

**OVERVIEW OF *POTENTILLA VERSICOLOR* (ROSACEAE)
AND A NEW VARIETY
IN THE “SKY ISLANDS” OF CENTRAL AND EASTERN OREGON**

BARBARA ERTTER

University and Jepson Herbaria
University of California
Berkeley, California 94720-2465
ertter@berkeley.edu

Snake River Plains Herbarium
Boise State University
Boise Idaho, 83725-1515

College of Idaho
Caldwell, Idaho 83605

ALEXA DINICOLA

Department of Botany
132 Birge Hall, 430 Lincoln Drive
University of Wisconsin-Madison
Madison, Wisconsin 53706
adinicola@wisc.edu

ABSTRACT

Potentilla versicolor Rydb. was resurrected for use in *Flora of North America North of Mexico* for a plant variously included in *P. ovina*, *P. breweri*, or *P. millefolia*. Because of the poorly known status of a species of possible conservation concern, discussion beyond what has previously been published, including infraspecific variation, is provided here. As treated in FNANM, the species comprises pinnate-leaved, sparsely to non-tomentose *Potentilla* occurring on “sky islands” in central and eastern Oregon and northern Nevada, specifically Gearhart, Steens, Greenhorn, Strawberry, Wallowa, and eastern Cascade mountains of Oregon, and the Ruby Mountains of Nevada. Populations from ultramafic substrates in the Greenhorn and Strawberry mountains tend to have more leaflets, more diffuse inflorescences, and smaller flowers than elsewhere; they are described here as ***Potentilla versicolor* var. *darrachii* Ertter & DiNicola, var. nov.** Other infraspecific variation in the species is currently under investigation by the second author.

As the first continent-wide revision of *Potentilla* since Rydberg (1908), the treatment of the genus in *Flora of North America North of Mexico* (FNANM) by Ertter et al. (2015) frequently diverged from previous treatments in available regional floras (e.g., Abrams 1944; Cronquist et al. 1997; Hitchcock et al. 1961), most of which differ among themselves in various details. As a prime example, the FNANM treatment resurrected *P. versicolor* Rydb. for pinnate-leaved, sparsely or non-tomentose *Potentilla* from high-montane settings in the northern Intermountain Region, specifically from central and northeastern Oregon and northern Nevada. Because this previously overlooked and relatively rare species was only cursorily addressed in the FNANM format, a more detailed discussion is provided here, including the description of a new ultramafic-associated variety. Additional information on related species is in a recent companion paper (Ertter 2017); the species complex as a whole is currently under investigation as the second author’s doctoral study.

Rydberg (1908) described *Potentilla versicolor* based on a single collection from central Oregon, collected in 1896 by F.V. Coville (#307, US) and J.B. Leiberger (#2918, ORE in OSC) from “Grayhart Buttes” (“Gayhart” on *Leiberger 2918*), generally understood to be Gearhart Mountain in Lake County, Oregon. No subsequent collections were added to the circumscription for over half a century. Few floras have covered this part of Oregon, a primary exception being that of Abrams

(1944), who dismissed *P. versicolor* as “doubtful, for it is known from a single collection.” Keck (in Clausen et al. 1940) treated *P. versicolor* as a variant of *P. breweri* S. Wats. with “leaflets small and rather well separated.” Peck’s *A Manual of the Higher Plants of Oregon* was the first (and for decades the only) flora to recognize *P. versicolor*, initially limited to “mountains of southern Lake Co.” (Peck 1941), but with the range subsequently expanded to include the Wallowa and Steens mountains (Peck 1961). With the exception of Mansfield’s (2000) *Flora of Steens Mountain* (which was influenced by the manuscript for Erter et al. 2015), other treatments have variously relegated the name and/or specimens to *P. breweri*, *P. ovina* J.M. Macoun (e.g., Hitchcock et al. 1961), or *P. millefolia* Rydb. (e.g., Johnston 1980; Cronquist et al. 1997).

