being a perennial with few internodes per stem and generally entire leaves in a loose series of rosettes.

Representative specimens.—U.S.A. COLORADO: Gunnison Co.: near Lake Fork of the Gunnison River, 12 mi. S of Sapinero, toward Lake City, 18 July 1951, *Rollins 51167* (US, NY). Black Canyon, Gunnison Rt River, 15 July 1961, *Hall 533* (CSU). E side of Blue Creek, 0.3 mi S of US Hwy 50, along Alpine Plateau Access Road, T48N, R5W, Sect 23 NW¼, 22 June 1981, *Grey 1188* (CSU). Canyon of Gunnison R., at mouth of Lake Fork, below Sapinero, 30 June 1950, *Ripley & Barneby 10208* (NY). Cliffs along County Rd 25, where it passes through edge of Pine Creek Mesa, ca 2 mi from US 50, T48N, R4W, Sect 9 SW ¼, 19 August 1980, *Grey 692* (NY). Hinsdale Co.: rimrock cliffs of the Cebolla State Wildlife Area, ca 2 mi N of Cathedral, T44N, R1W, Sect. 36 NW¼, 1 July 1981, *Grey 1379* (NY).

5. **Aliciella stenothyrsa** (A. Gray) J. M. Porter, comb. nov.

Gilia stenothyrsa A. Gray, *Proc. Amer. Acad. Arts* **8**: 276. 1870, (basionym). *Navarretia stenothyrsa* (A. Gray) Kuntze, *Revisio, Gen. Pl.* **2**: 433. 1891. *Ipomopsis stenothyrsa* (A. Gray) W. A. Weber, *Phytologia* **55**: 9. 1984. TYPE.—U.S.A. Utah. Among the cedars, between Duchesne and Lake Fork, June 1844, *Fremont 556* [holotype: GH!; isotype: NY!].

Biennial (or short-lived perennial?), from a stout taproot, 15–60 cm tall, stems glandular pubescent, simple and erect, thyrsoid or if apex damaged, diffusely branching. Basal leaves forming a rosette, entire to once-pinnatifid, 1.4–6.0 cm long, the rachis 1–2.8(–3.5)mm wide, the segments 8–28, linear to narrowly oblong, entire, glandular puberulent, usually with 2-celled barrel-shaped trichomes, cuspidate or mucronate. Cauline leaves gradually reduced in size, ultimately entire, bifid or trifid, glandular puberulent. Inflorescence usually elongate, more or less dense, virgate, thyrsoid, cymose-panicle, the lateral branches short, floral bracts entire, linear and cuspidate. Calyx cylindrical to ovoidal, 3.5–6.2 mm long, tube 2.8–5.5 mm long at anthesis, glandular, the lobes ⅓ or less the length of the calyx. Corolla 9.0–15.0 mm long, white to blue or lavender, often with a yellowish eye, corolla glabrous externally, funnelform; the tube fairly broad, longer than the calyx, 6.0–10.5 mm long, rarely unequally divided, lobes oval to orbicular 3.5–5.5 mm long. Stamens affixed in the upper tube, the free portion nearly as long as the fused portion, anthers 1.0–

1.8 mm long, exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 3.5–6.0 mm long. Seeds several per locule, 1.5–2.2 mm long, oblong-lenticular to angular.

Aliciella stenothyrsa occurs on dry soils of sand, gravel, or clay, often associated with stream beds, eroding slopes, outcrops or other openings in saltbush-greasewood shrublands, sagebrush, and pinyon-juniper woodlands, 1550–2850 m (5100–9350 ft). This species is endemic to the Uintah Basin of Emery, Uintah and Duchesne Counties, Utah and Mesa and Rio Blanco Counties, Colorado. Anthesis occurs from May through June (rarely continuing into July).

Representative specimens.—U.S.A. COLORADO. Mesa Co.: 1.2 mi NNW of Cameo Power plant, T10S, R98W, Sect. 22, SW ¼ of SW ¼, 25 May 1983, *Kelley 83–31* (CS). Rio Blanco Co.: 1.2 mi W of jct. of Yellow Creek and Greasewood Creek, NW ¼ of NE ¼ of NE ¼ of SE ¼ of T2N. R98W, Section 17, 11 June 1982, *O'Kane, Sigstedt & Peterson 82–311* (CS).—UTAH. Duchesne Co.: 9 Mile Canyon, 28 mi S of US Hwy 40, 20 June 1983, *Kelley 83–78* (CS). Uintah Co.: T11S, R23E, Sect. 10, SE ¼, Atchee Wash, 4 air miles S of White River, 30 May 1982, *Neese & Fullmer 11525* (CS). Emery Co.: T21S, R6E, Sec 15 & 16, Muddy Creek Canyon mouth, 13 May 1981, *Welsh 20450* (BRY). Carbon Co.: T15S, R9E, S2, ca 5 mi E of Wattis, 4 June 1981, *Welsh 20645a* (BRY).

B. Section ALICIELLA

Gilia ser. Leptomeriae Rydb., Fl. Rocky Mts. ed. 1: 692. 1917. TYPE.—*Gilia leptomeria* A. Gray.

Section *Aliciella* is phylogenetically defined as the most recent common ancestor of *Aliciella triodon* and *A. subnuda* and all of the descendants of that ancestor.

B1. Subsection **Subnuda** J. M. Porter, subsect. nov.

Herbae biennes vel brevivientes perennes; foliis integris vel pinnatifidis; florbus magnis et conspicuis; seminibus 1.5–2.0 mm longis. Typus subsectionis Aliciella subnuda.

Biennial to short-lived perennial herbs, entire to pinatifid leaves, flowers large and showy, seeds 1.5–2.0 mm long. TYPE.—*Aliciella subnuda* (A. Gray) J. M. Porter.

Subsection *Subnuda* is phylogenetically defined as the most recent common ancestor of *Aliciella haydenii* and *A. subnuda* and all of the descendants of that ancestor.

6. **Aliciella haydenii** (A. Gray) J. M. Porter, comb. nov.

Gilia haydeni A. Gray, *Proc. Amer. Acad. Arts* **11**: 85. 1876, (basionym).

Annual, biennial or short-lived perennial, 10–140 cm tall, stems sparsely and coarsely glandular pubescent with uniseriate glandular trichomes, simple and erect but freely and diffusely branching, sometimes to the base. Basal leaves forming a rosette, entire, coarsely toothed to once-pinnatifid, 1.5–7.1 cm long, the rachis broad, 1–5.5(–7.0) mm wide, the segments 8–18, entire to rarely lobed, glandular and crisp puberulent with white, uniseriate nonglandular trichomes, lobes cuspidate or mucronate. Cauline leaves pinnatifid to more commonly entire and linear, gradually to abruptly reduced in size, ultimately entire, 1–6 mm long, glandular puberulent. Inflorescence loosely open cymose-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate, 2.5–7.2 mm long, tube 1.9–4.5 mm long at anthesis, glandular, the lobes ⅓ or less the length of the calyx. Corolla 11.0–26.0 mm long, rose-purple, magenta, pink-lavender, to more rarely blue, corolla glabrous, glandular below the sinuses or entire tube glandular externally, narrowly funnelform-salverform; the tube much longer than the calyx, 8.0–17.5 mm long, lobes oval to oblanceolate (3.0–)3.5–9.0 mm long, 1.9–4.2 mm wide. Stamens equally inserted in the upper tube (at the sinuses of the corolla lobes), the free portion ca. 1 mm in length, anthers 1.5–2.2 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 2.5–6.2 mm long, style length variable, included to exserted. Seeds (1–)2–4 per locule, 1.5–3.0 mm long, fusiform to angular, narrowly and often incompletely winged. $2n=16$ (Grant 1959—cited as *Gilia subnuda*; R. Spellenberg—herbarium voucher with camera lucida, *Spellenberg & Corral 8184* [RSA, NMSU!, NY!]. There is a report of $2n=18$ from San Juan County, New Mexico, D. Ward— herbarium voucher with camera lucida, *Spellenberg, Ward & Collyer 6137* [NMSU!, NY!]).

Aliciella haydenii occurs in dry, often saline clay or sandy shale soils, often associated with badlands, eroding slopes, outcrops or other openings in sagebrush or shadscale shrublands, pinyon-juniper woodlands, oak-mountainbrush woodlands, and rarely ponderosa pine forests, 1220–2260 m (4000–7500 ft). This species ranges from north western Arizona to southwestern Colorado and southeastern Utah to northwest and northcentral New Mexico. Anthesis occurs from May through July (rarely continuing through September).

Two subspecies are recognized. *Aliciella haydenii* subspecies *haydenii* occurs at slightly lower elevation clay badlands, associated with the San Juan and Dolores River valleys. Although generally a biennial or short-lived perennial, populations of subspecies *haydenii* commonly possess individuals that will flower the first year and die, functioning as an annual. The remaining race is *A. haydenii* subspecies *crandallii,* a somewhat more robust form, occurring on exposed slopes and badlands at higher elevation. Although few chromosome counts are available, there is a potential distinction between these two taxa based on chromo-

some number. Two counts of subsp. *crandallii* are $2n=16$; however, a count for subspecies *haydenii* is reportedly $2n=18$. The two subspecies are morphologically distinguished by traits described in the following key:

1. Corolla 17–26 mm, the lobes 6–9 mm long, corolla tube glandular externally; corolla drying to a pink color; plants primarily of higher elevation pinyon-juniper, oak woodlands and Ponderosa pine . . . . . subspecies *crandallii*
– Corolla 11–20 mm, the lobes 3.5–5.5 mm long, corolla tube glabrous or only a few glands externally at the point where the filaments are attached; corolla generally drying dull blue (except some populations along the Dolores River); plants primarily of lower elevation pinyon-juniper, saltbush and desert scrub communities . . . . . subspecies *haydenii*

6a. ALICIELLA HAYDENII (A. Gray) J. M. Porter subsp. HAYDENII.

Gilia haydeni A. Gray, *Proc. Amer. Acad. Arts* **11**: 85. 1876. *Gilia subnuda* A. Gray subsp. *haydeni* (A. Gray) A. Brand, Pflanzen. IV. Fam. 250: 119. 1907. TYPE.—U.S.A. COLORADO or adjacent UTAH. Plains of the San Juan River, 1875, *Brandegee 1191* [lectotype: (here designated) GH!; isolectotype: NY!).

The name *Gilia bakerii* Greene appears in print as a synonym; however, the name was not validly published and appears only on the *Baker 533* collection.

Annual, biennial or short-lived perennial, 10–100 cm tall, stems sparsely and coarsely glandular pubescent with uniseriate glandular trichomes, simple and erect but freely and diffusely branching, sometimes to the base. Basal leaves forming a rosette, entire, coarsely toothed to once-pinnatifid, 1.5–7.1 cm long, the rachis broad, 1–5.5(–7.0) mm wide, the segments 8–18, entire to rarely lobed, glandular and crisp puberulent with white, uniseriate nonglandular trichomes, lobes cuspidate or mucronate. Cauline leaves pinnatifid to more commonly entire and linear, gradually to abruptly reduced in size, ultimately entire, 1–6 mm long, glandular puberulent. Inflorescence loosely open cymose-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate, 2.3–6.0 mm long, tube 1.9–4.2 mm long at anthesis, glandular. Corolla 11.0–20.0(–22) mm long, rose-purple, magenta, pink-lavender, to more rarely blue, corolla externally glabrous or very sparsely glandular below the sinuses, narrowly funnelform-salverform; the tube much longer than the calyx, 8.0–16.0 mm long, lobes oval to oblanceolate (3.0–)3.5–5.5(–6.0) mm long, 1.9–3.5 mm wide. Stamens equally inserted in the upper tube (at the sinuses of the corolla lobes), the free portion ca. 1 mm in length, anthers 1.5–2.2 mm long, slightly exserted. Styles variable in length, ranging from well exserted and approach herkogamous to included and reverse herkogamous.

Although Cronquist (1984) suggests that the NY specimen is the isotype, no holotype was ever designated. Indeed, the specimens annotated by Gray, from which the original description was based (GH), represent at least three different collections of Brandegee (and both of the subspecies here recognized). The three Brandegee collections were made at 1) the mesas at the mouth of the Mancos River, near the confluence with the San Juan River, New Mexico; 2) the western slopes of Mesa Verde, Colorado; and 3) El Late, Colorado. Only one individual on the GH mount still bears Brandegee's collection tag, linking it to a specific collection number and locality. The lectotype is here designated as *Brandegee 1191,* collected near the confluence of the Mancos and San Juan Rivers.

