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# NOMENCLATURE OF THE MAIN SUBDIVISIONS OF *PHLOX* (POLEMONIACEAE)

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**Abstract:** The task of finding the correct names for the main subdivisions of *Phlox* has been beset with difficulties in interpreting the intent of older authors, particularly Asa Gray. Gray divided *Phlox* into four main subgroups, some of which have been considered sections, but these are now seen to be only informal groups. Currently *Phlox* is subdivided into three sections: *Phlox*, *Divaricatae* Peter, and *Occidentales* A. Gray. The name *Occidentales* A. Gray was not validly published as a section; Gray used it only as part of a heading. The oldest valid name for what has been called sect. *Occidentales* is sect. *Pulvinatae* Peter. Recent papers have used the name sect. *Annuae* A. Gray in place of sect. *Divaricatae*, on grounds of priority. However, the name that Gray actually used was *Annuae*, *Texenses*, and it, like *Occidentales*, was not validly published. The sections of *Phlox* are being reconsidered at present in the light of new molecular evidence. Some changes will be needed, but old valid infrageneric names will still have a role to play in new infrageneric classifications.

**Keywords:** *Phlox*, nomenclature, Asa Gray.

The genus *Phlox* has had a history of problems with the nomenclature of the main infrageneric subgroups. Gray (1870, 1878, 1886) did not make it clear in his treatments whether his main subdivisions were subgenera or sections. Grant (1959) concluded that they were sections, which turns out to be wrong. Wherry (1955) set up a good system of sections for that time, but picked invalid names for them. Grant (1959) took up Gray's name *Occidentales* for one of Wherry's sections, but Gray's name is not valid. A similar problem has arisen recently with the introduction and use of the name *Phlox* sect. *Annuae* by Prather (1994) and Ferguson et al. (1999).

In order to understand the problems, we have to start with Gray's treatments (1870, 1878, 1886), and then follow the chain of later synonyms and substitutions. This along with reference to the rules of nomenclature will enable us to designate the correct names for the main infrageneric groups.

## SECTIONS OR SUBGENERA

Brizicky (1969) has documented the lack of standardization in the use of the

terms subgenus and section in the nineteenth century. Some authors used the category subgenus, others the category section, still others used both, or neither. Furthermore, some authors identified the type of category they were using, in the form *Gilia* sect. *Ipomopsis* (Bentham, 1833), while others marked their subgroups with symbols and numerals only, leaving it for the reader to infer the intended rank as best he/she could. The double-S symbol (§) was widely used to designate sections but was also used for primary subdivisions of other ranks.

We cannot be certain about the type of infrageneric category, whether section or subgenus, in the numerous cases where the original author did not identify his intent by attaching a category name to the taxon name. In such cases we have to be satisfied with a clear inference from the context, if possible, or otherwise treat the names as rankless if they are validly published (Greuter, 2000, Art. 35).

In Gray's three treatments of the North American Polemoniaceae (Gray, 1870, 1878, 1886), he recognized five genera. In two of these, *Collomia* and *Gilia*, he set up formal primary subgroups. Their taxonom-

ic names were preceded by the symbol §, a numeral, and a substantive name in capital letters, e.g., § 1. DACTYLOPHYLLUM, in the genus *Gilia*. Gray did not attach the term section or subgenus to the taxonomic name. However, he referred to the subgroups as "sections" in the text (Gray, 1878, p. 137; 1886, p. 137), and he called the symbol § the "sectional mark" (Gray, 1878, preface; 1886, preface).

On this basis I concluded that Gray's main formal subgroups were sections and listed them as such (Grant, 1959). Brizicky (1969), however, found a statement in Gray's prefaces that I missed. "The characters of sections of genera, when of comparatively high rank, are designated by the sectional mark (§) and printed in the larger type; and those of first importance, such as may be termed subgenera, are distinguished by having a substantive name." (Gray, 1878, preface; 1886, preface.) Thus, following Brizicky (1969) Gray's main formal infrageneric groups with substantive names should be regarded as subgenera, not sections.

#### GRAY'S TREATMENT OF PHLOX

Gray used a certain typography and style for formal subgenera, e.g., § 1. EU-COLLOMIA. However, he adopted a different typography and style for his four main subdivisions of *Phlox*.

In the 1870 treatment, the first subdivision reads: "§ 1. *Latifoliae*, *Perennes*, *Americae Boreali-Orientales*, *uniovulatae*." The second is labelled "*Subulatae*, *Suffruticulosulo-perennantes* . . .". The third is "*Occidentales* (transmontanae et montanae), . . .". The fourth subdivision set up for the *Phlox drummondii* Hook. group is: "*Annuae*, *Texenses*, *laxe*, *ramosae*, . . .". In the 1878 and 1886 editions these phrases are given in English, e.g., "Annuals, all Texan, more or less pubescent."

