

1956

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### Recommended Citation

Grant, Verne and Grant, Alva (1956) "Genetic and Taxonomic Studies in *Gilia*: X. Conspectus of the Subgenus *Gilia*," *Aliso: A Journal of Systematic and Floristic Botany*: Vol. 3: Iss. 3, Article 4.  
Available at: <https://scholarship.claremont.edu/aliso/vol3/iss3/4>

GENETIC AND TAXONOMIC STUDIES IN *GILIA*X. CONSPECTUS OF THE SUBGENUS *GILIA*

VERNE GRANT AND ALVA GRANT

The genus *Gilia* can be divided into four major groups worthy of subgeneric rank. These groups are: (1) the subgenus *Greeneophila* of Brand, comprising *Gilia rigidula* and its relatives; (2) *Giliandra*, treated as a section by Gray, and including *Gilia pinnatifida*, *G. stenothyrsa*, *C. leptomeria* and related species; (3) the subgenus *Campanulastrum* (Brand) Mason and A. Grant, which includes the *Gilia campanulata* complex; and (4) the subgenus *Gilia*. The latter, which is the largest and systematically the most complex of the subgenera, may be further subdivided into four natural sections: *Gilia*, *Saltugilia*, *Gilmania*, and *Arachnion*.

It is not the purpose of this paper to discuss the reasons for the classification outlined above, which differs markedly from that of previous authors. This aspect is being dealt with separately in *Systematic Botany and Phytogeography of the Phlox Family* (V. Grant, ms. in preparation). The present paper is intended rather to present in outline form a general classification of the subgenus *Gilia*, as it is now understood, together with certain supplementary notes concerning the individual species.

KEY TO THE SECTIONS OF SUBGENUS *GILIA*

- Arachnoid-woolly pubescence present at least on lower leaves. . . . . § *Arachnion*
- Arachnoid-woolly pubescence not present.
  - Inflorescence with loose to head-like glomerules of 3-many flowers subtended by a single leaf; upper cauline leaves well developed and pinnately dissected. . . . . § *Gilia*
  - Inflorescence loose, consisting of 1-8 flowers subtended by a single leaf; upper cauline leaves much reduced, or well developed and then linear to linear-oblong.
    - Plant leafy throughout, basal rosette absent or very little developed; leaves linear to linear-oblong and usually entire. . . . . § *Saltugilia*  
(*G. leptalea* group)
    - Plant scapose with reduced leaves above and basal rosette well developed; leaves much dissected or broadly ovate with sharp teeth.
      - Leaves not broadly ovate and sharply toothed.
        - Capsules oblong-ovate; leaves finely divided; basal leaves pubescent with multicellular hairs. . . . . § *Saltugilia*  
(*G. splendens* group)
        - Capsules broadly ovate; leaves finely to coarsely divided; basal leaves pubescent with multicellular or geniculate hairs . . . . . § *Gilmania*  
(*G. scopulorum*, *stellata*)
      - Leaves broadly ovate and sharply toothed. . . . . § *Gilmania*  
(*G. latifolia*, *ripleyi*)

SECTION *GILIA*

The North American species are *Gilia achilleaefolia*, *angelensis*, *capitata*, *clivorum*, *millefoliata*, *nevini*, and *tricolor*. The South American species, which are as yet poorly understood, are *G. laciniata* and *valdiviensis*. A key to the species is given in El Aliso 3: 48. Descriptions of the individual species may be found in the following

places: *G. achilleaeifolia* (El Aliso 3: 15); *G. angelensis* (op. cit. 2: 387); *G. capitata* (op. cit. 2: 301, 371); *G. clivorum* (op. cit. 3: 31); *G. millefoliata* (op. cit. 3: 33); *G. laciniata* (Pflzr. 250: 106; Lilloa 8: 214); *G. nevini* (Abrams, Fl. Pacific States 3: 465); *G. tricolor* (El Aliso 2: 385); *G. valdiviensis* (Reiche, Fl. Chile 5: 153).

