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**ALICIELLA, A REIRCUMSCRIBED 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 *Gilandra* 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 of the 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 *Gilandra* 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. *Gilandra* + 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,
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 pleiomorphic traits or homoplasic 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-

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**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. In both tree A and B *Linanthus* and *Gilia* sect. *Gilianstraum* 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. *Gilianstraum* is monophyletic in both ITS and *matK* analyses and is indicated in bold.

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**Table 1.** Hypothesized relationships of *Aliciella* (formerly *Gilia* section *Gilianstraum*) 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. In both tree A and B *Linanthus* and *Gilia* sect. *Gilianstraum* 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. *Gilianstraum* is monophyletic in both ITS and *matK* analyses and is indicated in bold.
bimations 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 “cobwebby 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.

**Classification**

Aliciella A. Brand.


Type species: *Gilia stenothyrsa* A. Gray.


Type species: *Gilia latifolia* S. Wats. Gilia subgen. Gilia sect.

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**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).

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 uniseriate trichomes bearing multicellular terminal glands, rarely also with uniseriate 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, cauleine 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, concolorous, 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, pericentric–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 least the longest filament); leaves holly-like, 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 exerted well beyond the corolla tube, the filaments nearly equaling or exceeding the corolla lobes, filaments inserted in the sinus of the corolla lobes or equally inserted in the corolla tube ............................. 4
   - Anthers not exerted, 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 exerted .................. 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 heterostylos, corolla pink, the veins purple, corolla tube gradually expanded .................. 13. *A. heterostyla*
   - Flowers not heterostylos, 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. penstemonoides*

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. penstemonoides*

11. Trichomes of basal leaves and stems multi-seriate, cauleine leaves generally entire, lateral branches long, the lower ones frequently longer than the primary axis, producing an open, diffuse architecture .... 2. *A. mcvickerae* (NE phase)
   - Trichomes of basal leaves and stems uniseriate, cauleine leaves pinnatifid, 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 non-glandular 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. tenais*
    - 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 southwestern 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. humilinus*

20. Flowers mostly 7.0 mm or more, magenta in color but sometimes drying blue; flowers dimorphic and populations heterostylos; 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. hutchinsisfolia
   - 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. ALCIELLA Subgenus ALCIELLA

Subgenus Aliciella is phylogenetically defined as the most recent common ancestor of Aliciella pinnatifida 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.

TYPE.—Gilia stenothyrsa A. Gray (see Grant 1959).
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.


Biennial to short-lived perennial, 10–60 cm tall, stems glandular pubescent, simple and erect but often becoming thrysoid 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 ⅜ 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 deciliate 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 gravely 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, deciliate another 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.


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


Biennial to short-lived perennial, 15–70 cm tall, stems glaucous, glabrous to sparsely and coarsely glandular pubescent with multiserial 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, glundlar, the lobes ½ 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 ovate 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, exerted, filaments declimate 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 calcarata 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 5989nm); 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 calcarata. 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 isolecotypes.


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


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, cymeose-paniculate, 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 oblomondglandular, 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.


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 thyroid 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 ½ or less than 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 declimate 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.


Biennial (or short-lived perennial?), from a stout taproot, 15–60 cm tall, stems glandular pubescent, simple and erect, thyroid 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 trifold, glandular puberulent. Inflorescence usually elongate, more or less dense, virgate, thyroid, cymose-paniculate, 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 ½ or less than 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.

*Aliiella 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, and Duchesne Counties, Utah and Mesa and Rio Blanco Counties, Colorado. Anthesis occurs from May through June (rarely continuing into July).


**B. Section Aliiella**


Section *Aliiella* is phylogenetically defined as the most recent common ancestor of *Aliiella 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; floribus magnis et conspicuis; seminibus 1.5–2.0 mm longis. Typus subsectionis Aliiella subnuda.*

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

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

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


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-panicled, 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 ½ or less the length of the calyx. Cor­olla 11.0–26.0 mm long, rose-purple, magenta, pink­lavrden, to more rarely blue, corolla glabrous, glandular below the sinuses or entire tube glandular exter­nally, narrowly funneliform-salverform; the tube much longer than the calyx, 8.0–17.5 mm long, lobes oval to oblong-ovate (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!].

