

ERIOGONUM COCCINEUM AND ERIOGONUM ZIONIS (POLYGONACEAE) RAISED FROM VARIETAL STATUS, U.S.A.

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ABSTRACT

Eriogonum zionis var. *coccineum* J.T. Howell and *E. zionis* var. *zionis* (Polygonaceae) are elevated to species level as *E. coccineum* and *E. zionis* based on 1) no overlap in their substrate edaphism or geographic ranges, 2) differences in tepal color, size, and shape that make them easily discernible, and 3) just one specimen of *E. racemosum* that might be interpreted as a morphologic intermediate. Specimen review, digital records, and geospatial information allow us to easily discern that the centers of these entities' ranges are separated by about 100 km and that their nearest occurrences are separated by 30 km. *Eriogonum zionis* var. *coccineum* occurs in northern Arizona while *E. zionis* var. *zionis* occurs in northern Arizona and southern Utah.

RESUMEN

Eriogonum zionis var. *coccineum* J.T. Howell y *E. zionis* var. *zionis* (Polygonaceae) se elevan al nivel de especie como *E. coccineum* y *E. zionis* con base en: 1) la ausencia de superposición en sus preferencias edáficas o en sus distribuciones geográficas, 2) diferencias en el color, tamaño y forma de los tépalos que las hacen fácilmente distinguibles, y 3) un solo espécimen de *E. racemosum* que podría interpretarse como un intermedio morfológico. La revisión de especímenes, los registros digitales y la información geoespacial nos permiten determinar fácilmente que los centros de distribución de estas entidades están separados por aproximadamente 100 km y que sus ocurrencias más cercanas están separadas por 30 km. *Eriogonum zionis* var. *coccineum* se encuentra en el norte de Arizona, mientras que *E. zionis* var. *zionis* se encuentra en el norte de Arizona y el sur de Utah.

KEY WORDS: Arizona, buckwheat, endemic plants, *Eriogonum zionis* var. *coccineum*, *E. zionis* var. *zionis*, plant classification, Polygonaceae, Utah

INTRODUCTION

In preparation for updating the Eriogonoideae treatment for Arizona, it is appropriate to update the taxonomy of some entities. Several developments contributed to our ability to update the taxonomy at this point: 1) Botany is now digital. Online images often allow us to make determinations of specimens at a distance, and to identify those that may need physical review. Taxa range maps can be created using online databases. This allows us to more easily target mis-determined specimens and easily contrast the ranges of distinct entities. 2) More specimens are available for study since prior treatments (Kearney & Peebles 1951, Reveal 2005) were completed. More specimens allow us to assess both infra- and inter-specific variation with greater confidence, allowing us to make better judgments about species boundaries, as well as determining where an entity belongs in the taxonomic hierarchy.

My interest is in discerning taxonomic categories based on functionality. In this approach, when we describe two entities as separate species, that judgment should be because they are readily identifiable morphologically and because we believe that there is little to no gene flow between them. Some intermediates are allowed by this definition. When we call two entities varieties of the same species, it should be because they are generally identifiable, but we see enough intermediates to suggest significant gene flow between them.

A great example of clarifying our understanding of plant taxonomy with the addition of plant specimens and the digitization of those specimen records is the demarcation of *Eriogonum zionis* as separate from *E.*

racemosum and the recognition at varietal rank the variation within *E. zionis* (Howell 1940, 1943). The next step in the progression begun by Howell is the raising of the varieties of *E. zionis* to species level, which is the purpose of this article.

Nuttall (1848) published *Eriogonum racemosum* (Types: *Gambel s.n.* [GH36505, GH36504, NY323502]). The critical parts of his description are the “scape naked and whitely tomentose” and “involucrum very woolly.” Howell (1940) published *E. zionis* Howell (Type: *Eastwood and Howell 6344*) recognizing it as separate from *E. racemosum* based on “its yellow-green glaucous upwardly inflated peduncles and in its smaller greenish-yellow flowers.” When Howell (1943) published var. *coccineum* (Type: *Bryant s.n.*, 21 Aug 1941; CAS293860), he separated it from var. *zionis*, based on var. *coccineum* having red tepals and var. *zionis* having yellowish white tepals.

