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NOMENCLATURAL SUMMARY OF *OONOPSIS* (ASTERACEAE: ASTEREAE)

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ABSTRACT

A summary of formal nomenclature is presented for the six species of *Oonopsis* — *O. engelmannii*, *O. foliosa*, *O. monocephala*, *O. multicaulis*, *O. puebloensis*, and *O. wardii*. Rationale is given for treating *O. monocephala* as a species separate from *O. foliosa*. **Oonopsis puebloensis** G.K. Brown & T.M. Evans, **sp. nov.** [in Nesom], is validated --- the name with authorship of "Kelso et al." has sometimes been used but was not validly published. A lectotype is designated for *Bigelowia engelmannii* A. Gray and for *Stenotus multicaulis* Nutt.

Oonopsis includes six species (Brown 1993; Nesom 2000; Brown & Nesom 2006), which occur primarily in Colorado, Montana, and Wyoming, with outlying populations in Kansas, Nebraska, and South Dakota. Plants of all species accumulate selenium and are indicators of selenium substrates. The genus was recognized early as a natural group (e.g., Greene 1896; Hall 1928) and molecular studies (e.g., Brouillet et al. 2009) show it as closely related to genera of subtribe Machaerantherinae (Nesom 2020), also including *Dieteria*, *Leucosyris*, *Machaeranthera*, *Xanthisma*, and *Xylorhiza*.

The account here is summary but serves to provide details of nomenclature and to address two taxonomic issues — see *Oonopsis monocephala* and *O. puebloensis*.

OONOPSIS (Nutt.) Greene, Pittonia. 3: 45. 1896. *Stenotus* Nutt. [unranked] *Oonopsis* Nutt., Trans. Amer. Philos. Soc., n. s. 7: 335. 1840. *Haplopappus* sect. *Oonopsis* (Nutt.) H.M. Hall, Yearb. Carnegie Inst. Wash. 25: 344. 1926. **TYPE**: *Oonopsis* [Stenotus] *multicaulis* (Nutt.) Greene

1. OONOPSIS ENGELMANNII (A. Gray) Greene, Pittonia. 3: 45. 1896. *Bigelowia engelmannii* A. Gray, Proc. Amer. Acad. Arts 11: 75. 1876. *Haplopappus engelmannii* (A. Gray) H.M. Hall, Publ. Carnegie Inst. Wash. 389: 93. 1928. **LECTOYPE** (designated here): **Colorado**. Hugo, on Pacif. R Road, plains east of Denver, Aug 1874, *C.C. Parry s.n.* (GH; isolectotypes: K MO, NY).

The locality description and date are from the MO specimen label. Protologue: "Plains of the eastern part of Colorado, at Hugo Station on the Arkansas Pacific Railroad, Dr. Engelmann and Dr. Parry, 1874; H.N. Patterson, 1875."

2. OONOPSIS FOLIOSA (Torr. & Gray) Greene, Pittonia 3: 46. 1896. *Pyrrocoma foliosa* Torr. & Gray, Boston J. Nat. Hist. 5: 108. 1845 [non *Pyrrocoma foliosa* Phil., 1858]. *Haplopappus fremontii* A. Gray, Proc. Acad. Nat. Sci. Philadelphia 15(1863): 65. 1864 [non *Haplopappus foliosus* DC., 1836]. **TYPE**: **Colorado**. 1845, *J.C. Fremont s.n.* (holotype: GH; isotype: NY).

3. OONOPSIS MONOCEPHALA A. Nels., Bot. Gaz. 31: 399. 1901. *Haplopappus fremontii* subsp. *monocephalus* (A. Nels.) H.M. Hall, Publ. Carnegie Inst. Wash. 389: 87. 1928. *Oonopsis foliosa* var. *monocephala* (A. Nels.) Kartesz & Gandhi, Phytologia 71: 60. 1991. **TYPE**: **Colorado**. [Las Animas Co.:] Berwind, 1900, *J. MacArchibald 257* (holotype: RM).

