

## GEOGRAPHY OF *ERYTHRANTHE DECORA* (PHRYMACEAE)

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### ABSTRACT

The occurrence of *Erythranthe decora* in Idaho and Montana is documented with collection citations and a map. These plants are disjunct nearly 200 miles eastward from the closest populations in the main part of the range in Washington and Oregon. Little or no morphological difference is apparent between the two disjunct population systems. Collections from Washington and Oregon are mapped in detail and the hypothetical distribution of evolutionary entities discovered by Coughlan et al. (2019) is shown.

The geographic range of *Erythranthe decora* (Grant) Nesom (*Mimulus guttatus* var. *decorus* A.L. Grant; *Mimulus decorus* (Grant) Suksd.) usually has been affirmed as eastern Oregon and Washington (Fig. 1). An earlier account (Nesom 2012, p. 51) noted that a UC collection from Idaho appeared to be *E. decora*, widely disjunct from the main range. Collections at PH and online images from CIC, ID, and WTU confirm the wide disjunction and show that the species in its eastern segment occurs over a relatively wide area.

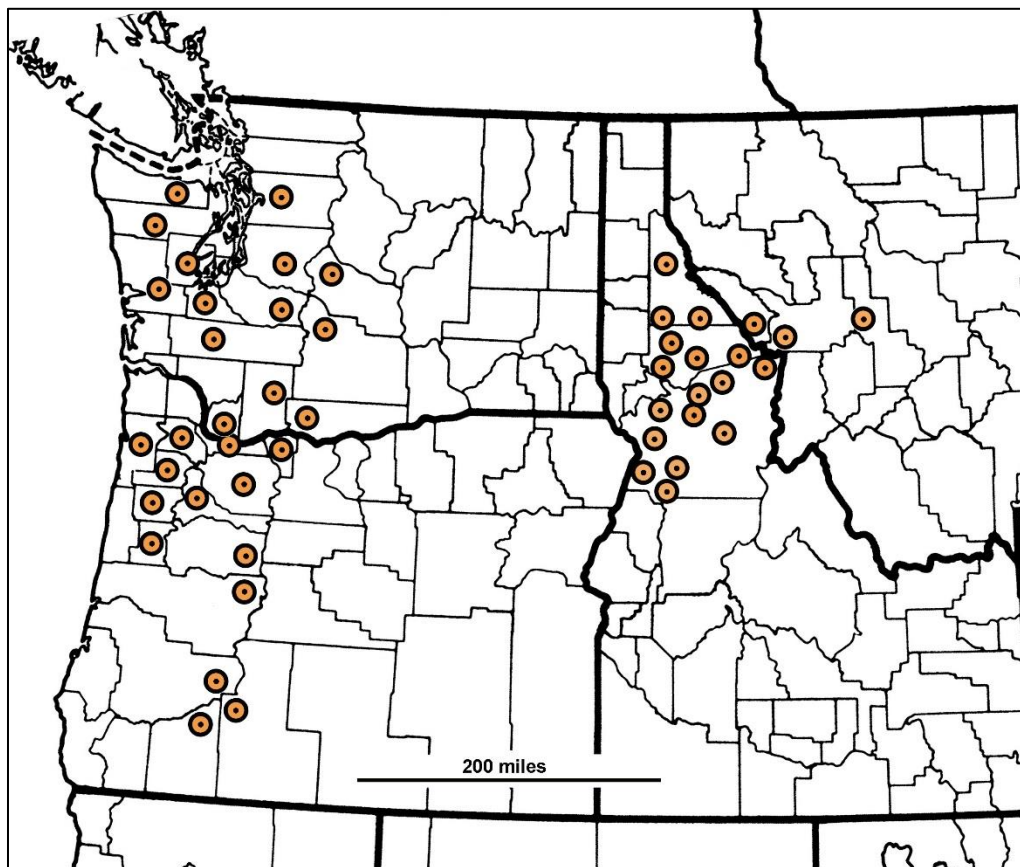


Figure 1. County-level distribution of *Erythranthe decora*. The western segment of the range is mapped with only 1 symbol per county. More localities are mapped in the eastern segment to show more detailed distribution within counties. Collections from Vancouver Island and from extreme southwestern Oregon previously identified as *E. decora* are a different species.

