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ALICIELLA, A RECIRCUMSCRIBED GENUS OF POLEMONIACEAE

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ABSTRACT

Recent phylogenetic analyses within Polemoniaceae have provided evidence that the current circumscription of Gilia recognizes and gives taxonomic status to a polyphyletic assemblage of species. As a first step in rectifying this problem, the genus Aliciella Brand (Polemoniaceae) is resurrected and recircumscribed to include Gilia section Giliandra and Gilia subgenus Gilmania sensu Mason & Grant, a monophyletic (=holophyletic) group as here described. Twenty-one recombinations are proposed: Aliciella cespitosa, A. formosa, A. haydenii, A. haydenii subsp. crandallii, A. heterostyla, A. humillima, A. hutchinsifolia, A. latifolia, A. latifolia subsp. imperialis, A. leptomeria, A. lottiæ, A. mcvickeræ, A. micromeria, A. nyensis, A. pentsteemonoïdes, A. pinatifida, A. ripleyi, A. sedifolia, A. stenothyrsa, A. subdivida, 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 those segregate genera, except Aliciella. Even so, Gilia remains in disarray—confusing and polyphyletic.

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

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

The recognition of monophyletic groups in classification has considerable advantage over other types of groups (paraphyletic or polyphyletic). In particular, monophyletic groups accurately and unambiguously reflect patterns of common ancestry that are the product of evolutionary diversification. That is, all of the members of a monophyletic group share a unique,
common ancestor, not shared by any species outside of that group and include all of the descendants of that ancestor (Hennig 1966). If character evolution is an important consideration, monophyletic groups are needed to accurately provide the context for evaluation of character change and the frequency of character evolution. Gilia is unfortunately not monophyletic. Because Gilia is polyphyletic as currently circumscribed, the only characters that distinguish it are either pleisiomorphic traits or homoplastic features (Porter 1993; Johnson and Soltis 1995), rather than homologous characters (synapomorphies).

MATERIALS AND METHODS

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

RESULTS AND DISCUSSION

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

An alternative to expanding Gilia is to recognize the unrelated lineages, previously referred to as Gilia, as either segregate genera or members of other currently recognized genera with which they share recent common ancestry. This is the more desirable of the two options. Such a course will result in minimal nomenclatural change and potential confusion, while also maximizing the information content of the classification. It is my purpose to reassign Gilia section Giliastrum, 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 Giliastrum) within Polemoniaceae, deduced from nuclear ribosomal internal transcribed spacer-ITS and chloroplast matK DNA sequences. The trees presented display as resolved only those clades that each of the two data sources unambiguously support. The ITS tree (A.) is derived from Porter (1996) and is taken from the strict consensus of the set of 1080 most parsimonious trees. The matK tree (B.) is derived from Johnson et al. (1996) and represents the strict consensus of three most parsimonious trees from their matrix two. In both tree A and B Linanthus and Gilia sect. Giliastrum are not monophyletic, falling into two and three clades, respectively. The multiple clades are denoted with Roman numerals. The asterisks denote terminal taxa that were not monophyletic (=holophyletic) in both Johnson et al.’s and Porter’s strict consensus trees. Gilia sect. Giliastrum is monophyletic in both ITS and matK analyses and is indicated in bold.
combinations 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 Gillas. 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 gillas.” 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 calcarea* M. E. Jones.


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 hololycly, the teeth aristate; pollen yellow (Subgenus *Giliania*) ..................................................... 2

2. Plants perennial; internal and external corolla lobe (adaxial and abaxial surfaces) similar in color, magenta 20. *A. ripleyi*

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

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

5. 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

6. 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

7. Filaments free from corolla tube at about mid-tube length, not evenly inserted; basal leaves with only glandular trichomes .................................................. 14

8. Seeds 1.5–2.0 mm long, plants biennial to perennial, rarely flowering the first year (Sect. *Aliciella*, Subsect. *Subnuda*) .................................................. 13

9. Seeds 0.5–0.9 mm long, plants annual (Sect. *Aliciella*, Subsect. *Aliciella*) .................................................. 17

10. Plants free from corolla tube at about mid-tube length, not evenly inserted; basal leaves with only glandular trichomes .................................................. 14

11. Anther not evenly inserted; basal leaves with only glandular trichomes in addition to glandular trichomes .................................................. 16