In Arizona, both Kearney and Peebles (1951) and McDougall (1973) treated these entities as Howell did. In Utah, Welsh (1984) treated both varieties of *E. zionis* as varieties of *E. racemosum*, separating vars. *coccineum* and *zionis* from var. *racemosum* based on the swollen and usually glabrous flowering stems of the former two. Welsh found specimens “that grade morphologically” between *E. zionis* and *E. racemosum*; “plants with glabrous stems are essentially nonfistulose and some with fistulose stems are tomentose throughout.” Welsh and Atwood (1993) published *E. racemosum* var. *nobilis* (Type: *Atwood 17250*) from specimens collected near Bluff, Utah. Their description that “this is a tall, slender phase of the species with numerous involucre in the inflorescence and cream to yellowish flowers” neglected to note that it has fistulose and mostly glabrous stems or that the fruits are strongly exserted, both characters shared with *E. zionis* var. *zionis*. Welsh et al. (2003, p. 512) maintained this nomenclature.

Reveal (2005) synonymized *Eriogonum racemosum* var. *nobilis* with *E. z. var. zionis*. He relied on tepal color to separate *E. zionis* from *E. racemosum*, adding that *E. zionis* “flowering stems and inflorescence branches are usually glabrous, rarely tomentose, occasionally fistulose.” In separating the two varieties of *E. zionis*, Reveal relied on tepal color alone.

In the Intermountain Flora, Reveal (2012) used this key couplet to separate the varieties of *Eriogonum zionis*:

Perianth bright red, 4–6(7) mm long; plants erect, 3–6 dm high; leaf blades elliptic to ovate, 3–4(6) cm long, 1.5–2(5) cm wide; flowering stems fistulose, glabrous; inflorescences 20–45 cm long; involucre 2–3 mm long; loam to gravelly flats and rim edges in sagebrush communities and in juniper, pinyon and montane conifer woodlands _____ ***E. zionis* var. *coccineum***
 Perianth white or yellow, 2–3.5(4) mm long; plants erect to spreading, 3–8(10) dm high; leaf blades oblong-ovate to ovate, 2–4.5 cm long, 1.5–2.5 cm wide; flowering stems usually fistulose, glabrous or rarely tomentose to densely floccose; inflorescences 20–45(60) cm long; involucre 1.5–3 mm long; deep sandy soil in sagebrush communities and in scrub oak, juniper, pinyon and montane conifer woodlands _____ ***E. zionis* var. *zionis***

Three other varieties of *E. racemosum* have been described, vars. *cordifolium* Gand., *desertorum* S. Stokes, and *sagittatum* Gand. (Type: *Crandall s.n.*, Colorado). Reveal (2005, 2012) placed the variety *desertorum* in synonymy with *E. panamintense* and both varieties *cordifolium* and *sagittatum* in synonymy with *E. racemosum*, issues which do not pertain to this discussion.

METHODS

I reviewed specimens of *Eriogonum zionis* var. *zionis* and var. *coccineum* at ASC(16), ASU(8), BRY(38), COLO(2), DBG:KHD(2), DES(12), MNA(1), NY(1), RM(2), RSA(6), SJNM(1), UNLV(5), UNM(1), USU:UTC(8), UVSC(2). I looked for differences in these entities other than tepal color. I especially looked for specimens which would support Welsh's observation of intermediates.

RESULTS

The accumulation of specimens of *Eriogonum zionis* of both varieties is as follows:

1905 (first appearance of *E. zionis* in SEINet)–1940 (pub. of *E. zionis*): 4 specimens; 0.11 specimens/year.

1941–2004 (pub. of the Flora of North America in 2005): 93 specimens; 1.47 specimens/year.

2005–2024: 39 specimens; 2.05 specimens/year

The increase in the number of specimens available for study since the naming of *E. zionis* allows greater clarity within these taxa.