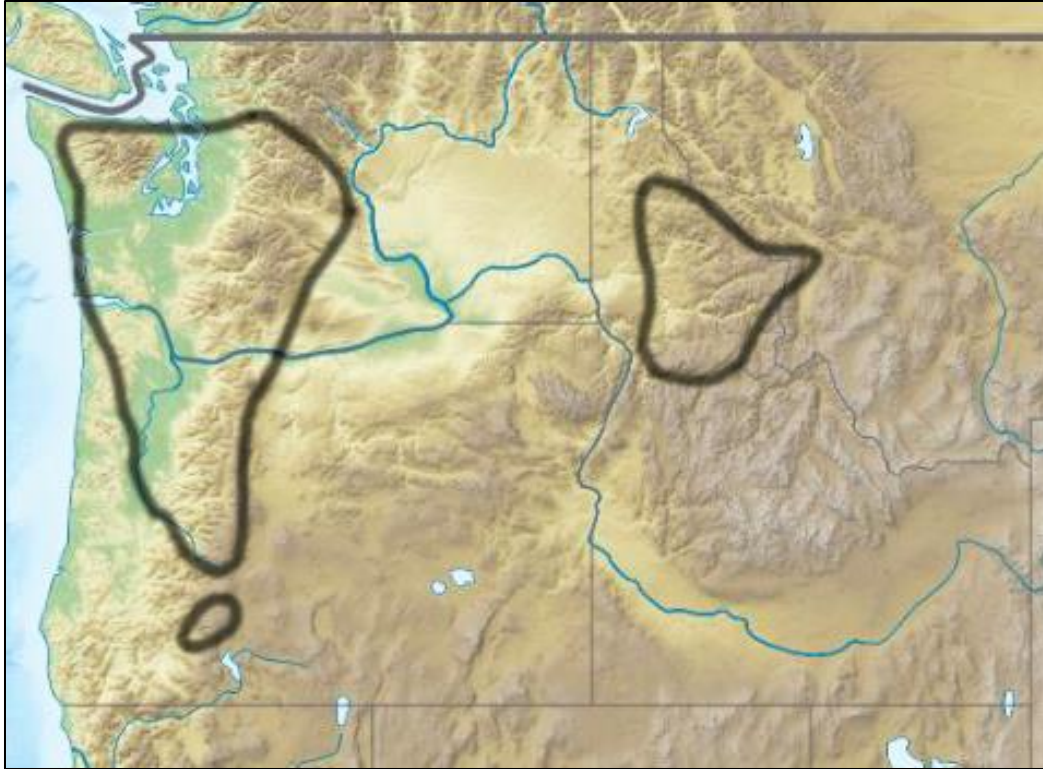


Figure 2. Distribution of *Erythranthe decora* (generalized from Figs. 1 and 5) showing the disjunction across the Columbia Plateau. The western segment of the species occurs in Coastal Ranges, the Olympic Mountains, and the Cascade Range. The eastern segment occurs in the Rocky Mountains.

Each of the PH collections cited below from Idaho and Montana was annotated in 1945 by Pennell as *Mimulus decorus*, and in a treatment of the genus for the Pacific States (Pennell 1951), he noted the distribution of the species as "coastal Washington and Oregon, east to northern Idaho." Although some floristic accounts have continued to recognize the presence of the species in Idaho (e.g., Hitchcock & Cronquist 2018; apparently following Pennell's notice in 1951; but not Davis 1952), collections of *Erythranthe decora* from there have been identified (by the author and others) as *E. guttata*, and *E. decora* has not appeared in pertinent databases.

The concept here of *Eythranthe decora* is the same as Pennell's and his annotations of PH collections initially confirmed (in the present study) the existence of the geographic disjunction. Although the characteristic stem, pedicel, and calyx vestiture (e.g., Fig. 2) is not visible in the images, collections from CIC, ID, and WTU (via the Consortium of Pacific Northwest Herbaria) are included here on the basis of the habit and perennation, characteristic leaf morphology, and large flowers, matching the features of the PH and UC specimens and standing apart from *E. guttata* in the same region (key couplet below). Figures 6-10 show representative collections of *E. decora* from Washington state; figures 11-17 show representative collections from Idaho and Montana.

