

**A REEVALUATION OF *CORDYLANTHUS PARRYI*  
AND A NEW COMBINATION IN *CHLOROPYRON* (OROBANCHACEAE)**

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**ABSTRACT**

The status of the long-neglected *Cordylanthus parryi* Wats. ex Parry is examined following recent field work, and it is here resurrected as ***Chloropyron maritimum*** subsp. ***parryi*** (Wats. ex Parry) J.M. Egger, **comb. et stat. nov.**, based on its almost entirely yellow and unstreaked abaxial corolla lip and discrete geographical range in Utah and immediately adjacent eastern Nevada.

In June of 1874, Charles C. Parry made a large gathering for his collection 155 in "saline marshes, valley of the Virgen (sic) [River]" in southwestern Utah. The following year, Sereno Watson provided a diagnosis for the new species, *Cordylanthus parryi* Wats. ex Parry, which was included in Parry's paper, "Botanical Observations in Southern Utah" (Watson in Parry 1875). The new species was distinguished from *Cordylanthus canescens* A. Gray by "its scattered greenish-yellow flowers, the bracts exceeding the calyx and corolla, the narrow, erect teeth of the calyx, the tube of the corolla much shorter than the throat, and by the shorter filaments sparsely hairy."

Eleven years later, Gray (1886) accepted the new taxon but at a reduced rank, as *Cordylanthus canescens* var. *parryi* (Wats. ex Parry) A. Gray. Gray diagnosed var. *parryi* as differing from typical *C. canescens* in its "slender form, with narrower bracts and sparser flowers: smaller filaments with some scattered hairs" (Gray 1886). He interpreted var. *parryi* as limited to "S.W. Utah", while the typical variety occurred from the "Sierra Nevada, on eastern border of California to Salt Lake, Utah."

Later, Greene (1891) returned Parry's plant to full species status but transferred it to a different genus, as *Adenostegia parryi* (Wats. ex Parry) Greene. Heller (1907) revised the then monotypic genus *Chloropyron* Behr, moving three additional species into it from *Adenostegia*, including both *Chloropyron canescens* (A. Gray) A. Heller and *Chloropyron parryi* (Wats. ex Parry) A. Heller, as full species but accepting Gray's earlier determination of their ranges, with *C. parryi* indicated as "known only from southwestern Utah."

In her monograph on the now archaic genus *Adenostegia* Benth., Ferris (1918) moved all the species of Heller's *Chloropyron* into an expanded *Adenostegia* but reduced *Cordylanthus parryi* to synonymy under *A. canescens* (A. Gray) Greene, noting "Examination of a fragment and a photograph of the type of *Cordylanthus parryi* shows that this is an immature specimen of *A. canescens*." It should be noted that the actual type gathering of *Cordylanthus parryi* consists of the holotype and at least fourteen isotype sheets, many of them obviously mature plants in full flower, indicating that Ferris' observations of very limited material may have clouded her evaluation of this taxon. Ferris was based at Stanford University, and from her description of the material to which she had access, specifically the isotype sheet at CAS-DS, it is easy to see why she interpreted it as an immature specimen. The sheet she observed (Fig. 4) contains the distal portion of a single stem from the type gathering and a poor quality black and white photo of mixed material at the Gray Herbarium

(GH), not the holotype she presumed it to be. The photo appears to contain an isotype sheet at GH on the left (GH accession 78221), along with an unknown specimen on the right, not represented within the known portions of Parry's type gathering.

Subsequently, Jepson (1925) treated Parry's type as *Cordylanthus maritimus* var. *parryi* (Wats. ex Parry) Jepson, resurrecting it from the synonymy proposed by Ferris.

