



Botanical Notes

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TAXONOMY OF *VIOLA SUBSINUATA* IN NEW ENGLAND

The genus *Viola* has been a consistent source of taxonomic hardship in New England and elsewhere. McKinney (1992) showed that the nomenclature surrounding *Viola palmata* L. has been confused. Specifically, the name *V. palmata* has been misapplied (i.e., the name has been used erroneously for another taxon). This misapplication has caused a New England rare violet to largely go unnoticed. This note discusses the taxonomy of *Viola subsinuata* Greene, including its identification, ecology, and distribution in New England.

Viola palmata is a member of the infrageneric group *Boreali-americanae*, colloquially referred to as the stemless blue violets. This group shares the following characteristics: leaves, stipules, and peduncles arising directly from the nodes of a relatively thick rhizome; leafy aerial stems and stolons not produced; stipules distinct from the petioles and toothed on the margin; corolla cyanic (i.e., varying from blue to purple), white in the center with dark purple lines on the three lowest petals; style dilated at apex, with a flat, scoop-shaped tip; cleistogamous flowers produced; and a chromosome number of $n=27$. *Viola palmata*, along with several other species, including *V. hirsutula* Brainerd, form a morphologically similar group related to *V. sororia* Willd. These species are characterized by pubescent herbage (at least in early season), broad-lanceolate to ovate sepals with marginal cilia and short auricles, cylindrical trichomes without expanded apices on the

lateral petals or on all three lowermost petals, and prostrate cleistogamous peduncles bearing capsules spotted or flecked with purple. *Viola palmata* is characterized as a heterophyllous species (i.e., the early and late season leaves unlobed, the midseason leaves lobed; Figure 1). The unlobed leaves have cordate-ovate blades, while the lobed leaves are commonly parted into 3–5 segments with the middle segment the largest.



Figure 1. *Viola palmata* during vernal flowering. Note the undivided outer (i.e., earlier) leaves.

The name *Viola palmata* has been misapplied by most American authors, including such violet enthusiasts as Brainerd (1921), Fernald (1950), and Russell (1965). McKinney (1992) has outlined the nomenclatural history of *Viola palmata*. In brief, Linnaeus described *V. palmata* as a heterophyllous species, with some leaves unlobed and others lobed (the latter usually with shallow

sinuses). Unfortunately, the description was, in part, based on a poor drawing by Plukenet, which did not show any of the unlobed leaves. This later led Pollard, Stone, and Brainerd to consider the name *V. palmata* to apply to a homophyllous species with all the leaves lobed, including the early and late season leaves. Brainerd then reintroduced the name *V. triloba* Schwein. for use with the heterophyllous violet. Based on McKinney's research, *V. triloba*, the name most commonly used in New England for heterophyllous violets with 3–5 lobed midseason blades, is a synonym of the earlier *V. palmata*. Ballard (1994) also agrees with this interpretation.

In New England, there are two species closely allied to *Viola sororia* with lobed leaf blades. *Viola palmata*, as previously mentioned, is a heterophyllous species with early and late season blades (outermost and innermost leaves, respectively) unlobed. In this species, the lobed leaves are typically parted into 3–5 segments separated by shallow sinuses in which the middle segment is substantially larger than the lateral segments and is usually unlobed (Figure 2). Rare plants of *V. palmata* possess deep sinuses and the principal segments may be again subdivided. This form has been called *V. triloba* var *dilitata* (Ell.) Brainerd, but it merely represents one end of the continuum of blade shapes in *V. palmata* (i.e., it is not a distinct form and many intermediates are found).



Figure 2. *Viola palmata*. Note the heterophyllous condition (i.e., both lobed and unlobed leaves present) and the large, unlobed middle segment of the lobed blade.

The second species allied to *Viola sororia* with lobed blades is *V. subsinuata*. This is a homophyllous plant with all the leaves cleft into 5–16, often narrow,

segments (Figure 3). *Viola subsinuata*, which has primarily passed under the name *V. palmata* in U.S. literature, has a distinctive blade outline. The principal lobes on many leaves rather uniformly become shorter and separated by shallower sinuses toward the basal margins, and the middle lobe is further cleft (Figure 4). In both of these traits, *V. subsinuata* is unlike *V. palmata*.