1. Perennation via rhizomes; stems, pedicels, and calyces sparsely to densely, minutely and evenly hirtellous, eglandular; leaf blades ovate, bases truncate to rounded or shallowly cordate, abaxial surface (at least of distal leaves) minutely hirtellous (use lens); calyces 5.5–8 mm wide (pressed), lobes obtuse; corolla tube 15–20 mm long, 8–10 mm wide (pressed) ..... **Erythranthe decora**

1. Perennation via stolons arising from lowermost stem nodes, becoming rhizomatous; stems, pedicels, and calyces glabrous to sparsely hirtellous or hirsute-pubescent, pedicels minutely stipitate-glandular at least near the calyces; leaf blades elliptic-ovate, bases attenuate, abaxial surfaces glabrous; calyces 3.5–6 mm wide (pressed), lobes acute; corolla tubes 12–15 mm long, 4–6 mm wide (pressed) .. **Erythranthe guttata**

Morphological identity between plants in the western and eastern segments of the range suggests that they can be considered a single species. A possible difference is in corolla markings — corolla throats of the Idaho-Montana plants sometimes dry with a distinctive blue-green color (e.g., see Figs. 13, 14, 16), suggesting a strongly differentiated bulls-eye UV nectar guide (Peterson et al. 2015). This coloration has not been observed in collections of western *E. decora*. The two geographic systems appear to be similar in ecology, although the eastern plants do not range as low in elevation — the eastern plants occur at 2450–5500(–6400) feet and are usually in wet meadows and seeps, along wet stream banks, or on wet rock faces and cliffs. In any case, the wide disjunction between two large population systems suggests that genetic differentiation probably has occurred, even if it does not influence apparent morphology or habitat.