Representative specimens.—U.S.A. ARIZONA. Apache Co.: W of Red Rock, on the eastern foot of Lukachuki Mtns, red silty loam, 14 May 1991 *Porter 9559* (RSA).—COLORADO. Dolores Co.: Disappointment Creek, T42N, R15W, 27 August 1937, *Ownbey 1487* (NY, RM). Mesa Co.: S of Gateway, along canyon of Dolores River, 22 August 1955, *Langenheim 4079* (RM). T47N, R18W, ca Sect. 10, 4 mi NE of Bedrock, Paradox Valley, 23 May 1984, *Atwood, Goodrich & Thompson 9729* (BRY, RSA, NY). Montrose Co.: hills N of Paradox, 12 June 1969, *Atwood & Higgins 1830* (BRY, NY). San Miguel Co.: T43N, R18W, Sect. 2, Disappointment Valley, 5.2 mi ENE of Slickrock, along Hwy 141, 6 May 1987, *Atwood 12508* (BRY, NY).—NEW MEXICO. San Juan Co.: 12 mi west of Shiprock along Hwy 504, 15 May 1970, *Atwood 2525* (BRY, NY). Bisti road, Farmington, 9 May 1975, *Heil 778* (SJNM, BRY). ca. 4 mi NE of La Plata, on the La Plata Mine, 3 June 1985, *Spellenberg & Corral 8216* (RSA).—UTAH. Grand Co.: T24S, R26E, Sect. 4, NW¼, ca. 6 mi NW of Gateway Colorado, Dolores River Canyon, 3 June 1986, *Franklin 3381* (BRY). San Juan Co.: Bluff to Aneth, 8 May 1978, *Foster 6005* (BRY).

6b. **Aliciella haydenii** subsp. **crandallii** (Rydb.) J. M. Porter, comb. et stat. nov.

Gilia crandallii Rydb., *Bull. Torrey Bot. Club* **31**: 634. 1904 (1905), (basionym). TYPE.—U.S.A. COLORADO. La Plata Co.: Durango, *Crandall 2053,* [holotype: NY!].

Gilia montezumae Tidestrom & Dayton, *Bull. Torrey Bot. Club* **55**: 73. 1928. TYPE.—U.S.A. COLORADO. Montezuma National Forest, 9200 ft., steep south slope, open bank of wash south of Lone Cone, 18 Aug. 1922, *Rose R-102* [holotype: US!].

Annual, biennial or short-lived perennial, 15–140 cm tall, stems sparsely and coarsely glandular pubescent with uniseriate glandular trichomes, simple and erect but freely and diffusely branching, sometimes to the base. Basal leaves forming a rosette, entire, coarsely toothed to once-pinnatifid, 1.5–7.1 cm long, the rachis broad, 1–5.5(–7.0) mm wide, the segments 8–18, entire to rarely lobed, glandular and crisp puberulent with white, uniseriate nonglandular trichomes, lobes cuspidate or mucronate. Cauline leaves pinnatifid to more commonly entire and linear, gradually to abruptly reduced in size, ultimately entire, 1–6 mm long, glandular puberulent. Inflorescence loosely open cymose-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate, 3.5–7.2 mm long, tube 2.2–4.5 mm long at anthesis, glandular. Corolla (16.0–)17.0–26.0 mm long, rose-purple

to magenta, corolla tube externally glandular, narrowly funnelform-salverform; the tube much longer than the calyx, 10.0–17.5 mm long, lobes oval to oblanceolate (5.0–)6.0–9.0 mm long, 2.9–4.2 mm wide. Stamens equally inserted in the upper tube (at the sinuses of the corolla lobes), the free portion ca. 1 mm in length, anthers 1.5–2.2 mm long, slightly exserted. Styles variable in length, ranging from well exserted and approach herkogamous to included and reverse herkogamous.

Representative specimens.—U.S.A. COLORADO. La Plata Co.: 3.8 mi E of Bondad, on County Road 310, T33N, R9W, 2 May 1987, *O'Kane 2643* (RM, COLO). T32N, R9W, Sect. 27, along highway, 12 mi W of Ignacio, 9 June 1984, *Porter 84–357* (SJNM, BRY). Durango, 16 June 1911, *Treakle sn.* (POM). Montezuma Co.: Talus slopes, W of Mesa Verde (NY mount says "W. Mesa Verda [sic], S. Carteg [sic]), S of Cortez, 7 May 1948, *Clark 14472* (UNM, NY). shale slide at base of cliff, 2.5 mi inside Mesa Verde Park, 16 August 1953, *Waterfall 11720* (BRY, RSA, GH, US). Mancos, below town on sage plains, on a shelving bank, 8 July 1898, *Tracy, Earl & Baker 404* (GH, POM, US, NY, RM).—NEW MEXICO. Sandoval Co.: 8 mi S of Cuba on Hwy 44, 10 August 1977, *Higgins 10500* (BRY, UTC, GH). Jemez Indian Reservation, 7 mi S of La Ventana, 12 May 1977, *Wagner & Sabo 2843* (UNM). Rio Arriba Co.: Chama Valley, N of Ghost Ranch, 31 August 1970, *Wilson 68* (UNM).

7. **Aliciella formosa** (Greene ex A. Brand) J. M. Porter, comb. nov.

Gilia formosa Greene ex A. Brand, Pflanzen. IV. Fam. 250: 119. 1907, (basionym). TYPE—U.S.A. NEW MEXICO: Aztec, 26 April 1899, *Baker 353* [lectotype (here designated): GH!; isolectotypes: RM!, US!, NM!]

Long-lived monocarpic perennial, from a branched, woody caudex, 5–15 cm tall, stems sparsely and coarsely glandular pubescent with uniseriate glandular trichomes, erect and more or less openly branching above the middle. Basal leaves forming a rosette, entire, linear, 1.0–4.5 cm long, 1–1.5 mm wide, glandular and crisp puberulent with white, uniseriate nonglandular trichomes, leaf tip cuspidate or mucronate. Cauline leaves linear entire, gradually to abruptly reduced in size, ultimately 1–2.5 mm long, glandular puberulent. Inflorescence few-flowered open cymose-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate, 3.5–6.1 mm long, tube 2.5–3.6 mm long at anthesis, glandular, the lobes (1.0–)1.5–2.5 mm long. Corolla 14.7–27.0 mm long, rose-purple, magenta, to pink-lavender, rarely white, but often drying to a lead-blue, corolla sparsely glandular below the sinuses and on tube externally, narrowly funnelform-salverform; the tube much longer than the calyx, 10.0–20.0 mm long, lobes oval to oblanceolate , 4.0–7.0 mm long, 2.9–5.8 mm wide. Stamens equally inserted in the upper tube (at the sinuses of the corolla lobes), the free portion ca. 1 mm in length, anthers 1.5–2.4 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 3.5–7.0 mm long, style length variable, included to exserted. Seeds (1) 2–7 per locule, 1.5–3.0 mm long, fusiform to angular, narrowly and often incompletely winged.

Aliciella formosa is found in dry saline clay or sandy clay soils, usually associated with badlands and eroding slopes in sagebrush-shadscale shrublands and pinyon-juniper woodlands, at 1640–1980 m (5000–6500 ft.) elevation. Endemic to the Nacimiento formation of San Juan County, northwestern, New Mexico, this species flowers from May through July (rarely as late as September).

Although Brand was specific regarding the collection on which *Gilia formosa* was based, there are no mounts of *Baker 535* currently at Berlin. Moreover, none of the extant sheets bear annotation by Brand, verifying that he examined the mount. Brand cites many collections at GH, and given the contribution of Gray to taxonomy of Polemoniaceae, it seems likely that he consulted that herbarium. I therefore designate the GH mount as lectotype.

Representative specimens.—U.S.A. NEW MEXICO. San Juan Co.: Aztec, 26 April 1899, *Baker 535* (US, RM, GH). near Angel's Peak, ca. 10 mi. SE of Bloomfield, 18 May 1982, *Barneby 17796* (UTSU).

8. **Aliciella subnuda** (Torr. ex A. Gray) J. M. Porter, comb. nov.

Gilia subnuda Torr. ex A. Gray, *Proc. Amer. Acad. Arts* **8**: 276. 1870, (basionym). *Navarretia subnuda* (A. Gray) Kuntze, Revisio, Gen. Pl. 2: 433. 1891. TYPE.—U.S.A. UTAH. Banks of the Grand (Colorado) River, *Newberry sn* [lectotype (here designated): GH!]

Gilia superba Eastwood, *Zoe* **4**: 122. 1893. *Gilia subnuda* A. Gray subsp. *superba* (Eastwood) A. Brand, Pflanzen. IV. Fam. 250: 119. 1907. TYPE.—U.S.A. UTAH. San Juan Co.: Hatch's Wash, between Moab and Monticello, 29 May 1892, *A. Eastwood s.n.* [holotype: CAS!; isotype: POM!].

Biennial to short-lived monocarpic perennial, from a few-branched, caudex, 15–60 cm tall, stems usually densely glandular pubescent with uniseriate glandular trichomes, erect, solitary, openly branching above the middle, sometimes to the base. Basal leaves forming a compact rosette, spatulate to broadly oblanceolate, entire to toothed or lobed as much as halfway to the midrib (the lobes sometimes toothed), 1.5–9.5 cm long, 5–25 mm wide, glandular, densely puberulent or nearly glabrous, leaf tip cuspidate or mucronate. Cauline leaves dentate to entire, abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open cymose-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate often anthocyanic, 4.0–7.7 mm long, tube 2.2–4.0 mm long at anthesis, glandular, the lobes (1.5–2.0–3.8 mm long. Corolla 16.0–26.0 mm long, scarlet to vermilion, crimson or carmine-red, corolla densely

glandular externally, broadly salverform; the tube much longer than the calyx, 11.0–19.0 mm long, lobes lance-elliptic to oblanceolate, acute, 5.0–8.5 mm long, 1.5–5.2 mm wide. Stamens equally to unequally inserted in the upper tube (well below the sinuses of the corolla lobes), the free portion 0.5–1.3 mm in length, anthers 1.5–2.4 mm long, included to slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 3.0–5.5 mm long, style length variable, included and shorter than the stamens to slightly exserted and somewhat longer than the stamens. Seeds (3–)5–11 per locule, 1.5–2.5 mm long, fusiform to angular, narrowly and often incompletely winged.

Aliciella subnuda occurs in dry sandy soils, often associated with outcrops and eroding slopes in sagebrush-shadscale shrublands and pinyon-juniper woodlands. It is found at elevations of 1100–2040 m (3600–6700 ft), on the Colorado Plateau of Utah and Arizona. Flowering may begin as early as April, but usually occurs from May through June, rarely extending into July.

Identifying the type of Gray's *Gilia subnuda* is difficult and complicated by the implied lectotypification of Cronquist (1984). Gray cites three collections, those of Newberry (from the "banks of the Grand River"), Stretch (from "Nevada"), and Palmer (from "Arizona or New Mexico"), but identifies no holotype. Gray also gives Torrey credit for the epithet "*subnuda.*" Cronquist suggests that because only the Stretch collection is in the Torrey Herbarium, it is the holotype. In fact, the Newberry, Stretch, and Palmer collections are syntypes. Indeed, the first collection mentioned by Gray is that of Newberry. This collection possesses flowers fruit and basal leaves, corresponding to the description more closely than the Stretch specimen, which lacks basal leaves. Further, the Newberry collection is the only syntype lacking a vague or erroneous collection locality. The Stretch specimen is purportedly from Nevada, though this species does not occur in that state. Likewise, the Palmer specimen (actually collected by Parry, this fact not mentioned by Gray) is from "Arizona or New Mexico." *Aliciella subnuda* is found in Arizona, but it has not been collected in New Mexico. Because of the completeness of the specimen, the less vague collection locality, and the unambiguous nature of the collector, I designate the GH specimen of Newberry's collection lectotype. No isolectotypes were found.

Although local floras report this species from both Colorado and New Mexico, I can find no specimen to justify these claims. However, the many collections identified as *Aliciella subnuda* from Colorado and New Mexico represent misdeterminations of *A. haydenii* subsp. *crandallii.* Presumably this confusion is an historical artifact, resulting from Brand's monograph (1907) which treated *A. haydenii* as a subspecies of *Gilia subnuda.* On the other hand, the use or recognition of subspecies *superba* (see Martin and Hutchins 1980) is unwarranted and illegitimate, as Brand (1907) used the epithet to refer to the "typical" race. The persistent use of "subsp. *superba*" in floras is even more surprising in light of the confession by Eastwood (1894) that she had published the name *G. superba* in error, being unaware that Gray had already described *G. subnuda.*

Representative specimens.—U.S.A. ARIZONA. Apache Co.: 23 mi N of Ganado, 10 June 1937, *Peebles & Smith 13495* (ARIZ, US). 6 mi S of Chin Lee (sic), 5 June 1935, *Peebles & Fulton 11988* (ARIZ, US). Coconino Co.: 8 mi N of Inscription House Trading Post, 11 June 1938, *Peebles & Smith 13909* (US). mile 14.2 BLM Paria Primitive Area Map (from US89), 8 June 1971, *Woodruff 1125* (BRY).—UTAH. Garfield Co.: Escalante River between Death Hollow and Sand Canyon, 15 May 1984, *Neely & Warner 1945* (UTC, COLO). Aquarius Plateau, UT54, 1 mi E of Boulder, T33S, R4E, S 35, 29 June, 1965, *Holmgren, Reveal, & LaFrance 2095* (BRY). Kane Co.: SE of Escalante, on rd to Boulder, just before the downgrade to the Escalante River, 100 yds off on the rt side of rd, 8 June, 1964, *Atwood 296* (UTC). San Juan Co.: Armstrong and White Canyons, near the Natural Bridges, 4–6 Aug. 1911, *Rydberg & Garrett 9483* (US). Hatch's Wash, Utah Territory, 27 May 1892, *Eastwood s.n* (US). Wayne Co.: 2 mi S of Notom, 3 May 1982, *Neese 11310* (CS, BRY). T30S, R7E, S 35 SWqtr, 0.8 mi S of UT24, on Notom Rd, 5 May 1982, *Atwood & Goodrich 8627* (BRY). Wayne Co.: roadside area 5.8 mi E of Visitor Center, Capitol Reef Nat. Park, along UT24, 1 June 1974, *Harrison 1348* (BRY). Near mile post 83 W of Hanksville, 26 May 1968, *Higgins 1343* (BRY).