The recognition and circumscription of *Potentilla versicolor* in FNANM resulted from herbarium studies, fieldwork, and common garden observations over the last several decades, which have confirmed that plants comparable to the type of *Potentilla versicolor* form reasonably uniform populations at high elevations in the scattered “sky island” system of eastern Oregon, specifically Steens Mountain, Gearhart Mountain, the Wallowa Mountains, the Greenhorn Mountains, and the Strawberry Mountains, from 2100 to 3200 meters elevation. Some populations from the northern Ruby Mountains of northern Nevada also fit morphologically within *P. versicolor*, as do some populations from the eastern Cascade Mountains (e.g., the Sky Lakes Wilderness area). Occurrences often show intergradation with co-occurring populations of *P. breweri* and other species, but relatively “pure” subpopulations indicate that *P. versicolor* is as distinct as any other species in *Potentilla* sect. *Multijugae* (Rydb.) A. Nelson.

As now circumscribed, *Potentilla versicolor* is distinguished by its somewhat thickened taproot, simple to few-branched caudex, prostrate to ascending stems that are usually more than 1.5 times as long as the leaves, pinnate leaves with confluent terminal leaflets, usually sparse to absent vestiture (more variable on Gearhart Mountain), and a diffuse inflorescence with relatively straight pedicels. Leaflets are palmately and deeply divided into narrowly elliptic or linear-lanceolate teeth or segments, which when fresh appear semiverticillate (Fig. 1). Intertwined cottony hairs are usually absent or sparse, with the latter state possibly resulting from intergradation with co-occurring *P. breweri*. Petals, filaments, and styles tend to be somewhat shorter in *P. versicolor* than in *P. breweri*. Vigorous populations are most often found on shallow rocky soils, often near outcrops and/or with abundant cobble-size rocks, which are moist early in the season but dry out as the season progresses.



Figure 1. Semiverticillate leaf of *Potentilla versicolor* var. *versicolor* on Steens Mountain. Photo by B. Erter.

A key to distinguish *Potentilla versicolor* from the species with which it is most often conflated, and including the new variety described below, is as follows (modified from Ertter et al. 2015, with characters as defined therein). See discussion for plants from Ruby Mountains, Nevada.

1. At least distal leaflets pinnately incised, all leaflets \pm distinct; often on calcareous substrates, primarily Rocky Mountains and eastern Great Basin ranges (confirmed in Oregon only from high peaks in the Wallowa Mountains) **Potentilla ovina**
1. Leaflets \pm palmately or unevenly incised (pinnately in rare exceptions), distal leaflets \pm confluent; rarely if ever on calcareous substrates, Oregon, Nevada, and California.
 2. Pedicels \pm recurved in fruit; stems usually prostrate, 1–2 times as long as basal leaves; meadows in shrub-steppe and low- to mid-montane forest communities (700–2200 m), ne California, s-central Oregon, adjacent Nevada **Potentilla millefolia**
 2. Pedicels straight to slightly recurved in fruit; stems prostrate to ascending, 2–3(–7) times as long as basal leaves; various habitats in mid-montane conifer forests to alpine fell-fields (1500–3600 m).
 3. Leaflets grayish green to white with \pm dense cottony hairs, straight hairs usually obscured or absent; caudex commonly branched; filaments (1–)2–4 mm long; high Sierra Nevada and mountains of n California, Oregon, and n Nevada **Potentilla breweri**
 3. Leaflets usually green to grayish green with sparse (to common on Gearhart Mountain) or absent cottony hairs, straight hairs sometimes abundant (primarily on emerging leaves); caudex usually simple to few-branched; filaments 1.5–2.5(–3) mm long; mountains of Oregon **Potentilla versicolor**
 4. Inflorescence branch angle 30–70(–90)°; pedicels to 2.5(–3.5) cm long; leaflets 3–6(–10) per side on distal \pm $\frac{1}{2}$ (– $\frac{3}{4}$) of leaf-axis; salient glandular trichomes present or absent, cottony hairs usually absent or sparse; basaltic, metamorphic (but not ultramafic), and granitic substrates; Steens, Gearhart, Wallowa, and Cascade mountains **var. versicolor**
 4. Inflorescence branch angle 60–100°; pedicels to 3.5(–4) cm long; leaflets (5–)6–9 per side on distal ($\frac{1}{2}$ –) $\frac{2}{3}$ – $\frac{3}{4}$ or more of leaf-axis; salient glandular trichomes present, cottony hairs always absent; ultramafic substrates; Strawberry and Greenhorn mountains .. **var. darrachii**