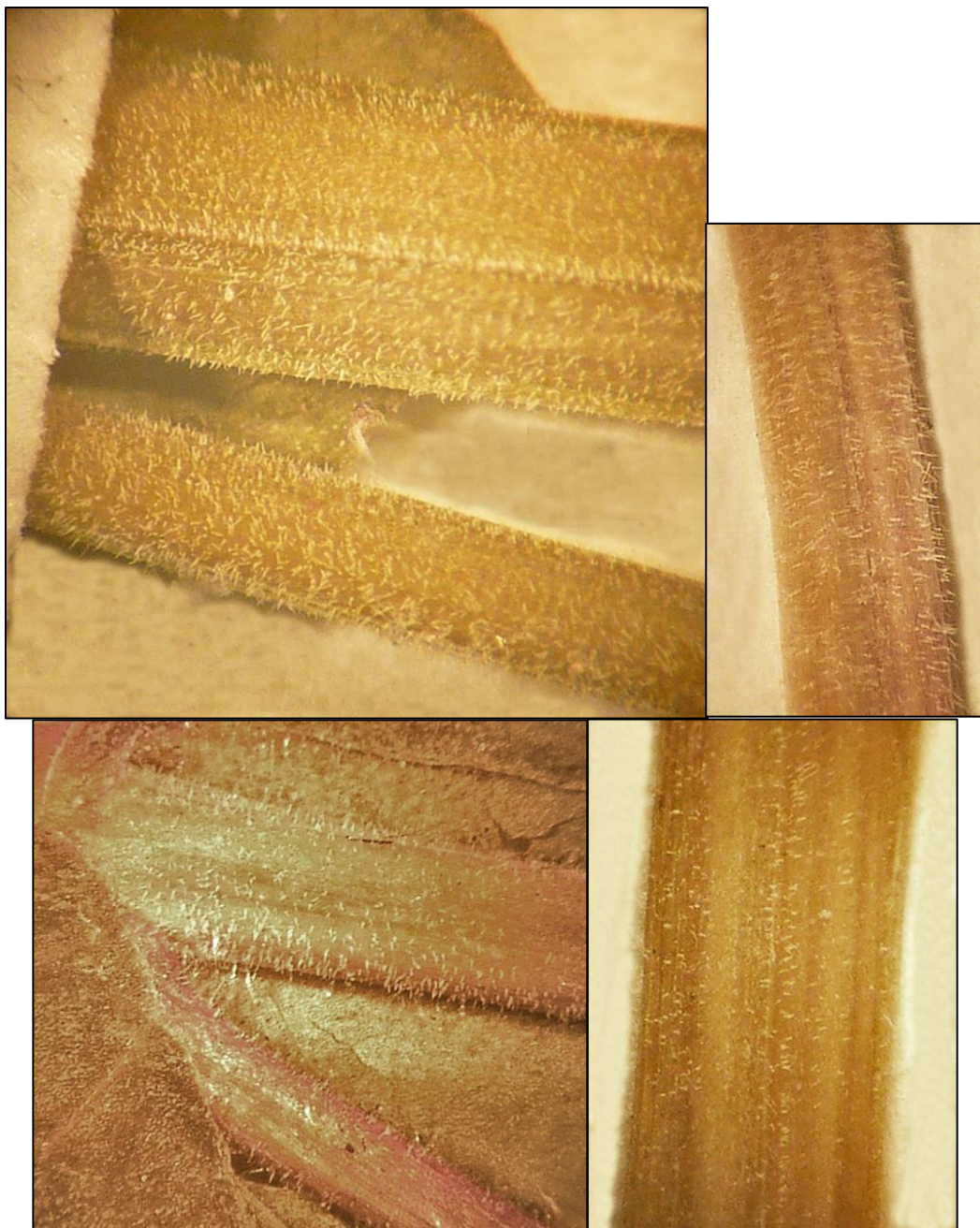


Figure 3. *Erythranthe decora*, representative stem and pedicel vestiture.

### **Erythranthe decora in Idaho and Montana.**

**Idaho.** Clearwater Co.: Near Jaype, 3 Jul 1946, *Joslyn 342* (ID); near Hollywood, between Jaype and Pierce, meadow, 3 Jul 1946, *Joslyn 343-346* (WTU); wooded tributary of Clearwater River, along FS Road 1705, ca. 2-3 mi E of Granddad Bridge, *Alnus*, *Thuja*, *Acer*, *Tsuga*, *Pseudotsuga*, 2296 ft, 17 Jun 2003, *Parks 377* (ID); Morris Creek drainage, near headwaters of Morris Creek and Old Growth Cedar Grove, along FRd 1969d, 0.5 mi from jct of FRd 1969, ca. 1.3 air mi N of Shattuck Butte, 12.2 mi NNE of Elk River by road, riparian area along Morris Creek dominated by *Carex* sp., *Phalaris arundinacea*, and *Alnus* sp., 4300 ft, plants occasional along wet stream banks, 21 Jul 1996, *Richardson 478* (ID, UC); Pierce, 4 Jul 1939, *Stillinger 556* (ID). Idaho Co.: Lolo Pass, North Meadow, 30 Jun 1941, *Davis 3697* (IDS, PH); California Creek, cold springs, wet seep, 5000 ft, 25 Jun 1930, *Gray 67344* (CIC); Nez Perce Natl Forest, 1.3 mi W on Swiftwater Road from jct with Selway River Road, W side of road, streamside mossy wet banks, 2500 ft, 25 Jun 1995, *Crockett 90* (ID); Red River Hot Springs, creek bottom at headwaters of Red River, 11 Aug 1954, *Baker 12407* (ID, WTU); Grave Creek Canyon, 6 mi N of the Salmon River, wet rocky cliffs, 7 Jun 1960, *Baker 15841* (ID); along the McClinery Ridge Road 517 at its jct with the S Fork of Papoose Creek (at the upper or 4th crossing), 6400 ft, rocky creek bottom along roadside, 17 Aug 1982, *Bingham & Miller 570* (ID); Clearwater Natl Forest, Lochsa River Drainage, Canyon Creek Trail 107 of Hwy 12 along trail in very moist creek bottom, locally common on moist rock faces, 2475 ft, 2 Jun 2009, *Brunsfeld 6301* (ID); Snake River Canyon, Sheep Creek 1/2 mi above its mouth, springy places on rocky N slope, 13 May 1937, *Constance et al. 1826* (WTU); Frenchman Butte, seepage in spruce-fir zone, dense *Alnus* scrub, 13 Jun 1945, *Daubenmire 4583* (WTU); Nez Perce Natl Forest, between Orogrande and Dixie, common along Moose Meadow Creek just upstream from jct with Big Creek, ca. 2 mi SSE of Badger Summit, 19 Aug 1976, *Henderson et al. 3526A* (ID); N of Elk City, head of West Fork of American River, cold brook sides, 4800-4900 ft, 2 Jul 1937, *Pennell 20865* (PH); N of Elk City, head of West Fork of American River, cold brook sides, 5300-5400 ft, 2 Jul 1937, *Pennell 20867* (PH); Hwy 95, Whitebird grade, 1/5 mi N of mile marker 228, base of Columbia River, basalt face, occasional in rocks, ca. 4630 ft, 22 May 2008, *Poor 16* (ID); Clearwater, Powell Ranger Station, 1932, *Rust 1985* (ID); Hazard Lakes, near summit of Bruin Mtn, 13 Aug 1934, *Tucker 141* (CIC, ID); along East Fork of Papoose Creek, very moist borrow pit off road, Thupli/Pacmyr H.T., 3600 ft, 30 Jun 1974, *Wellner 197* (ID). Shoshone Co.: 5 mi E of Clarkia on Gold Center Creek road, grazed meadow near St. Maries River, 23 Jun 1968, *Bobisud 885* (ID); Bitterroot Range, Clearwater Natl Forest, N side of Chamberlain Meadows, ca. 2.5 air mi ESE from Five Lakes Butte along Vanderbilt Trail, rare in wet depressions near main stream channel, 5450 ft, 6 Aug 1987, *Henderson 7382* (ID); near Clarkia, near Grandfather Creek, Potlatch ownership, wet meadow, 3158 ft, 17 Jun 2009, *Longworth 29* (ID).

