Spring 2020

Wildflower of the Year—Cymes, not Corymbs!

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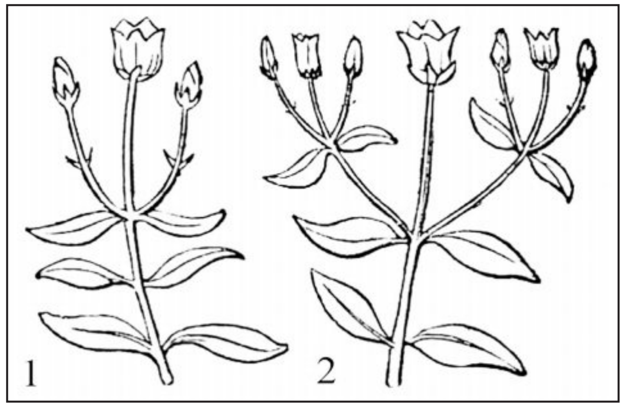
Recommended Citation
Hayden, John W. "Wildflower of the Year—Cymes, not Corymbs!" *Sempervirens: The Quarterly of the Virginia Native Plant Society* (Spring, 2020): 4-5.

Wild Geranium

Wildflower of the Year—Cymes, not Corymbs!

Article by W. John Hayden, Botany Chair



Figures 1 and 2. 1. Simple cyme (dichasium), the first-to-open flower terminates this determinate inflorescence; one pair of flowers form below the terminal flower. 2. Compound cyme (dichasium), a determinate inflorescence in which the cyme pattern of flower formation repeats below the terminal flower of each branch. Images from Gray (1868).

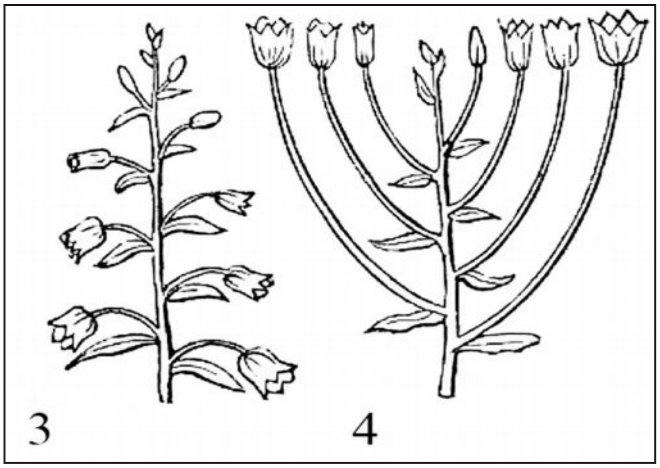
I hit a snag while composing the text for this year's wildflower of the year brochure on Wild Geranium, *Geranium maculatum*. The problem concerned the proper descriptive term for its inflorescence, i.e., the pattern in which its flowers are grouped. In more than one source, I read that, for the family Geraniaceae, inflorescences are cymes (Figures 1 and 2), but those same sources indicated that inflorescences of *Geranium maculatum* are corymbs (Figure 4). That conflict caused me to scratch my head because cymes and corymbs are fundamentally different kinds of inflorescences.

If the Geranium family is characterized by cymes, how could *Geranium maculatum* have corymbs? Eventually, I decided that, from a morphological and phylogenetic perspective, cymes made more sense than corymbs. Consequently, the word "corymb" does not appear in this year's WOY brochure. But I still worried that someone might challenge me on this detail. I could imagine someone suggesting that I could have, or should have, consulted the *Flora of Virginia* (Weakley et al. 2012), or *Gray's Manual* (Fernald 1950), more carefully, where the inflorescence of *Geranium maculatum* is clearly described as "terminal corymbs." This article explains why I opted to contradict these respected sources.