Variation within *Potentilla versicolor*

Noteworthy variation occurs from mountain range to mountain range within the distribution of *Potentilla versicolor*, suggesting that the species has undergone radiation in the “sky islands” of the northern Great Basin. The second author is currently investigating this hypothesis, along with the possible contribution of introgression with *P. breweri* and other co-occurring congeners. Distinctions noted to date among metapopulations include the following.

(1) The type of *Potentilla versicolor* and recent collections by the second author from Gearhart Mountain approach *P. breweri* in having more cottony late-season leaves than most other populations. Styles are exceptionally long and slender as well, and less likely to stay attached to the achenes. At least one collection in the relatively nearby Cascade Mountains (*Dennis 2861*, OSU) is morphologically comparable. All known populations are on basaltic substrates.

(2) Steens Mountain in Harney County, Oregon, supports the largest and most accessible metapopulation of *Potentilla versicolor* by far, with numerous occurrences throughout the treeless upper expanses from at least 2530 to 2900 m elevation, on basaltic substrates. Because of the relative abundance of available material, collections from Steens Mountain are the primary basis for the description of *P. versicolor* in FNANM, supplemented with specimens from other sites. Existing collections have mostly been identified as either *P. breweri* or *P. ovina* using standard regional floras (Cronquist et al. 1997, Hitchcock et al. 1961, Hitchcock & Cronquist 1973). *Potentilla breweri* is

also present on Steens Mountain, evidently hybridizing with *P. versicolor*, but *P. ovina* is now treated as a more eastern species confirmed in Oregon only from high peaks in the Wallowa Mountains (Ertter et al. 2015).

(3) Collections of *Potentilla versicolor* from metamorphic and granitic substrates in the Wallowa Mountains (referred to as the “Powder River Mountains” on some older labels) are most comparable to those from Steens Mountain, though the leaves tend to have more leaflets occupying more of the leaf-axis. Although some collections were provisionally annotated by the senior author as var. *darrachii*, subsequent research indicates that optimum placement of the Wallowa Mountains metapopulation remains to be determined. Putative hybridization with co-occurring *P. glaucophylla* Lehm. has resulted in significant variation, some of which might represent a semi-stabilized nascent taxon.

(4) Metapopulations from ultramafic substrates in the Greenhorn Range of the Blue Mountains and Strawberry Mountains of Oregon are described below as var. *darrachii*.

(5) Several collections from Island Lake and Liberty Pass in the Ruby Mountains of Elko County, Nevada, have a strong resemblance to *Potentilla versicolor* in Oregon, particularly to the Steens Mountain form. Whether these are conspecific or have an independent origin, possibly involving *P. ovina*, remains to be determined.

(6) The first author had previously included some collections (*Thompson 13225, Applegate 7535*) from Crane Mountain, Lake County, Oregon, within *Potentilla versicolor* and annotated them accordingly. More recent fieldwork, however, indicates that they are more likely variants, or even possible topotypes, of *P. bruceae* Rydb.