Oonopsis monocephala (heads discoid) has often been treated at varietal rank within *O. foliosa* (heads radiate) (e.g., Hall 1928; Brown & Nesom 2006). The rationale for considering them conspecific is based on the occurrence of intermediates in Las Animas County where their geographical ranges meet (Fig. 1) (Schulz & Shaw 1992; Hughes & Brown 2004), the lack of other distinguishing morphological features, and the tetraploid chromosome number (2n=20) for both, while the other *Oonopsis* taxa are diploid (2n=10) (Brown & Nesom 2006).

Oonopsis foliosa is endemic to 10 Colorado counties, while *O. monocephala* is restricted to Las Animas County, with a single collection from Otero County (Figs. 1, 3). The zone of sympatry is an area within the U.S. Army Pinyon Canyon Maneuver Site (Fig. 2). Some populations within the sympatric zone are monomorphic for either radiate or discoid heads, with no individuals of intermediate head morphology (Hughes & Brown 2004).

The intermediates, putatively hybrid, produce chain and ring multivalents in prophase I, as well as bridges, fragments, and other meiotic abnormalities — Hughes & Brown (2004) suggested that these features are suggestive of translocation heterozygosity. Unexpectedly, they found that pollen stainability of the putative hybrids is similar to that in individuals of typical *O. foliosa* and *O. monocephala*.

Ackerfield (2015, 2022) has considered *Oonopsis foliosa* and *O. monocephala* as distinct species. Weber & Wittmann (2012) treated *P. monocephala* simply as a synonym of *O. foliosa*, perhaps in agreement with the view of Hughes & Brown (2004) that the "presence or absence of ray florets within Astereae is not a species-defining character" (to me, neither logically nor biologically true). Hybrids are known in many instances where species ranges overlap, and there seems to be no compelling morphological or cytological evidence to consider *O. foliosa* and *O. monocephala* conspecific, even should they prove to be evolutionarily sister taxa. Further, as noted by Hughes and Brown (2004, p. 119-120), "DNA sequence data from 2 chloroplast intergeneric spacers (trnL-trnF and psbA-trnH and the nuclear-ribosdoma internal transcribed spacers … place var. *foliosa* and var. *monocephala* in different clades involving different polyploid events." "The molecular phylogeny places var. *monocephala* in a well-supported clade with *O. multicaulis*, and not with *O. foliosa*, as is suggested by morphological data" (Bricker & Brown 1998).

4. OONOPSIS MULTICAULIS (Nutt.) Greene, Pittonia. 3: 45. 1896. *Stenotus multicaulis* Nutt., Trans. Amer. Philos. Soc., n. s. 7: 335. 1840. *Haplopappus multicaulis* (Nutt.) A. Gray, Amer. Naturalist 8: 213. 1874. **LECTOTYPE** (designated here): **Wyoming**. BM label: "Westn declivity of the Ry. Mts. in saxis," 1834, *T. Nuttall s.n.* (BM; isolectotype: PH; probable isolectotypes: GH, NY). Protologue: "On rocks, on the western declivity of the Rocky Mountains."

Oonopsis argillacea A. Nels., Bull. Torrey Bot. Club 26: 481. 1899. **TYPE**: **Wyoming**. Natrona Co.: Bates Hole, 13 Jul 1898, *Elias Nelson 4867* (holotype: RM; isotypes: CS, GH, NY-2, RM, US).

5. OONOPSIS PUEBLOENSIS G.K. Brown & T.M. Evans [in Nesom], **sp. nov. TYPE**: **Colorado**. Fremont Co.: [Along Hwy 50, SE side of Penrose, 1 mi SE of jct with County Rd 120], T19S, R68W, sec 15, outcrop of Niobrara Shale with Hwy 120 cut through, open pinyon-juniper woodland on shale barrens, with *Frankenia jamesii*, *Mentzelia chrysantha*, *Oxybaphus rotundifolius*, *Penstemon versicolor*, *Parthenium tetraneuris*, 5150 feet, 175 plants observed, 6 Jul 1995, *S. Spackman 95-034* (holotype: COLO 113399; isotype: COLO 113365). Figures 7 and 8.