Figure 3. *Viola subsinuata*. Note the homophyllous condition (i.e., all the leaf blades lobed).



Figure 4. *Viola subsinuata*. Note the many-lobed leaf blades with sinuses decreasing in width and depth toward the basal margins.

Identification of *Viola subsinuata* is generally unproblematic in the field. Poor collections can, however, make confident determination difficult. The dilutate form of *V. palmata* infrequently has some leaf blades on a given plant that are transitional to the blades of *V. subsinuata*. Collections that do not gather enough material or make note of the presence/absence of unlobed blades in the population may not be identifiable. The

following characteristics may prove helpful for scant collections:

1. Dilutate forms of *Viola palmata* (i.e., those with deeply cleft blades) have only 3–7 principal segments. *Viola subsinuata* has 5–16 segments.
2. Dilutate forms of *Viola palmata* often have an unlobed middle segment (Figure 5). This condition is rare in *V. subsinuata*.
3. Dilutate forms of *Viola palmata* sometimes have the outer (i.e., lower) leaf blade segments borne on thin petiolules (Figure 5). This trait is very rare for *V. subsinuata* in New England.



Figure 5. Dilutate form of *Viola palmata*. Note the unlobed middle segment and the thin petiolules of the lateral segments present in this collection.

Dilutate forms of *Viola palmata* are extremely rare in New England, hence they are unlikely to be a cause of confusion during floristic surveys. Known occurrences are in Brooklyn, CT, and Middlebury, VT. The status of collections identified as dilutate forms of *V. palmata* in MA is currently under study—several specimens at the Harvard University Herbaria from Berkshire County labeled as such appear to be *V. subsinuata*. Field study is needed to confirm their identification (i.e., identify the presence/absence of unlobed leaves).

Viola subsinuata is very rare in New England and is currently known from only eight towns. Identified occurrences are primarily based on annotated herbarium collections observed during the Herbarium Recovery Project surveys (Figure 6).

Connecticut

Fairfield County. Greenwich.
Hartford County. Southington.
Litchfield County. Salisbury.

New Haven County. Meriden City.

Massachusetts

Berkshire County. Egremont; Great Barrington.

Vermont

Addison County. Middlebury.
Bennington County. Pownal.

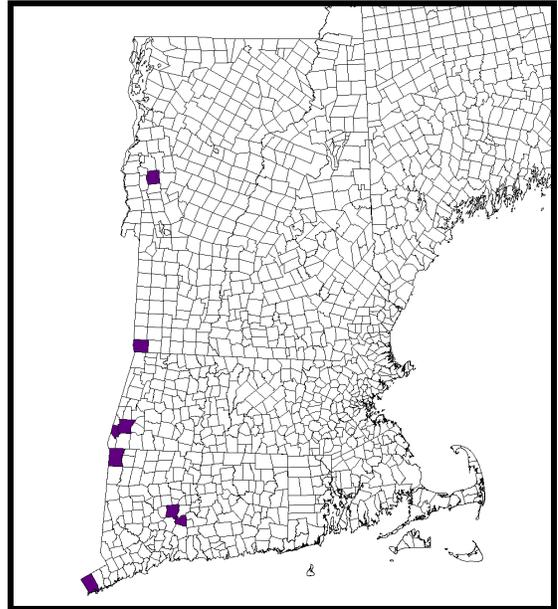


Figure 6. Distribution of known collections of *Viola subsinuata* in New England.

Viola subsinuata is a species of mesic to dry-mesic forests and woodlands. Herbarium label data indicates the species occurs in rich, mesic forests as well as dry, open situations of rocky ridges and hillsides. Bedrock has been noted as Trap Rock and calcareous types. Where it has been observed on Meriden Mountain (Haines, unpublished), it occurred in openings created by recent selective-cutting of a south-facing slope and grew with other species of violets, including *V. palmata*. This species should be sought throughout western and southern New England. It is identifiable throughout a large part of the summer as either flowering or fruiting material is sufficient for determination.