Pennell (1951) treated Parry's type as a synonym within *Cordylanthus canescens*, which he returned to species rank. Pennell's description of *C. canescens* matches Parry's collection, with the galea described as "pale yellow" and the lower lip as, "pinard yellow," with no mention of the white base color and longitudinal purplish strips typical of the populations of *C. canescens* found in California and adjacent portions of Nevada and Oregon. Pennell's description was apparently based on his collection 22845, gathered "near Beck's Hot Springs" near Salt Lake City, on which his annotation reads, "Galea with pale yellow and pouch of lower lip pinard yellow." Pennell's treatment was accepted by Edwin (1959), who copied Pennell's manuscript verbatim in his treatment of the Scrophulariaceae of Nevada, even though Edwin cited *C. canescens* as occurring only in Douglas, Esmeralda, and Washoe counties, where the corollas are mostly white with purplish longitudinal markings.

In a revision of *Cordylanthus* subg. *Hemistegia* (A. Gray) Jeps., Chuang and Heckard (1973) moved all the species of Heller's *Chloropyron* back into *Cordylanthus*, reduced *C. canescens* to *Cordylanthus maritimus* subsp. *canescens* (A. Gray) Chuang & Heckard, and reduced *C. parryi* to synonymy under subsp. *canescens* without comment, evidently accepting Ferris's treatment of *C. parryi*. Ferris did not mention the corolla coloration of either the typical *canescens* nor of the *parryi* form, and Chuang and Heckard described the corolla coloration of their subsp. *canescens* as "...white, often reddish-striped, with yellow apex." This description is consistent with the type material of *C. canescens*, *C.L. Anderson 207*, "near Carson City" (GH) and other plants from the western part of the range, but it does not match the description of *C. parryi* as having "greenish-yellow flowers" or the other plants occurring in Utah and adjacent Nevada. In the Intermountain Flora, Holmgren (1984) followed Chuang and Heckard's treatment and described the corollas as, "...the galea yellow..." and the "...lower lip whitish with purple stripes...", though he preferred to use the rank of variety rather than Chuang and Heckard's subspecies.

Finally, Tank et al. (2009) resurrected the genus *Chloropyron*, moving the species of *Cordylanthus* subg. *Hemistegia* and accepting *Chloropyron maritimum* subsp. *canescens* (A. Gray) Tank & Egger, as well as the synonymy of the *parryi* form thereunder. This nomenclature was also followed in the treatments of *Chloropyron* in the Flora of North America (Barringer 2019) and in the most recent editions of The Jepson Manual (Wetherwax & Tank, 2012) and *A Utah Flora* (Atwood 2016).

The only other recent treatment of this assemblage is that of Gilman and Tank (2018), where the taxonomy presented in Tank et al. (2009) is accepted and a molecular-genetics analysis of *Chloropyron* provides strong support for the *C. maritimum* complex, including subsp. *canescens*, as a monophyletic group separate from the other species of *Chloropyron*, though with subsp. *canescens* as sister to the more closely related pair, subsp. *maritimum* and subsp. *palustre* (Behr) Tank & Egger. This analysis left unresolved the question of at what rank the Great Basin complex should best be treated.

In 2018, Zharkikh posted photos from a late season population of *Chloropyron* from the Utah Lake Wetland Preserve, near the south end of Utah Lake, on his Flickr site: <<https://www.flickr.com/photos/zharkikh/albums/72157627581058258>>. After viewing these photos, Egger realized they were strikingly different in corolla coloration from the populations of *C. maritimum* subsp. *canescens* he had observed in the Owens Valley of far eastern California. On 24 July 2019, Egger joined Zharkikh for a visit to the Utah County population to observe and document these plants and their ecological

association in prime flowering condition. These observations are documented on Zharkikh's Flickr site, as well as on Egger's site: <[https://flickr.com/photos/mark\\_egger\\_castilleja/albums/72157710531916591](https://flickr.com/photos/mark_egger_castilleja/albums/72157710531916591)>. Zharkikh's site also contains field photos of *C. maritimum* subsp. *parryi* from several other sites in western Utah.