Similar to *Oonopsis foliosa* but stems often shorter (10–18 cm vs. 10–40 cm), stems, leaves, and phyllary surfaces prominently villous (vs. glabrous, or nearly so), and phyllaries spreading to strongly reflexed (vs. erect). Chromosome number, 2n = 10. El Paso, Fremont, and Pueblo cos., Colorado.

Greg Brown and associates made detailed studies (Brown & Clark 1989; Brown 1993; Evans & Brown 1991; Bricker & Brown 1998) toward a taxonomic revision of *Oonopsis* but the revision was never published. Brown (1993) noted the existence of an undescribed species from Colorado and his group made collections of it and annotated herbarium specimens as "Oonopsis puebloensis" (e.g., Figs. 4-6) in advance of its publication. In 1996, however, a different group apparently published the name in a technical report ("Gen. Techn. Rep. R.M. U.S. Forest Serv. GTR-283" — not located), but nomenclatural guidelines were not followed and the name is now

- characterized as a nomen nudum or nomen invalidum (e.g., POWO 2024; IPNI 2024),
- discussed without reference to its authorship (e.g., Panjabi & Smith 2017),
- listed as "sp. 1" (Colorado Natural Heritage Program 2023, 2024),
- given as "Oonopsis puebloensis G. Brown & Evans" (Locklear 2017), or
- not included at all in the account (e.g., USDA, NRCS 2024).

The name is validated here (as "sp. nov."), crediting the authorship to Brown & Evans, as originally intended.

Sixty-six RM collections of *Oonopsis puebloensis* by Brown and associates are now accessioned and annotated and will soon be available online under that name.

6. OONOPSIS WARDII (A. Gray) Greene, Pittonia. 3: 46. 1896. *Haplopappus fremontii* var. *wardii* A. Gray, Syn. Fl. N. Amer. 1(2): 128. 1884. *Aster wardii* (A. Gray) Kuntze, Revis. Gen. Pl. 1: 317. 1891. *Haplopappus fremontii* subsp. *wardii* (A. Gray) H.M. Hall, Publ. Carnegie Inst. Wash. 389: 88. 1928. *Haplopappus wardii* (A. Gray) Dorn, Man. Vasc. Pl. Wyoming 1: 396. 1977. **TYPE**: **Wyoming**. No locality, 1881, *L.F. Ward s.n.* (holotype: GH).

Oonopsis wardii var. *condensata* A. Nels., Bull Torrey Bot. Club 25: 376. 1898. *Oonopsis condensata* (A. Nels.) A. Nels. in Coulter & Nelson, New Man. Bot. Centr. Rocky Mts., 501. 1909. **TYPE**: **Wyoming**. [Albany Co.:] Laramie Plains, 7 Aug 1897, *A. Nelson 3459* (holotype: RM; isotypes: E, GH, ILL-3, NY).