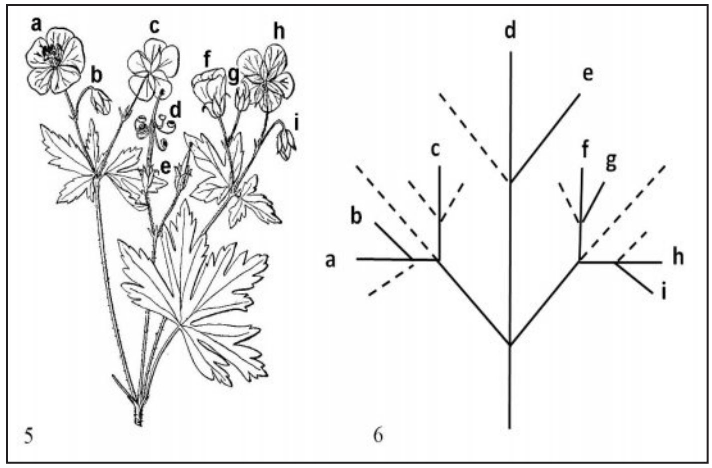
To a morphologist, the corymb versus cyme issue is a big deal. Corymbs and racemes (Figures 3 and 4) are indeterminate inflorescences, i.e., they have at least some potential for protracted extension growth; older flowers develop at the base of the inflorescence, younger flowers (or flower buds) are located at the tip, where a meristem provides the potential for continued growth. In contrast, cymes (Figures 1 and 2) are determinate inflorescences; the first flower to develop is located at the stem tip and subsequent flowers grow from lateral buds on stem segments below the terminal flower. To some extent, the contrast is a matter of developmental sequence, bottom-up (indeterminate racemes and corymbs) versus top-down (determinate cymes). All branches of a corymb are lateral to a single central axis (stem); cymes branch repeatedly, forming complex branch patterns. Note also that the sequence of flower opening differs, as suggested by the relative sizes of open flowers and flower buds in Figures 2 and 4.

Corymbs are especially common in Brassicace and some common, non-native, members of this family provide good examples: Shepherd's Purse (*Capsella bursa-pastoris*), Rockets (*Barbarea* spp.), and Garlic Mustard (*Alliaria petiolata*), to mention just a few. Because of the progressive elongation of pedicels during flower development, the oldest flowers of a flat-topped corymb are toward the outside of the cluster, and the youngest at the center.

Cymes and cyme-derived inflorescences are also relatively common. Some real examples that closely match textbook diagrams can be found, for example, in species of *Stellaria* or *Silene* (Caryophyllaceae). Often, however, the fully developed, idealized, cyme pattern is modified in various ways. Bracteal leaves may be foliose, rendering subtle the distinction between inflorescence and vegetative growth. Or the relative lengths of flower pedicels and subtending stem segments may be greatly prolonged, or severely contracted, or altogether absent, again, obscuring the fundamental cyme pattern. Trickier still, is the elimination of some branch stem segments or some pedicels (and, hence, loss of some flowers) from the theoretical, fully developed, cyme pattern. It is this latter variation of cyme structure that



Figures 3 and 4. 3. Raceme, an indeterminate inflorescence, oldest flowers or fruits at the base, youngest flowers or flower buds at the tip, pedicels of approximately equal length. 4. Corymb, an indeterminate inflorescence similar to a raceme, but with pedicels of markedly different lengths resulting in a relatively flat-topped pattern of flowers and flower buds. Images from Gray (1868).



Figures 5 and 6. 5. *Geranium maculatum*, Wild Geranium, flowering stem; image from Britton & Brown (1913). 6. Branching pattern of a compound cyme corresponding to the inflorescence in Fig. 5; dotted lines depict elements of the ideal, fully developed cyme that are absent in this particular example; letters correspond to the letters on flowers and fruits in Fig. 5; diagram by W. J. Hayden.

is at the heart of the corymb versus cyme conflict in *Geranium maculatum*.

To my eye, the inflorescence of *Geranium maculatum* is a cyme with just a few orders of branching, but with a significant fraction of potential branch stem segments and flower-bearing pedicels absent. Consider the images compared in Figures 5 and 6. Figure 5 is a rendition of the flowering portion of the plant. The diagram in Figure 6 represents my interpretation of the inflorescence depicted in Figure 5: a central, simple, cyme flanked by two compound cymes, but all three with some cyme elements missing, the missing elements represented via dotted lines. To support this interpretation, I have arbitrarily labelled the flowers in Figure 5 with letters that are matched with the solid line segments of the cyme depicted in Figure 6. I should hasten to add that perfunctory examination of a few herbarium specimens and inspection of published illustrations of flowering *Geranium maculatum* indicate that these plants do not always conform strictly with the pattern illustrated in Figure 5 and diagrammed in Figure 6; nevertheless, all conform, generally, with a group of cymes in which a significant fraction of stem segments and pedicels are absent—just not the same exact pattern in each case. *Geranium maculatum* has cyme-derived inflorescences, not corymbs!

Is cyme versus corymb a big deal? I think so! Detailed and accurate description of form is at the core of taxonomy; for an organism to be “known to science” means, minimally, that the entity has a name and a description that distinguishes it from all other life forms. Morphological terms constitute this first step in establishing the essence of a species. Beyond establishing taxonomic identity, patterns of shared morphological characters among organisms are the foundation of biological classification, i.e., the grouping of species into genera, genera into families, families into orders, etc. Morphology, of course, is now supplemented with chemical characters for classification. Nevertheless, descriptive terminology remains essential to the understanding of biodiversity. We need to get it right. ❖

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