Subsequent field work, study of herbarium collections, and analysis of populations of *Chloropyron* on the iNaturalist web site and similar sites led to the realization that the predominantly yellow-flowered populations matching the description of Watson's *Cordylanthus parryi* are fairly widespread in appropriate habitat in western Utah and closely adjacent extreme eastern Nevada, and, while additional field studies would be useful, it appears that the yellow-flowered form is the only one present in this region. Likewise, the predominantly white-flowered form, matching the type of *Cordylanthus canescens*, is the only form known in the western part of the range usually assigned to subsp. *canescens* in recent treatments, including the eastern tier of California, scattered locations in southeastern Oregon, the western tier of Nevada, and a few scattered sites in central Nevada. We have found no indication of populations of one form occurring within the range of the other, nor of populations containing a mix of individuals of the two forms. On the other hand, the virtually complete, apparently parapatric isolation of the two corolla color forms does not appear to be matched by any further consistent divergence in morphology.

Nevertheless, the divergence in corolla coloration in the eastern populations of the traditional subsp. *canescens* from the western populations justifies resurrection of Parry's type collection as a formally recognized entity. Indeed, *Cordylanthus parryi* is visually the most distinctive element within this group of closely similar population systems (*Chloropyron maritimum* sensu lato), while, as Chuang & Heckard (1973, p. 148) noted, "... difficulty arises in establishing taxonomic criteria for separating subsp. *maritimum* from subsp. *canescens*." Such is not the case with *Cordylanthus parryi*.

With its consistent morphology and apparently disjunct range, a case could be made for recognizing the *parryi* expression at species rank. This would necessitate a reevaluation of the status of the other presently accepted subspecies of *Chloropyron*, while the goal of this paper is to bring a renewed recognition to the *parryi* form so that field botanists and land managers can watch for it, more completely map its distribution, and include it in future studies, rather than to revise the entire genus.

While we generally prefer the use of variety over subspecies for infraspecific nomenclature, the use of subspecies in *Chloropyron* has become well established (Tank et al. 2009; Wetherwax & Tank 2012; Gilman & Tank, 2018; Barringer 2019).

**Chloropyron maritimum** subsp. **parryi** J.M. Egger, **comb. et stat. nov.** *Cordylanthus parryi* S. Wats. ex Parry, Amer. Naturalist 9: 346. 1875. **TYPE: USA. Utah.** Washington Co.: Saline marshes in the valley of the Virgen (sic) [River], Jun 1874, *C.C. Parry 155* (holotype: GH, represented by two plants located on the lower right of GH accession 78220 [Fig. 3]; isotypes: BRU[2], CAS-DS, CM, F, GH, ISC-IA, K, MO[2], NY, P, PH, US)

**Additional collections examined.** **Nevada.** Elko Co.: 15 mi S of Wendover on Utah-Nevada line, 24 Jul 1941, *A.H. Holmgren 1539* (CAS-DS, NY, UC). White Pine Co.: White River Valley, ca. 10 air mi SW of Lund, T11N, R61E, S34, 17 Aug 1986, *Knight 1539* (ID, NY), 1.7 mi W of main road on W side of valley on a main E-W road, just N of county line, T11N, R61E, S33m 20 Jul 2000, *Tiehm 13336* (BRY, ID[2], NY, RENO, RSA, UNLV). **Utah.** Box Elder Co.: Hot Springs 8 mi N of Ogden, Jul 1882, *Patterson s.n.* (F, NY, PH); Locomotion [=Locomotive] Springs, Kelton, 29 Aug 1916, *Wetmore 438* (US); Hogup Spring, 0.5 mi W of Hogup Cave, 8 Aug 1970, *Mehringner s.n.* (BRY, NY, UT); Salt Wells Flat, along the Cedar Springs Road, 29 km W of Lampo Junction and 19 km E of Locomotive Springs Road., 17 Aug 2008, *N.H. Holmgren 15882* (BRY, NY); Bear River Valley, State Route 83, 0.16 km (0.1 mi) W of the junction with State Route 102, 22 km (14 mi) air distance WNW of Corinne., 41.61277 -112.36944, 20 Aug 2010, *N.H. Holmgren 16334* (BRY, NY).

