



Trillium hibbersonii (Melanthiaceae), a phylogenetically distinct species from western North America

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Trillium Linnaeus (1753: 339) species have a reputation for being difficult to distinguish from one another, both on morphological (e.g. Freeman 1985, Schilling *et al.* 2019) and initial studies with standard plastid markers (Osaloo *et al.* 1999). Thus, the species that is sister to the rest of the Parideae, *Pseudotrillium rivale* (Watson 1885: 378) Farmer (2002: 687), was only recognized to be distinctive after DNA sequence data became available (Farmer & Schilling 2002). In the somewhat similar case discussed here, an entity that was considered to be only a form or variety of one species, *T. ovatum* Pursh (1803: 216), has turned out to be so genetically distinct that it is not even placed in the same clade as *T. ovatum* (Farmer 2006, Lampley *et al.* unpubl.).

The entity now known as *T. ovatum* forma *hibbersonii* Taylor & Szczawinski (1974: 250) was first discovered on the west coast of Vancouver Island in 1938 by Hibberson (Wiley 1968). The type locality is near Boat Basin, Hesquiat Harbour. Although it has gained popularity as a garden plant due to its diminutive size, it has received little attention in the scientific community. Gardeners who have grown the plant, however, have long believed that it is a distinct species (Ware 2014). Wiley (1968) attempted to name this dwarf plant, but by failing to include a Latin description and not citing a nomenclatural type, he created a *nomen nudum*. Taylor & Szczawinski (1974) subsequently reviewed its status and suggested that it was simply part of an intergrading series with *T. ovatum*, but they published the new name, *T. ovatum* forma *hibbersonii*. More recently, the name *T. ovatum* var. *hibbersonii* (T.M.C.Taylor & Szczaw.) Douglas & Pojar (2001: 353) has been proposed, in part to be able to list it as a distinct entity in a floristic treatment that did not include forms (Douglas & Pojar 2011). Both Taylor & Szczawinski (1974) and Douglas & Pojar (2011) considered it to be merely a dwarf variant of *T. ovatum*.

O'Neill (1995) presented a comprehensive review of *T. ovatum* forma *hibbersonii* based on multiple sources of data, including cytology, morphology and flavonoid chemistry, and concluded that it should be recognized as a species distinct from *T. ovatum*. Most recently, analyses of DNA sequence data including a complete set of plastid genes (Lampley *et al.* unpubl.) have shown that it is not only distinct from *T. ovatum* but a member of a different clade. Thus, similarities in morphology between it and *T. ovatum* (Taylor & Szczawinski 1974, Douglas & Pojar 2011) reflect primarily the overall similarity of many species of *Trillium* to one another rather than being conspecific. We thus make the new combination for *T. ovatum* forma *hibbersonii* at the species level.

Taxonomic treatment

Trillium hibbersonii (T.M.C.Taylor & Szczaw.) D.O'Neill & S.B.Farmer, *comb. et stat. nov.* Basionym: *Trillium ovatum* Pursh forma *hibbersonii* T.M.C.Taylor & Szczaw., *Syesis* 7: 250, 1974. Type:—CANADA. British Columbia: near Boat Basin, Hesquiat Harbour, west coast of Vancouver Island, elev. 2000 ft., 1938, Hibberson s.n. (holotype: UBC!). Fig. 1.

Homotypic synonyms: *Trillium ovatum* Pursh var. *hibbersonii* (T.M.C.Taylor & Szczaw.) G.W.Douglas & P.Pojar, *Canad. Field-Naturalist* 115: 343, 2001. *Trillium hibbersonii* Wiley, *nom. nud.*, *Rare wildflowers of North America*. Wiley, Portland, 1968.

Both the specific epithet and the suggested common name, Hibberson's trillium, reflect the first collector of this taxon, English Canadian surveyor John Arthur Hibberson (1881–1955). Note that the taxon has also been called dwarf western trillium or dwarf trillium, but use of Hibberson's trillium is recommended because it avoids potential confusion with other small species of *Trillium*.

