

NOMENCLATORIAL CHANGES IN POLEMONIACEAE

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ABSTRACT

Recent molecular phylogenetic analyses of nuclear, chloroplast and mitochondrial DNA of Polemoniaceae have prompted a reexamination of morphological data and a reassessment of current taxonomy. These studies prompt several nomenclatorial changes in the family. Eight taxa formerly included in *Gilia* section *Giliastrum* are transferred to the genus *Giliastrum*. In addition, two new tribes of Polemoniaceae are recognized.

Key words: *Gilia*, *Giliastrum*, Polemoniaceae, taxonomy, tribes.

INTRODUCTION

Quantitative phylogenetic analyses of the Polemoniaceae based on morphological (Porter 1993; unpubl.) and molecular data, including nuclear ribosomal ITS (Porter 1993, 1996), chloroplast *matK* (Johnson and Soltis 1995; Johnson et al. 1996), chloroplast *trnL-trnF* region (Porter and Johnson, unpubl.), and mitochondrial *nadl* intron (Porter and Johnson 1998), have prompted a reexamination of the current taxonomy and classification (Grant 1959) of the family. These data unanimously provide evidence that *Gilia* is polyphyletic (Johnson et al. 1996; Porter 1996) and that the current tribal classification is dubiously supported. A step in ameliorating this situation is the recognition of *Aliciella* (Porter 1998), formerly *Gilia* section *Gilian-dra*, in addition to *G. latifolia* S. Wats. and *G. ripleyi* Barneby. This short note proposes nomenclatorial changes that will further remove disparate lineages formerly included in *Gilia*. In addition two new tribal names are provided, supported by multiple gene phylogenies (e.g., Johnson et al. 1996; Porter 1996), to facilitate discussion of higher-level diversification in Polemoniaceae. Even so, the genus *Gilia* remains a problem. Several species included in *Gilia* clearly do not belong in the genus, and are treated below in different tribes! This note continues, but does not complete, needed nomenclatorial changes. Ongoing research should clarify the relationships and taxonomy of these *Gilia* species.

NEW COMBINATIONS IN THE GENUS *GILIASTRUM*

In addition to *Aliciella*, another element formerly included in *Gilia* is supported as both monophyletic and a lineage distant from *Gilia*. This clade corresponds to *Gilia* section *Giliastrum* sensu Grant (1959), excluding *Gilia tenerrima* A. Gray, *G. campanulata* A. Gray, *G. filiformis* Parry, *G. maculata* Parish, *G.*

palmeri S. Wats., and *G. glutinosa* Phil. As a generic name already has been erected by Rydberg, eight taxa are transferred to the genus *Giliastrum*. The monophyletic genus *Giliastrum* is characterized by pale to deep blue, rotate corollas, bright yellow anthers, and peritectate to semitectate pollen grains with zonate pori and spinule processes, in addition to a suite of unusual developmental characters. Both *Gilia palmeri* and *G. glutinosa* lack the characteristic pollen morphology, but may be closely related. However, until more conclusive evidence is brought to bear on the problem, they are excluded from *Giliastrum*.

Giliastrum (Brand) Rydb., Fl. Rocky Mts. 699. 1917.

Gilia Ruiz & Pavón subgenus *Greeneophila* Brand section *Giliastrum* Brand in Engler, Pflanzen. IV. Fam. 250: 147. 1907. Type species: *Giliastrum rigidulum* (Benth.) Rydb.

Perennial, or annual herbs, glandular puberulent, with sparse nonglandular trichomes, or glabrous. Leaves alternate, entire, toothed to pinnatifid, gradually reduced in size in the inflorescence. Flowers perfect, in dichasia. Calyx campanulate, 5-lobed or 5-cleft; the tube scarious in the sinuses and ruptured by the fruit. Corolla rotate-funnelform, the lobes much longer than the tube, abaxial (external) surface glabrous, adaxial (internal) tube pubescent or glabrous. Stamens equally inserted in the lower portion of the corolla tube, filaments pubescent, papillate or glabrous basally. Carpels 3, fused, style with 3 stigmatic lobes, apex of ovary glandular puberulent to glabrous. Fruit a loculicidal capsule, ellipsoidal or globose in shape. Seeds several per carpel, seed coat producing mucilage when wetted. $n = 6, 9, 10, 12, 18$ (Covas and Schnack 1946; Grant 1959; Weedon and Powell 1978, 1980; Ward and Spellenberg 1986)

1. *Giliastrum foetidum* (Gillies ex Benth.) J. M. Porter, comb. nov.