Juab Co.: Fish Springs, 14 Sep 1938, *Jensen 225* (RM); Great Salt Lake Desert, unnamed spring and seep on flats N of the Fish Springs Range, ca. 14 air mi due east of Callao, 15 Aug 2018, *Johnson 5895* (ASC, BRY); Fish Springs National Wildlife Refuge, on the road to Simpson Springs about 3 mi SW of the headquarters for the Refuge, 1 mi W of the turnoff to Cane Spring., 15 Aug 1978, *Reveal 4851* (BRY, NY[2], US). Millard Co.: Near Meadow, 19 Jul 1925, *Harris 25131* (GH); Clear Lake, shoreline of the third unit, 17 Sep 1938, *Jensen 76* (NY); 17.5 mi S of Delta, Clear Lake., 2 Aug 1983, *Goodrich 19355* (BRY, GH, RM, RENO, UT); Clear Lake, 30 Aug 1936, *Piranian 15983* (GH), 17 Sep 1939, *Smith s.n.* (NY, PH); Clear Lake, 18 mi NW of Fillmore, 39.10426 -112.62524, 3 Sep 1984, *Neese 16226* (BRY, RM), *Welch 23099* (BRY); saline marsh S of Clear Lake Waterfowl Mgt. area gate, 3 Sep 1984, *Baird 1512* (BRY, NY); 12.5 mi NW of Fillmore, 4 Sep 1976, *Welsh 14472* (BRY); Foote Reservoir area, 29 Jun 2004, *Atwood 30503* (BRY, SRP, RENO); Pahvant Valley, Meadow Hot Springs, 4.9 rd. mi W of Hwy 133 on Hot Springs Rd, ca 5.5 air mi WSW of Meadow, 4 Oct 2014, *Johnson 3481* (BRY, OBI, SRP); Lincoln Beach, 24 Jul 1925, *Cottam 242* (BRY). Salt Lake Co.: Salt Lake Valley, 1877, *Hooker & Gray s.n.* (GH); Salt Lake City, 17 Aug 1880, *Jones 1403* (F, NY[4]), PH, RSA[2], RM, US); meadows near Salt Lake City, 12 Jul 1884, *Leonard 141* (NY); Garfield Beach, Great Salt Lake, 15 Jun 1905, *Rydberg 6897* (GH, NY, RENO, RM, US); Beck's Hot Springs, 13 Aug 1908, *Garrett 2309* (RM, UT), 19 Jul 1938, *Pennell 22845* (GH, NY, US); near Beck's Hot Springs, Jul 1905, *Garrett 1500* (GH, NY[2]); Saltair, 1 Aug 1929, *Cottam 866* (UT), *Flowers 867* (UT); W of Salt Lake City, just W of 4000 W and 0.9 mi N of turn-off to parking area at City Airport, 1 Aug 1971, *Arnow 3262* (BRY, UT); S of Salt Lake City, 1/4 mi W of state prison adjacent to largest ponds in the Crystal Hot Springs complex, T4S, R1W, Sec. 11, NE 1/4, 14 Sep 1974, *Arnow 4298* (UT). Tooele Co.: Smelter Beach, 20 Jul 1909, *Smith 1891* (RM); near lake, Route 40, SE of Timple, 12 Jul 1938, *Pennell 22853* (GH, NY, PH, US); W of highway in Skull Valley, ca. 3 mi W of Iosepa, 28 Aug 1977, *Albee 3801* (UT[2], UTC); 12.2 mi S of Rowley, Junction exit on Interstate 80, 28 Jul 1989, *Stermitz 382* (CS). Utah Co.: Goshen Valley, US Hwy 6, E of Goshen, 10 Oct 2014, *Barnes 595* (UVSC); Goshen, 4 Aug 1972, *Brotherson 2840* (BRY), 4 Aug 1974, *Brotherson 2834* (BRY); Goshen Bay salt marsh, 23 Aug 1994, *Welsh 25781* (BRY); Goshen Valley, one mi E of Goshen on Hwy 6, N side of road, 39.95908, -111.87781, 25 Sep 2018, *Koide s.n.* (BRY); ca. 2 mi N of Goshen, 5 Jul 1978, *Brotherson 3187* (BRY); ca. 1 mi N of Goshen, 27 Aug 1998, *Kass 5093a* (BRY); Goshen Valley, 4 Sep 1984, *Thorne 3523* (BRY, GH); Utah Lake Wetlands Preserve, N of UT Hwy 141 near Goshen, 24 Jul 2019, *Egger 1659* (US, WTU); W of Genola, 21 Aug 1968, *Coombs 490* (BRY); beach of Utah Lake, S of Lincoln Point., 40.13413 - 111.79829, 8 Sep 1980, *Jeppsen 141* (BRY). Washington Co.: St. George, 1875, *Palmer 6301* (GH), 20 May 1918, *Emstall 523* (US); 15 May 1934, *Galway s.n.* (BRY), *Hall 6274* (BRY); 11 Jun 1934, *Galway s.n.* (BRY); 25 Jun 2005, *Higgins 26788* (BRY, RENO, UCR); just N of the Virgin River, St. George, 24 May 1935, *Hall s.n.* (BRY); Utah Hwy 64 (Mt. Trumbull Road) at Virgin River crossing, S of St. George, 14 Oct 1973, *Meyer 3293* (BRY, UNLV). Weber Co.: Ogden Hot Springs, 16 Aug 1893, *Ries s.n.* (US); Pavilion yard, hot springs, Ogden, 15 Aug 1901, *Anon. s.n.* (UT); ca. 15 mi W of Ogden on W side of Little Mountain, T6N, R4W, Sec. 12, 22 Jul 1973, *Arnow 3709* (BRY, UT).