9. **Aliciella cespitosa** (A. Gray) J. M. Porter, comb. nov.

Gilia caespitosa A. Gray, *Proc. Amer. Acad. Arts* **12**: 80. 1876, (basionym). *Navarretia caespitosa* (A. Gray) Kuntze, *Revisio, Gen. Pl.* **2**: 433. 1891. *Gilia grayi* A. Nels, *Bull. Torrey Bot. Club* **25**: 547. 1898. TYPE.—U.S.A. UTAH. On Barren cliffs of sandstone, Rabbit Valley, at 7000 ft., Utah, 14 Aug 1875, *Ward s.n.,* [holotype: GH!; isotypes: GH!, NY!].

Long-lived monocarpic perennial, pulvinate-caespitose, with a taproot and multi-branched, woody caudex, 3–11(–30) cm tall. Stems usually densely glandular pubescent with uniseriate glandular trichomes (usually with sand grains adhering), erect, with a few short branches above the middle. Basal leaves forming a loose to compact rosette, spatulate to ovate or oblanceolate, entire with a few teeth, 0.4–2.5 cm long, 0.8–4.2 mm wide, glandular, leaf tip cuspidate or mucronate. Cauline leaves entire, abruptly to gradually reduced in size, ultimately bractlike, glandular puberulent. Inflorescence 1- to 5(–7)-flowered, cymose-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate often anthocyanic, 4.0–5.7 mm long, tube 2.2–4.0 mm long at anthesis, glandular, the lobes 1.5–3.8 mm long. Corolla 14.8–23.0 mm long, scarlet to vermillion, crimson or pink, corolla densely glandular externally, salverform;

the tube much longer than the calyx, 9.0–17.0 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, 3.8–6.9 mm long, 3.0–4.8 mm wide. Stamens 5, unequally inserted in the upper tube (well below the sinuses of the corolla lobes), the free portion 0.5–1.3 mm in length, anthers 1.2–2.1 mm long, several included and 2 or 3 slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 3.0–5.5 mm long, style length 9.0–11.0 mm, at the same position as the anthers. Seeds (3–)5–11 per locule, 3.5–4.5 mm long, fusiform to angular, narrowly and often incompletely winged, slightly mucilaginous when wet. $2n=16$ (Wilken 1979).

Occurring in crevices, sandy pockets, or on ledges of white, Navajo sandstone, *Aliciella cespitosa* frequently co-occurs with pinyon-juniper woodlands, *Cercocarpus intricatus* scrub and Ponderosa pine-manzanita at 1700–2600 m (5550–7000 ft) elevations. This species is endemic to the Navajo and Kayenta sandstone formations of Wayne County, Utah. It flowers from June through July (August).

Representative specimens.—U.S.A. UTAH. Wayne Co.: Rabbit Valley, 14 August 1875, *Ward s.n.* (GH). Grand Wash, ca. 4 mi. E of Fruita, 18 May 1956, *Flowers 3218* (NY). North of Boulder Mountain and 1 mile SW of Teasdale, 1 July 1984, *Schultz & Schultz 7970* (NY, UTC, COLO). E of Government Creek and W of Teasdale, N of Black Ridge, Rabbit Valley, NW 1/2 Sec. 18, T29S, R4E, 38"15'N, 111"30'W., 2 July 1984, *Schultz, Schultz & Anderson 7995* (RSA, UTC). N side of Boulder Mtn., 1 mi SW of Teasdale, T29S, R4E, Sec. 20, 4 July 1965, *Holmgren, Reveal & LaFrance 2138* (NY, RSA, UTC, CS, COLO, RM). Teasdale, 7500 ft., 10 June 1947, *Ripley & Barneby 8607* (NY, UTC, RM). Capitol Reef National Park, upper end of Whisky Spring Canyon, above Rim Overlook Trail T29S, R6E, Sec 9, 22 October 1985, *Anderson, 85–133* (UTC). 1 mi S of Teasdale, 7 July 1976, *Wilken 12685* (CS).

10. **Aliciella tenuis** (Smith & Neese) J. M. Porter, comb. nov.

Gilia tenuis Smith & Neese, *Great Basin Naturalist* **49**: 461. 1989, (basionym). TYPE.—U.S.A. UTAH. Sevier Co.: Head of Mussentuchit Creek, 0.9 mi. w. of Emery Co. line, T25S, R5E, Sect. 1, NW ¼, at 1900 m elevation, 14 May 1987, *Neese, Smith & Shaw 18025* [holotype: BRY].

Short to long-lived monocarpic perennial, somewhat pulvinate-caespitose, with a taproot and multibranched, woody caudex, 5–26(–35) cm tall. Stems usually densely glandular pubescent with uniseriate glandular trichomes (usually with sand grains adhering), erect, openly branching above the middle, sometimes to the base. Basal leaves forming a compact rosette, 0.4–5.5 cm long, 1–15 mm wide, spatulate, obovate to oblanceolate, entire to irregularly toothed or pinnatifid, glandular pubescent, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open cymose-panicle, the flowers mostly crowded at the tips of the branches, subsessile or pedicels to 9 mm long. Calyx cylindrical to campanulate often anthocyanic, 3.0–7.0 mm long, tube 2.2–4.5 mm long at anthesis, glandular, the lobes (1.5–)2.0–3.8 mm long. Corolla 15.0–25.0 mm long, blue, pale blue to white, corolla glandular externally, broadly salverform; the tube much longer than the calyx, 11.0–19.0 mm long, lobes lance-elliptic, oblanceolate to spatulate, acute to obtuse, 4.0–7.0 mm long, 3.0–5.5 mm wide. Stamens unequally inserted, 3 in the upper tube (below the sinuses of the corolla lobes) and 2 affixed at nearly the middle of the tube, the free portion 1.5–3.2 mm in length, anthers 1.5–2.5 mm long, included to slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 2.0–3.0 mm long, mature capsule 2.6–3.5 mm long, style length variable, included and shorter than the stamens to exserted and somewhat longer, stigmatic lobes 0.5–0.8 mm long. Seeds (1–)3–9 per locule, 1.5–2.5 mm long, fusiform to angular, narrowly and often incompletely winged, slightly mucilaginous when wet. $2n=16$ (Smith and Neese 1989).

Aliciella tenuis is found in dry sandy soils, associated with sandy pockets, washes and cracks in sandstone in mountain mahogany-shadscale shrublands and pinyon-juniper woodlands, at 1900–1999 m (6200–6600 ft) elevation. It is endemic to the Dakota and Navajo Sandstone formations of the San Rafael Swell, Sevier and Emery Counties, Utah. Flowering begins in May and continues through July (occasionally as late as August).

Representative specimens.—U.S.A. UTAH. Emery Co.: San Rafael Swell, T25S, R8E, S22, Rim above (N) of Chimney Canyon, 21 May 1987, *Atwood & Thorn 12709* (BRY). San Rafael Swell, 6 June 1932, *Cottam 5230* (NY, RM). 7 air mi S of Fremont Jct, T25S, R5E, S1, 22 May 1980, *Atwood 7516* (BRY). Ca 0.5 mi S of Coal Wash, San Rafael Swell vicinity, T22S, R9E, Sect. 13, SW ¼ of SE ¼, 6 June 1989, *Kass 3004* (BRY). Ca 0.5 mi NW of Secret Mesa, San Rafael Swell, T22S, R9E, Sect 24, NW¼ of SE ¼, 25 May 1989, *Kass 2990* (BRY). Sevier Co.: T25S, R5E, S1, SW¼. 7 air mi S of Fremont Jct and I-70, on road to Last Chance Canyon, Utah, 22 May 1987, *Thorn & Atwood 5201* (BRY).

B2. Subsection ALICIELLA

Subsection *Aliciella* is phylogenetically defined as the most recent common ancestor of *Aliciella micromeria* and *A. triodon* and all of the descendants of that ancestor.

11. **Aliciella hutchinsifolia** (Rydberg) J. M. Porter, comb. nov.

Gilia hutchinsifolia Rydberg, *Bull. Torrey Bot. Club* **40**: 472. 1913, (basionym). *Gilia arenaria* Benth. subsp. *leptantha* (Parish) A. Brand var. *rubella* A. Brand, Pflanzen. IV. Fam. 250: 103. 1907. *Gilia leptomeria* Gray subsp. *rubella* (A. Brand) H. Mason & A. Grant, *Madroño* **9**: 214. 1948. TYPE.—U.S.A. UTAH.

Washington Co.: St. George, 12 April 1880, *Jones 1651,* [lectotype (Mason and Grant 1948): DS; isolectotype: NY!, RM!]

Annual to more often winter annual, with a taproot, 3–35(–55) cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.2–8.5 cm long, 0.5–20.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, deeply pinnatifid, the segments again cleft or toothed, rachis narrow, glandular pubescent, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower subsessile to short pediceled, the pedicel to 2.0 mm, the lateral pedicel (if present) to 17.0 mm. Calyx shortly cylindrical to campanulate often anthocyanic, 1.5–4.0 mm long, tube 1.0–3.0 mm long at anthesis, glandular with uniserate trichomes bearing multicellular, turbinate terminal glands, the lobes slightly thickened, 0.5–1.0 mm long. Corolla (5.0–)7.0–14.0 mm long, white to lavender or pale magenta, the upper tube (throat) pale yellow, often with a greenish-yellow spot, lower tube pale purple or pale and streaked with purple, corolla glandular externally, particularly around mid-tube, narrowly funnelform, somewhat constricted just above mid-tube and flaring to the orifice; the tube much longer than the calyx, (3.0–)5.0–10.0 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, often erose, 2.0–4.2 mm long, 0.5–2.5 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.6–1.0 mm in length, anthers 0.6–0.9 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 0.5–1.0 mm long, style equal in length to the anthers, stigmatic lobes <0.5 mm long, mature capsule 3.0–6.0 mm long, equal to or slightly longer than the fruiting calyx. Seeds 7–12 per locule, 0.6–0.9 mm long, ovoid, roughened but glossy, seed coat epapillose, golden brown to tan in color, no winged, not mucilaginous when wet. $2n=18$ (Grant 1959; Day pers. comm.).

Sandy or gravely slopes and flats, dunes, washes, and roadsides, rarely volcanic ash; associated with *Juniperus-Bouteloua, Tetradymia-Atriplex, Chrysothamnus-Atriplex-Ephedra, Larrea-Coleogyne, Larrea-Atriplex,* and *Larrea-Ambrosia dumosa* communities; 400–1800 m (1300–6000 ft); southeastern California, Arizona, Nevada, and Utah.

Representative specimens.—U.S.A. ARIZONA. Coconino Co.: Wupatki Nat Mon, NE of Flagstaff, 12 May 1961, *Drake-Welsh 92* (BRY). Lee's Ferry, 7 July 1927, *Cottam 2605* (BRY).—CALIFORNIA. Inyo Co.: Last Chance Range, SE end of Eureka Valley drainage at mouth of Dedeckera Canyon, ca 2.5 mi SE of main dune field, T10S, R40E, S19 SE¼, 3 June 1987, *Morefield & Ehrendorfer 4500* (BRY). Mono Co.: Sandy saddle on N side McAfee Cr, near its mouth, 1.2 mi N 40° Es of Red Mtn., Fishlake Valley drainage, T4S, R35E, S3, 11 Aug 1985, *Morefield 3060* (BRY).—NEVADA. Churchill Co.: Sand Mtn., Rd to Parking area, T17N, R32E, S32 SE ¼, 15 June 1978, Williams, *Lott & Schuler 78–110–10* (BRY). Clark Co.: Desert Range, 6.6 mi N of Hidden Forest Rd., on the road from Corn Creek to Alamo, W of rd, T14S, R59E, 9 May 1987, *Tiehm 10974* (BRY). Esmeralda Co.: 8.1 mi E of Lida, on Hwy 3, roadside, 117° 21′W, 37° 27′N, 15 June 1977, *Conrad, LeDoux & Kenney 6757* (BRY). Lincoln Co.: Hillsides above US93, 1.6 mi N of Jct with US25, 10 June 1975, *McNeal, Frey, Gray 1771* (BRY). Nye Co.: Toiyabe N. F.; Monitor Range, Saulsbury Wash Drainage, W of Lower Mud Spring, 15 June 1977, *Goodrich 8652* (BRY).—UTAH. Garfield Co.: T36S, R11E, SE¼ of S11, SE of Henry Mtns, Between UT276 & Lake Powell on Tikaboo Mesa, 30 May 1978, *Neese 5153* (BRY). Kane Co.: Colorado River, ca 2 mi N of the confluence with Warm Creek, 27 April 1972, *Atwood 3705* (BRY). Lake Powell at base of Labyrinth Canyon, 27 April 1972, *Atwood 3732* (BRY). Millard Co.: White Valley, 22 May 1940, *Fautin 9963* (BRY). Desert Experimental Sta., Lightning Knolls, 7 mi N of range HQ, T24S, R17W, S26, 7 June 1965, *Holmgren 462* (BRY). T25S, R14W, SE¼ of NW ¼ of S5 ca 2 mi S of Lawson Cove Reservoir, 25 June 1980, *Welsh & Chatterly 19638* (BRY). San Juan Co.: Navajo Res., T42S, R18E, S29, 1.5 mi SE of Mexican Hat Post Office, Hwy 6440, 5 June 1985, *Welsh, Neese & House 23564* (CSU). Breaks along San Juan River, 3 mi W of Bluff, 13 June 1931, *Harrison, Marshall & Nielsen 10335* (BRY). Washington Co.: S of Gunlock along the Santa Clara River, 12 May 1972, *Higgins & Atwood 5307* (BRY). Dixie State Park, ca 5 mi NW of Ivins, 13 May 1967, *Higgins 946* (BRY). Sugar Loaf Mtn., St. George, 11 May 1932, *Harrison 283* (BRY).