Basionym: *Gilia foetida* Gillies ex Benth. in DC., Prodr. 9: 313. 1845.

2. ***Giliastrum gypsophilum*** (B. L. Turner) J. M. Porter, comb. nov.

Basionym: *Gilia gypsophila* B. L. Turner, *Phytologia* 76: 54. 1994.

3. ***Giliastrum ludens*** (Shinners) J. M. Porter, comb. nov.

Basionym: *Gilia ludens* Shinners, *Sida* 1: 174. 1963.

4. ***Giliastrum insigne*** (Brand) J. M. Porter, comb. nov.

Basionym: *Gilia rigidula* Benth. subsp. *insignis* Brand in Engler, Pflanzen. IV. Fam. 250: 147. 1907. Other synonyms: *Gilia insignis* (Brand) Cory & Parks, *Texas Agr. Exptl. Sta. Bull.* 550: 85. 1938.

5. ***Giliastrum incisum*** (Benth.) J. M. Porter, comb. nov.

Basionym: *Gilia incisum* Benth. in DC., Prodr. 9: 312. 1845. Other synonyms: *Navarretia incisum* (Benth.) Kuntze, *Rev. Gen. Fl.* 2: 433. 1891. *Polemonium incisum* (Benth.) Kuntze, *Rev. Gen.* 3: 203. 1898.

6. ***Giliastrum purpusii*** (K. Brandegee) J. M. Porter, comb. nov.

Basionym: *Gilia purpusii* K. Brandegee, *Zoe* 5: 179. 1904.

6b. ***Giliastrum purpusii*** (K. Brandegee) J. M. Porter subsp. ***platylobum*** (I. M. Johnston) J. M. Porter, comb. et stat. nov.

Basionym: *Gilia platyloba* I. M. Johnston, *J. Arnold Arb.* 24: 95. 1943.

6c. ***Giliastrum purpusii*** (K. Brandegee) J. M. Porter subsp. ***stewartii*** (I. M. Johnston) J. M. Porter, comb. et stat. nov.

Basionym: *Gilia stewartii* I. M. Johnston, *J. Arnold Arb.* 24: 94. 1943.

TRIBAL TAXONOMY

Following Grant's (1959) classification of Polemoniaceae, no nomenclatural changes have been proposed, in spite of a vast accumulation of new data (reviewed in Johnson et al. 1996; Porter 1996) and frequent calls for such change (e.g., Day and Moran 1986). Consistent phylogenetic inferences from both chloroplast and nuclear gene phylogenies provide a new insight into tribal classification. Two new tribes are proposed. These tribes correspond to clades discussed by Johnson et al. (1996) and Porter (1996). Note that several miscellaneous species of *Gilia* are included in both

tribes. These species are believed to be better treated outside of the genus *Gilia*, however, the nomenclatural changes are being addressed elsewhere.

Tribe **Phlogieae** (Reichb.) J. M. Porter & L. A. Johnson, trib. nov.

Polemoniariae Gruppe *Phloginae* Reichb., Handb. Nat. Pflzsystems, ed. 1, 194. 1837.

Plantae annuae vel perennes, subfruticosae; foliis oppositis vel raro alternis; corolla regulari, campanulata vel hypocrateriformi vel infundibuliformi.

Type: *Phlox glaberrima* L.