A map is provided below (Fig. 1), delineating the counties in which *Chloropyron maritimum* subsp. *canescens* and subsp. *parryi* are known to occur. A single collection of subsp. *parryi*, was technically made in Elko Co., Nevada (*Holmgren 1539*), but the collection was made "on Utah-Nevada line", next to Tooele Co., Utah. Since this is the only record of any subspecies of *C. maritimum* from Elko Co., we decided to exclude that county from the map for subsp. *parryi*, so as not to convey an inaccurate impression of its range.

**Identification.** To aid in identifying the subspecies of *Chloropyron maritimum*, a key is presented below, as well as a composite image showing details of the inflorescences and the typical coloration of the corollas in all four subspecies (Fig. 2). Additional images of typical plants of subsp. *parryi* in the field are also presented below (Figs. 5-11).

While dried specimens of *Chloropyron maritimum* frequently lose all the base coloration of the corollas in the drying process, subsp. *parryi* can often still be separated from subsp. *canescens* in

such cases by the continued presence of purplish-red longitudinal lines on the lower lip of the corollas in the latter subspecies, a trait that is preserved in many specimens in which the base colors of yellow vs. white are lost or are ambiguous. The frequent fading of the base coloration on herbarium sheets may well account for the historical neglect of subsp. *parryi* in the literature. We did not detect any change of corolla color in either subspecies related to phenology, from early flowering to senescence, in living plants.