(7) Even in the broad sense, *Potentilla versicolor* is not currently recognized in California (Ertter 2012; Ertter et al. 2015), but the type of *P. millefolia* var. *algida* Jepson has tantalized the first author for some years with its similarities to *P. versicolor* (e.g., Ertter & Mansfield 2007). Jepson (1936) based this variety on a single collection (*Hall 8698, UC*) from a glacial meadow at the head of the North Fork of Swift Creek in the eastern Salmon Mountains of Trinity County, California. Some recent collections from the Mount Eddy area by the second author are comparable to the type, but other populations from ultramafic substrates in the Scott and Trinity mountains, and possibly Mount Shasta, are consistently intermediate between *P. breweri* and *P. versicolor*.

A new variety of *Potentilla versicolor*

While working on the treatment for FNANM, the first author was puzzled by a specimen from the Greenhorn Range in the Blue Mountains of Oregon, collected by Jean Wood in 2002 as part of a floristic survey of the Umatilla National Forest. With the help of forest botanist Mark Darrach, this population was relocated in 2012; two years later Darrach found another population nearby. Comparable plants on Baldy Mountain in the Strawberry Mountains had been photographed by Paul Slichter in 2010 and were brought to the authors’ attention in 2015. Both sites found by Slichter were visited by the authors later that same year, shortly before a major forest fire burned through the area.

Plants from both the Greenhorn and Strawberry mountains clearly belong to *Potentilla versicolor* sensu lato, but they have a generally greener and more delicate gestalt, more leaflets on average, more diffuse inflorescences, and smaller flowers, especially compared to populations from Steens Mountain. These metapopulations also are restricted to ultramafic substrates, commonly associated with unique species and varieties of plants in other areas. Although the morphological distinctions were diminished in plants grown in a common-garden setting with regular watering, sufficient differences persisted to support the recognition of these populations as a definable variety on ultramafic substrates in contiguous parts of the species’ range, as described here.

POTENTILLA VERSICOLOR Rydb. var. **DARRACHII** Ertter & DiNicola, **var. nov.** (Figures 2, 3).

TYPE: USA. Oregon. Grant Co.: head of Salmon Creek on NE side of Vinegar Hill, Blue Mts. ca 28 air mi NE of John Day, open conifer forest on serpentine, 2280 m, 44.717°N 118.551°W, 3 Aug 2012, *B. Ertter 21219* with M. Darrach & E. George (holotype: UC; isotypes: CIC, MO, NY, OSC, PR, RM, SRP, US, WIS, WTU, and to be determined.)

Differs from var. *versicolor* (particularly on Steens Mountain) in generally having more leaflets per side on a greater fraction of the relatively slender leaf-axis, a more openly branched inflorescence with longer pedicels on average, fewer and slightly smaller flowers, fewer carpels, styles that are smooth rather than somewhat swollen-papillate basally, and an association with ultramafic substrates.

Plants usually green, sometimes grayish green in late season; taproot not to somewhat fleshy-thickened; caudex simple to few-branched. **Stems** prostrate-decumbent in open sites, ascending in competing vegetation, (0.8–)1–3(–3.5) dm long, 1.5–2.5(–7) times as long as basal leaves. **Basal leaves** not evidently 2-ranked, pinnate with distalmost leaflets \pm confluent, (2–)4–10(–15) \times (0.6–)0.8–2(–3.5) cm; petiole (0.5–)1–2.5(–4.5) cm long, glabrous (early season) to sparsely (late season) wavy-hairy, often sparsely glandular as well; leaflets (5–)6–9 per side, on distal ($\frac{1}{2}$ –) $\frac{2}{3}$ – $\frac{3}{4}$ + of leaf-axis, overlapping at least distally, largest leaflets cuneate to flabellate, (0.3–)0.7–1.2(–2) \times (0.2–)0.4–1.0(–1.5) cm, palmately divided ($\frac{1}{2}$ –) $\frac{2}{3}$ to completely to midrib, often medially split, ultimate teeth or segments 2–4(–6) in a semiverticillate arrangement, narrowly elliptic to linear-oblongate, rarely obovate, (1–)2–8(–12) \times 0.5–2(–4) mm, surfaces similar, green (grayish) with sparse (especially early season) to common (primarily late season) straight to \pm wavy hairs, these weak, ascending, 0.5–2 mm long, salient peglike glands sparse to common, often pink-headed, cottony hairs absent. **Cauline leaves** (0–)1(–3). **Inflorescences** (1–)3–10(–12 or more in cultivation)-flowered, very openly cymose; inflorescence branch angles 60–100°; pedicels (1–)2–3.5(–4) cm long, straight to slightly recurved in fruit. **Flowers:** hypanthium 3–4 mm diam., epicalyx bractlets lanceolate to ovate-elliptic, 2–3.5 \times \pm 1 mm; sepals 3.5–5 mm long, narrowly to broadly acute; petals yellow, lacking darker basal patch, 5–7 \times 4–5 mm; filaments 1.5–3 mm long; anthers 0.7–0.8(–1) mm long; carpels 5–15, styles slender, 2–2.5 mm long, smooth at base. **Achenes** \pm 1.8 mm, smooth, pale brown.