12. **Aliciella nyensis** (Reveal) J. M. Porter, comb. nov.

Gilia nyensis Reveal, *Bull. Torrey Bot Club* **96**: 480. 1969, (basionym). TYPE.—U.S.A. NEVADA. Nye Co.: D.O.E. Nevada Test Site, 0.5 mi. W of Buckboard Mesa (Tippipah Spring) Road, on the road to area 40, 29 May 1968, *Reveal & Beatley 1048,* [holotype: BRY!; isotypes: ARIZ!, NY!].

Annual or winter annual, with a taproot, 3–30(–36) cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.2–6.5 cm long, 1.0–17.0 mm wide, spatulate, to lanceolate, deeply pinnatifid, the segments again cleft or toothed, rachis narrow, glandular pubescent, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower short pediceled, 1.0–1.5, the lateral pedicel (if present) to 8.0 mm long. Calyx shortly cylindrical to campanulate, often anthocyanic, 1.5–3.5 mm long, tube 0.8–1.8 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 0.5–1.5 mm long. Corolla (5.0–)7.0–14.0 mm long, pink to magenta, the

upper tube yellow or yellowish, lower tube pale pink or white, corolla glabrous externally, broadly funnelform; the tube much longer than the calyx, (3.0–)4.0–8.0 mm long, lobes lance-elliptic to oblanceolate, acute to rounded or erose, 2.0–6.2 mm long, 1.5–5.5 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 2.2–6.5 mm in length, anthers 0.6–0.9 mm long, strongly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 1.5–2.5 mm long, mature capsule 2.5–4.5 mm long, style equal in length to the anthers, stigmatic lobes 0.8–1.2 mm long. Seeds 4–12 per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, golden brown to tan in color, not mucilaginous when wet. $2n=16$ (Day pers. comm.), 18 (Reveal 1969).

Most frequently occurring in pale tuffaceous sand, but occasionally in sandy or gravely slopes and flats, dunes, washes, roadsides, and burned areas, *Aliciella nyensis* is associated with saltbush, sagebrush, pinyon-juniper communities. It occurs at elevations ranging from 1500 to 2400 m (3500–8000 ft). This species is endemic to Nye Co., Nevada and apparently is restricted to U.S. Department of Energy Nevada Test Site.

Representative specimens.—U.S.A. NEVADA. Nye Co.: Nevada Test Site, S 40 Mile Basin, 0.5 mi W of Buckboard Mesa (Tippipah Spring) Road on Area 30 Rd. (rd. to Cat Canyon, Timber Mtn.), 29 May 1968, *Reveal & Beatley 1048* (US, BRY, NY, RSA); Nevada Test Site, S Face of Rainier Mesa, Holms Rd. 0.4 mi W of Jctn with Stockade Wash Rd., 14 Aug. 1968, *Reveal & Holmgren 1775* (US, COLO, NY, RSA); Nevada Test Site, locally common in a wash 0.2 mi S Airport Rd. turnoff, along Pahute Meas Rd., East 40 mi Drainage Basin, 19 July 1968, *Reveal 1600* (NY, UTC, RSA); Nevada Test Site, N of playa, 13 mi S of highway 25, Kawich Valley Rd, 1 June 1968, *Reveal & Beatley 1116* (NY, UTC, BRY, RSA); Nevada Test Site, along Pahute Mesa Rd., 1 mi ESE of rd summit, along S face of Pahute Mesa, 22 July 1968, *Reveal 1629* (BRY, NY, RSA); Nevada Test Site, common in wash 0.5 mi S of Stockade Wash Rd. and ca 1 mi E of Pahute Mesa Rd., 12 July 1968, *Reveal 1524* (NY, UTC, BRY, US); Nevada Test Site, locally abundant on steep pumice slope from road cut, P-J woodland, volcanic mountain above Area 16 Tunnel, 17 June 1971, *Bostick 5511* (NY, UTC); Nevada Test Site, N. Gold Meadows (Kawich Valley Cyn), Kawich Valley Rd. 4.0 mi N Rainier Mesa Rd, 1 June 1968, *Reveal & Beatley 1100* (NY, UTC, BRY, US); Nevada Test Site, S. Kawich Basin; sandy wash, Kawich Valley Rd. from Gold Meadows, S of barricade, 14 June 1968, *Reveal & Beatley sn.* (NY, US, RSA); Nevada Test Site, Plot 65, sand dune, E. 40-Mile Basin, 10 June 1965, *Beatley sn.* (NY, BRY, US); Nevada Test Site, near Plot 65, sand dune, old Rainier Mesa Rd. E. 40-Mile Basin, 17 June 1967, *Beatley & Bostick sn.* (NY, UTC); Nevada Test Site, sandy wash below light colored tuff slope near Wheelbarrow Peak and Johnnies Water, E slope of Central Belt Range; W. Groom Basin, 12 June 1967, *Beatley & Rhodes sn.* (NY, US); Nevada Test Site, common on sandy soil, 2.5 mi W of Tippipah Spg., 28 June 1967, *Bostick sn.* (NY, BRY, US); Nevada Test Site, locally common on steep sandy slope E of Tunnel P, S end of Belted Range, NW Yucca Basin, 16 June 1967, *Beatley & Bostick sn.* (NY, BRY); Nevada Test Site, locally common on sandy areas of 40-mile Canyon wash between pt. of entrance of Cat Canyon Rd. into 40-Mile Canyon and Cat Canyon, S. 40-Mile Basin, 17 June 1967, *Beatley & Bostick sn.* (NY, UTC, US); Nevada Test Site, locally common in sandy wash, E end of Pahute Mesa; SW Kawich Basin, 12 July 1967, *Bostick sn.* (NY, UTC, BRY, US); Nevada Test Site, locally common in deep tuff sand, low flat ridge on Holms Rd., 1.5 mi. from Stockade Wash Rd., SW face of Rainier Mesa, E. 40-Mile Basin, 10 June 1968, *Beatley sn* (NY, UTC, US); Nevada Test Site, locally common in sand of valley floor of cent. Groom Basin, near Valley Rd., 30 May 1969, *Reveal 1217* (NY, UTC, US, RSA); Nevada Test Site, Common, loose sands, near Groom barricade; SW Penoyer Basin, 1 June 1969, *Beatley sn.* (UTC, US, RSA).

13. **Aliciella heterostyla** (S. Cochrane & A. Day) J. M. Porter, comb. nov.

Gilia heterostyla S. Cochrane & A. Day, *Madroño* **41**: 120. 1994, (basionym). TYPE.—U.S.A. NEVADA. Nye Co.: T3S, R49E, Sect. 3, Cactus Flat, 1705 m, 14 June 1978, *S. Cochrane 1300,* [holotype: CAS; isotypes: BRY, NY, RSA!, US].

Annual or winter annual, with a taproot, 3–15 cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 0.5–8.0 cm long, 2.0–13.5 mm wide, spatulate to lanceolate, deeply pinnatifid, the segments again cleft or toothed, rachis narrow, glandular pubescent, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower subsessile to short pediceled, the lateral pedicel (if present) to 6.0 mm long. Flowers distylous (pin and thrum morphs). Calyx shortly cylindrical to campanulate often anthocyanic, 2.0–3.5 mm long, tube 1.0–2.5 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 0.5–1.5 mm long. Corolla (5.0–)7.0–15.0 mm long, pink-violet to white with pink-violet streaks, with five yellow-green bilobed spots at the orifice, glabrous, funnelform, somewhat constricted just above mid-tube; the tube much longer than the calyx, (3.0–)5.0–9.0 mm long, lobes broadly ovate to oblanceolate, acute to rounded, 3.0–6.5 mm long, 4.0–6.0 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion either 0.6–1.0 mm in length (pin flowers) or 3.0–5.0 mm long (thrum flowers), anthers 0.6–0.9 mm long, well exserted 3.2–5.5 mm in thrum flowers. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 2.5–3.3 mm long, mature capsule 3.0–5.5 mm long, style of pin flowers 8.0–11.0 mm long, exserted 3.5–5.5 mm above the orifice, style of thrum flowers 4.0–7.5(–9) mm long, not exserted beyond the orifice, stigmatic lobes white 1.1–1.2 mm long in pin flowers, 0.6–0.8 mm long in thrum flowers. Capsule 3.5–5.5 mm long, exserted beyond the calyx, ovoid to oblongoid. Seeds

10–16 per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, golden brown to tan in color, not mucilaginous when wet. $2n=16$ (Cochrane and Day 1994).

Aliciella heterostyla is found on deep alluvial sands and volcanic soils of valleys and slopes, associated with *Atriplex canescens, Chrysothamnus greenei, Tetradymia glabrata, Psorothamnus polydenius,* and *Oryzopsis hymenoides.* It grows at elevations of 1463–1828 m (ca. 4500–6000 ft), in northern Nye County, Nevada. Flowering generally begins in early May and continues through July.

Representative specimens.—U.S.A. NEVADA. Nye Co.: 2 mi N of Hwy 6, Saulsbury Wash Rd. S end of Toquima Range, 27 May 1978, *Williams 78–62–1* (NY, UTC). Ralston Valley, T6N, R44E, Section 9, 21 June 1978, *Goodrich 11529* (NY). T9S, R58E, Section 6, Railroad Valley, 5.5 mi S of Currant, on partially stabilized sand dunes, 5 June 1980, *Thorne et al. 995* (NY, BRY). T9S, R58E, Section 6, Railroad Valley, 5.5 mi S of Currant, on partially stabilized sand dunes, 23 May 1981, *Welsh 20574* (NY, CS, RM, BRY). Georges Canyon, on S end of the Monitor Range, Toiyabe Natl. Forest, 18 June 1982, *Atwood 8875* (NY, BRY). Hot Creek Valley, 7 mi NE of Warm Springs, T5N, R50E, flat valley bottom, in deep sandy alluvium, 16 May 1968, *Holmgren 537* (RM, BRY).

14. **Aliciella leptomeria** (A. Gray) J. M. Porter, comb. nov.

Gilia leptomeria A. Gray, *Proc. Amer. Acad. Arts* **8**: 278. 1870, (basionym). *Navarretia leptomeria* (A. Gray) Kuntze, *Revisio, Gen. Pl.* **2**: 433. TYPE.—U.S.A., NEVADA, Unionville Valley, 4700 ft. elev., June 1868, *Watson 927,* [lectotype (here designated): GH!]

Gilia inconspicua var. *dentiflora* Davidson, *Bull. S. Calif. Acad. Sci.* **25**: 84. 1926. TYPE.—U.S.A., CALIFORNIA, Los Angeles Co.: Between Palmdale and Lancaster, DATE, *Davidson 3617,* [holotype: CAS; isotype= POM!]

Gilia subacaulis Rydb., *Bull. Torrey Bot. Club* **30**: 261. 1903. *Gilia inconspicua* subsp. *euinconspicua* var. *subacaulis* (Rydb.) A. Brand, Pflanzen. IV Fam. 250: 105. 1907. TYPE.—U.S.A., WYOMING, Point of Rocks, *Merrill & Wilcox 607,* [holotype: NY!; isotype: GH!]