Eriogonum coccineum and *E. zionis* are easily discernible based on tepal differences including color, size, and shape (Fig. 1 and 2). I have found just one specimen (Welsh 13025 with tomentose stems) that might be considered a morphologic intermediate with *E. racemosum*. The intermediacy has to do with stem vestiture, not tepal characters. I have seen no overlap in tepal morphology between *E. coccineum* and *E. zionis* and there is no overlap in their substrate requirements or ranges. *Eriogonum coccineum* is restricted to calcareous substrates (either limestone or sandstones with a significant calcium carbonate component) in and around the Grand Canyon. *Eriogonum zionis* is restricted to sandy substrates along the AZ/UT border on the Paria Plateau, west to Cane Beds in Arizona and from near the Paria River west to Zion National Park in Utah, with one outlier near Bluff, San Juan County, Utah. The centers of these entities' ranges are separated by about 100 km. Their nearest occurrences are separated by 30 km (Fig. 3).

These two can be separated from *Eriogonum racemosum* and from each other using this key:

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|---|-----------------------------------|
| 1. Flowering stems not swollen nor hollow below the nodes, usually tomentose to floccose; involucre 2–6 mm long; tepals white to pinkish; abaxial surfaces of the inflorescence bracts mostly tomentose; various ranges ____ | <i>Eriogonum racemosum</i> |
| 1. Flowering stems swollen and hollow below the nodes, usually glabrous; involucre 1.5–4 mm long; tepals whitish to yellowish to greenish or bright red; abaxial surfaces of the inflorescence bracts mostly glabrous; Grand Canyon and n | 2 |
| 2. Tepals red, 3–6(–7) mm long, oblanceolate, obelliptic to oval; achenes included or exerted up to 0.8 mm beyond the tepals; calcareous substrates (either limestone or sandstones with a significant calcium carbonate component) | <i>Eriogonum coccineum</i> |
| 2. Tepals whitish to yellowish to greenish, sometimes nearly clear, 2.2–5 mm long, obelliptic; achenes exerted 1–1.5 mm beyond tepals; sand | <i>Eriogonum zionis</i> |

Eriogonum coccineum (J.T. Howell) G. Rink. Point Sublime wild buckwheat. Perennial herbs, erect to spreading 30–90(–100) cm tall, grayish. **Stems:** caudices branching underground, spreading to erect, with persistent leaf bases, aerial flowering stems erect to spreading, fistulose, 10–40 cm from base to the first branch, glabrous, glaucous, grayish. **Leaves:** basal; petioles 1–8(–10) cm long, tomentose, not well differentiated from the blades in color, texture or vestiture; blades elliptic or oblong-ovate to ovate, 1–6 cm long, 1–2.5(–5) cm wide, basally tapered, sometimes blunt or cordate, abaxial surfaces lanate to densely tomentose, obscuring the surfaces, adaxial surfaces less hairy such that the surfaces are visible, the margins plane to crisped. **Inflorescences:** narrowly virgate, 15–45(–60) cm long above the first branch, 5–25 cm wide, the branches glabrous; tending to have smaller branches attached to a dominant central stem, the branches bearing 3–16 racemously arranged involucre; bracts 3, scalelike, triangular, 2–7 mm long, abaxially mostly glabrous, the bases adaxially glabrous, distally tomentose. **Involucre:** sessile, 1 per node, bearing 6–20 flowers, turbinate to narrowly campanulate, 2–4 mm long, 1–3 mm wide, often nearly hidden within the involucral bracts, abaxially tomentose distally or throughout, adaxially glabrous throughout or tomentose on the lobes; teeth 5, erect, 0.2–1 mm long. **Flowers:** pedicels reddish, exerted, 3–5.5(–6) mm long; tepals nearly monomorphic, obelliptic, oblanceolate to oval, 3–6(–7) mm long, bright to dull red, glabrous, connate proximal 1/10 their length; filaments flat, attached to the inner tepals, at midlength densely sericeous, becoming fimbriate. **Achenes:** light brown, 3.5–5.3 mm long, papillate, the papillae either fine, longer than wide and oriented parallel to the achene axis or sharp and conical, included or exerted up to 0.8 mm beyond the tepals. [*Eriogonum racemosum* Nuttall var. *coccineum* (J.T. Howell) S.L. Welsh]. (Jun) Jul–Nov; Great Basin Desert up through Pinyon-Juniper Woodland, calcareous substrates (either limestone or sandstones with a significant calcium carbonate component) mostly on the rims of, and within, Kanab Creek and central Grand Canyon; 1000–2300 m (3250–7500 ft); AZ endemic.