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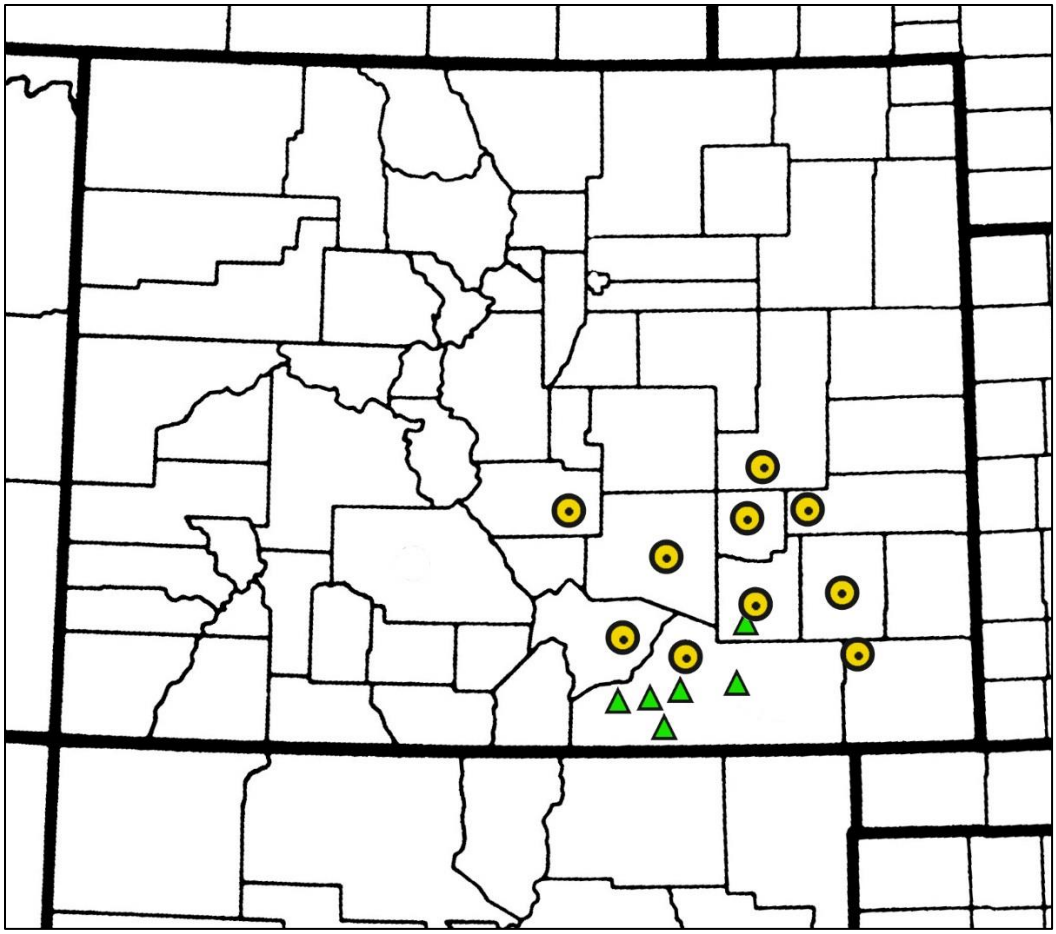

Figure 1. Distribution of *Oonopsis foliosa* (circles) and *O. monocephala* (triangles).

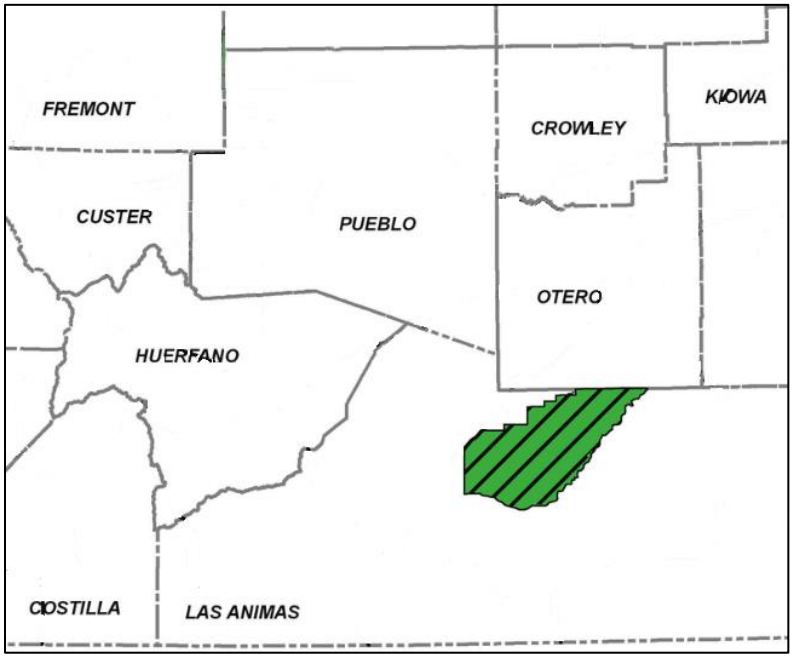

Figure 2. Location of U.S. Army Pinyon Canyon Maneuver Site in Las Animas County, Colorado.