Annual to winter annual, with a taproot, 4.8–35(–40) cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (frequently with sand grains adhering), erect, openly branching to the base. Basal leaves forming a more or less flattened rosette, 1.0–7.5 cm long, 1.5–20.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, dentate to pinnate lobed, the segments entire or toothed, antrorse to spreading at nearly right angles, rachis narrow to broad, glandular pubescent on both surfaces, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to more commonly abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower subsessile to short pediceled, 2.5–5.5 mm, the lateral (if present) to 14.0 mm long. Calyx shortly cylindrical to campanulate often anthocyanic, 2.0–3.5 mm long, tube 1.1–2.8 mm long at anthesis, glandular with uniseriate trichomes bearing a uni- or multicellular terminal gland, the lobes 0.5–1.2 mm long. Corolla (3.0–)4.5–9.0 mm long, white to lavender, the upper tube white, yellowish or bearing 5 pale yellow spots, lower tube white, corolla glabrous externally, narrowly funnelform, somewhat constricted just above mid-tube, but conspicuously flaring toward the orifice; tube much longer than the calyx, (2.0–)3.0–6.2 mm long, lobes lance-elliptic to oblanceolate, or more or less truncate with a cuspidate tip, 1.2–3.0 mm long, 1.5–2.2 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.2–1.0 mm in length, anthers 0.3–0.9 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 1.0–2.0 mm long, style 2.2–4.5 mm, equal in length to the anthers, stigmatic lobes 0.3–0.7 mm long, mature capsule 3.0–4.8 mm long, ovoid to oblongoid, equal to or longer that the fruiting calyx. Seeds 7–12 per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, golden brown to tan in color, not mucilaginous when wet. $2n=16$ (Day 1993*b*; Grant 1959—cited as *Gilia micromeria*), 34 (Day 1993*b*), 36 (Day 1993*b*).

Aliciella leptomeria occurs in sandy and gravelly washes, and on flats, slopes and roadsides (generally dry sites), with creosote, saltbush, sagebrush, and pinyon-juniper communities, at 800–2200 m (2600–7500 ft) elevation. It is found from the east of the Sierra Nevada to the Modoc Plateau in California, eastern Oregon, southeastern Washington, southern Idaho, Utah, northern Arizona, southwestern Wyoming, Colorado, and northern New Mexico. Flowering begins as early as March in the southern extent of the range, but generally take place between April and June.

The interpretation of *Aliciella leptomeria* presented here is based on the lectotypification of *Gilia leptomeria* (see below). The type description cites only "Mountain valleys of Nevada and Utah, S. Watson," without citing a collection number (Gray 1870). There are at least two extant mounts from the collections of S. Watson (GH! and NY!), but the two labels differ in both collection locality and date. The mount at GH is labeled Watson (*927*) from Unionville Valley, Nevada in 1868. The *Watson 927* mount at NY however, states that the collection locality is Strawberry Island, Utah 1869. Although they bear the same number, it is clear that there are at least two different collections. It is most logical to assume that Asa Gray based his description of *Gilia leptomeria* on the mount at GH, as this mount bears "*Gilia leptomeria* n. sp." in Gray's handwriting. Therefore the lectotype should be selected from the Watson collection at GH. The NY specimen represents a syntype, but because it is not from the same locality it cannot be an isolectotype.

There are several complications associated with the GH mount of *Aliciella leptomeria.* The mount at GH bearing the Watson collection, also includes a collection (*Parry 199*), from near St. George, Utah. The specimen directly above Parry's label is assumed to be this collection (lower left corner of the mount). This is consistent with Rydberg's citation of this specimen as representative of *Gilia subacaulis* (the specimen is morphologically similar to both the description and the holotype of *G. subacaulis*). The remaining plants on this sheet still represent two different species. On the upper right is a specimen that is also consistent with Rydberg's *G. subacaulis,* under it Gray has written "*Gilia leptomeria* n. sp." Above and slightly to the left of the Watson label is a specimen consistent with Day's (1993*a*) *Gilia lottiae.* However, because Gray writes on the sheet that the "*lottiae*" specimen represents "a larger form," I interpret this to mean that it differs from the typical form. I therefore designate the plant in the upper right as the lectotype. The epithet *leptomeria* has prioroty over *subacaulis,* and *G. subacaulis* is treated as a synonym.

This lectotypification results in a circumscription of *Aliciella leptomeria* that is different from the interpretations by Day (1993*a, b*), and Cronquist (1984). Specifically, the type of *A. leptomeria* possesses corollas with tubes that are gradually flaring to the orifice and lobes that are broadly lanceolate and acute. Material with this floral morphology is referred to as "*Gilia subacaulis*" by Day (1993*a, b*). Because chromosome counts of "*Gilia subacaulis*" are diploid (n= 8—Day 1993*b*; pers. comm.), it is assumed that the lectotype also represents this diploid. Specimens with flowers that have corolla tubes somewhat constricted at the orifice and lobes more or less truncate but cuspidate ("*G. leptomeria*" sensu Day 1993*a, b*; see figures in Day 1993*a*: 334 and Cronquist 1984: 119) are here included under the name, but represent different (thus unnamed, tetraploid) species. Delineation of species within this group is beyond the scope of this paper and is being addressed elsewhere (Tommerup and Porter unpubl.). Although this circumscription is broad, it excludes *A. micromeria, A. humillima* and *A. lottiae,* which were considered conspecific by Cronquist (1984).

Aliciella leptomeria, as here circumscribed, remains a very problematic complex of diploid and polyploid individuals. It is clear from molecular systematic studies (Porter 1993, 1996; Tommerup and Porter 1996) that there are several independent polyploid events, involving different diploid parental species. Given the degree of morphological variation, primarily autogamous reproductive system, and independent origins, it seems there is no cohesive process underlying this "species." As treated here, *A. leptomeria* is more a taxonomic convenience than a biological or phylogenetic species. However, ongoing studies will eventually clarify species boundaries in this complex.

Representative specimens.—U.S.A. ARIZONA. Coconino Co.: US Hwy 89, 9.5 mi S Navajo Bridge, 18 May 1979, *Lehto & Lehto L23706* (NY). CALIFORNIA. Mono Co.: White Mtns, mouth of McAfee Cr., T4S, R35E, S2 NW¼, Fishlake Valley Drainage, 8 May 1986, *Morefield & McCarty 3606* (RSA, BRY); White Mtns, mouth of Furnace Cr., 0.7 mi N80°W of Wildhorse BM 5484, T4S, R36E, S33, Fishlake Valley Drainage, 14 May 1987, *Morefield, Liston & Meury 4416* (RSA).—COLORADO. Gunnison Co.: Deer Rim, Gunnison Watershed, 4700 ft., 11 June 1901, *Baker 83* (GH). Mesa Co.: Grand Junction, 19 June 1915, *MacBride & Payson 693* (GH).—IDAHO. Butte County: National Reactor Testing Station, T1N, R28E; At Webb Spgs. on the N side of Big Butte, 24 May 1967, *Atwood 839* (BRY); Jefferson County: National Reactor Test Station, T5N, R34E; Tractor Flat, S of Mud Lake, 20 June 1967 *Atwood 989* (BRY); Owyhee County: ID51, 13.5 mi S of Bruneau, T8S, R5E, S19, 31 May 1971, *Holmgren & Holmgren 4937* (BRY).—NEW MEXICO. San Juan Co.: S. Burnham Trading Post, T24N, R15W, 7 June 1980, *Shultz 761* (NY).—NEVADA. Elko Co.: Antelope Valley, 63.6 km (39.5 mi) S of Wendover, 32 km (20 mi) 87° E of Currie and Pass, adjacent to Dolly Varden turnoff, T28N, R67E, S26, 2 June 1984, *Holmgren & Holmgren 10367* (BRY); Esmeralda Co.: T2S, R42E, Hills 2.5 mi E of Goldfield, 2 June 1980, *Neese & White 8823* (BRY); Eureka Co.: Toiyabe Nat. For., Monitor Valley; Reynolds Cr., T18N, R48E, S16, 6 June 1978, *Goodrich 11326* (BRY); Lincoln Co.: N25, Tikaboo Valley, 21.6 mi from jct. with US93, 17 mi W of Ash Spg., T5S, R58E, S29, 18 May 1975, *Holmgren & Holmgren 8006* (BRY); Mineral Co.: Rough Creek Rd. (Forest Rd 028) between Hawthorne & Bridgeport, jct. of rd to China Camp, ca 1 mi W of Nine Mile Ranch, W of Fletcher, T6N, R27E, S9, 11 June 1980, *Ertter & Strachan 3683* (BRY); Nye Co.: San Antonio Mtns, 8 mi and 17° from Tonopah, ca 3/4 mi and 0° from Air Force Radar Station, N38° 10′25″, W117° 11′30″, 11 June 1979, *Goodrich 12568* (BRY); T8N R51E E 1/2 of S27, ca 22 mi N of Warm Springs, 30 June 1980, *White & Neese 279* (BRY); Washoe Co.: 2 mi N of Wadsworth, 12 June 1942, *McKnight & McMillan 94* (BRY); White Pine Co.: Snake Range, Humboldt Nat. For., Murphy Wash, 4 mi above mouth, T10N, R68E, S2, 24 June 1964, *Holmgren & Reveal 1081* (BRY).—OREGON. Harney Co.: 52 mi SE Burns, 29 June 1959, *Cronquist 8562* (GH). Malheur Co.: Crooked Cr., 6 mi SW Rome, 11 June 1959, *Cronquist 8405* (GH).—UTAH. Beaver Co.: Between Minersville and Lund, 16 May 1972, *Higgins & Atwood 5269* (BRY); Box Elder Co.: T14N, R19W, S10 NE qtr, 14.25 mi NW of Lynn, Goose Cr. drainage, 22 June 1982, *Atwood & Goodrich 8992* (BRY); Daggett Co.: T2N, R25E, S29, Browns Park, near the Green River, 3 mi W of Colorado border, 7 July 1983, *Neese 14215* (BRY); Duchesne Co.: Wells draw, ca 15 mi SW of Myton, 16 July 1965, *Botherson 712* (BRY); Emery Co.: T21S, R14E, S5, San Rafael Swell, Old Smith Cabin area, 31 May 1981, *Despain 654* (BRY); Garfield Co.: T36S, R11E, SE qtr S11, SE of Henry Mtns., between U276 & Lake Powell, on Ticaboo Mesa, 30 May 1978, *Neese 5155* (BRY); Grand Co.: Along U128, at mile post 24, vicinity of Fischer Towers, 3 May 1968, *Welsh 7020* (BRY); Juab Co.: T12S, R17W, S20, ca 4.5 mi NNE of Trout Creek, 6 June 1978, *Welsh, Foster & Henriod 16747* (BRY); Kane Co.: ca 33 mi SW of Glen Canyon City, on Cedar Mtn Rd., T43S, R2E, ca S21, 12 June 1971, *Atwood, Welsh, Murdock & Allen 20744* (BRY); Millard Co.: 3 mi S of Garrison, at base of rocks, 18 June 1941, *Maguire 20855* (BRY); San Juan Co.: ca 1 mi S of U47, in Comb Wash, W of Bluff, 6 June 1970, *Welsh & Atwood 10000* (BRY); Sevier Co.: Richfield, 14 May 1932, *Harrison 275* (BRY); Uintah Co.: Hill Cr., ca 12 mi S of Ouray, 27 July 1965, Botherson 548 (BRY); Utah Co.: 1.4 mi above Mill Fork, 2 Aug. 1935, Mason 6568 (BRY); Wayne Co.: Caineville Wash Rd., NW of jct w/U24, Carl's Reservoir, 10 June 1973, *Harrison 1007* (BRY); T29S, R12E, S 33, Burr Desert, near

Pool Spring, 3 mi E of U95, 11 mi S of Hanksville, 25 May 1980, *Neese 8729* (BRY); Washington Co.: Valley of the Virgin near St. George, 1874, *Parry 197* (GH).—WASHINGTON. Benton Co.: Hanford Works, Cold Creek Valley, Army Loop Rd., T12N, R25E, S10, 4 June 1984, *Baird 939* (BRY). Grant Co.: Moses Lake, 21 May 1937, *Eyerdam 671* (GH).—WYOMING. Carbon Co.: 5 mi NE Sinclair, 25 May 1947, *Porter 4143* (GH). Fremont Co.: 9 mi W Riverton on WY Hwy 26, 2 June 1986, *Haines 6102* (GH). Hot Springs Co.: ca. 100 m W of power line in Meeteetse Draw, 4.5 mi NW of Thermopolis, 10 June 1979, *Martin 1268* (BRY). Sweetwater Co.: Point of Rocks, 20 June 1901, *Merrill & Wilcox 607* (NY, GH).

15. **Aliciella lottiae** (A. Day) J. M. Porter, comb. nov.

Gilia lottiae A. Day, *Novon* **3**: 332. 1993, (basionym). TYPE.—U.S.A., NEVADA, Churchill Co.: Hot Springs Mountains, 11.5 mi. N of Hazen on pole-line road, 8 May 1980, *Day & Lott 80–36* (holotype: CAS; isotype: RSA!)

Gilia leptomeria A. Gray var. *myriacantha* M. E. Jones, *Contr. W. Bot.* **12**: 53. 1908. TYPE.—U.S.A., CALIFORNIA, San Bernardino Co.: Needles, *M. E. Jones 9868* (holotype: POM!).