12. Filaments free from corolla lobes, or if free in the upper part of the corolla tube, then evenly inserted; basal leaves with crisp, white non-glandular trichomes .................................................. 16

13. Filaments free from 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. tenuis*

15. Corolla crimson (some herbarium mounts fading to yellow) .................................................. 15

16. Plants with a much-branched woody caudex; leaves linear and entire; restricted to southwestern New Mexico ............ 7. *A. formosa*

17. 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*

18. 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*

19. Plants with a much-branched woody caudex; leaves linear and entire; restricted to southwestern New Mexico ............ 7. *A. formosa*

20. 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*

21. Plants with a much-branched woody caudex; leaves linear and entire; restricted to southwestern New Mexico ............ 7. *A. formosa*

22. 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*
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

- Corolla glabrous externally .................................................................................. 14. A. leptomeria
- Corolla with glandular trichomes ................................................................. 11. A. hutchinsifolia

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. ALICIIELLA Subgenus ALICIIELLA

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

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

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.


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

Biennial to short-lived perennial, 10–60 cm tall, stems glandular pubescent, simple and erect but often becoming thyrsoid or diffusely branching in flower. Basal leaves forming a rosette, once-pinnatifid, 1.4–7.0 cm long, the rachis 1–2.5(−3.5) mm wide, the segments, 8–18, linear to narrowly oblong, entire to rarely lobed, glandular puberulent, usually with 2-celled barrel-shaped trichomes, to glaucous, cuspidate or mucronate. Cauline leaves gradually reduced in size, ultimately entire, bifid to trifid, 8–20 mm long, glandular puberulent. Inflorescence cymose-paniculate, ultimately becoming symподial, 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, exerted, filaments often declinate and sternotribal. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 2.5–5.0 mm long. Seeds 1–several per locule, ca. 1.5 mm long, lenticular to angular, narrowly and often incompletely winged. 2n=16 (Grant 1959).

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

This species is characterized by deeply pinnatifid leaves in a dense basal rosette, an open inflorescence, and blue to white corollas that appear somewhat bilaterally symmetric due to the exserted, declinate 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 multiseriate to uniseriate glandular trichomes, less commonly finely glandular, simple and erect but usually becoming diffusely branching to the base. Basal leaves forming a rosette, entire to once-pinnatifid, 1.5–8.0 cm long, the rachis 1–3.5(–4.0) mm wide, the segments, 8–18, linear to obovate, 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, glabular, 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 oval to orbicular 3.0–5.0 mm long. Stamens affixed in the upper tube, the free portion nearly as long as the fused portion, anthers 0.7–1.8 mm long, exerted, filaments declimate or not. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblanceolate, 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 glaucous, 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 flares slightly at the orifice and the lobes erect and not widely spreading, whereas, *A. pinnatifida* has a corolla tube that does not flair toward the orifice and the lobes are widely spreading (ca 90° relative to the tube). Molecular phylogenetic analyses (Porter 1993) support that *A. mcvickerae* is the earliest diverging species of section *Giliandra*, possibly a paraphyletic assemblage of populations,
representing the remnants of a once ancestral species of subgenus Aliciella; however, such an interpretation must be viewed with skepticism. The apparent paraphyly may be either an artifact of past and current patterns of introgression between members of this alliance or may be the result of lineage sorting of an ancient polymorphism in the gene used to infer relationships. Morphological evidence may support hypotheses involving introgression. For example, populations around the type locality of Gilia calcarea and south to the region around Dinosaur National Monument, Utah, referred to in the key as the “NE phase,” possess characteristics (e.g., densely glandular basal leaves, more compact inflorescences, larger corollas) somewhat intermediate with A. stenothyrsa. DNA sequence data (Porter 1993; unpubl.) were used to infer a closer relationship between this “NE phase” of A. mcvickerae and A. stenothyrsa, than to other populations of A. mcvickerae.

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

A somewhat similar situation exists with the original description of Gilia calcarea. Jones provides a collection locality and a date but does not cite a collection number (or collector, although the collector presumably would have been Jones). Many mounts were found at various herbaria of an unnumbered Jones collection from Green River, 23 June 1896. Many of these mounts (but not all) also bear the word “type.” Two duplicates are found at POM. Of all of these duplicates only one possesses a collection number (Jones 10072; hand written by Jones). The POM mount of Jones 10072 is here designated as the lectotype; the other specimens, designated as types by Jones, are 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 thyroid 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, thyroid, cymose-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 oblongoid, glabrous, ca. 1.6 mm long and 1.1 mm wide at the base, the style 3.0–4.2 mm long, stigmatic lobes ca. 0.5 mm long, mature capsule 3.0–6.5 mm long. Seeds 1–5 per locule, ca. 1.5 mm long, lenticular to angular, narrowly winged.