FIG. 1. Red *Eriogonum coccineum* flowers from Clifton 45036. Image from Gary Alpert, Northern Arizona University1



FIG. 2. Whitish to pale green or yellow *Eriogonum zionis* flower from Watters 292. Image from Gary Alpert, Northern Arizona University1

Eriogonum zionis J.T. Howell. Perennial herbs, erect to spreading 25–80 cm tall, grayish. **Stems:** caudices branching underground, spreading to erect, with persistent leaf bases, aerial flowering stems erect to spreading, fistulose, 5–30 cm from the base to the first branch, glabrous, glaucous, grayish. **Leaves:** basal; petioles 1–7(–10) cm long, tomentose, not well differentiated from the blades in color, texture or vestiture; blades oval to ovate, 1–3.5 cm long, 1–2.5 cm wide, basally cordate, sometimes blunt or slightly tapered, abaxial surfaces lanate to densely tomentose, obscuring the surfaces, adaxial surface less hairy such that the surfaces are visible, the margins plane to crisped. **Inflorescences:** narrowly virgate, 10–40 cm long, 5–20 cm wide, glabrous; tending to have smaller branches attached to a dominant central stem, the branches bearing 5–15 racemously arranged involucre; bracts 3, scalelike, triangular, 2–7 mm long, abaxially mostly glabrous, the tubes

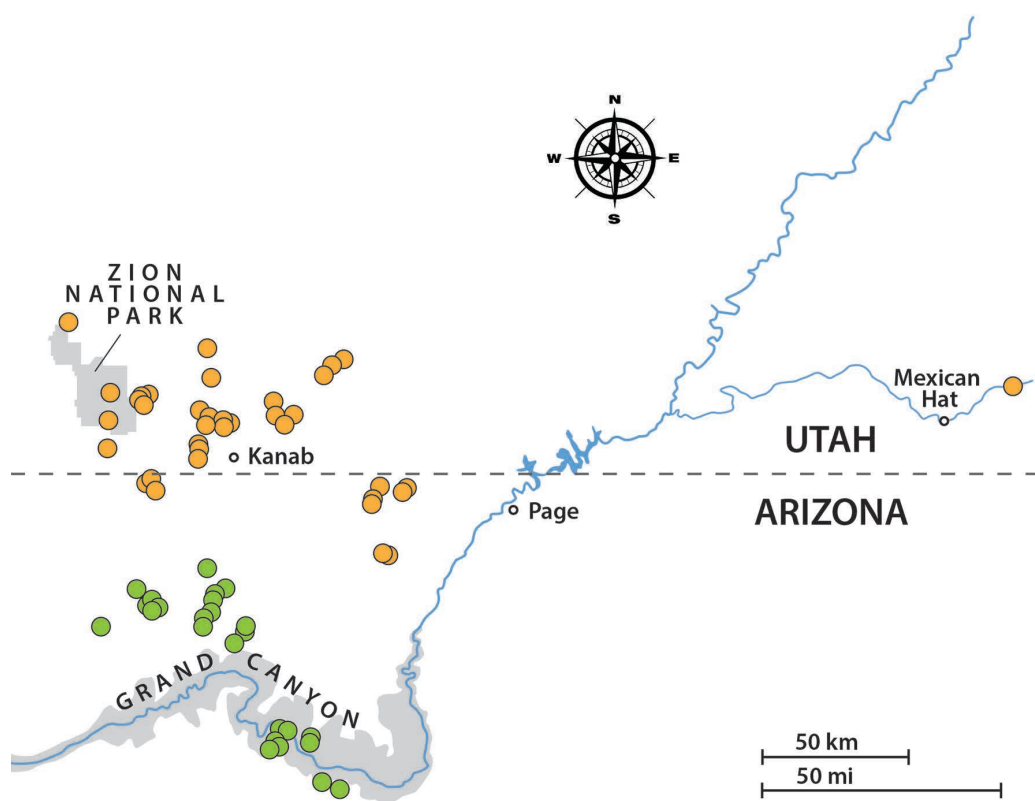


FIG. 3. Range of *Eriogonum coccineum* in green; range of *Eriogonum zionis* in yellowish orange. Symbiota. Graphics by Mary Williams Design, Flagstaff, Arizona.

