

***ERYTHRANTHE HOWALDIAE* (PHRYMACEAE):
FIELD STUDIES IN THE SONORA PASS REGION,
MONO COUNTY, CALIFORNIA**

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ABSTRACT

Erythranthe howaldiae (sect. *Simiolus*) was recognized as a new species in 2020 from a 2019 collection on the east slope of the Sierra Nevada in Mono Co., California. Field studies in 2020 and 2021 found five additional populations, all within less than 2 kilometers from the type locality. The six known populations are small and occur on seepy granite slopes and most plants grow within beds of the moss *Imbribryum alpinum*. The habitat and habit of plants at the type locality and at other sites are documented in color photographs.

The type locality of the recently described *Erythranthe howaldiae* Nesom (Nesom 2020) is on a vernal seepy southeast-facing granite slope on the north side of Highway 108 (Sonora Pass Road) in Mono Co., California, at approximately 2490 meters elevation. This species was first collected in July 2019 (Howald 5078). A description of the plant and a discussion of its putative close relatives is provided by Nesom (2020). Field studies in 2020 and 2021 have documented the type locality in greater detail, including color photographs of the habitat and habit, and located five additional small populations. All known populations are within 2 kilometers of the type locality. Additional nearby areas of seemingly suitable habitat were surveyed during the peak blooming time in 2021, but individuals of *E. howaldiae* were not found.

When *Erythranthe howaldiae* was described, no photographs of living plants were available. In June 2021 plants at the type locality were photographed by the second author (Figs. 1-6). Close-up photos show an entire plant at peak bloom (Fig. 1), lower cauline leaves (Fig. 2), distinctive bracts at the base of the pedicels (Fig. 3), corolla with spot pattern of the lower lip, and characteristics of the calyx (Fig. 4), arrangement of stigma and anthers (Fig. 5), and a native bee identified as a male *Osmia* visiting a flower (Fig. 6). These male bees collect only nectar (Douglas Yanega, pers. comm.) so cannot be effective pollinators of *E. howaldiae* — no putative pollinator has been identified to date.

Nesom (2020) interpreted the arrangement of stigma and anthers in the type specimen as herkogamous, indicating that the flowers of *Erythranthe howaldiae* are allogamous, but the photos here show stigma and anthers at the same level (plesiogamous) and well within the corolla tube, suggesting instead that the flowers are autogamous.

At the type locality the habitat of *Erythranthe howaldiae* consists of granite slabs with thick beds of the alpine bryum moss, *Imbribryum alpinum* (Figs. 7, 8, 11). This moss occupies wet acidic rocks or the soil overlying them (Spence 2014). The California Moss eFlora (Wilson 2021) lists six California collections of this moss, as *Bryum alpinum* (a synonym). None of these are from Mono County. Norris and Shevock (2004), in their specimen-based catalog of California mosses, also listed four records for *Bryum alpinum* from California, none from Mono County. This lack of records likely indicates that mosses

are under-collected in Mono County and it may also suggest that the habitat for *E. howaldiae* in Mono County is limited in extent.

The type locality for *Erythranthe howaldiae* supports a large number of additional vascular plant species within the moss beds. These include annual herbs such as *Leptosiphon septentrionalis*, *Erythranthe breweri*, *Boisduvalia densiflora*, *Madia gracilis*, *Epilobium brachycarpum*, *Trifolium variegatum* var. *geminiflorum*, *Trifolium monanthum*, *Trichostema austromontanum* subsp. *austromontanum*, *Floerkea proserpinacoides*, *Nemophila spatulata*, and *Castilleja tenuis*. Also growing in the moss beds at the type locality are perennial herbs such as *Micranthes aprica*, *Erythranthe primuloides*, *Allium campanulatum*, *Triteleia ixioides* subsp. *anilina*, *Toxicoscordion venenosum*, and *Juncus chlorocephalus*.

All of these are native species. No non-native species were observed in the moss beds at the type locality during several visits in 2019, 2020, and 2021. No trees or shrubs were observed growing in the moss beds at the type locality, but *Juniperus grandis* and *Pinus contorta* subsp. *murrayana* grow in rocky sites nearby.

Five additional populations of *Erythranthe howaldiae* were detected during field studies in 2020 and 2021 (Figs. 9-10, 12-13). These are identified as populations 2-6. All of these are located less than 2 kilometers from the type locality. In three of these five populations, *E. howaldiae* was observed growing only within moss beds. In two of these populations, most *E. howaldiae* individuals were observed growing within moss beds, with a few individuals growing in vernal moist to wet open sites adjacent to moss beds. All known populations occur within the Humboldt-Toiyabe National Forest.