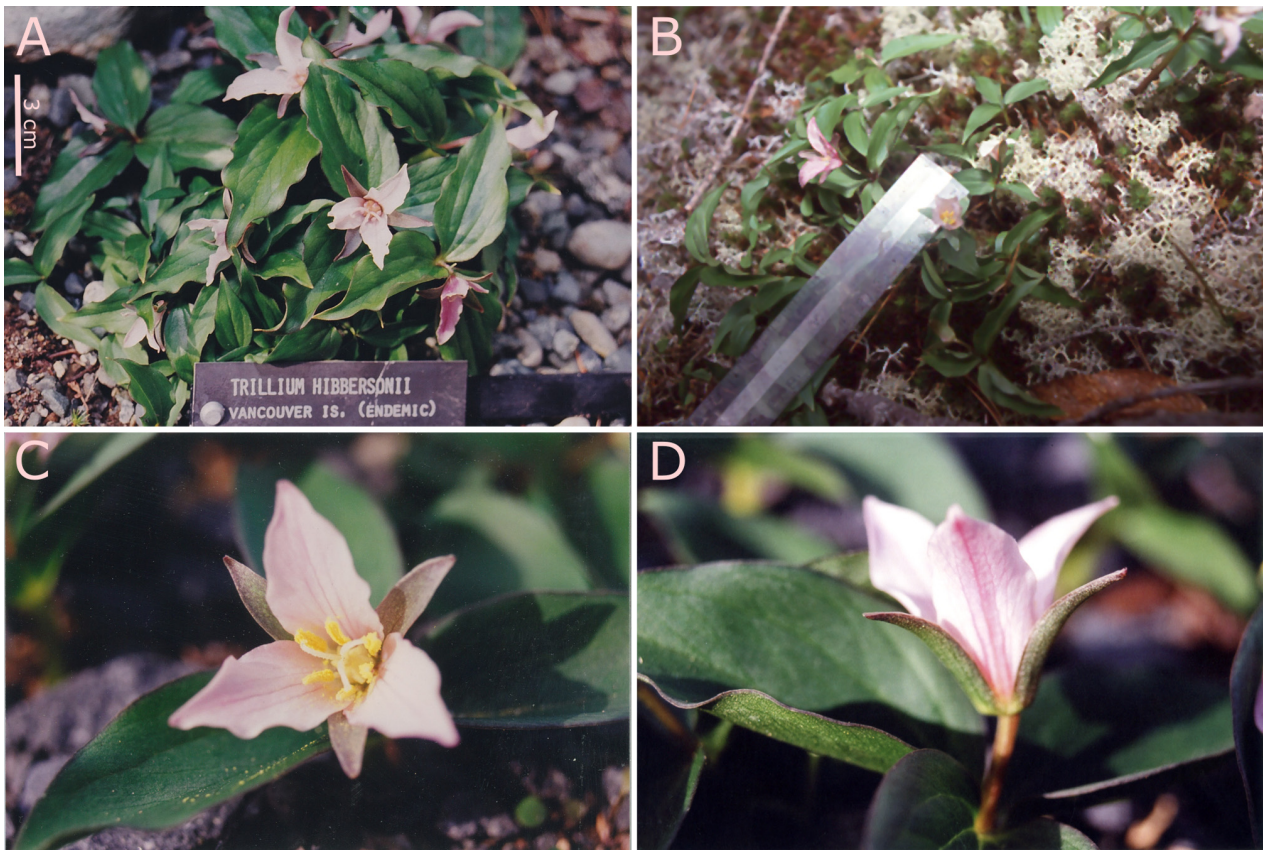


FIGURE 1. *Trillium hibbersonii*. A. North American Garden, UBC Botanical Garden. B. Hesquiak Lake site, moss and lichen abundant, an organic layer covers the underlying bedrock and rubble. C. Flower at full anthesis; note stigmas held above introrsely dehiscent anthers, and petals are pink. D. Flower just prior to anthesis; note sepals and leaf margins are rimmed with red, and sepals are not fused at base. Photographs taken by David Wilson and Darlene O'Neill.