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

This very rare species of Aliciella is currently known from two locations. Following the type collection, this species was not collected for 102 years, until 1995. Due to the infrequency of collection, A. sedifolia has long been ignored or considered to be an aberrant form of A. pinnatifida. Examination of the type as well as a recent collection verifies that it is morphologically distinct from other members of the Pinnatifida Alliance. Recent molecular phylogenetic analyses provide evidence that the A. sedifolia lineage shares common ancestry with A. pinnatifida and A. penstemonoides (Porter unpubl.). This very distinctive species is char-
acterized by its simple, entire, terete, succulent, sedum-like leaves, small stature, and dark blue corollas with lobes longer than the tube.

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


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


**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 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, exerted, filaments decline and sternovertical. 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.


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


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 trifid, 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 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 locale, 1.5–2.2 mm long, oblong-lenticular to angular. 

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


B. Section *Aliciella*


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

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

*Herbae biennes vel brevivientes perennes; foliis integris vel pin- natifidis; florisbus magnis et conspicuis; seminibus 1.5–2.0 mm longis. Typus subsectionis Aliciella subnuda.*

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

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


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 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 cyme-panicle, the flowers mostly crowded at the tips of the branches. Calyx cylindrical to campanulate, 2.5–7.2 mm long, tube 1.9–4.5 mm long at anthesis, glandular, the lobes ½ or less the length of the calyx. Corolla 11.0–26.0 mm long, rose-purple, magenta, pink-lavender, to more rarely blue, corolla glabrous, glandular below the sinuses or entire tube glandular externally, narrowly funnel-form-salverform; the tube much longer than the calyx, 8.0–17.5 mm long, lobes oval to oblongate (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 locale, 1.5–3.0 mm long, fusiform to angular, narrowly and often incompletely winged. 2n=16 (Grant 1959—cited as *Gilia subnuda*; R. Spellenberg—herbarium voucher with camera lucida, *Spellenberg & Corral 8184* [RSA, NMSU!, NY!]. There is a report of 2n=18 from San Juan County, New Mexico, D. Ward—herbarium voucher with camera lucida, *Spellenberg, Ward & Collyer 6137* [NMSU!, NY!]).

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

Two subspecies are recognized. *Aliciella haydenii* subspecies *haydenii* occurs at slightly lower elevation clay badlands, associated with the San Juan and Dolores River valleys. Although generally a biennial or short-lived perennial, populations of subspecies *haydenii* commonly possess individuals that will flower the first year and die, functioning as an annual. The remaining race is *A. haydenii* subspecies *crandallii*, a somewhat more robust form, occurring on exposed slopes and badlands at higher elevation. Although few chromosome counts are available, there is a potential distinction between these two taxa based on chromo-
some number. Two counts of subsp. *crandallii* are $2n=16$; however, a count for subspecies *haydenii* is reportedly $2n=18$. The two subspecies are morphologically distinguished by traits described in the following key:

1. Corolla 17–26 mm, the lobes 6–9 mm long, corolla tube glandular externally; corolla drying to a pink color; plants primarily of higher elevation pinyon-juniper, oak woodlands and Ponderosa pine ............... subspecies *crandallii*

   - Corolla 11–20 mm, the lobes 3.5–5.5 mm long, corolla tube glabrous or only a few glands externally at the point where the filaments are attached; corolla generally drying dull blue (except some populations along the Dolores River); plants primarily of lower elevation pinyon-juniper, saltbush and desert scrub communities ............... subspecies *haydenii*

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


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 cymos-panicale, 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 exerted. Styles variable in length, ranging from well exerted 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. **ALICIELLA HAYDENII** subsp. **crandallii** (Rydb.) 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 cymos-panicale, 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 oblongoid (5.0–9.0 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 approached 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 sparsely and coarsely glandular pubescent with uniseriate glandular trichomes, erect and more or less openly branching above the middle. Basal leaves forming a rosette, entire, linear, 1.0–4.5 cm long, 1–1.5 mm wide, glandular and crisp puberulent with white, uniseriate 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-paniculate, 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 oblongoid, 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, southwestern, 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).