Annual to more often winter annual, with a taproot, 5–43(–45) cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching to the base. Basal leaves forming a spreading or flattened rosette, 2.0–12.5 cm long, 3.5–30.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, dentate to pinnately lobed, the segments entire or toothed, spreading to somewhat antrorse, rachis broad, glandular pubescent along the vasculature of the lower surface, glabrous above, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower subsessile to short, pedicel 0.5–2.0 mm long, the lateral (if present) to 10.0 mm long. Calyx shortly cylindrical to campanulate often anthocyanic, 2.0–4.0 mm long, tube 1.0–3.0 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 0.5–1.8 mm long. Corolla (5.5–)6.0–7.5 mm long, white to lavender or pink, the upper tube yellow, lower tube white, corolla glabrous externally, narrowly funnelform, sometimes slightly constricted just above mid-tube, the tube conspicuously flaring toward the orifice; the tube much longer than the calyx, (2.5–)3.0–5.7 mm long, lobes lance-elliptic to narrowly oblanceolate, acute, 1.5–2.5 mm long, 0.7–2.0 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.3–1.0 mm in length, anthers 0.3–0.8 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 0.9–2.2 mm long, style equal in length to the anthers, 1.6–3.0 mm long, stigmatic lobes 0.3–0.6 mm long; mature capsule 3.0–5.5 mm long, generally longer that the fruiting calyx. Seeds 8–14 per locule, 0.6–0.9 mm long, ovoid, roughened, lacking any vestige of wing, golden brown to tan in color, not mucilaginous when wet. $2n$=32, 34, 50 (Day 1993*a*; Grant 1959—cited as *Gilia micromeria*).

Aliciella lottiae is found on dunes and deep sands of plains, foothills, and washes, associated with creosote, saltbush, sagebrush, and pinion-juniper communities, at 400–2100 m (1300–7000 ft) elevation. It appears on the eastern slopes of the Sierra Nevada to the Modoc Plateau in California, eastern Oregon, southeastern Washington, southern Idaho, western Utah, and northwestern Arizona. Flowering begins in March in the southern extent of the range, and continues through June in the higher elevations in the north.

Generally *Aliciella lottiae* is characterized by its relatively robust habit, rosette leaves with a glabrous, shiny upper surface, and corollas with narrowly lanceolate lobes; however, these traits are variable in some populations and converge toward the morphologies exhibited by *A. leptomeria* tetraploids. Molecular systematic studies (Porter 1993, 1996; Tommerup and Porter 1996) provide evidence that several independent allopolyploid events, involving different diploid (and polyploid) parental species, have occurred in populations referred to *A. lottiae*. This is supported by chromosome counts by Day (1993*a, b*; pers. comm.) of $2n$= 32 (= $4x$= 8_{II}+8_{II}), $2n$= 34 (= $4x$= 8_{II}+9_{II}), and $2n$= 50 (= $6x$= 8_{II}+8_{II}+9_{II}), requiring minimally three independent allotetraploid events. *Aliciella lottiae,* as here circumscribed, is an assemblage of at least three species of hybrid origin. As is the case with *A. leptomeria, A. lottiae* is a taxonomic convenience, not a species. Considerable work still remains in sorting out both the number of polyploid species and the morphological range of these species before they can be properly characterized.

Representative specimens.—U.S.A. ARIZONA. Mohave Co.: Sand bed of Beaver Dam River, 3 April 1934, *Maguire, Maguire & Maguire 4922b* mixed sheet (GH).—CALIFORNIA. Inyo Co.: W base of Black Mtn., T8, 34E, S17, 5 May 1986, *Morefield & McCarty 3577* (GH, RSA). Mono Co.: S of Leevining, 27 July 1942, *Rose 42092* (GH). San Bernardino Co.: Barstow, 16 April 1921, *Spencer 1568* (GH).—IDAHO. Owyhee Co.: ca. 10 mi NE Bruneau, S side Snake R., 30 May 1963, *Hitchcock & Muklick 22547* (COLO).—OREGON. Harney Co.: 1 mi N Andrews, E base Steens Mtn., 29 May 1959, *Cronquist 8304* (GH, NY). Lake Co.: Desert near Alkali Lake, 13 July 1936, *Thompson 13272* (GH).—NEVADA. Churchill Co.: Near abandoned hot springs baths, Soda Lake Road, 5.6 mi from NV95, NW of Fallon, 29 April 1978, *Day & Lott 78–34* (BRY); Lyon Co.: T13N, R26E, S3, 8 mi NE of Yerington, 18 July 1961, *Holmgren 105* (BRY).—WASHINGTON. Douglas Co.: Near Wilson Creek, 25 June 1893, *Sandberg & Leiberg 301* (GH).

16. **Aliciella micromeria** (A. Gray) J. M. Porter, comb. nov.

Gilia micromeria A. Gray, *Proc. Amer. Acad. Arts* **8**: 279. 1870, (basionym). *Navarretia micromeria* (A. Gray) Kuntze, *Revisio, Gen. Pl.* **2**: 433. 1891. *Gilia leptomeria* Gray subsp. *microm-*

eria H. Mason & A. Grant, *Madroño* **9**: 214. 1948. *Gilia leptomeria* Gray var. *micromeria* A. Cronquist, *Univ. Wash. Publ. Biol.* **17**: 107. 1959. TYPE.—U.S.A., NEVADA, Pershing Co.: Humboldt Lake, *S. Watson 928* (holotype= GH!)

Annual to more often winter annual, with a taproot, 3–15(–18) cm tall. Stems narrow, glandular pubescent (sometimes sparsely so) with uniseriate viscid trichomes bearing a single terminal cell, erect, openly branching to the base. Basal leaves forming a spreading to flat rosette, 1.2–6.5 cm long, 0.5–20.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, deeply pinnatifid, the segments narrow, spreading at right angles to the narrow rachis, glandular pubescent to glabrous, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes only slightly dimorphic, the terminal flower short to long-pediceled, 2.0–8.0 mm long, the lateral (if present) to 9.0 mm long, spreading to arcuate. Calyx shortly cylindrical to campanulate, often anthocyanic, 1.6–3.5 mm long, tube 0.5–1.5 mm long at anthesis, glandular, the lobes 1.0–2.0 mm long. Corolla (1.5–)1.7–4.0 mm long, white to lavender or pale magenta, the upper tube pale yellow, lower tube pale cream or streaked with purple, corolla glabrous externally, shortly funnelform, somewhat constricted just above mid-tube; the tube shorter to slightly longer than the calyx, (0.8–)1.2–3.0 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, sometimes slightly erose, 0.8–1.4 mm long, 0.5–1.5 mm wide. Stamens 5 or reduced to 3, equally inserted at the sinuses of the corolla lobes, the free portion 0.1–1.0 mm in length, anthers 0.6–0.9 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 0.5–1.0 mm long, approximately 7–10 ovules per carpel, mature capsule 1.6–2.5 mm long, style equal in length to the anthers, stigmatic lobes 0.1–0.6 mm long. Seeds 1–5(–6) per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, not mucilaginous when wet. $2n=18$ (Day 1993*b*).

Aliciella micromeria appears on sandy to gravely saline flats, associated with lake margins, alkaline wetlands and vernal sinks. It generally co-occurs with *Sarcobatus,* in saltbush, and sagebrush communities, at 1200–1800 m (4000–6000 ft) elevation. This species is found in Nevada, California (Modoc Co.), southeastern Oregon and adjacent Idaho, also at a few scattered localities in Utah and Colorado. Generally this species flowers from April through June.

Aliciella micromeria is characterized by its open, divaricate branching (branches and flower pedicels appear to be nearly at 90° angles to one another), pinnatifid leaves with narrow rachis and lobes at right angles to the rachis, small flowers, often with fewer than five anthers, and small globose fruit. The narrow, almost filiform stems and elongate primary and secondary pedicels are also characteristic. This combination of characters makes *A. micromeria* distinct and easily distinguishable from *A. leptomeria, A. lottiae* and *A. hutchinsifolia.*

Cytologically *Aliciella micromeria,* as here interpreted, is a diploid, $n= 9$. It has been implicated as one of the probable parents of several tetraploid species, including one of the tetraploid species here included under the name *A. leptomeria.*

Representative specimens.—U.S.A. COLORADO. Conejos Co.: Alkaline soils N Alamosa, 27 June 1921, *Bethel, Willey & Clokey 4248* (UTC).—NEVADA. Churchill Co.: Carson Sink, 16 mi N of Fallon, on Lovelock Cutoff, 17 May 1976, *Day, Lott & Long 76–100* (BRY). Esmeralda Co.: 20 mi W of Tonopah, 15 May 1941, *Eastwood & Howell sn.* (POM). Humboldt Co.: Humboldt Lake, May 1868, *Watson 92* (GH). Bog Hot Valley, Bog Hot Springs, 1.2 air mi NW of Bog Hot Ranch, T46N, R28E, NW ¼ Sect. 18, 23 May 1978, *Tiehem & Rogers 4255* (UTSU). Lander Co.: Carico Lake Valley, flats at the SW end of Carico Lake, T26N, R45E, Sect. 21, 25 May 1986 *Tiehm 10469* (RSA, BRY). Mineral Co.: Rock House Spring, in the foothills S of Teel's Marsh, 10 mi NNW of Basalt, T3N, R32E, Sect. 1, 18 May 1986, *Tiehm 10289* (RSA, BRY). Nye Co.: Pancake Range, 14 May 1941, *Eastwood & Howell 9437* (UTSU). Pershing Co.: West Humboldt Range, 2 mi S of Humboldt R., on the Rd. over Wildhorse Pass to the Carson Sink, T25N, R31E, Sect. 25, 23 May 1985, *Tiehm 11671* (RSA, BRY).—OREGON. Malheur Co.: Alkali flat with *Sarcobatus,* along Crooked Creek; 6 mi SE of Rome, T32S, R41E, Sect. 6, 12 June 1959, *Cronquist 8419* (RSA).

17. **Aliciella humillima** (A. Brand) J. M. Porter, stat. et comb. nov.

Aliciella triodon var. *humillima* A. Brand, Pflanzen. IV. Fam. 250: 150. 1907, (basionym). TYPE.—U.S.A., CALIFORNIA, Inyo Co.: Inyo, 10 April 1891, *Brandegee s.n.* (holotype: CAS; isotype= UC).

Annual to more often winter annual, with a taproot, 3–20(–27) cm tall. Stems narrow, glandular pubescent (sometimes sparsely so) with uniseriate viscid trichomes bearing a single terminal cell, erect, openly branching to the base. Basal leaves forming a spreading to flat rosette, 1.2–7.5 cm long, 0.5–20.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, deeply pinnatifid, the segments narrow, spreading at right angles to the narrow rachis, glandular pubescent to glabrous, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes only slightly to distinctly dimorphic, the terminal flower short to long-pediceled, 1.2.0–4.0 mm long, the lateral (if present) to 8.0 mm long, spreading to arcuate. Calyx shortly cylindrical to campanulate, often anthocyanic, 1.8–3.5

mm long, tube 0.5–1.5 mm long at anthesis, glandular, the lobes 1.0–2.0 mm long. Corolla (3.0–)3.7–7.0 mm long, white to lavender or pale magenta, the upper tube pale yellow, lower tube pale cream or streaked with purple, corolla glabrous externally, ±salverform, somewhat constricted just above mid-tube; the tube distinctly longer than the calyx, (2.0–)2.7–5.0 mm long, lobes more or less truncate with a cuspidate tip, sometimes grading to lance-elliptic or oblanceolate, 0.8–1.8 mm long, 0.5–1.5 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.3–1.0 mm in length, anthers 0.6–0.9 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblong, glabrous, 0.5–1.0 mm long, approximately 7–10 ovules per carpel, mature capsule 2.0–3.5 mm long, style equal in length to the anthers, stigmatic lobes 0.1–0.6 mm long. Seeds 1–5(–8) per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, not mucilaginous when wet. $2n = 36$ (Day 1993*b*).

Occurring on sandy to gravely saline flats, on lake margins, alkaline wetlands and vernal sinks, *Aliciella humillima* is usually associated with *Sarcobatus,* saltbush, and sagebrush communities, at 1200–1800 m (4000–6000 ft) elevation. This species ranges from Nevada, California [Modoc and Inyo Cos.], Oregon and adjacent Idaho. Flowering begins in April and continues through June.

Aliciella humillima is very similar in architecture and general appearance to *A. micromeria* and the two have been collected sympatrically. They can be distinguished by the long corolla tube with little flaring toward the orifice, truncate but cuspidate corolla lobes, and five anthers in *A. humillima.* Note that *A. micromeria* possesses a short corolla tube, flaring toward the orifice, lance-elliptic to oblanceolate lobes, and anthers may be as few as three. The similarity to *A. micromeria* is not coincidental—as interpreted here, *A. humillima* is a tetraploid species derived (in part) from *A. micromeria.* The population of *A. humillima* at Diaz Lake, Inyo Co., California has been shown to be an allotetraploid species ($n=18$), derived from the hybridization of *A. micromeria* ($n=9$) and *A. triodon* ($n=9$) (Tommerup and Porter 1996).