Thus Gray did not recognize formally named sections in *Phlox*. His primary subdivisions in *Phlox* were labeled with diag-

nostic phrases as were the secondary and tertiary subdivisions. To be sure, Gray used the § symbol for the main subgroups of *Phlox*, but he used this symbol for the primary subdivisions in all genera whether they had formal subgenera (*Collomia*, *Gilia*) or not (*Polemonium*).

The names *Occidentales* and *Annuae*, *Texenses* used by Gray (1870) in *Phlox*, and taken up by later authors, are not validly published according to the rules of botanical nomenclature (Greuter, 2000). The names are used only as headings for sets of included species (Greuter, 2000, Art. 34.1). Furthermore Gray himself did not accept the epithets in question as shown by the fact that he replaced them with English phrases in later editions (Gray, 1878, 1886). The Latin names of 1870 are so-called "provisional names" and these are invalid (Greuter, 2000, Art. 34.1). An additional problem with the name *Annuae*, *Texenses* is that it is a descriptive phrase and is not in the right word form for a sectional (or subgeneric) name (Greuter, 2000, Art. 21.2).

#### LATER WORKS

Peter (1897a) subdivided *Phlox* into six main groups: *Drummondianae*, *Reptantes*, *Paniculatae*, *Divaricatae*, *Subulatae*, and *Pulvinatae*. The names of the first five stand for representative species. The sixth is named for the cushion-like growth habit of a group of suffruticose western montane species. A key gives the distinguishing characters of these groups.

The groups are marked with the § symbol which Peter used consistently for sections. Space considerations in the key would favor the use of a symbol rather than a word for the category. Elsewhere, however, Peter (1897b, p. 59) connects the symbol § with the rank of section, as in "Gattungssection: *Phacelia* § *Cosmanthoides* (Hydrophyllaceae; Fred Barrie, pers. comm.). He used the term Untergattung for subgenus in both the Polemoniaceae and Hydrophyllaceae (Peter, 1897a, 1897b). Pe-

TABLE 1. The current sectional classification of *Phlox* (Wherry, 1955; Grant, 1959).

- 1 Sect. *Phlox*. Perennial herbs with soft deciduous leaves and long styles. *P. glaberrima* L., *P. paniculata* L., *P. subulata* L., and other species.
- 2 Sect. *Divaricatae*. Perennial or annual herbs with soft deciduous leaves and short styles. *P. divaricata* L., *P. drummondii* Hook., *P. nivalis* Lodd., *P. pilosa* L., and others.
- 3 Sect. *Occidentales*. Cespitose or cushion-like shrubs with stiff evergreen leaves and short styles. *P. caespitosa* Nutt., *P. hoodii* Richardson, *P. sibirica* L., and others.

ter's infrageneric names in *Phlox* thus meet the requirements of the code (Greuter, 2000, Art. 35.5) for valid publication as section names.

Brand (1907) divided *Phlox* into two subgenera: subgen. *Microphlox* for the suffruticose western montane species, and subgen. *Macrophlox* for other species of both eastern and western North America which are mainly erect and herbaceous. Brand's complex system of categories below the subgenus level does not concern us here.

Wherry's (1955) monograph of *Phlox* was a milestone, based as it was on extensive knowledge of the plants in field, garden, and herbarium. Wherry divided *Phlox* into three sections. For some reason he chose to assign new or modified names to these sections that did not conform to the rules of nomenclature. His names were: sect. *Protophlox* Wherry, sect. *alpha-Phlox* Wherry, and sect. *Microphlox* (Brand) Wherry.

In my family-wide treatment (Grant, 1959) I naturally followed Wherry (1955) as to the circumscription and composition of the sections but it was necessary to find the legitimate names for them. I rounded up all the infrageneric names in *Phlox* that I could find, legitimate or otherwise, grouped them by Wherry's system of sections, listed them chronologically, and then identified the oldest legitimate names in what I then considered to be sections. These were: sect. *Divaricatae* Peter (for *Protophlox*), sect. *Phlox* (for *alpha-Phlox*), and sect. *Occidentales* A. Gray (for *Microphlox*). Wherry (1966) kindly accepted these substitutions (Table 1). It should be noted that Wherry and I were in frequent contact during those years.

## THE MONTANE SUFFRUTICOSE PHLOXES

One of Gray's (1870, 1878, 1886) four main subgroups of *Phlox* was the suffruticose species of the western mountains. In his 1870 treatment he referred to them as "*Occidentales* (transmontanae et montanae). . ." In the 1878 and 1886 treatments he retains the subdivision, but drops the term *Occidentales*, and presents the distinguishing characters in English.