adaxially glabrous, the lobes tomentose, or leaflike, ovate, and 10–30 mm long, 4–15 mm wide, vestiture similar to leaf blades. **Involucres:** sessile, 1 per node, bearing 3–20 flowers, turbinate to narrowly campanulate, 1.5–3.3 mm long, 1–2 mm wide, often nearly hidden within the involucre bracts, abaxially tomentose distally or throughout, adaxially glabrous throughout or tomentose on the lobes; teeth 5, erect, 0.2–1 mm long. **Flowers:** pedicels exserted, 2–4.5 mm long, yellowish; tepals nearly monomorphic, whitish to pale green or yellow, sometimes nearly clear, 2.2–5 mm long, obelliptic, connate proximal 1/10 their length, the filaments attached to the inner tepals, the bases flat, long fimbriate. **Achenes:** light brown, 3.5–6.5 mm long, papillate, the papillae either fine, longer than wide and oriented parallel to the achene axis or uncommonly sharp and conical, exserted 1–1.5 mm beyond the tepals. [*Eriogonum racemosum* Nuttall var. *nobilis* S.L. Welsh & N.D. Atwood, *Eriogonum racemosum* Nuttall var. *zionis* (J.T. Howell) S.L. Welsh]. Apr–Nov; Cane Beds in Mohave Co. east to the Paria Plateau, Coconino Co.; Great Basin Desert to pine woodlands, sand; 1250–2300 m (4100–7550 ft), AZ, UT. “The Zion wild buckwheat, with a chromosome number $2n = 40$ (J. L. Reveal, unpubl.), is distinct from the related *E. racemosum*, with $2n = 36$, and no intermediates are known” (Reveal 2005).

Mischler 1215 (ASU, BRY), collected near Lake Mary in Coconino County, Arizona, was originally determined as *E. racemosum* var. *zionis*, probably due to its glabrous stems. The specimen is sterile, the stems are not inflated, nor is it within the range of *E. zionis*. I have interpreted this specimen as *Eriogonum racemosum*, which uncommonly has glabrous stems and is common in that area.

APPENDIX

Specimens examined: **Eriogonum coccineum. ARIZONA. Coconino Co.:** Bass Camp, Grand Canyon, 18 Jul 1947, *Goodwin s.n.* (ASC); along South Bass Trail, 4 Nov 1995, *Hodgson 9646* (DES); Horse Spring Canyon, 13 Sep 1997, *Hodgson 10537A* (ASU, DES, UNLV); Near Jump up-Nail Trail, 27 Sep 1998, *Hodgson 11146* (ASU, DES); South Bass Trail, 3 Jun 2005, *Hodgson 20392* (DES); South Bass Trail, 26 Oct 2008, *Hodgson 23611* (ASC, DES); Horse Spring Point, 21 Jun 2010, *Hodgson 25475* (DES); along Hermit Trail, 18 Apr 2012, *Hodgson 26880* (DES); along Hermit Trail, 26 Apr 2015, *Hodgson 30292* (DES); GCNP, nnw of Pt. Sublime, 27 Aug 1974, *Reveal 3827* (BRY, USU:UTC); Big Cove Canyon, 19 Oct 1999, *Rink s.n.* (ASC); Bass Canyon, Grand Canyon, 2 Nov 1975, *Roden s.n.* (ASC). **Mohave Co.:** ¾ mi NW of Hack Reservoir, 14 Jul 1980, *Bundy 147* (ASU); 1 mi S of Finlay-Heaton Tank, 12 Aug 1980, *Bundy 183* (ASU); Hack Canyon, 7 Sep 2005, *Clifton 45036* (ASC); Hack Canyon, 22 Sep 1977, *Gierisch 4034* (ASC, ASU, RSA); Hack Reservoir, 17 Sep 2003, *Higgins 24986* (ASU, DBG:KHD, DES, UNLV); w of Hack Reservoir, 1 Sep 2004, *Higgins 26087* (BRY, UNM).

Eriogonum racemosum. ARIZONA. Coconino Co.: along Lake Mary, 2 Jul 1967, *Mischler 1215* (ASU, BRY).