Biennial to short-lived monocarpic perennial, from a few-branched, caudex, 15–60 cm tall, stems usually densely glandular pubescent with uniseriate glandular trichomes, erect, solitary, openly branching above the middle, sometimes to the base. Basal leaves forming a compact rosette, spatulate to broadly oblongoid, 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-paniculate, 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, longer than the stamens. Seeds (3-)5-11 per locule, fusiform to angular, narrowly and often incompletely winged.

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

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

graph (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-cespitose, 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 cylindrical to campanulate often anthocyanic, 4.0–5.7 mm long, tube 2.2–4.0 mm long at anthesis, glandular, the lobes 1.5–3.8 mm long. Corolla 14.8–23.0 mm long, scarlet to 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 oblongate, acute to rounded, 3.8–6.9 mm long, 3.0–4.8 mm wide. Stamens 5, unequally inserted in the upper tube (well below the sinuses of the corolla lobes), the free portion 0.5–1.3 mm in length, anthers 1.2–2.1 mm long, several included and 2 or 3 slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, mature capsule 3.0–5.5 mm long, style length 9.0–11.0 mm, at the same position as the anthers. Seeds (3–)5–11 per locule, 3.5–4.5 mm long, fusiform to angular, narrowly and often incompletely winged, slightly mucilaginous when wet. 2n=16 (Wilken 1979).

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


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


Short to long-lived monocarpic perennial, somewhat pulvinate-caespitose, with a taproot and multibranched, woody caudex, 5–26–(35) cm tall. Stems usually densely glandular pubescent with unicellular 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, oblongate to spatulate, acute to obtuse, 4.0–7.0 mm long, 3.0–5.5 mm wide. Stamens unequally inserted, 3 in the upper tube (below the sinuses of the corolla lobes) and 2 affixed at nearly the middle of the tube, the free portion 1.5–3.2 mm in length, anthers 1.5–2.5 mm long, included to slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 2.0–3.0 mm long, mature capsule 2.6–3.5 mm long, style length variable, included and shorter than the stamens to exserted and somewhat longer, stigmatic lobes 0.5–0.8 mm long. Seeds (1–)3–9 per locule, 1.5–2.5 mm long, fusiform to angular, narrowly and often incompletely winged, slightly mucilaginous when wet. 2n=16 (Smith and Neese 1989).

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


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.


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, ob lanceolate to lanceolate, deeply pinnatifid, the segments again cleft or toothed, rachis narrow, glandular pubescent, the lobes and apex acute to rounded, cupulidate 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 pedicelled, the pedicel to 2.0 mm, the lateral pedicel (if present) to 17.0 mm. Calyx shortly cylindrical to campanulate often anthocyanic, 1.5–4.0 mm long, tube 1.0–3.0 mm long at anthesis, glandular with uniseriate trichomes bearing multicellular terminal glands, the lobes slightly thickened, 0.5–1.0 mm long. Corolla (3.0–)5.0–14.0 mm long, white to lavender or pale magenta, the upper tube (throat) 0.5–2.0 mm long, anthers (5.0-)7.0–14.0 mm long at anthesis, glandular with trichomes bearing multicellular terminal glands, the lobes 0.5–1.5 mm long. Nectary an uniseriate multicellular glandular capsule, the lobes and apex acute to rounded, cupulidate or mucronate. Ovary oblongoid, glabrous, much longer than the calyx, 1.0–3.0 mm long, style equal in length to the anthers, stigmatic lobes 0.5–1.0 mm, the free portion 0.5–1.0 mm wide, spatulate, obovate, ob lanceolate to lanceolate, deeply pinnatifid, the segments again cleft or toothed, rachis narrow, glandular pubescent, the lobes and apex acute to rounded, cupulidate 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 pedicelled, the pedicel to 2.0 mm, the lateral pedicel (if present) to 17.0 mm. Calyx shortly cylindrical to campanulate often anthocyanic, 1.5–4.0 mm long, tube 1.0–3.0 mm long at anthesis, glandular with uniseriate trichomes bearing multicellular terminal glands, the lobes slightly thickened, 0.5–1.5 mm long. Corolla (3.0–)5.0–14.0 mm long, white to lavender or pale magenta, the upper tube (throat) 0.5–2.0 mm long, anthers (5.0-)7.0–14.0 mm long at anthesis, glandular with trichomes bearing multicellular terminal glands, the lobes 0.5–1.5 mm long. Corolla (5.0–)7.0–14.0 mm long, pink to magenta, the.
upper tube yellow or yellowish, lower tube pale pink or white, corolla glabrous externally, broadly funnelform; the tube much longer than the calyx, (3.0–)4.0–8.0 mm long, lobes lance-elliptic to oblanceolate, acute to rounded or erose, 2.0–6.2 mm long, 1.5–5.5 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 2.2–6.5 mm in length, anthers 0.6–0.9 mm long, strongly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 1.5–2.5 mm long, mature capsule 2.5–4.5 mm long, style equal in length to the anthers, stigmatic lobes 0.8–1.2 mm long. Seeds 4–12 per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, golden brown to tan in color, not mucilaginous when wet. 2n=16 (Day pers. comm.), 18 (Reveal 1969).