The difficulties of setting up an infraspecific classification for *Gilia achilleaeifolia*, which will satisfactorily dispose of the extraordinary intercolonial variation and yet correspond to the natural populations, were discussed by V. Grant (El Aliso 3: 15). The solution adopted was to recognize no subspecific groupings and to place *G. multicaulis* into synonymy with *G. achilleaeifolia*. This solution has not proved practical.

We now prefer to recognize two subspecies corresponding to the large-flowered forms of sunny hillsides (*G. a. achilleaeifolia*), and the small-flowered forms of shady woods (*G. a. multicaulis*). The distribution as shown in the map (El Aliso 3: 9) does not indicate a broad geographical segregation of the two subspecies. The separation is ecological with intergradation occurring in intermediate habitats; no case is known where *G. a. achilleaeifolia* and *G. a. multicaulis* grow in close proximity to one another.

*Gilia achilleaeifolia* subsp. *multicaulis* (Benth.) V. & A. Grant, comb. nov. (*Gilia multicaulis* Benth., Bot. Reg. 19, sub t. 1622, 1833; *G. multicaulis* subsp. *eu-multicaulis* Brand, Pflzr. 250: 109, 1907.)

The following range extensions may be noted for *Gilia capitata*. Dr. R. Bacigalupi has called attention to collections of *G. c. capitata* from Boulder Creek in the Santa Cruz Mountains (*Hesse* 329, 336). The plants were growing in cultivated ground and were probably adventive. *Gilia capitata tomentosa*, previously recorded from the Marin and Sonoma County coasts and from Mt. Diablo, is also present in the Mount Hamilton Range in Santa Clara County, on the basis of a specimen in the Dudley Herbarium (*Elmer* 5078).

We have observed the Coast Range species, *Gilia clivorum*, growing adventively near Claremont in Los Angeles County. An apparently natural population, which for the present can be assigned to *G. clivorum*, though it differs slightly from the Coast Range populations of this species, was found near Temecula in Riverside County (*Grant* 9315). In the Coast Ranges *Gilia clivorum* commonly grows in grain and hay fields and may be transported with these crops. It may be significant that the Claremont population was near a horse corral.

#### SECTION SALTUGILIA V. & A. GRANT

The species, all of which are North American, are *Gilia australis*, *capillaris*, *caruifolia*, *leptalea*, and *splendens*. A key to the species and subspecies is given in El Aliso 3: 84. Descriptions of the species will be found in El Aliso 3: 85 ff.

The distribution ranges reported in the above cited pages need to be corrected in three instances. *Gilia splendens grantii* was recorded by Mason and A. Grant on the basis of herbarium specimens as occurring in both the San Gabriel and San Bernardino Mountains (cf. Abrams, Fl. Pacific States 3: 470, as *G. s. grinnellii*). After some field work in the San Bernardino Mountains, the present authors concluded that *G. s. grantii* was not there, and reinterpreted the herbarium specimens as belonging to *G. s. splendens*. In the summer of 1955, however, Prof. Richard Beeks and the senior author found good *G. s. grantii* growing in abundance in a burned-over area at 5600 feet elevation near Strawberry Peak in the San Bernardino Range (*Grant and Beeks* 9755). It has also been collected on Clark's Grade at 4900 feet (*M. Jones* in 1900). *Gilia splendens grantii* is thus sporadic in occurrence through-

out the main range of the San Bernardino Mountains, where it is connected with *G. s. splendens* by a complete series of intergrading forms.

The second correction concerns *Gilia leptalea leptalea*. The main distribution area of this taxon is in the Sierra Nevada; several collections are also known from southern Oregon; and in the distribution map published in El Aliso (3: 68) one outlying and highly disjunct locality is shown from The Dalles, Oregon. This latter was based on a single herbarium specimen in the Pomona College Herbarium collected by C. Davidson and labelled in Marcus Jones' handwriting. Dr. Arthur Cronquist questioned the validity of the locality in correspondence with the authors. After reconsideration of the circumstances, we now agree with Dr. Cronquist that the documentary evidence for the existence of *Gilia leptalea leptalea* in northern Oregon is inadequate. The Davidson specimen is like typical Sierra Nevada *leptalea*, and may actually have been collected there, but may have been erroneously attributed to Davidson's principal collecting grounds, The Dalles, by Jones at a later date.