*Aliiella 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, oak­mountainbrush 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. *Aliiella 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. ALICIHELLA HAYDENII (A. Gray) J. M. Porter subsp. HAYDENII.


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 cuspitate 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 Lote, 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.


6b. ALICIHELLA haydenii subsp. crandallii (Rydby.) J. M. Porter, comb. et stat. nov.


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 cuspitate 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.


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


Long-lived monocarpic perennial, from a branched, woody caudex, 5–15 cm tall, stems sparingly 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 non-glandular 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 353* 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 353 (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.


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, spathulate 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

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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 purported 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 isolecotypes 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 misidentifications 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*.


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 ob lanceolate, 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 cylin drical 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 vermilion, 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. Stamina 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 oblalongoid, 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 pinesmanzanita 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).


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


Short to long-lived monopercarp 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. Stamina 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, mature capsule 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).


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.

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, oblancoleate 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 cylindric to campanulate often anthocyanic, 1.5–4.0 mm long, tube 1.0–3.0 mm long at anthesis, glandular with uniseriate 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 purple or pale and streaked with purple, co­rolla of the corolla tube narrowly funnel-shaped, 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 flowering 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 mucilaginous when wet. 2n=18 (Grant 1959; Day pers. comm.).

Sandy or gravelly slopes and flats, dunes, washes, and roadsides, rarely volcanic ash; associated with Ju­niperus-Buttonia, 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.


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


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 funnelliform; the tube much longer than the calyx, (3.0–)4.0–8.0 mm long, lobes lance-elliptic to oblancocele, 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 exerted. 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 mm long, 0.5–1.5 mm wide. This species 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.


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, cuspitate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicled, the distal branching symподial, pedicels of cymes dimorphic, the terminal flower subsessile to short pedicelled, the lateral pedicle (if present) to 6.0 mm long. Flowers distyloous (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-violaceous to white with pink-violet streaks, with five yellow-green bilobed spots at the orifice, glabrous, funneliform, 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 exerted 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, exerted 3.5–5.5 mm above the orifice, style of thrum flowers 4.0–7.5(–9) mm long, not exerted 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, exerted 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*, *Tetradynamia 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.


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 funnel-form, 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 sinus 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 oblongloid, 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.

*Gilia 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 isolecotype.
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 1999), 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 (1993a) 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 priority 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 (1993a, 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 (1993a, b). Because chromosome counts of "Gilia subacaulis" are diploid (n = 8—Day 1993b; 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 1993a, b; see figures in Day 1993a: 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 phylogetic 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 NW4, Fishlake Valley Drainage, 8 May 1986, Morefield & McCarty 3606 (RSA, BRY); White Mtns, mouth of Furnace Cr., 0.7 mi N80W of Wildhorse BM 5448, T4S, R36E, S33, Fishlake Valley Drainage, 14 May 1987, Morefield, Liston & Meully 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 Co.: National Reactor Testing Station, T1N, R28E, At Webb Spgs. on the N side of Big Butte, 24 May 1967, Arwood 839 (BRY); JEFFERSON Co.: National Reactor Test Station, T5N, R34E, Tractor Flat, S of Mud Lake, 20 June 1967 Arwood 989 (BRY); OWYHEE Co.: ID51, 13.5 mi S of Bruneau, T8S, R5E, S19, 31 May 1971, Holmgen & Holmgen 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) E7W of Currie and Pass, adjacent to Dolly Varden turnoff, T28N, R67E, S26, 2 June 1984, Holmgen & Holmgen 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 Co., T18N, R48E, S16, 6 June 1978, Goodrich 11326 (BRY); LINCOLN Co.: N25, Tikaboo Valley, 21.6 mi from jet. with US93, 17° W of Ash Spg., T5S, R58E, S29, 18 May 1975, Holmgen & Holmgen 8006 (BRY); MINERAL Co.: Rough Creek Rd. (Forest Rd 028) between Hawthorne & Bridgeport, jet. of rd to China Camp, ca 1 mi W of Nine Mile Ranch, W of Fletcher, T6N, R27E, S9, 11 June 1960, Ertter & Strachan 3683 (BRY); NEVADA. 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); WASHOE Co.: Snake Range, Humbold Nat. For., Murphy Wash, 4 mi above mouth, T10N, R65E, S2, 24 June 1964, Holmgen & 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, Arwood & 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 & Henroid 16747 (BRY); KANE Co.: ca 33 mi SW of Glen Canyon City, on Cedar Mtn Rd., T43S, R2E, ca 21, 12 June 1971, Arwood, 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 & Arwood 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); UT Co.: 1.4 mi above Mill Fork, 2 Aug. 1935, Mason 6568 (BRY); WAYNE Co.: Caineville Wash Rd., NW of jct w/U22, Carl's Reservoir, 10 June 1973, Harrison 1007 (BRY); T29S, R12E, S 33, Burr Desert, near