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


Annual or winter annual, with a taproot, 3–15 cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 0.5–8.0 cm long, 2.0–13.5 mm wide, spatulate to lanceolate, deeply pinnatifid, the segments again cleft or toothed, rachis narrow, glandular pubescent, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-paniculate, the distal branching sympodial, pedicels of cymes dimorphic, the terminal flower subsessile to short pedicelled, the lateral pedicel (if present) to 6.0 mm long. Flowers distylos (pin and thrum morphs). Calyx shortly cylindrical to campanulate often ancytocan, 2.0–3.5 mm long, tube 1.0–2.5 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 0.5–1.5 mm long. Corolla (5.0–)7.0–15.0 mm long, pink-violet to white with pink-violet streaks, with five yellow-green bilobed spots at the orifice, glabrous, funnelform, somewhat constricted just above mid-tube; the tube much longer than the calyx, (3.0–)5.0–9.0 mm long, lobes broadly ovate to oblanceolate, acute to rounded, 3.0–6.5 mm long, 4.0–6.0 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion either 0.6–1.0 mm in length (pin flowers) or 3.0–5.0 mm long (thrum flowers), anthers 0.6–0.9 mm long, well 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

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

* Aliciella heterostyla* is found on deep alluvial sands and volcanic soils of valleys and slopes, associated with *Atriplex canescens*, *Chrysothamnus greenei*, *Tetradymia glabrata*, *Psorothamnus polydendius*, 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.


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


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 pedicelled, 2.5–5.5 mm, the lateral (if present) to 14.0 mm long. Calyx shortly cylindrical to campanulate often anthocyanic, 2.0–3.5 mm long, tube 1.1–2.8 mm long at anthesis, glandular with uniseriate trichomes bearing a uni- or multicellular terminal gland, the lobes 0.5–1.2 mm long. Corolla (3.0–)4.5–9.0 mm long, white to lavender, the upper tube white, yellowish or bearing 5 pale yellow spots, lower tube white, corolla glabrous externally, narrowly funnelform, somewhat constricted just above mid-tube, but conspicuously flaring toward the orifice; tube much longer than the calyx, (2.0–)3.0–6.2 mm long, lobes lance-elliptic to oblanceolate, or more or less truncate with a cuspidate tip, 1.2–3.0 mm long, 1.5–2.2 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.2–1.0 mm in length, anthers 0.3–0.9 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous, 1.0–2.0 mm long, style 2.2–4.5 mm, equal in length to the anthers, stigmatic lobes 0.3–0.7 mm long, mature capsule 3.0–4.8 mm long, ovoid to oblongoid, equal to or longer that the fruiting calyx. Seeds 7–12 per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, golden brown to tan in color, not mucilaginous when wet. $2n=16$ (Day 1993b; Grant 1959—cited as *Gilia micromeria*), 34 (Day 1993b), 36 (Day 1993b).