**Montana.** Mineral Co.: Lolo Natl Forest, between Irish and Cache Creek, edge of stream, small pocket near summit of Continental Divide, 13 Aug 1933, *Hitchcock 2118* (PH); subalpine area on Hoodoo Creek near pass, glacial cirque area, large wet meadows along creek, 28 Jul 1971, *Mooar 13,757* (MONTU); Great Burn Proposed Wilderness Area, near a seep on the SE end of Pearl Lake, in a 75+ year-old subalpine forest burn still in the shrub-herb stage, 40+ individuals restricted to the vicinity of the seep, 6320 ft, 25 Aug 1985, *Mooers 1051* (MONTU). Missoula Co.: Stream banks of East Fork of Lolo Creek, marshy and mossy areas, 19 Jul 1970, *Mooar 12,757* (MONTU). Powell Co.: Clearwater Forest, Chamberlain meadows, 5300 ft, 5 Jul 1916, *Devan 83* (PH).

Coughlan et al. (2019 – their data mapped here in Figure 3) found that diploids and tetraploids occur within *Erythranthe decora* (the western segment of the range) and that two geographic clades (evidence from crossing data) exist among the diploids. Strong post-zygotic reproductive barriers (hybrid seed inviability) exist between the northern and southern diploids and between each of these and the tetraploids. The three races appear to be indistinguishable in morphology (personal observation).