Flowering June to August. Moist ground along drainages in open conifer forests near timberline, sometimes in rock crevices, on ultramafic substrates; 2000–2400 m.

Additional specimens examined. Oregon. Grant Co.: Salmon Creek watershed, Vinegar Hill RNA, Greenhorn Mts., 8 Jul 2014, *Darrach 1070* (CIC); Pine Creek trail up N side of Baldy Mt., Strawberry Range ca 8 airmi SE of John Day, 44.347°N 118.8045°W, 2026 m, 13 Jun 2015, *Ertter & DiNicola 22341* (OSC, SRP, UC, WIS, and to be determined); saddle between peaks of Baldy Mt. (= serpentine ridge) in Strawberry Range ca 9 airmi SE of John Day, 44.3311°N 118.7912°W, 2165 m, 13 Jun 2015, *Ertter & DiNicola 22357* (CIC, OSC, UC, WIS, and to be determined); Salmon Creek below Bimetallic Mine, ca $\frac{3}{4}$ airmi E of Vinegar Hill Peak, T10S R35E S7, 7000 ft, 10 Jul 2002, *Wood 7784* (RM, Umatilla NF herb.).

As currently understood, *Potentilla versicolor* var. *darrachii* is known from two metapopulations in the mountains of northeastern Oregon, each with two known occurrences: the Greenhorn Range of the Blue Mountains, and Baldy Mountain in the Strawberry Mountains. Plants grow on ultramafic substrates in moist ground at the edge of rocky drainages in open conifer forests near treeline.