The range of *Gilia capillaris* is also wider than indicated in our treatment (El Aliso 3: 90), where it was reported as occurring solely in the Pacific states. Wherry (Fl. of Idaho, 556) lists it for central Idaho. Although the present authors have been unable to examine Idaho material of *Gilia capillaris*, Drs. R. J. Davis, E. T. Wherry, and A. Cronquist have kindly supplied several definite records as follows. Washington County: 18 miles NNW of Weiser (*E. T. Wherry* in 1931); Middle Valley (*M. Jones* in 1899); 17 miles NW of Mann Creek Store at Fourth of July Creek (*J. H. Christ* 17942). Bonner County: near Sandpoint (*R. J. Davis* in 1940). Clark County: high bridge near Spencer (*Rust* 626). There is also a collection of *Gilia capillaris* from Steamboat Springs, Routt County, Colorado (*A. Eastwood* in 1891, Univ. of Colorado Herbarium and New York Botanical Garden Herbarium, cf. Weber, Univ. Colo. Studies, Biol., 3: 97, 1955). The fact that the plant has not been recollected since 1891, together with the highly disjunct nature of the Colorado locality, raises a question as to the authenticity of the Eastwood collection. Drs. Cronquist and Keck have judged from the handwriting on the label that the locality and date were inserted by someone other than Miss Eastwood. Attempts should be made to verify the supposed existence of *Gilia capillaris* in Colorado.

#### SECTION GILMANIA (MASON & A. GRANT) V. & A. GRANT

Mason and A. Grant proposed the infrageneric category *Gilmania* for the two species *Gilia latifolia* and *G. ripleyi*. In view of the evident relationship of *G. scopulorum* to *G. latifolia*, and of *G. stellata* to *G. scopulorum*, we now suggest that the group be enlarged by the incorporation of these latter species. Mason and A. Grant set up *Gilmania* as a subgenus. The system of classification which the present authors now favor, because it expresses an apparent relationship of *Gilmania* to other groups within a comprehensive subgenus *Gilia*, has been outlined in the introductory paragraph. Our system requires that *Gilmania* be reduced in rank to a section and recharacterized after the inclusion of two additional species.

**Gilia** subg. **Gilia** sect. **Gilmania** (Mason & A. Grant) V. & A. Grant, comb. nov. (*Gilia* subg. *Gilmania* Mason & A. Grant, Madroño 9: 205, 1948).

Annuals and one perennial of medium size; upper cauline leaves much reduced; pubescence of herbage stipitate-glandular or consisting of multicellular or geniculate hairs; corolla lobes pink or violet. North American deserts. Related to sect. *Saltugilia*.

Descriptions of the species are given by Mason and A. Grant as follows: *Gilia latifolia* (Abrams, Fl. Pacific States 3: 462); *G. ripleyi* (loc. cit.); *G. scopulorum* (op. cit. 471); and *G. stellata* (op. cit. 470).

The species are fairly well defined at present with the exception of *Gilia scopulorum*. *Gilia scopulorum* includes both diploid ( $n=9$ ) and tetraploid ( $n=18$ ) forms, correlated with prominent morphological differences, and when more data are available it may prove necessary to make specific segregations in this entity. The few counts so far made indicate that *G. latifolia* is tetraploid ( $n=18$ ) and *G. stellata* diploid ( $n=9$ ).

SECTION ARACHNION A. & V. GRANT

A revision of the section *Arachnion* has recently been published in El Aliso (vol. 3, no. 3). An index to the descriptions of the species and subspecies will be found in that work. No supplementary notes concerning the Cobwebby Gilias are needed at the present time.