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

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


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-ciliate cell (often with sand grains adhering), erect, openly late, dentate to pinnately lobed, the segments entire or glandular puberulent, gradually to abruptly reduced in size, ultimately bracteate, glandular pubescent. Inflorescence open, diffusely branching, cymose-paniculate, ultimately bracteate, glandular pubescent. Flowers in a solitary racemose to short, pedate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular pubescent. Corolla longer than the calyx, lance-elliptic to narrowly oblanceolate, acute, 1.5–2.5 mm long, ovate, 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 pinon-juniper communities, at 400–2100 m (1300–7000 ft) elevation. It appears on the eastern slopes of the Sierra Nevada to the Modoc Plateau in California, eastern Oregon, southeastern Washington, southern Idaho, western Utah, and northwestern Arizona. Flowering begins in March in the southern extent of the range, and continues through June in the higher elevations in the north.

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


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, brous, the lobes and apex acute to rounded, cuspidate branching to the base. Basal leaves forming a spreading rosette, 0.5–20.0 mm wide, spatulate, obovate, oblongate 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 en- 

gles 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, 0.5–1.5 mm long at anthesis, glandular, the lobes lavender or pale magenta, the upper tube pale yellow, sometimes slightly erose, 0.8–1.4 mm long, 9.0–12.0 mm in length, anthers 0.6–0.9 mm long, ovoid, yellow, lower tube pale cream or streaked with purple, lower tube lance-elliptic to oblanceolate, acute to obtuse, slightly exserted. Nectary an undulate disc at the insertion at the sinuses of the corolla lobes, the free base of the ovary.

Seeds 1–5(–6) per locule, 2.0–4.0 mm long, the lateral (if present) to 0.6–0.9 mm long, ovoid, roughened, not winged, not mucilaginous when wet. 2n=18 (Day 1993b).

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

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

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


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


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, oblongate to lanceolate, deeply pinnatifid, the segments narrow, spreading at right angles to the narrow rachis, glandular pubescent to glabrous, the lobes and apex acute to rounded, cuspidate or mucronate. Cauline leaves pinnatifid to mostly entire, gradually to abruptly reduced in size, ultimately bracteate, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicle, the distal branching sympodial, pedicels of cymes only slightly to distinctly dimorphic, the terminal flower short to long-pedicelled, 1.2–4.0 mm long, the lateral (if present) to 8.0 mm long, spreading to arcuate. Calyx shortly cylindrical to campanulate, often anthocyanic, 1.8–3.5
mm long, tube 0.5–1.5 mm long at anthesis, glandular, the lobes 1.0–2.0 mm long. Corolla (3.0–)3.7–7.0 mm long, white to lavender or pale magenta, the upper tube pale yellow, lower tube pale cream or streaked with purple, corolla glabrous externally, ± salverform, somewhat constricted just above mid-tube; the tube distinctly longer than the calyx, (2.0–)2.7–5.0 mm long, lobes more or less truncate with a cuspidate tip, sometimes grading to lance-elliptic or oblanceolate, 0.8–1.8 mm long, 0.5–1.5 mm wide. Stamens equally inserted at the sinuses of the corolla lobes, the free portion 0.3–1.0 mm in length, anthers 0.6–0.9 mm long, slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblong, glabrous, 0.5–1.0 mm long, approximately 7–10 ovules per carpel, mature capsule 2.0–3.5 mm long, style equal in length to the anthers, stigmatic lobes 0.1–0.6 mm long. Seeds 1–5(–8) per locule, 0.6–0.9 mm long, ovoid, roughened, not winged, not mucilaginous when wet. 2n = 36 (Day 1993b).

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

Aliciella humillima is very similar in architecture and general appearance to A. micromeria and the two have been collected sympatrically. They can be distinguished by the long corolla tube with little flaring to 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).


Annual to more often winter annual, with a taproot, 3–15(–25) cm tall. Stems glandular pubescent with uniseriate viscid trichomes bearing a single terminal cell (often with sand grains adhering), erect, openly branching above, generally branches filiform. Basal leaves forming a spreading or flattened rosette, 0.5–3.5 cm long, 0.3–9.0 mm wide, spatulate, obovate, 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, cymose-panicule, 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 locale, 0.6–0.9 mm long, ovoid, roughened, not winged, not mucilaginous when wet. 2n = 18 (Day 1993b).

Aliciella triodon, the type species of Aliciella, occurs in open areas of sandy or gravelly flats and slopes, associated with juniper, pinyon-juniper, sagebrush, and shadscale communities, at 1200–2100 m (4000–7000
ft) elevation. This species is found scattered from southeastern California, through Nevada, Utah, northern Arizona, to Colorado (and reported from northwestern New Mexico [Day 1993b]). Flowering may begin as early as late April and continues through June.