Eriogonum zionis. ARIZONA. Coconino Co.: Paria Plateau, 3 Oct 1979, *Gierisch 4690* (ASC, ASU, BRY); Paria Plateau, Sand Hills, 13 Jul 2011, *Hodgson 26409* (DES, USU:UTC); Paria Plateau, 17 Jul 2013, *Hodgson 28597* (DES); Vermilion Cliffs, 27 Sep 2013, *Prince 739* (ASC, DES); Paria Plateau near White Pocket, 17 Sep 1997, *Rink s.n.* (ASC); Sowats Canyon, 29 Aug 2013, *Rink 12239* (ASC); Paria Plateau near Paw's Hole, 27 Sep 2013, *Watters 292* (ASC). **Mohave Co.:** Head of Hack Canyon, S of Pipe Springs, 5 Sep 2003, *Atwood 29774* (DBG:KHD); Rosy Canyon, 26 Sep 2010, *Clifton 50626* (ASC); Cane Beds, 23 Jul 1997, *Rink s.n.* (ASC). **UTAH. Kane Co.:** N of Nephi Pasture, 4 Sep 1998, *Atwood 24097* (BRY); Cottonwood Canyon, N of Kane Beds, 18 Jun 2003, *Atwood 29587* (BRY); Coral Pink Sand Dunes, 27 Sep 2006, *Barnes 5442* (BRY, UVSC); 8 mi N of Kanab, 30 Aug 1948, *Benson 13470* (RSA); T41S, R5W, S26, 29 Jun 1953, *Castle 135* (BRY); Hwy 89, Mt. Carmel Quad., 30 Jul 2003, *Clifton 41130* (BRY); Grand Staircase, 15 Aug 2004, *Fertig 21255* (BRY); 9 mi NW of Kanab, 27 Aug 2006, *Fertig 22904* (BRY); The Sand Hills, 27 Aug 2008, *Fertig 24303* (UVSC); White Cliffs Knoll on E side of Johnson Canyon Road, 19 Sep 2009, *Fertig 25228* (BRY); NW side of Red Knoll, 26 Sep 2010, *Fertig 26235* (ASC); White Cliffs the Sand Hills S of Hwy 89 and 6.5 mi N of the Coral Pink Sand Dunes, 6 Oct 2010, *Fertig 26265* (BRY); Best Friends Animal Sanctuary, 16 Oct 2011, *Fertig 27208* (BRY); N of Coral Pink Sand Dunes, 13 Oct 2012, *Fertig 28065* (ASC); Clear Creek south re-entry, 19 Aug 1987, *Franklin 5131* (BRY); Clear Creek, 21 Aug 1987, *Franklin 5155* (BRY); Clear Creek, Zion Canyon, 16 Oct 1987, *Franklin 5588* (BRY, USU:UTC); Johnson Canyon, Lone Pine Pt., 6 Jun 1984, *Higgins 14303* (BRY, RM); Long Valley, along US Highway 89, 21 Aug 1992, *Reveal 7293* (RSA, USU:UTC), note "both glabrous and pubescent plants in this population"; along Hwy 89 at the summit about 9 km SE of Mt. Carmel Junction, 11 Oct 2025, *Rink 18395* (ASC); Johnson Canyon, 2 May 1986, *Shultz 9905b* (USU:UTC); T41S R5W, S26, 17 Jul 1992, *Thorne 10496A* (BRY); Moquith Mtn, 7 mi W of Kanab, 25 Sep 1992, *Thorne 15202* (BRY); Kitchen Corral Road, 1 mi S of Nipple Lake, 26 Sep 1992, *Thorne 15247* (BRY); Zion NP, NE of Checkerboard Mesa, 9 Jun 1987, *Tuhy 3209* (SJNM); NW side of Checkerboard Mesa, Zion NP, 13 Jun 1987, *Tuhy 3257* (BRY, UNLV); 1.5 mi N of Orderville, 26 Sep 1975, *Welsh 13025* (BRY); Coral Pink Sand Dunes, 21 Jul 1977, *Welsh 15541* (BRY); ca. 7 mi N of Orderville, 30 Aug 1980, *Welsh 20205* (NY); Head of Dry Lake Canyon, 5 Oct 1982, *Welsh 21441* (BRY); 3 mi S of the Barracks, along Parunuweap Canyon, 16 Jul 1992, *Welsh 25092* (BRY); the Barracks, Parunuweap Canyon, 16 Jul 1992, *Welsh 25114* (BRY); 4 mi S of the Barracks NW of the Coral Pink Sand Dunes, 25 Sep 1992, *Welsh 25190* (BRY); North Swag Pass, 1 Oct 1998, *Welsh 27164* (BRY); Lick Wash Canyon, 1 Oct 1998, *Welsh 27181* (BRY, RSA). Washington Co.: The Watchman Campground, 24 Aug 2000, *Atwood 26019* (BRY); Zion NP, East entrance, 18 Aug 1987, *Clark 4938* (BRY); Berkeley Std Medium Washington Col.; Zion NP, jct of Hwy 15 and Zion Canyon Road, 24 Sep 1977, *Foster 5661* (BRY); Canyon bottom, Zion National Park, 15 Aug 1932, McDonald 1164 (RM); Pine Creek above the Mt. Carmel Tunnel, Zion NP, 29 Aug 1970, *Moor Z1560* (UNLV); Emerald Pool Trail, Zion National Park, 9 Oct 1937, *Ramsey 1269* (RSA); Canaan Mountain, 14 Jun 1981, Zion NP, 1 mile up Loop Road, 23 Sep 1963, *Reveal 587* (USU:UTC); Canaan Mountain, 14 Jun 1981, *Shultz 5327* (RSA, USU:UTC); Clear Creek, 15 Oct 1987, *Thorne 5748* (BRY, UNLV); Pine Creek ca 1.3 mi N of Mt Carmel Hwy and Clear Creek, 17 Oct 1987, *Thorne 5770* (BRY); Clear Creek Zion NP, 11 Jun 1987, *Tuhy 3244* (BRY); Clear Creek Canyon, ZNP, 25 Sep 1982, *Welsh 21382* (BRY); Zion Canyon, 28 Dec 1983, *Welsh 22683* (BRY). Wayne Co.: Parker Mountain, 21 Jun 1967, *Beale 113* (USU:UTC). **Undetermined Co.:** East Zion Plateau, 10 Sep 1972, *Nelson 10080* (COLO).