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, cuspidate or mucronate. Cauline leaves densely uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly or flattened rosette, mm wide, spatulate, obovate, oblanceolate to lanceolate, dentate to pinnately lobed, the segments entire or toothed, spreading to somewhat arrostrate, 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-paniculate, 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 than 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 1993a; 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. leptotermia_ 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 (1993a, b; pers. comm.) of 2n= 32 (= 4x= 8y8), 2n= 34 (= 4x= 8y8+9y), and 2n= 50 (= 6x= 8y8+9y+19y), 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. leptotermia_, _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.


16. _Aliciella micromeria_ (A. Gray) J. M. Porter, comb. nov.

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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 rachis, glandular pubescent to glabrous, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly diffusely branching, cymose-panicle, the distal branches to the narrow rachis, glandular pubescent to glaucous, sympodial, pedicels of cymes only slightly dimorphic, the terminal flower short to long-peduncled, 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, 1.8–3.5 mm long, tube 0.5–1.5 mm long at anthesis, glandular, the lobes and apex acute to rounded, cuspidate to obtuse. Nectary an undulate disc at the base of the ovary.

Pel, mature capsule 1.6–2.5 mm long, style equal in length to the anthers, stigmatic lobes 0.1–0.6 mm long. 2n=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*.


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-paniculate, the distal branching symподial, pedicels of cyms only slightly to distinctly dimorphic, the terminal flower short to long-peduncled, 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, 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 ob lanceolate, 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 1993b).

Occurring on sandy to gravelly saline flats, on lake margins, alkaline wetlands and vernal sinks, Alici ella 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.

Alici ella 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 ob lanceolate 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, Sec. 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 Sec. 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, Sec. 28, 28 May 1972, Pierce 1854 (UTSU); Lincoln Co.: Rd from Rose Valley to Deer Lodge Canyon, T1N, R69E, Sec. 22, 10 June 1981, Williams & Tiehm 81–34–5 (UTC, BRY). Nye Co.: 0.7 mi N of Hwy 6, Railroad Valley, T8N, R55E, Sec. 10, 28 May 1978, Williams &


Annual to more often winter annual, with a taproot, 3–15(–25) cm tall. Stems glandular pubescent with uniseriate viscous 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, ob lanceolate to narrowly lanceolate, often 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, cymo 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 ob lanceolate, 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 1993b).

Alici ella triodon, the type species of Alici ella, occurs in open areas of sandy or gravelly flats and slopes, associated with juniper, pinyon-juniper, sagebrush, and shad scale communities, at 1200–2100 m (4000–7000 ft) elevation.
ft) elevation. This species is found scattered from southeastern California, through Nevada, Utah, northern Arizona, to Colorado (and reported from northwestern New Mexico [Day 1993b]). 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.


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


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.


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, oblongate 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, cyrpose-paniculate, in 2-flowered cymes (or in subsp. imperialis reduced to 1-flowered and branching sympodial), pedicles of cymes of similar length, the terminal flower long pedicelled, 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 cylinrical to campanulate often anathocyanic 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 funneliform, 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 oblongate, 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, papilllose, 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 1993b).
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, holly like 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 and Nevada Co., Utah

1a. Calyx 2.5–4.8 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.).

1b. Aliciella latifolia (S. Watson) J. M. Porter subsp. latifolia.


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, 0.5–7.50 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-paniculate, 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. Stamina 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.


1b. Aliciella latifolia subsp. imperialis (S. L. Welsh) J. M. Porter, comb. nov.


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, 0.5–7.00 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-paniculate, in 2-flowered cymes, more frequently reduced to one flower and branching sympodial, pedicels of cymes of similar length, the terminal flower long pedicelled, 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 except in the mid to lower corolla tube, filaments of unequal length, 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), papilllose, 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 1993b).

_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.


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LITERATURE CITED