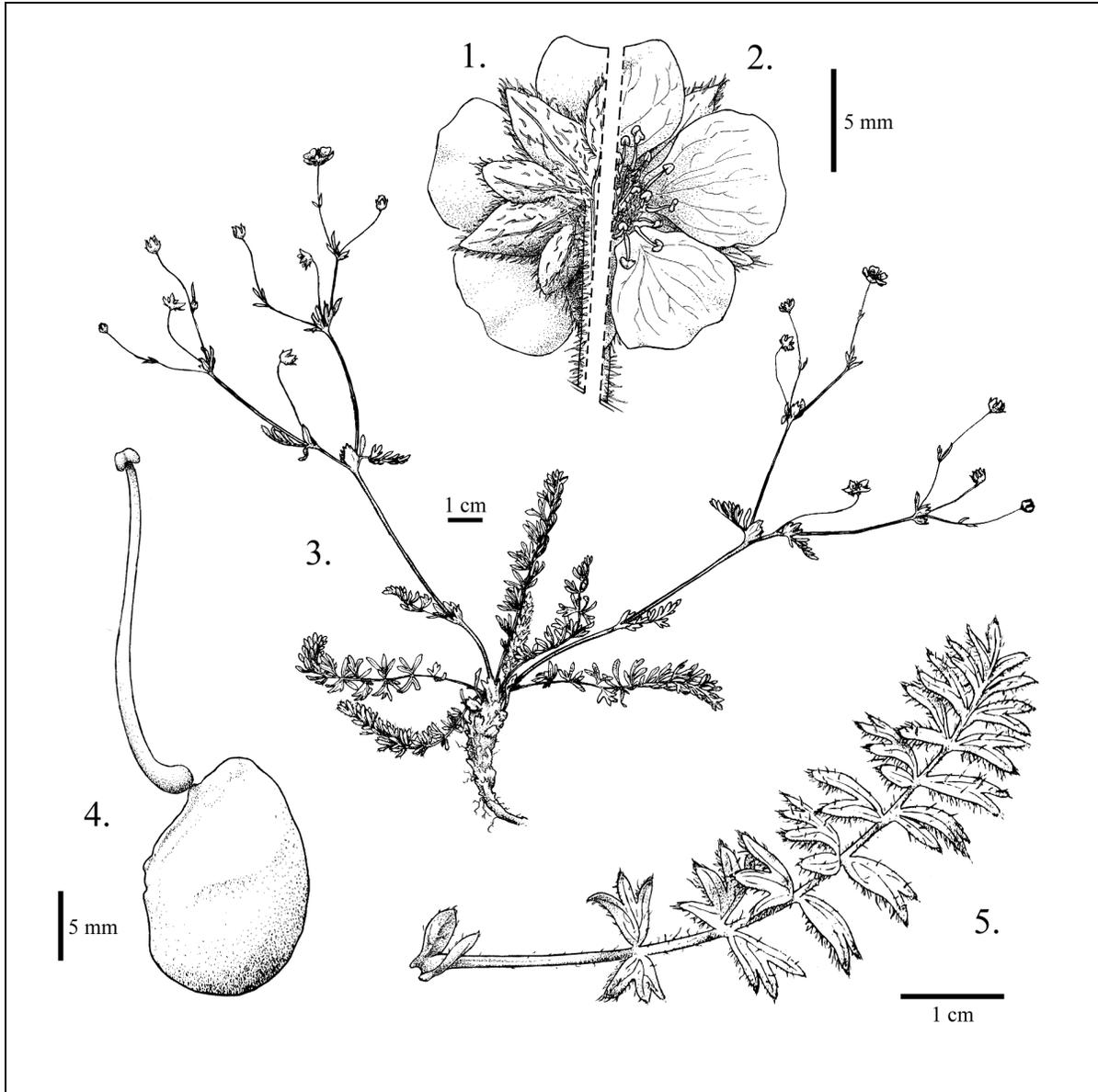


Figure 2. *Potentilla versicolor* var. *darrachii* Ertter & DiNicola. 1. Flower, abaxial. 2. Flower, adaxial. 3. Habit. 4. Achene & style. 5. Basal leaf. Drawn by A. DiNicola from *Ertter 21219* and corresponding live material, supplemented by field photos.

We are pleased with the opportunity to recognize Mark Darrach (b. 1957) by naming this new variety in his honor. He relocated the Greenhorn Mountains population, provided essential field support for the first author's visit to the site, subsequently located another population, and continued to assist in subsequent research on this new variety. Mark is a geologist-turned-botanist who has discovered and described several new species himself, mostly *Lomatium*, during his career with the Umatilla National Forest. He is also an avid Americana/Folk musician with a special fondness for Bernese Mountain Dogs. He runs a botanical and geological consulting business, Corydalis Consulting LLC. (pers. comm.; <oregonlive.com/pacific-northwest-news/index.ssf/2013/08/ore_botanist_bushwhacks_in_rug.html>).



Figure 3. Plants of *Potentilla versicolor* var. *darrachii* at the type locality. The rock crevice habitat is not typical but provides better photographic contrast than bare ground. Photo by B. Ertter.

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