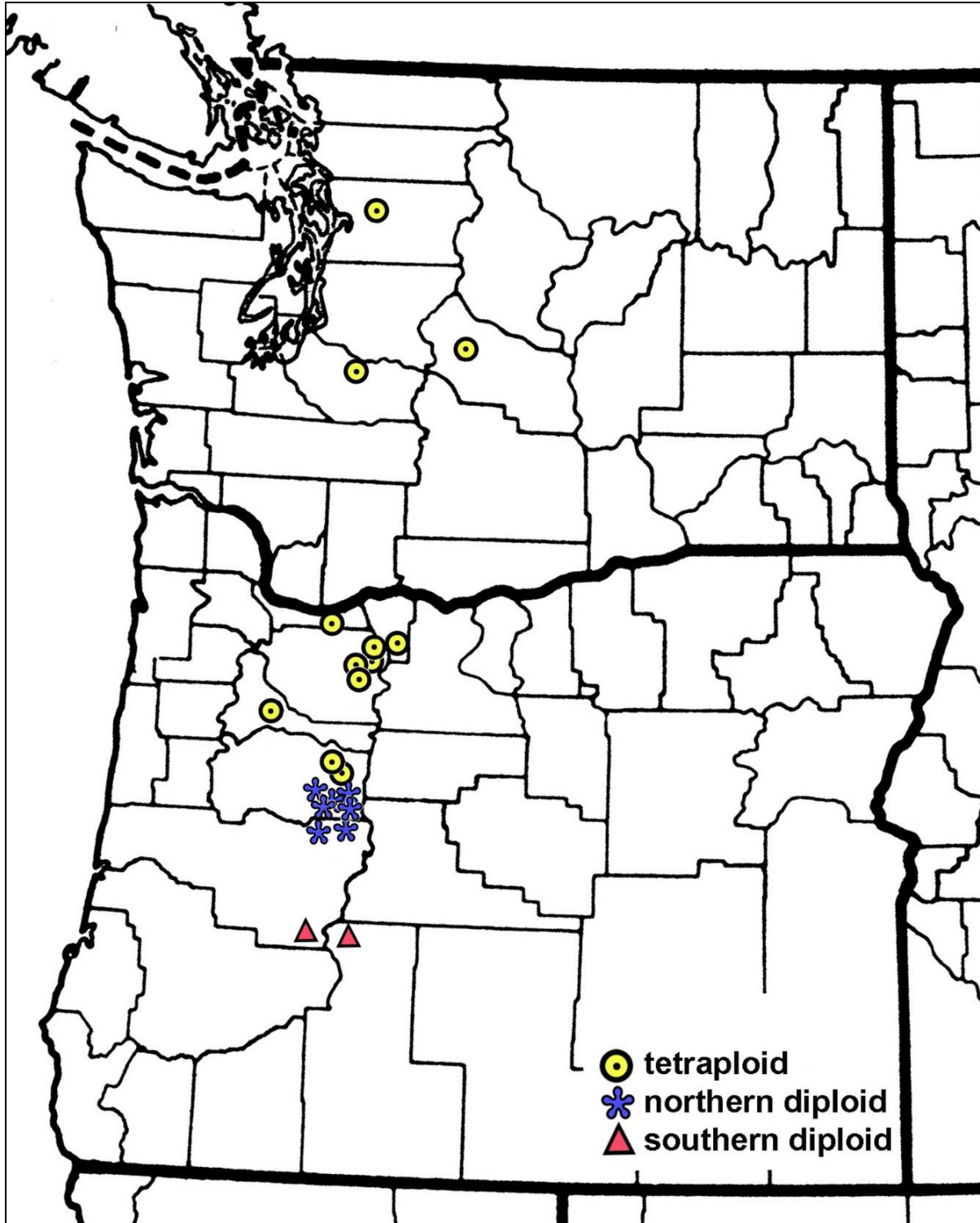


Figure 4. Distribution of evolutionary entities within *Erythranthe decora*. Mapped from data from Coughlan et al. (2019, Supplemental Table 2), reporting chromosome counts from 21 populations. Localities were precisely given as geographic coordinates, but no vouchers were cited.