Known populations of *Erythranthe howaldiae* face several categories of threat. The moss beds naturally desiccate rapidly, especially in drought years such as 2020 and 2021. Smaller snowpacks in the Sierra Nevada and warmer temperatures earlier in the growing season could cause a reduction in the length of the growing season, affecting the ability of *E. howaldiae* to produce seed. In 2021 the flowering period for *E. howaldiae* at all known populations was approximately four weeks in length. In 2021 some individuals of other species within the drying moss beds, such as *Micranthes aprica*, were observed to wilt before mature fruit had formed.

Additional threats include erosion of roadside gravel placed by the California Department of Transportation (CalTrans) onto the moss beds (Fig. 14, at the type locality), trampling of the moss beds during field operations by soldiers from the Marine Corps Mountain Warfare Training Center located approximately 12 kilometers downslope from the type locality (observed in 2020 at the type locality), and habitat destruction by off-road vehicles (Fig. 15, showing Population 5).

Additional populations of *Erythranthe howaldiae* probably exist on other granite slopes in the Sonora Pass region. We hope that other botanists will take up the challenge of searching for and documenting its geographic range and abundance. Known populations are small and threatened, and this species is without protected status at any level.



Figure 1. *Erythranthe howaldiae* at the type locality, 16 June 2021. The plant is approximately 7 cm tall. Distinguishing characteristics include terete, ascending to erect stems, petioled lower leaves, ascending pedicels, 5-lobed calyces with sharp, purple-spotted ridges, the upper calyx lobe slightly longer than the others, flowers in 3-6 pairs, and the corolla tube-throat narrowly cylindrical-funnelform. Photo by Steve Matson.



Figure 2. *Erythranthe howaldiae* at the type locality, 16 June 2021. Mature calyces with slightly exerted stigmas, cauline leaf blade and petiole, showing vestiture, and terete stems. Photo by Steve Matson.



Figure 3. *Erythranthe howaldiae* at the type locality, 16 June 2021. Bracts at the base of the pedicels, with glandular hairs on the pedicels near the node. Photo by Steve Matson.



Figure 4. *Erythranthe howaldiae* at the type locality, 16 June 2021. Photo by Steve Matson.



Figure 5. *Erythranthe howaldiae* at the type locality, 16 June 2021. Corolla interior showing anthers and stigma at essentially the same level. Photo by Steve Matson.



Figure 6. Male bee in the genus *Osmia* visiting flower of *Erythranthe howaldiae* at the type locality, 16 June 2021. Photo by Steve Matson.



Figure 7. *Erythranthe howaldiae* type locality, landscape view, looking northeast, 16 June 2021. Photo by Ann Howald.



Figure 8. *Erythranthe howaldiae* microhabitat, type locality, in beds of *Imbricium alpinum*, 16 June 2021. Tiny yellow flowers are *Erythranthe howaldiae*. Photo by Ann Howald.



Figure 9. *Erythranthe howaldiae* (part of Population 4) in a vernal wet gravelly swale, 18 June 2021. Yellow-flowered plants near center of photo are *E. howaldiae*. Photo by Ann Howald.



Figure 10. Moss bed habitat for *Erythranthe howaldiae* at Population 6, 18 June 2021. Photo by Ann Howald.



Figure 11. *Imbricbryum alpinum* at the type locality for *Erythranthe howaldiae*, 16 June 2021. Photo by Steve Matson.



Figure 12. *Erythranthe howaldiae* (yellow-flowered plants) growing in moss bed with *Micranthes aprica* and *Trifolium monanthum*, Population 6, 18 June 2021. Photo by Ann Howald.



Figure 13. *Erythranthe howaldiae*, post-flowering, part of Population 5, 21 June 2021. Photo by Ann Howald.



Figure 14. Gravel at the *Erythranthe howaldiae* type locality that has eroded from the shoulder of Highway 108 onto a portion of the moss beds (the gray material at the base of the granite slope at center is eroded gravel), 18 June 2021. Photo by Ann Howald.



Figure 15. Tracks of off-road vehicles through some moss beds in the vicinity of *Erythranthe howaldiae* Population 5, 21 June 2021. Photo by Ann Howald.

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