Representative specimens.—U.S.A. CALIFORNIA. Inyo Co.: Alkaline soils near shore of Diaz Lake, Diaz Lake State Recreation Area, 10 May 1990, *Porter 8293* (RSA).—NEVADA. Churchill Co.: Near the intersection of new Hwy 50 and Carroll Summit Rd. (old Hwy 50), T17N, R36E, Sect. 32, 15 June 1978, *Williams & Lott 78–114–9* (UTC, BRY); Humboldt Co.: Virgin Valley, sand dunes on S side of Duffurena Pond #19, T46N, R26E, SW ¼ Sect. 32, 31 May 1978, *Tiehm & Rogers 916* (UTSU). Lander Co.: Big Smokey Hill, 1 mi E of Nev Hwy 8a, USFS Hwy 001, T18N, R45E, Sect. 28, 28 May 1972, *Pierce 1854* (UTSU); Lincoln Co.: Rd from Rose Valley to Deer Lodge Canyon, T1N, R69E, Sect. 22, 10 June 1981, *Williams & Tiehm 81–34–5* (UTC, BRY). Nye Co.: 0.7 mi N of Hwy 6, Railroad Valley, T8N, R55E, Sect. 10, 28 May 1978, *Williams & Williams 78–77–1* (UTSU). Pershing Co.: N of West Humboldt Range, 11 air mi S of Lovelock, T25N, R31E, Sect. 22, NW ¼, 27 May 1978, *Tiehm & Birdsey 4279* (UTSU).—OREGON. Lake Co.: 5 mi SE of Paisley, *Hitchcock 6757* (RSA). Alkali Lake, sandy wash, *Hardham 7979* (RSA). Buckaroo Lake area, N of Alkali Lake, Hwy 395, 23 June 1956, *Steward 7118* (RSA).

18. ALICIELLA TRIODON (A. Eastwood) A. Brand. *Helios* **22**: 78. 1905.

Gilia triodon Eastwood, *Zoe* **4**: 121. 1893, (basionym). TYPE.—U.S.A. UTAH. San Juan Co.: Ruin Canyon, 20 June 1892, *Eastwood, s.n* (holotype: CAS!; isotypes: GH!, UC)

Gilia leptomeria A. Gray var. *tridentata* M. E. Jones, *Proc. Cal. Acad. Sci. II.* **5**: 713. 1895. TYPE.—U.S.A. UTAH. Emery Co.: in clay near Emery, 16 June 1894, *Jones 5445n* (holotype: POM!; isotypes: US!).

Annual to more often winter annual, with a taproot, 3–15(–25) cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching above, generally branches filiform. Basal leaves forming a spreading or flattened rosette, 0.5–3.5 cm long, 0.3–9.0 mm wide, spatulate, obovate, oblanceolate to narrowly lanceolate, often entire, or coarsely dentate, the segments spreading, entire or rarely few-toothed, rachis broad, glandular pubescent, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves mostly entire, ± abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower subsessile the pedicel 0.3–3.0 mm long, the lateral (if present) to 12.5 mm long. Calyx shortly cylindrical to campanulate, often anthocyanic, 1.8–4.5 mm long, tube 0.8–3.5 mm long at anthesis, glandular, the lobes 0.9–1.7 mm long. Corolla 3.5–6.5(–7.3) mm long white to lavender or pale magenta, the upper tube (orifice) yellow, lower tube pale purple or pale and streaked with purple, corolla glabrous externally, narrowly salverform, constricted at the orifice, the tube 3.0–5.8 mm long, much longer than the calyx, lobes lance-elliptic to oblanceolate, tridentate, 0.9–2.0 mm long, 0.5–1.3 mm wide, the teeth subequal in length. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.2–0.5 mm in length, anthers 0.3–0.6 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 0.6–1.9 mm long, mature capsule 2.0–4.5 mm long, style equal in length to the anthers, 2.0–4.0 mm long, stigmatic lobes 0.1–0.5 mm long. Seeds 3–12 per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, not mucilaginous when wet. $2n=18$ (Day 1993*b*).

Aliciella triodon, the type species of *Aliciella,* occurs in open areas of sandy or gravelly flats and slopes, associated with juniper, pinyon-juniper, sagebrush, and shadscale communities, at 1200–2100 m (4000–7000

ft) elevation. This species is found scattered from southeastern California, through Nevada, Utah, northern Arizona, to Colorado (and reported from northwestern New Mexico [Day 1993*b*]). Flowering may begin as early as late April and continues through June.

There has been a long-standing confusion between *Aliciella triodon* and *A. leptomeria.* However, the three-toothed corolla lobes and corolla tube that narrows at the orifice results in *A. triodon*'s unique and characteristic "star-like" floral morphology. Some of the tetraploid forms referred to *A. leptomeria* possess corolla lobes that are truncate and cuspidate and may appear similar with casual observation. Careful examination reveals that these flowers do not have three distinct, shortly-attenuate teeth per lobe, nor do their corolla tubes narrow at the orifice. Plants with similar morphology referred to *A. leptomeria* have been shown to be associated with allotetraploidy involving *A. triodon* (or an ancestor of *A. triodon*) as one of the parental species (Tommerup and Porter 1996). That *A. triodon* (or an ancestor of *A. triodon*) has been involved with allopolyploidy and the resulting tetraploid species is somewhat similar to *A. triodon* in no way detracts from the fact that *A. triodon* is a morphologically and evolutionarily distinct lineage and species. Even so, identification of this species on herbarium sheets is difficult and generally requires rehydration and dissection of the minute flowers.

Representative specimens.—U.S.A. ARIZONA. Coconino Co.: Buckskin Mtns., ca 18 mi S of US89, along W side of the Cockscomb, T41N, R3E, S21, 18 May 1973, *Atwood 4931* (BRY). Mohave Co.: Sand bed of Beaver Dam River, 3 April 1934, *Maguire, Maguire & Maguire 4922* (GH).—COLORADO. Moffat Co.: Near Hiawatha Dome, Green River Fm., 11 June 1945, *Porter 3682* (GH).—NEVADA. Pershing Co.: Trinity Range, 5 air mi WSW of Rye Patch Dam, T30N, R32E, S28, 28 May 1983, *Tiehm & Tucker 7742* (BRY).—UTAH. Beaver Co.: 6 mi NW Milford, 13 May 1941, *Eastwood & Howell 9353* (CAS, GH). Duchesne Co.: 1 mi up side canyon of Indian Canyon, 3.5 mi SW of Duchesne, T8S, R5W, 3 June 1965, *Holmgren, Reveal & LaFrance 1769* (BRY). Kane Co.: NE slopes of Kaiparowits, S of Willow Tank, halfway up slope, 9 May 1939, *Harrison 9076* (BRY). 7.9 mi SW of Jct. of Cottonwood Wash Rd and UT54, at Cannonville, 0.5 mi E of Kodachrome Flat Rd., T38S R2W S14, 23 May 1978, *Reveal & Gentry 803* (BRY). W side of Paria R., just upstream from the abandoned settlement of Paria, T41S R1W S18, 21 May 1965, *Cronquist 10135* (BRY). San Juan Co.: Ruin Ca–on, June 1892 *Eastwood sn.* (GH). Head of canyon, 0.5 mile beyond Upheaval Dome Road, 9 July 1964, *Moore 211* (BRY). San Pete Co.: Point above mill, Manti, 20 May 1895, *Howard s.n.* (GH). Tooele Co.: Stansbury Mtns, 2 mi E of Horseshoe Springs on the W side of the range T2S, R7W, S31, 18 May 1981, *Taye 1357* (BRY). Uintah Co.: 1 mi W of Rainbow, T11S, R24E, 4 June 1965, *Holmgren, Reveal & LaFrance 1799* (BRY). Washington Co.: Rockville, 14 May 1932, *Harrison 275* (BRY). Wayne Co.: River Ford Road, NW of Jct with U24, North Blue Flats, 14 May 1932, *Harrison 987* (BRY).

II. ALICIELLA Subgenus **Gilmania** (Mason & A. Grant) J. M. Porter, comb. nov.

Gilia subg. *Gilmania* Mason & A. Grant, *Madroño* **9**: 205. 1948. *Gilia* subg. *Gilia* sect. *Gilmania* V. Grant & A. Grant, *El Aliso* **3**: 299. 1956 (in part) TYPE.—*Gilia latifolia* Wats.

Subgenus *Gilmania* is phylogenetically defined as the most recent common ancestor of *Aliciella latifolia* and *A. ripleyi* and all of the descendants of that ancestor.

19. **Aliciella latifolia** (S. Watson) J. M. Porter, comb. nov.

Gilia latifolia S. Watson, *Amer. Nat.* **9**: 347. 1875, (basionym).

Annual to more often winter annual, with a taproot, 3–32(–40) cm tall. Stems glandular pubescent with long uniseriate viscid trichomes bearing a single terminal cell (strongly scented), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.4–12.0 cm long, 0.5–75.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, holly-like, petiole long and narrow, glandular pubescent, the lobes and apex acute with aristate teeth. Cauline leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate and acerose, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, in 2-flowered cymes (or in subsp. *imperialis* reduced to 1-flowered and branching sympodial), pedicels of cymes of similar length, the terminal flower long pediceled, 5.0–16.0 mm long, the lateral only slightly shorter, 3.0–7.0 mm long. Calyx 2.8–6.9 mm long, shortly cylindrical to campanulate often anthocyanic on lobe margins, tube 1.3–3.2 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 1.7–3.8 mm long. Corolla 4.0–10.0 mm long, bright magenta or pink on internal lobes, external lobes cream or pale pink, the upper tube pale yellow, lower tube pale, corolla glabrous externally, broadly funnelform, narrowest at the base of corolla tube, the tube equal to or only slightly longer than the calyx, (3.0–)3.4–5.5 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, 1.0–4.5 mm long, 0.6–2.2 mm wide. Stamens 5, subequally inserted in the mid to lower corolla tube, filaments of unequal lengths, the free portion 0.8–3.3 mm in length, papillose below the anthers, anthers 0.5–0.9 mm long, one anther slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous or sparsely glandular at the apex, 1.8–2.5 mm long, mature capsule 3.0–7.0 mm long, style subequal in length to the anthers, papillose, 1.6–3.0 mm long, stigmatic lobes 0.4–1.2 mm long. Seeds 17–28(–32) per locule, 0.6–0.9 mm long, ovoid, roughened, red-brown in color, not winged, not mucilaginous when wet. 2n=36 (Grant 1959; Day 1993*b*).

Aliciella latifolia is found on clay, sandy, gravelly or rocky soils of washes, flats and slopes, occurring in creosote, blackbrush, saltbush, or mesquite associations (or some mixture thereof), from 45 m below sea level in Death Valley to ca. 2100 m elevation (–150–7000 ft). Flowering begins as early as March, in the southern portion of the range, and continues through May or June. Throughout the range, in areas where there is more frequent or reliable summer rainfall, flowering my continue through the summer into September or October. This is particularly true for subsp. *imperialis,* which occurs in areas with reliable summer rains.

Aliciella latifolia is characterized by its densely villous-glandular vesture, hollylike leaf morphology, small pink flowers, and minute reddish-brown seeds. Two subspecies are recognized, distinguished by the characters described in the following key (after Welsh 1993):

1. Calyx (4.4–)5.0–6.9 mm long, the teeth 2.0–3.6 mm long; capsules (4.5–)5.2–7.0 mm long; plants generally less than 25 cm tall; widespread, from northeastern Baja California, Mexico, to Arizona, California, Nevada and Washington Co., Utah . . . . . subsp. *latifolia*
– Calyx 2.8–4.8 mm long, the teeth 1.0–2.0 mm long; capsules 3.0–4.5 (–4.9) mm long; plants frequently over 25 cm tall; restricted to Utah (except Washington Co.) . . subsp. *imperialis*

19a. ALICIELLA LATIFOLIA (S. Watson) J. M. Porter subsp. LATIFOLIA.

Gilia latifolia S. Watson, *Amer. Nat.* **9**: 347. 1875. *Navarretia latifolia* (S. Wats.) Kuntze, *Revisio, Gen. Pl.* **2**: 433. TYPE.—U.S.A. UTAH. Valley of the Virgin River, near St. George, 1874, *Parry 188* (holotype: GH!; isotype: NY!).

Annual to more often winter annual, with a taproot, 3–22(–26) cm tall. Stems glandular pubescent with long uniseriate viscid trichomes bearing a single terminal cell (strongly scented), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.4–12.0 cm long, 0.5–75.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, hollylike, petiole long and narrow, glandular pubescent, the lobes and apex acute with aristate teeth. Cauline leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate and acerose, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, in 2-flowered cymes, pedicels of cymes of similar length, the terminal flower long pediceled, 5.0–16.0 mm long, the lateral only slightly shorter, 3.0–7.0 mm long. Calyx (4.4–)5.0–6.9 mm long, shortly cylindrical to campanulate often anthocyanic on lobe margins, tube 2.5–3.2 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 2.0–3.8 mm long. Corolla 4.0–10.0 mm long, bright magenta or pink on internal (adaxial) lobes, external (abaxial) lobes cream or pale pink, the upper tube pale yellow, lower tube pale, corolla glabrous externally, broadly funnelform, narrowest at the base of corolla tube, the tube equal to or only slightly longer than the calyx, (3.0–)3.4–5.5 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, 1.0–4.5 mm long, 0.6–2.2 mm wide. Stamens subequally inserted in the mid to lower corolla tube, filaments of unequal lengths, papillose below the anthers (particularly the longer filaments). Capsule (4.5–)5.2–7.0 mm long.