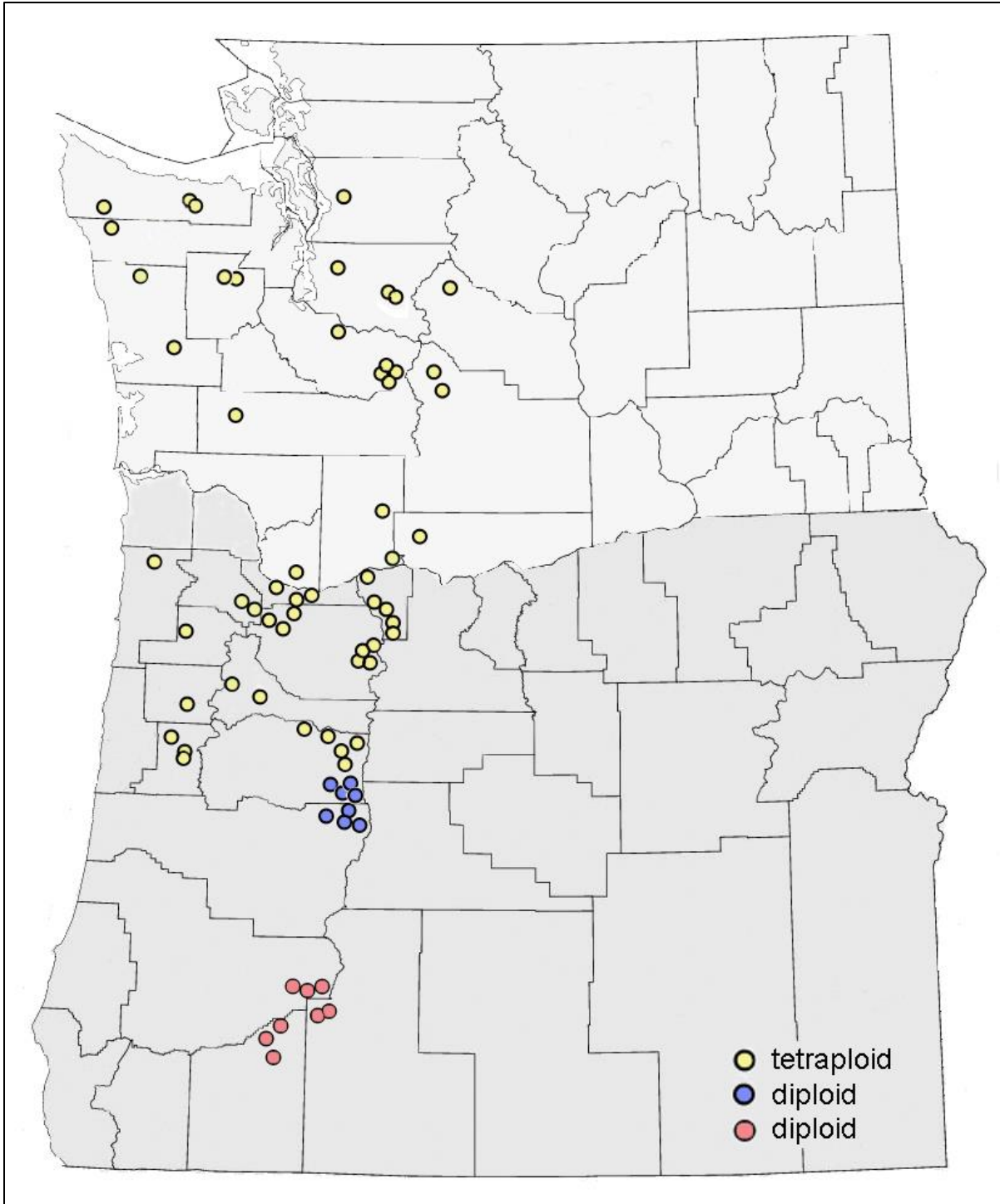


Figure 5. Distribution of *Erythranthe decora* in Washington and Oregon, mostly from records in WTU, OSC, and PH. Colors show hypothetical distribution of entities discovered by Coughlan et al. (2019; compare with Figure 3).



Figure 6. *Erythranthe decora*, representative collection. Washington. Clallam Co.: Meyer 1017 (WTU).



Figure 7. *Erythranthe decora*, representative collection. **Washington**. Jefferson Co.: Otis 1310 (WTU). Exceptionally large leaves.





Figure 8. *Erythranthe decora*, representative collection. **Washington. King Co.: Antieau 01-12 (WTU).**



Figure 9. *Erythranthe decora*, representative collection. Washington. Pierce Co.: McCalla 5155 (UBC).



Figure 10. *Erythranthe decora*, representative collection. **Washington**, Skamania Co.: *Suksdorf* 2774 (WTU).