### Key to the subspecies of *Chloropyron maritimum*

1. Bracts usually with a pair of short distal lobes; seeds 10-20 per capsule; galeas purplish-red, whitish, pink, pale brownish, or faintly pale yellowish; plants of outer margins of coastal salt marshes from northwestern Baja California north to Tillamook Co., Oregon.
  2. Stems usually much-branched with the distal branches usually exceeding the central stem in length; lower lip of corollas entirely whitish or whitish with the far distal portion (the teeth) tinged with purplish red or pale brownish, the whitish portions usually with faint, purplish-red longitudinal veins; plants of Santa Barbara Co. south into northern Baja California ..... subsp. **maritimum**
  2. Stems solitary or few-branched with the branches approximately equaling the central spike in length; lower lip of corollas prominently purplish red, at least on the distal 1/4-1/2, often lacking purplish-red longitudinal veins; San Luis Obispo Co., California, north to Tillamook Co., Oregon and apparently intergrading with subsp. *maritimum* in San Luis Obispo and Santa Barbara counties ..... subsp. **palustre**
1. Bracts usually entire, sometimes with minute distal lobes; seeds 25-40 per capsule; galeas prominently yellow to yellow-green at least distally; plants of inland saline/alkaline meadows and flats from eastern California north to southeastern Oregon and east to western Utah.
  3. Lower lip of corollas entirely dull whitish (occasionally suffused with pale pink-purple proximally or the distal teeth yellowish), usually with purplish-red longitudinal veins; plants of eastern California northward to southeastern Oregon and east to central Nevada ..... subsp. **canescens**
  3. Lower lip of corollas bright yellow (rarely orange-yellow) at least on the distal 1/3-3/4, without purplish-red longitudinal veins; plants of western Utah and adjacent Elko and White Pine counties, Nevada ..... subsp. **parryi**