There has been a long-standing confusion between AlicieUa 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. ALICIEUa Subgenus Gilmania (Mason & A. Grant) J. M. Porter, comb. nov.


Subgenus Gilmania is phylogenetically defined as the most recent common ancestor of AlicieUa 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, ob lanceolate 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, cy­ mose-panicle, in 2-flowered cymes (or in subsp. imperialis reduced to 1-flowered and branching sympodial), pedicels of cymes of similar length, the terminal flower long pediceled, 5.0–16.0 mm long, the lateral only slightly shorter, 3.0–7.0 mm long. Calyx 2.8–6.9 mm long, shortly cylindrical to campanulate often an­ thoxyanic on lobe margins, tube 1.3–3.2 mm long at anthesis, glandular with trichomes bearing a multicel­ lular 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 exter­ nally, broadly funnelform, narrowest at the base of corolla tube, the tube equal to or only slightly longer than the calyx, (3.0–)3.4–5.5 mm long, lobes lance­ elliptic to oblanceolate, acute to rounded, 1.0–4.5 mm long, 0.6–2.2 mm wide. Stamens 5, subequally inserted in the mid to lower corolla tube, filaments of unequal lengths, the free portion 0.8–3.3 mm in length, papilllose below the anthers, anthers 0.5–0.9 mm long, one anther slightly exserted. Nectary an undulate disc at the base of the ovary. Ovary ovoid to oblongoid, glabrous or sparsely glandular at the apex, 1.8–2.5 mm long, mature capsule 3.0–7.0 mm long, style subequal in length to the anthers, papillose, 1.6–3.0 mm long, stigmatic lobes 0.4–1.2 mm long. Seeds 17–28(–32) per locule, 0.6–0.9 mm long, ovoid, roughened, red­ brown in color, not winged, not mucilaginous when wet. 2n=36 (Grant 1959; Day 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, hollylike leaf morphology, small pink flowers, and minute reddish-brown seeds. Two subspecies are recognized, distinguished by the characters described in the following key (after Welsh 1993):

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

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


Annual to more often winter annual, with a taproot, 3-22(-26) cm tall. Stems glandular pubescent with long uniseriate viscid trichomes bearing a single terminal cell (strongly scented), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.4-12.0 cm long, 0.5-75.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, hollylike, petiole long and narrow, glandular pubescent, the lobes and apex acute with aristate teeth. Cauleine leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate and acerose, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicale, in 2-flowered cymes, 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 (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 lower 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. Stamen subequally inserted in the mid to lower corolla tube, filaments of unequal lengths, papilllose below the anthers (particularly the longer filaments). Capsule (4.5-)5.2-7.0 mm long.


Annual to more often winter annual, with a taproot, 3-32(-40) cm tall. Stems glandular pubescent with long uniseriate viscid trichomes bearing a single terminal cell (strongly scented), erect, openly branching to the base. Basal leaves forming a spreading or ascending rosette, 1.4-12.0 cm long, 0.5-70.0 mm wide, spatulate, obovate, oblanceolate to lanceolate, hollylike, petiole long and narrow, glandular pubescent, the lobes and apex acute with aristate teeth. Cauleine leaves dentate to mostly entire, gradually to abruptly reduced in size, ultimately bracteate and acerose, glandular puberulent. Inflorescence open, diffusely branching, cymose-panicale, in 2-flowered cymes or 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 anthocyamic on lobe margins, tube 1.5–2.8 mm long at anthesis, glandular with trichomes bearing a multicellular terminal cell, the lobes 1.0–2.0 mm long. Corolla 4.0–10.0 mm long, bright magenta or pink on internal lobes, external lobes cream or pale pink, the upper tube pale yellow, lower tube pale, corolla glabrous externally, broadly funnelform, narrowest at the base of corolla tube, the tube equal to or only slightly longer than the calyx, (3.0–)3.4–5.5 mm long, lobes lance-elliptic to oblanceolate, acute to rounded, 1.0–4.5 mm long, 0.6–2.2 mm wide. Stamens subequally inserted in the mid to lower corolla tube, filaments of unequal lengths, papillose below the anthers (particularly the longer filaments). Capsule 3.0–4.5(–4.9) mm long.


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


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