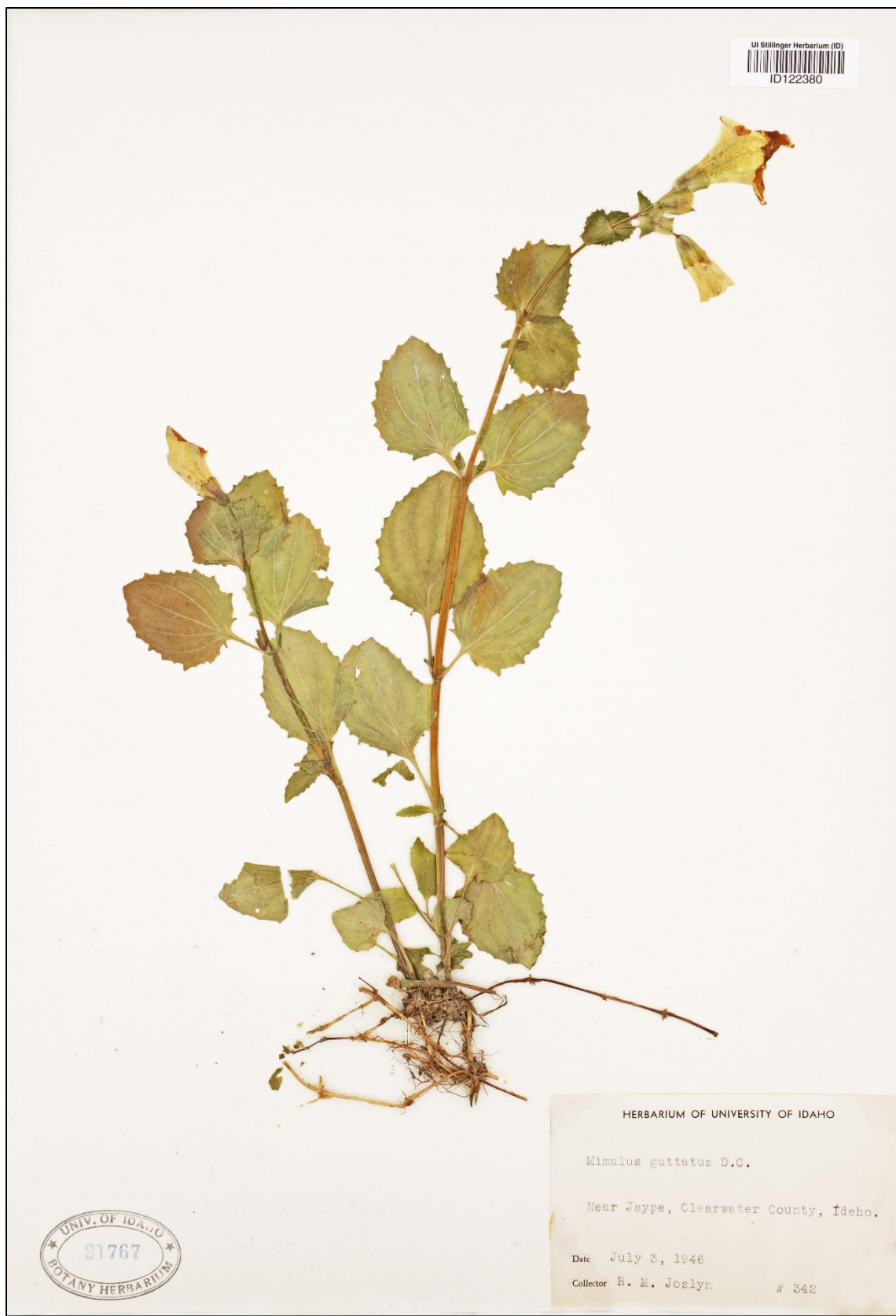


Figure 11. *Erythranthe decora*, representative collection. **Idaho**. Clearwater Co.: Joslyn 342 (ID).



Figure 12. *Erythranthe decora*, representative collection. **Idaho**. Clearwater Co.: Joslyn 343-346 (WTU).



Figure 13. *Erythranthe decora*, representative collection. **Idaho**. Clearwater Co.: Parks 377 (ID).



Figure 14. *Erythranthe decora*, representative collection. **Idaho**. Idaho Co.: *Crocket 90* (ID).



Figure 15. *Erythranthe decora*, representative collection. **Idaho**. Shoshone Co.: Longworth 0029 (ID).





Figure 16. *Erythranthe decora*, representative collection. **Montana**. Missoula Co.: Moar 12,757 (MONTU).



Figure 17. *Erythranthe decora*, representative collection. **Montana**. Mineral Co.: Mooers 1051 (MONTU).

### ACKNOWLEDGEMENTS

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