As noted earlier, Wherry (1955) took up Brand's name *Microphlox* for this section, and I (Grant, 1959) took up *Occidentales* A. Gray. I did not delve sufficiently into the documents at the time, but the problem with this choice is now obvious. The name *Occidentales* was part of a descriptive heading in a synoptical treatment, not the name of a true formal subgroup, and furthermore, Gray did not reuse this name in his later (1878, 1886) treatments. The name is not validly published.

The oldest valid name in the rank of section for the montane suffruticose phloxes is sect. *Pulvinatae* Peter (1897: 46). Peter cited the following species under sect. *Pulvinatae*: *P. muscoides* Nutt., *P. bryoides* Nutt., *P. hoodii* Richardson, *P. caespitosa* Nutt., and *P. douglasii* Hook. The designated type species of sect. *Pulvinatae* is *P. hoodii* Richardson (Grant 1959: 119). The informal subgroup name *Occidentales* A. Gray, *nomen nudum*, is reduced to synonymy under *Phlox* sect. *Pulvinatae* Peter.

## THE PROPOSED SECTION NAME ANNUAE

*Phlox* § *Annuae*, *Texenses* of Gray (1870) was duly included in the list of in-

frageneric names (in Grant, 1959, as a section). I passed over it because it was a two-word phrase and a heading, not a proper section name, and I took up sect. *Divaricatae* of Peter (1897a) instead. However, Prather (1994) recently reversed this decision, on the grounds that "Gray's name clearly has priority" over Peter's name. But the priority rule does not apply to invalid names, and, as pointed out earlier, Gray's name was not validly published.

Prather (1994) cited the name as "section *Annuae* A. Gray." This represents a change to a form of the name that Gray never used. Ferguson et al. (1999) then took up Prather's (1994) section *Annuae* in their paper on the molecular (ITS) systematics of eastern North American phloxes. The name *Annuae* can be treated nomenclaturally as follows: *Phlox* sect. *Annuae* L.A. Prather (non A. Gray), *nomen nudum*, (Prather, 1994: 64). It should be reduced to synonymy under *Phlox* sect. *Divaricatae* Peter in the present three-section classification, or under *Phlox* sect. *Drummondianae* Peter if that section is recognized.

## DISCUSSION

This paper deals with the correct naming of the primary subgroups or sections of *Phlox*. Nothing has been said so far about the biologically more important problem of the correct, that is, natural or monophyletic, circumscription of the subgroups themselves. In recent decades we have operated within the framework of Wherry's (1955) three-section system, with sections *Divaricatae* (*Annuae*), *Phlox*, and *Pulvinatae* (*Ocidentales*). How good are these sections? At present molecular evidence is being brought to bear on this question (Ferguson et al., 1999, and unpubl.).

The western montane suffruticose phloxes (*Pulvinatae*) have seemed to be a natural group on the basis of morphology and ecology. Two or three species of *Pulvinatae* (two in Wherry's system or three in other systems) were sampled by Ferguson

et al. (1999). These form a subclade in the ITS cladogram. More extensive work on the *Pulvinatae* is in progress (Ferguson et al., unpubl.).

There have been some reasons for skepticism about the naturalness of the two mainly herbaceous sections, *Divaricatae* and *Phlox*. Wherry (1955) based these sections largely on the length of style and stigma, raising the specter of single-character classification.

The problem comes into focus in the group containing *Phlox subulata* L., *P. nivalis* Lodd., and *P. bifida* Beck. These plants have slightly woody, trailing or decumbent stems that form mats, and mostly persistent leaves. Older authors grouped the first two species together (Gray, 1870, 1886; Brand, 1907) or all three together (Wherry, 1934; Fernald, 1950; Smith and Levin, 1967). However, *P. subulata* and *P. bifida* have long styles, and *P. nivalis* a short style included in the corolla tube. On this basis Wherry (1955) placed them in separate sections, the long-styled species in sect. *Phlox*, and the short-styled species in sect. *Divaricatae*.

The molecular (ITS) evidence of Ferguson et al. (1999) shows that the above three species together with a fourth one, *P. oklahomensis* Wherry, form a monophyletic subgroup. The latter, *P. oklahomensis*, is slightly woody and spreading, and has a short style; it is currently in sect. *Divaricatae*. Growth habit appears to be a better indicator of relationship than style length in this case.

If it is deemed desirable to segregate the *P. subulata* group as a section, the name *Phlox* sect. *Subulatae* (Bentham, 1845) is available (cf. Grant, 1959, p. 117).

Another case is the wide-ranging polytypic species, *P. pilosa* L., placed in sect. *Divaricatae* by Wherry (1955). In the ITS cladogram of Ferguson et al. (1999) some subspecies of *P. pilosa* fall in a predominantly *Divaricatae* clade, while other subspecies group with species of sect. *Phlox* in another clade.

The two predominantly herbaceous sections of *Phlox* do not hold up in their present circumscription (Ferguson et al., 1999). It will be interesting to see how the herbaceous species can be grouped more naturally when more evidence is obtained.

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