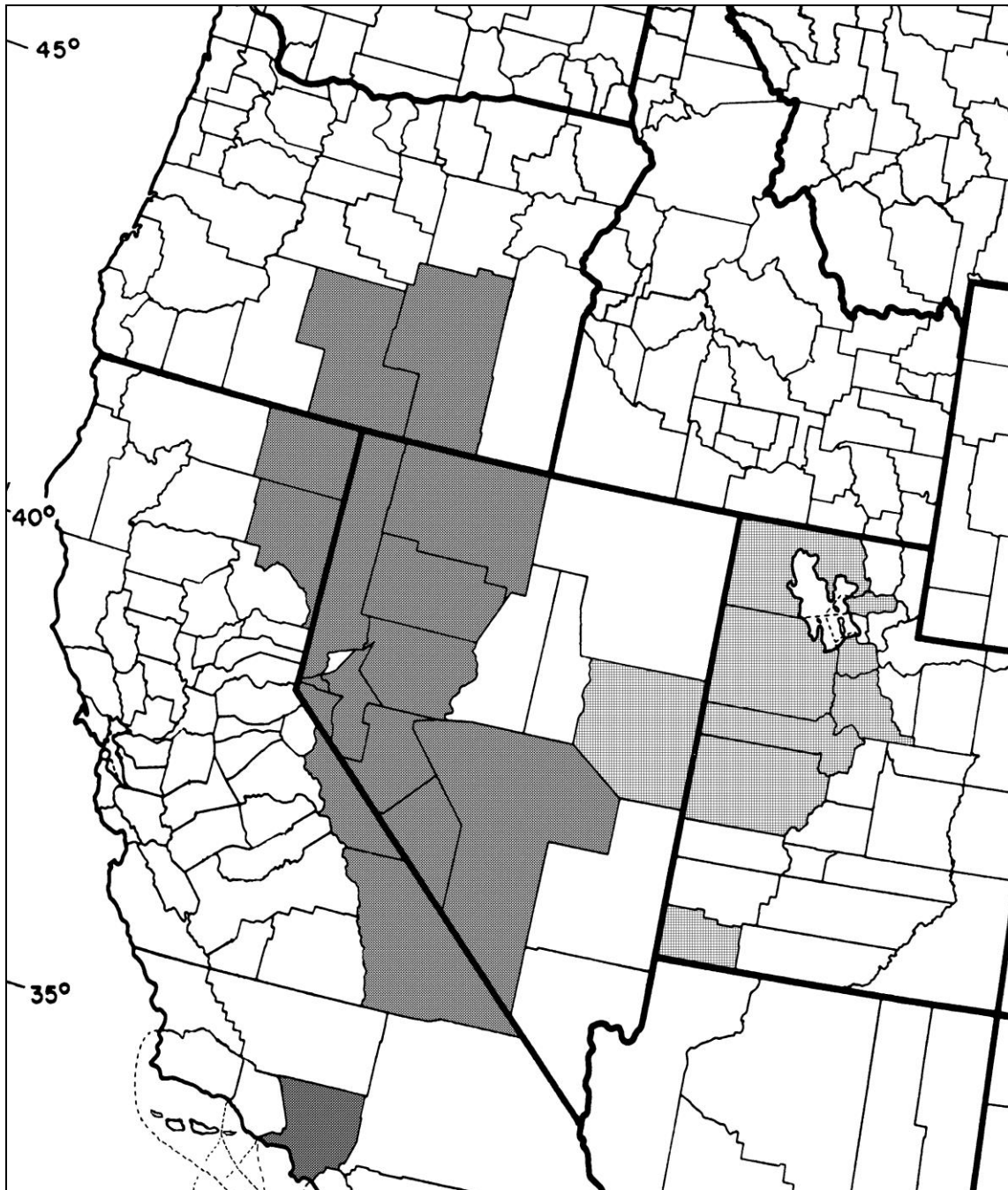


Figure 1. Distribution by county of *Chloropyron maritimum* subsp. *canescens* (dark gray) and subsp. *parryi* (light gray). Note that Elko Co., Nevada, is excluded, as the single collection of subsp. *parryi* known from that county was made on the state line with Tooele Co., Utah and could as easily be included there. Most collections of subsp. *canescens* from Nye Co., Nevada, are from the southwestern part of the county, and it is known from only a single collection from Los Angeles County, close to its border with Kern County.



Figure 2. The subspecies of *Chloropyron maritimum*: subsp. *canescens*, Inyo Co., California, upper left; subsp. *palustre*, Humboldt Co., CA, upper right; subsp. *maritimum*, Orange Co., California, lower left; ssp *parryi*, Utah Co., Utah, lower right. Note the consistent bract lobing, a pair of distal lobes in the maritime subspecies vs. entire margins in the interior subspecies). Photos by J.M. Egger.

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Figure 3. Parry 155, holotype of *Cordylanthus parryi*, represented by the two stems on the right. On the left is a stem of Palmer 6301, collected in the same area the following year. Image courtesy of GH.