O'Neill (1995) showed that *T. hibbersonii* differs from *T. ovatum* in several respects. They differ in seed germination and dormancy requirements, and crosses between them failed to produce viable seed. They also differ in the relative position of staminal apices and stigmas, floral pigmentation and ovary shape. The stigmas in *T. hibbersonii* are positioned above the top of the stamens (Fig. 1), whereas in *T. ovatum* the stamens extend beyond them. Flowers of *T. hibbersonii* are pink in bud and remain so through anthesis (Fig. 1), eventually fading to a darker pink, whereas those of *T. ovatum* are white at anthesis and fade to a pink-red; there is also a pigment difference in the sepals, with those of *T. hibbersonii* with red margins and venation at anthesis (Fig. 1) compared to green in *T. ovatum*. The fruits in *T. hibbersonii* are ridged but not prominently winged, in contrast to the distinctly winged fruits of *T. ovatum*. These morphological differences were maintained when plants were grown in a common garden setting. Other morphological differences include the smaller size of all plant parts in *T. hibbersonii* compared to *T. ovatum*, the presence of pigmentation in the anther connective of *T. hibbersonii* compared to whitish in *T. ovatum*, the narrower, lanceolate to elliptic leaves in *T. hibbersonii* compared to the broader rhombic to rhombic-ovate leaves of *T. ovatum* and differences in flower position, with a distinct bend in the peduncle resulting in an angled position in *T. hibbersonii* whereas the flower is held erect in *T. ovatum*. The two species occupy parapatric geographical distributions and occur in different local habitat types, with *T. hibbersonii* occupying a distinctive area in the northwestern region of Vancouver Island, whereas *T. ovatum* has a relatively widespread distribution that includes the southern and eastern parts of Vancouver Island, and mainland British Columbia as far south as California. Plants of *T. hibbersonii* are found in seasonally wet seepage zones of steep, rocky slopes, whereas those of *T. ovatum* occur in various moist shady sites; both occur in acidic soils, but *T. hibbersonii* occurs in poor, less developed or scant soils compared to *T. ovatum*.

In addition to differing in multiple features of phenotype and habit, *T. hibbersonii* is distinct from *T. ovatum* genetically (Farmer 2006). Analysis of plastid genes placed *T. hibbersonii* in a clade in *Trillium* apart from *T. ovatum* (Lampley *et al.* unpubl.). In contrast to the earlier results (Farmer 2006), the larger data set placed *T. hibbersonii* as sister to the species of the *T. erectum* clade. Nuclear ribosomal ITS of *T. hibbersonii* (Genbank MT020083) was distinct from all other reported species of *Trillium*, with the most similar almost 5% different; it was only 93–94% similar to those of *T. ovatum* (AB018817; DQ404194).

Trillium hibbersonii has been found at only four sites and is documented by herbarium vouchers from only two. Published estimates indicate that colonies do not typically exceed more than two dozen or so plants (O'Neill 1995, Wiley 1968). The extremely restricted geographic distribution and small population sizes make *T. hibbersonii* a source of conservation concern.

Specimens examined:—CANADA. British Columbia: Hesquiat Lake, 60 km nw of Tofino, Van. Island, 20 m elev., 49°30' N 126°24' W, 11 Apr 1992, *O'Neill s.n.* (UBC); Vancouver Island, Hesquiat Lake, southwest slopes of a peninsula on the eastern side of the lake, 49°30' 30" N 126°23' 24' W, 10 May 1981, *Ceska et al. 5019* (UBC); above Hesquiat Harbor, V.I., in rock at 4-500 ft., but garden grown for five years, 17 Apr 1947, *Hibberson s.n.* (UBC).

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