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IDENTIFICATION OF *LYCOPODIUM LAGOPUS*

Lycopodium clavatum L. is a well-known clubmoss with nearly cosmopolitan distribution. Worldwide, it has been considered to consist of a single polymorphic taxon, or as many as 15 closely related species (Øllgaard 1987). In North America, two taxa have traditionally been recognized, separated, in part, by the number of strobili produced by each stalk. Apparent variation in this character has caused some taxonomists and field workers to dismiss recognition of multiple taxa within the *L. clavatum* complex in North America (e.g., Billington 1952, Gleason and Cronquist 1991, Tryon and Moran 1997). Close examination of these plants, however, reveals two relatively discrete morphological groups that are correlated with geography. This note summarizes known distinguishing characteristics of New England's two members of the *L. clavatum* complex.

The *Lycopodium clavatum* complex is easily recognized in New England. The plants have elongate horizontal stems at or near the ground surface that produce spreading to erect upright shoots, the entire plant without a tree-like growth form of some clubmosses (Figure 1). The leaves, which are borne in alternating whorls of ca. 10, and sporophylls are provided with long, colorless, bristle tips, at least when young (unique for northeastern clubmosses). The strobili are borne on stalks produced from the apex of the upright shoots (Figure 2).



Figure 1. Habit of *Lycopodium clavatum*.



Figure 2. Habit of *Lycopodium lagopus*.

Lycopodium clavatum has often been separated into two infraspecific taxa in the northeast—a relatively southern form with multiple strobili per stalk and a relatively northern form with a single strobilus per stalk. The southern form has been called *L. clavatum* var. *clavatum* (which is the type of the species and genus) and the northern form has been called *L. clavatum* var. *monostachyon* Grev. & Hook. In some manuals, the single strobilus forms are further subdivided, and those with large strobili and more elongate strobilus stalks are called *L. clavatum* var. *megastachyon* Fern. & Bissell (Fernald 1950). Reliance on a single character for discrimination (i.e., number of strobili per stalk) has obscured a number of differences between northern and southern forms.

Lycopodium clavatum sensu stricto (i.e., the southern form) is characterized by upright shoots with spreading to ascending branches (Figure 1). Each upright shoot bears 3–6 branches. The leaves are usually spreading to spreading-ascending and measure 4–6 mm long (Figure 1). Each strobilus stalk bears from 1–5 strobili. Stalks bearing a single strobilus do occur within a given population, but are not the common character state (2 or more strobilus per stalk is typical). Each lateral strobilus

on a given stalk is borne on a small side-branch (sometimes referred to as a pedicel; Figure 3).



Figures 3 (left) and 4 (right). 3—Strobili of *Lycopodium clavatum*, note that each strobilus has a short stalk. 4—Strobili of *L. lagopus*, note that when 2 are produced from a single stalk, they appear paired and sessile at the apex of the stalk.

Lycopodium lagopus (C. Hartman) G. Zinserling ex Kuzeneve-Prochorova, the name provided to the northern form when it is recognized at the species level, is characterized by upright shoots with ascending to erect branches (Figure 5). Each upright shoot usually bears only 2 or 3 branches (Figure 2). The leaves are ascending to appressed and average shorter than those of *L. clavatum*, 3–5 mm long (Figure 2). Each strobilus stalk normally bears a single strobilus. Rarely, some strobilus stalks will have two strobili. Unlike *L. clavatum*, *L. lagopus* does not produce separate side-branches for lateral strobili; rather, the second strobilus is sessile, giving the appearance of paired strobili at the summit of the stalk (Figure 4).



Figure 5. *Lycopodium lagopus*, note the relatively strict, ascending nature of the upright shoots and branches.

As evidenced from the text and images, *L. clavatum* and *L. lagopus* are separated by a number of subtle characteristics that, when observed collectively, justify separation into two species. Further, the two species have been observed growing together in southern Michigan and maintained their distinctions (Wagner & Beitel 1993). As previously mentioned, past treatment of these two species has often relied on comparisons of a single character for discrimination. *Lycopodium clavatum* is ubiquitous in New England, found in a wide variety of open or partly forested upland habitats. *Lycopodium lagopus*, on the other hand, is more common in the northern and higher elevation portions of New England. When found in southern New England, *L. lagopus* is often associated with sites having cool microclimates. As a final note, further subdivision of *L. lagopus* into small- and large-strobilus forms does not seem to be warranted, as variation in strobilus dimensions is continuous.

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