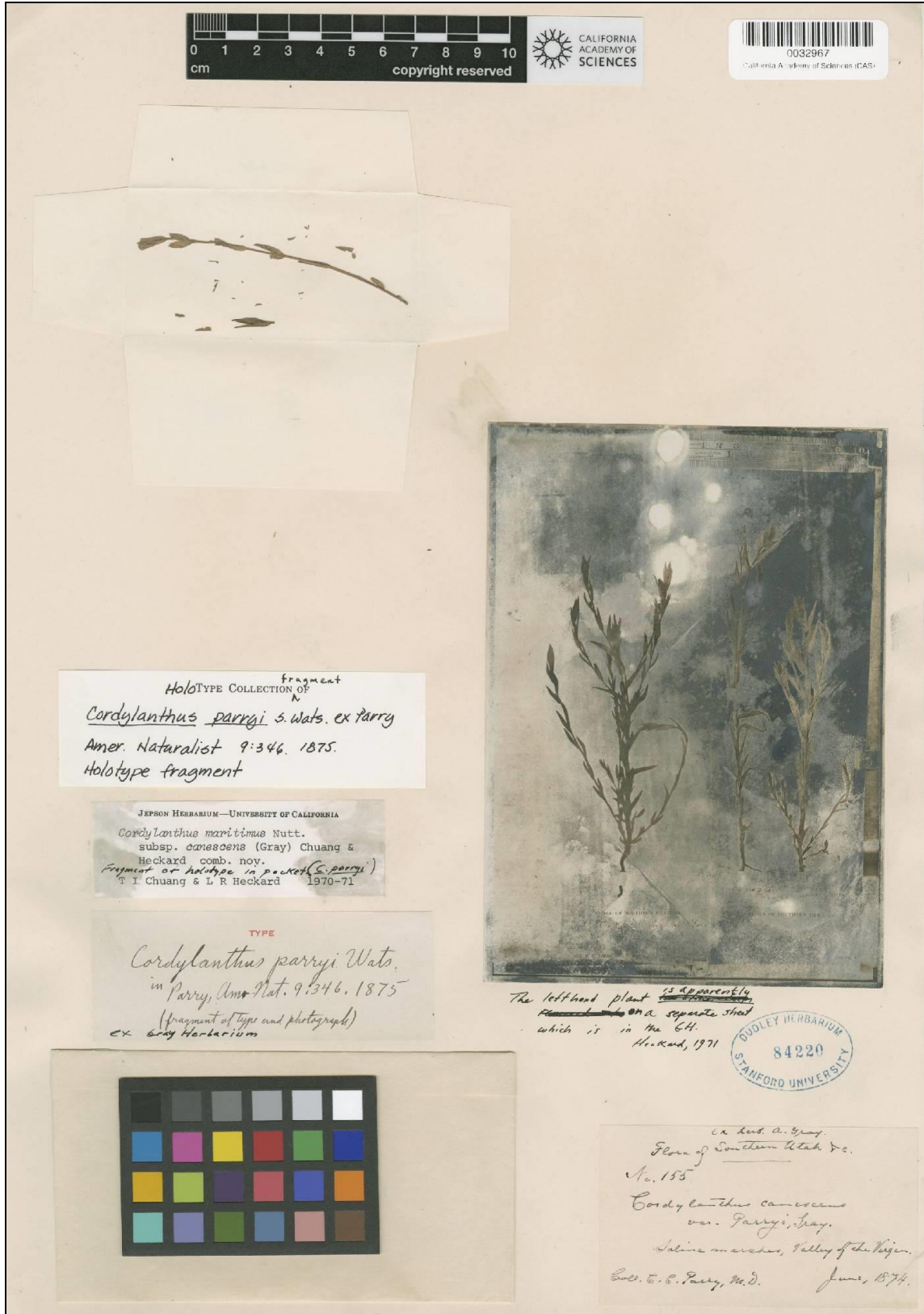


Figure 4. Type material for *Cordylanthus parryi* studied by R.S. Ferris. A fragment from the type gathering (Parry 155), along with an image of the isotype sheet at GH (left) and two stems of unknown disposition (right). Image courtesy of CAS-DS.



Figure 5. Subsp. *parryi*, dissection 1, left to right: corolla, calyx, floral bract, complete flower.



Figure 6. Subsp. *parryi*, dissection 2, left to right: calyx, adaxial corolla and galea with two stamens, pistil, abaxial corolla lip with two stamens, floral bract. Both photos: Utah Lake Wetland Preserve, Utah Co., Utah, 7 September 2019, by A. Zharkikh. 1 mm grid.



Figure 7. Habitat of *Chloropyron maritimum* subsp. *parryi*, Utah Lake Wetland Preserve, Utah Co., Utah. The *Chloropyron* occurs only within the low, saline swale in the center of the image. Photo by J.M. Egger, 24 Jul 2019.



Figure 8. *Chloropyron maritimum* subsp. *parryi* and associated species, along Hwy. 83, around former rail tracks. Box Elder County, Utah. Photo by A. Zharkikh, 3 August 2019.



Figure 9. *Chloropyron maritimum* subsp. *parryi*, inflorescence. Utah Lake Wetland Preserve, Utah Co., Utah. Photo by A. Zharkikh, 8 September 2018.



Figure 10. *Chloropyron maritimum* subsp. *parryi*, much-branched plant. Meadow Hot Springs, Millard Co., Utah. Photo by A. Zharkikh, 17 August 2019.



Figure 11. *Chloropyron maritimum* subsp. *parryi*, inflorescence. Utah Lake Wetland Preserve, Utah Co., Utah. Photo by J.M. Egger, 24 Jul 2019.



Figure 12. *Chloropyron maritimum* subsp. *parryi*, stem and branched inflorescence. Utah Lake Wetland Preserve, Utah Co., Utah. Photo by J.M. Egger, 24 Jul 2019.