The tribe can be phylogenetically defined as the most inclusive clade that includes *Phlox glaberrima* L., *Linanthus dichotomus* Benth., *Leptodactylon californicum* Hook. & Arn., *Linanthus liniflorus* (Benth.) Greene, *Gymnosteris nudicaulis* (Hook. & Arn.) Greene, *Gilia filiformis* Parry, *Gilia maculata* Parish, *Gilia campanulata* A. Gray, and *Gilia inyoensis* Johnston, but not *Polemonium cearuleum* L., *Gilia splendens* Dougl. or *Aliciella latifolia* (Wats.) J. M. Porter. Tribe Phlogieae can be characterized as annual and perennial herbs, or shrubs; leaves opposite, rarely alternate, leafy throughout; corollas radially symmetric, campanulate, funnelform, or salverform. Included in the tribe are the following genera and species: *Gymnosteris*, *Linanthus*, *Leptodactylon*, *Phlox*, *Gilia filiformis*, *Gilia maculata*, *Gilia campanulata*, and *Gilia inyoensis*.

Tribe **Loeseliaeae** J. M. Porter & L. A. Johnson, trib. nov.

Plantae annuae vel perennes, subfruticosae; foliis alternis vel raro oppositis; corolla interdum regulari, interdum bilabiata vel subbilabiata, rotata vel hypocrateriformi vel infundibuliformi; ovarium interdum glandulosum interdum glabrum.

Type: *Loeselia ciliata* L.

The tribe can be phylogenetically defined as the least inclusive clade that includes *Alliciella subnuda* (A. Gray) J. M. Porter, *Ipomopsis rubra* (L.) Wherry, *Loeselia ciliata* L., *Eriastrum densifolium* (Benth.) Mason, *Gilia rigidula* Benth. and *Gilia scabra* Brandegee. Tribe Loeseliaeae can be characterized as annual and perennial herbs, or shrubs; leaves alternate, rarely opposite (in *Loeselia*), leafy throughout, or in some annual species with leaves much reduced in size in the inflorescence; corollas bilaterally or radially symmetric, campanulate, funnelform, or salverform; ovary frequently glandular distally. Included in the tribe are the following genera and species: *Alliciella*, *Ipomopsis*, *Eriastrum*, *Langloisia*, *Loeseliastrum*, *Loeselia*, *Gilia scabra* Brandegee, *G. palmeri*, *G. glutinosa* and *Giliastrum* (as circumscribed above).

LITERATURE CITED

- COVAS, G., AND B. SCHNACK. 1946. Numero de cromosomas en antopitas de la region de Cuyo. *Rev. Argent. Agron.* **13**: 153-166.
- DAY, A., AND R. MORAN. 1986. *Acanthogilia*, an new genus of Polemoniaceae from Baja California, Mexico. *Proc. Calif. Acad. Sci.* **44**: 111-126.
- GRANT, V. 1959. Natural history of the phlox family. Martinus Nijhoff. The Hague, Netherlands. 280 p.
- JOHNSON, L. A., AND D. E. SOLTIS. 1995. Phylogenetic inference in Saxifragaceae sensu strictu and *Gilia* (Polemoniaceae) using *matK* sequences. *Ann. Missouri Bot. Gard.* **82**: 149-175.
- , J. L. SCHULTZ, D. E. SOLTIS, AND P. S. SOLTIS. 1996. Monophyly and generic relationships of Polemoniaceae based on *matK* sequences. *Amer. J. Bot.* **83**: 1207-1224.
- PORTER, J. M. 1993. Phylogeny of *Gilia* sect. *Giliandra* (Polemoniaceae). Ph.D. dissertation, University of Arizona, Tucson, AZ.
- . 1996. Phylogeny of Polemoniaceae based on nuclear ribosomal internal transcribed spacer DNA sequences. *Aliso* **15**: 57-77.
- . 1998. *Aliciella*, a recircumscribed genus of Polemoniaceae. *Aliso* **17**: 23-46.
- , AND L. A. JOHNSON. 1998. Phylogenetic relationships of Polemoniaceae: inferences from mitochondrial *nad1* intron sequences. *Aliso* **17**: (in press).
- WARD, D. E., AND R. W. SPELLENBERG. 1986. Chromosome counts of angiosperms of western United States. *Phytologia* **61**: 119-125.
- WEEDIN, J. F., AND A. M. POWELL. 1978. In IOPB chromosome number reports 60. *Taxon* **27**: 223-231.
- , AND ———. 1980. In IOPB chromosome number reports 69. *Taxon* **29**: 716-718.