Representative specimens.—MEXICO. BAJA CALIFORNIA. Between Mex Hwy 2 and US border, 32° 17′N, 115° 54′W, Brey 2361 (SD). —U.S.A. ARIZONA. Mohave Co.: Canyon of the Colorado River, above Boulder Dam, 9 April 1940, *Ripley & Barneby 2902* (NY). Yuma Co.: Road to Martinez Lake, 9.1 mi NW jct. Hwy 95, 25 April 1978, *Broome, Ertter & Cagle 1854* (NY).—CALIFORNIA. Imperial Co.: Ca. 8 mi N Winterhaven, sandy wash, 18 March 1970, *Hitchcock 25694* (NY, RM). Inyo Co.: Lower Johnson Canyon, Panamint Range, 30 April 1940, Jepson 19791 (JEPS, NY). Mono Co.: Mouth of Coldwater Canyon, 1.2 mi N Southern Belle Mine, 28 May 1986, *Morefield & McCarty 3697* (RSA, NY). Riverside Co.: Silty soil E side of Salton Sea, 1 mi N Imperial Co. line, 24 March 1941, *Wiggins 9587* (CAS, NY, RM, RSA). San Bernardino Co.: Sheep Springs Canyon, quarter mile up canyon from spring, 24 March, 1964, *Hitchcock & Mulick 23302* (NY, RM). San Diego Co.: Signal Mt., Colorado Desert, 2 April 1903, *Abrams 3165* (NY).—NEVADA. Clark Co.: Nellis Air Force Range, Spotted Range, limestone talus, 18 May 1969, Beatley 8471 (NY, RSA) Esmeralda Co.: Fish Lake Valley, Gap Springs, 11 September 1983, *Tiehm 8333* (NY, RSA, UTSU). Lincoln Co.: Pahranagat Valley, 2 mi S Alamo on Hwy 93, 1 June 1980, *Thorne & Welsh 930* (BRY, NY). Nye Co.: Nevada Test Site, Bare Mountain, along "Ruins" road below Gold Ace Mine, 19 June 1969, *Beatley 9069* (NY, RSA, UTSU). Washoe Co.: At or near Reno, summer 1939, *Shore 53* (NY).—UTAH. Washington Co.: Valley of the Virgin River, near St. George, 1874, *Parry 188* (GH).

19b. **Aliciella latifolia** subsp. **imperialis** (S. L. Welsh) J. M. Porter, comb. nov.

Gilia latifolia var. *imperialis* S. L. Welsh, *Rhodora* **95**: 409. 1993, (basionym). TYPE.—U.S.A. UTAH. San Juan Co.: Cataract Canyon, 15 Sept. 1983, *Welsh 22507* (holotype: BRY; isotype: UTC!).

Annual to more often winter annual, with a taproot, 3–32(–40) cm tall. Stems glandular pubescent with long uniseriate viscid trichomes bearing a single terminal cell (strongly scented), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.4–12.0 cm long, 0.5–70.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, hollylike, petiole long and narrow, glandular pubescent, the lobes and apex acute with aristate teeth. Cauline leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate and acerose, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, in 2-flowered cymes or more frequently reduced to one flower and branching sympodial, pedicels of cymes of similar length, the terminal flower long pediceled, 5.0–16.0 mm long, the lateral only

slightly shorter, 3.0–7.0 mm long. Calyx 2.8–4.8 mm long, shortly cylindrical to campanulate often anthocyanic on lobe margins, tube 1.5–2.8 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 1.0–2.0 mm long. Corolla 4.0–10.0 mm long, bright magenta or pink on internal lobes, external lobes cream or pale pink, the upper tube pale yellow, lower tube pale, corolla glabrous externally, broadly funnelform, narrowest at the base of corolla tube, the tube equal to or only slightly longer than the calyx, (3.0–)3.4–5.5 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, 1.0–4.5 mm long, 0.6–2.2 mm wide. Stamens subequally inserted in the mid to lower corolla tube, filaments of unequal lengths, papillose below the anthers (particularly the longer filaments). Capsule 3.0–4.5(–4.9) mm long.

Representative specimens.—U.S.A. UTAH. Emery Co.: Moroni Slopes, San Rafael Swell, 5 June 1980, *Harris 874* (BRY). Garfield Co.: Canyonlands National Park, Cataract Canyon, Big Drop, along Colorado R., 5 May 1983, *Welsh 21819* (BRY). Kane Co.: Tibbet Canyon, ca. 16 mi. NE Glen Canyon City, 4 September 1973, *Atwood 5959* (BRY, NY). San Juan Co.: Canyonlands National Park, Cataract Canyon and Imperial Canyon, 20 September 1983, *Welsh & Neese 22534,* (BRY).

20. **Aliciella ripleyi** (Barneby) J. M. Porter, comb. nov.

Gilia ripleyi Barneby, *Leafl. West. Bot.* **3**: 129. 1942, (basionym). TYPE.—U.S.A. NEVADA. Nye Co.: Fissures of hard, dry limestone cliffs, in the south end of the Spector Range, 18 July 1941, *Ripley & Barneby 3992* (holotype: CAS!; isotypes: POM!, NY!, K).

Gilia gilmanii Jepson, A California Flora 3 (Part II): 192. 1943, (basionym). TYPE.—U.S.A. CALIFORNIA. Inyo Co.: Limestone cliffs above Shadscale Spring, Johnson Canyon, Panamint Range, 24 June 1940, *Gilman 4271* (holotype: UC).

Herbaceous perennial, with a stout taproot, 8–30 (–35) cm tall, frequently branched from the base. Stems glandular pubescent with long uniseriate viscid trichomes bearing a single or bicellular terminal cell (ill-scented), erect, openly branching to the base. Basal leaves of each monocarpic branch forming a spreading or ascending rosette, 1.4–7.0 cm long, 9.0–35.0 mm wide, spatulate, obovate, to ovate, hollylike, petiole long and narrow, glandular pubescent, the lobes and apex terminating in acerose teeth, primary veins prominent. Cauline leaves dentate to mostly entire, gradually to abruptly reduced in size and sessile to subsessile, ultimately bracteate and acerose, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes similar in length, the terminal flower with pedicel (3–)7–20 mm long, the lateral subequal to slightly shorter than the primary, (3–)6–18 mm long. Calyx shortly cylindrical to campanulate, 4.0–6.0 mm long, tube 2.0–3.1 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 2.0–3.2 mm long, acuminate. Corolla (5.0–)7.0–11.0 mm long, the upper tube white, lower tube pale blue to white, corolla glabrous externally, funnelform, the tube and throat collectively shorter than the calyx, (2.5–)3.5–5.4 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, 2.5–5.7 mm long, 2.0–3.2 mm wide, pink to magenta on both the abaxial and adaxial surface. Stamens equally to unequally inserted in the lower corolla tube and unequal in length, the free portion 1.0–2.5 mm in length, anthers 1.0–1.4 mm long, one or two anther(s) slightly exserted, others included. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous or sparsely glandular at the apex, 1.8–2.3 mm long, mature capsule 3.0–6.5(–7.0) mm long, style equal in length to the longest anther(s), papillose, stigmatic lobes 0.5–1.3 mm long. Seeds 18–24 per locule, 0.4–0.6 mm long, ovoid, roughened, not winged, reddish-brown in color, not mucilaginous when wet. 2n=18 (Day 1993*b*).

Aliciella ripleyi is restricted to limestone, usually in fissures or silty pockets on steep slopes or cliffs, occurring with *Eriogonum, Brickellia,* and/or *Atriplex confertifolia* (Torr. & Frem.) S. Watson, from 900 to 1900 m (3300–6500 ft) elevation. Flowering may begin as early as May, but generally commences in June and continues through July. In years when there is more frequent or abundant summer rainfall, flowering may continue through the summer into September or October.

Representative specimens.—U.S.A. CALIFORNIA. Inyo Co.: Titus Canyon, Grapevine Mtns., 21 June 1940, *Gilman 4262* (POM); 9.0 mi ENE Horse Thief Springs, dolomite, 3 May 1980, *Castagnoli, Nevers & Stone 110* (RSA, UCSC).—NEVADA. Clark Co.: Spotted Range, 5 mi N US Hwy 95 and 6 mi ESE Mercury, 24 August 1968, *Reveal & Holmgren 9112* (NY, US). Lincoln Co.: Meadow Valley Mtns., W side of range, 28 July 1981, *Tiehm & Williams 6735* (NY). Nye Co.: Nevada Test Site, N slope of the Specter Range, S Rock Valley Basin, 24 June 1968, *Beatley 5967* (NY, RSA, US).

ACKNOWLEDGMENTS

I thank Travis Columbus, Alva Day, Michael Donoghue, Leigh Johnson, Robert Patterson, Tim Ross, and Dieter Wilken for helpful comments and advice that greatly improved this manuscript. I also acknowledge Verne Grant, whose research (through no fault of his own) inspired and has laid the foundation for this study. This research was carried out under NSF research grant, DEB-9509121.

LITERATURE CITED

BRAND, A. 1907. Polemoniaceae, pp. 1–203. *In*: A. Engler, Das Pflanzenreich. 4 (250).

COCHRANE, S., AND A. DAY. 1994. A heterostylous *Gilia* (Polemoniaceae) from central Nevada. *Madroño* **41**: 120–127.

CRONQUIST, A. 1984. Polemoniaceae, pp. 86–155. *In*: Cronquist, A.,

A. Holmgren, N. Holmgren, J. Reveal, and P. Holmgren [eds.], Intermountain Flora: Vascular Plants of the Intermountain West, USA. Vol. 4. Subclass Asteridae (except Asteraceae). New York Botanical Garden. Bronx, New York.

DAY, A. 1993*a*. New taxa and nomenclatural changes in *Allophyllum, Gilia,* and *Navarretia* (Polemoniaceae). *Novon* **3**: 331–340.

———. 1993*b*. *Gilia,* pp. 828–836 *In*: Hickman, J. [ed.], The Jepson manual. Higher plants of California. University of California Press, Berkeley, CA.

EASTWOOD, A. 1894. *Gilia superba. Phacelia nudicaulis.* Zoe 4: 296.

GRANT, V. 1959. Natural history of the phlox family. Martinus Nijhoff. The Hague, Netherlands. 280 p.

GRAY, A. 1870. Revision of North American Polemoniaceae. *Proc. Amer. Acad. Arts* **8**: 247–282.

———. 1886. Polemoniaceae, pp. 128–151 *In*: Synoptical flora of North America, Ed 2, Vol. 1 and Supplement: 406–412. Smithsonian Institution. Washington, D.C.

GREY, W. 1982. Population and habitat studies of two endemic plants in the Gunnison River basin, Colorado. *J. Colo. Wy. Acad. Sci.* **14**: 40–45.

HENNIG, W. 1966. Phylogenetic Systematics. University of Illinois Press, Urbana, Illinois. 263 p.

JOHNSON, L. A., AND D. E. SOLTIS. 1995. Phylogenetic inference in Saxifragaceae sensu strictu and *Gilia* (Polemoniaceae) using *mat*K sequences. *Ann. Missouri Bot. Gard.* **82**: 149–175.

———, J. L. SCHULTZ, D. E. SOLTIS, AND P. S. SOLTIS. 1996. Monophyly and generic relationships of Polemoniaceae based on *mat*K sequences. *Amer. J. Bot.* 83: 1207–1224.

MARTIN, W. C., AND C. R. HUTCHINS. 1980. A flora of New Mexico. J. Cramer, Hirschberg, Germany. 2591 p.

MASON, H. L. AND A. D. GRANT. 1948. Some problems in the genus *Gilia. Madroño* **9**: 169–200.

PORTER, J. M. 1993. Phylogeny of Gilia sect. Giliandra (Polemoniaceae). Ph.D. dissertation, University of Arizona, Tucson, AZ. 327 p.

———. 1996. Phylogeny of Polemoniaceae based on nuclear ribosomal internal transcribed spacer DNA sequences. *Aliso* **15**: 57–77.

REVEAL, J. 1969. New species in *Eriogonum* and *Gilia* from southern Nevada. *Bull. Torrey Bot. Club* **96**: 476–484.

SMITH, F., AND E. NEESE. 1989. A new perennial species of *Gilia* (Polemoniaceae) from Utah, USA. *Great Basin Nat.* **49**: 461–465.

TOMMERUP, M., AND J. M. PORTER. 1996. The trouble with tetraploids. *Amer. J. Bot. Suppl.* **83**: 198.

WELSH, S. L. 1993. New taxa and new nomenclatural combinations in the Utah flora. *Rhodora* **95**: 392–421.

———, N. D. ATWOOD, S. GOODRICH, and L. HIGGINS (eds.). 1993. A Utah flora. Second Edition. Monte L. Beam Life Science Museum, Brigham Young University, Provo, Utah. 986 p.

WHERRY, E. 1945. A provisional key to the Polemoniaceae. *Bartonia*: 14–17.

WILKEN, D. H. 1979. The taxonomic status of *Gilia caespitosa* (Polemoniaceae). *Madroño* **26**: 91–95.