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REFERENCES

- HOWELL, J.T. 1940. New Western plants. *Leafl. W. Bot.* 2(14):253–254.
- HOWELL, J.T. 1943. *Plantae occidentales*—III. *Leafl. W. Bot.* 3(9):205–208.
- KEARNEY, T.H. & R.H. PEEBLES. 1951. *Arizona flora*. University of California Press, Berkeley, U.S.A.
- MCDUGALL, W.B. 1973. Seed plants of northern Arizona. Museum of Northern Arizona, Flagstaff, U.S.A.
- NUTTALL, T. 1848. Descriptions of plants collected by Mr. William Gambel in the Rocky Mountains and Upper California. *Proc. Acad. Nat. Sci. Philadelphia* 4:14. <https://www.biodiversitylibrary.org/item/28006#page/32/mode/1up>
- REVEAL, J.L. 2005. *Eriogonum*. In: *Flora of North America* Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 25+ vols. Oxford Univ. Press, New York, U.S.A. and Oxford, U.K. Vol. 5, pp. 221–430.
- REVEAL, J.L. 2012. Polygonaceae. In: Holmgren, N.H., P.K. Holmgren, J.L. Reveal, and collaborators, *Intermountain flora*, Vol. 2, Part A. The New York Botanical Garden, Bronx, U.S.A. Pp. 196–387.
- STOKES, S. 1941. *Eriogonum racemosum* var. *desertorum*. *Leafl. W. Bot.* 3(1):17.
- SEINET – AZ/NM Node. *Biodiversity occurrence data*. Accessed through the SEINET – AZ/NM Node, 2024–2026.
- WELSH, S.L. 1984. Utah flora: Polygonaceae. *Great Basin Naturalist* 44(4):543. <https://scholarsarchive.byu.edu/gbn/vol44/iss4/1>
- WELSH, S.L. & N.D. ATWOOD. 1993. New taxa and new nomenclatural combinations in the Utah Flora. *Rhodora* 95(884):392–421.
- WELSH, S.L., N.D. ATWOOD, S. GOODRICH, & L.C. HIGGINS. 2003. *A Utah flora* (ed. 3). M.L. Bean Life Science Museum, Brigham Young Univ. Press, Provo, U.S.A. p. 512.