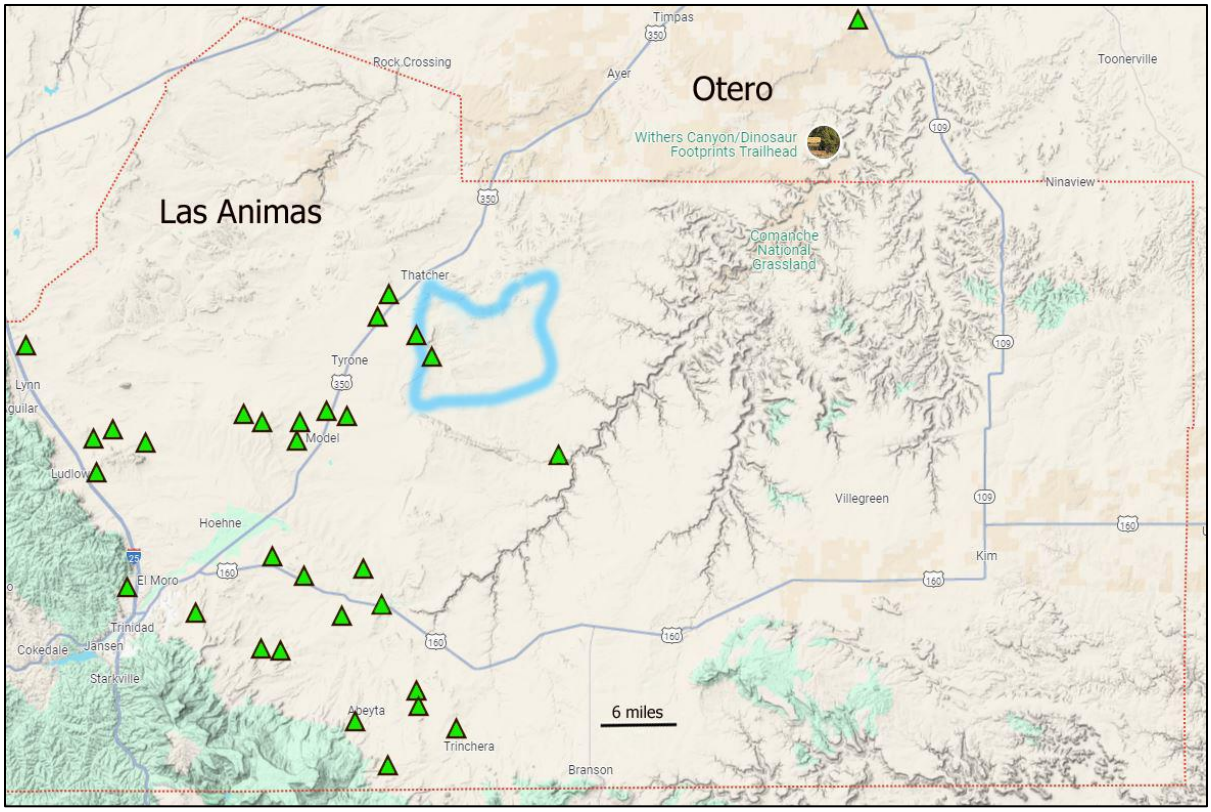

Figure 3. Total distribution of *Oonopsis monocephala* — records are from collections at COLO, CS, GREE, and RM via online databases. The blue outline (fide Figure 1 in Hughes & Brown 2004) is within the Pinyon Canyon Maneuver Site and shows the zone where intermediates with typical *O. foliosa* occur. The boundary of Las Animas County is the thin red line. The collection from Otero County is this: Comanche Natl Grassland, Road 802, ca. 0.2 mi SW of Colorado Hwy 109, 37° 48' 6.25" N, 103° 29' 54.95" W, disturbed shortgrass prairie, 4410 ft, 27 Jul 1998, *Snow 7524* (GREE).

Figure 4. *Oonopsis puebloensis* Brown & Evans. Pueblo Co., *Spackman 95-031* (COLO).

Figure 5. *Oonopsis puebloensis* Brown & Evans. Fremont Co., *Elliott 1715* (COLO).

Figure 6. *Oonopsis puebloensis* Brown & Evans. Pueblo Co., *Clark 2572* (COLO).

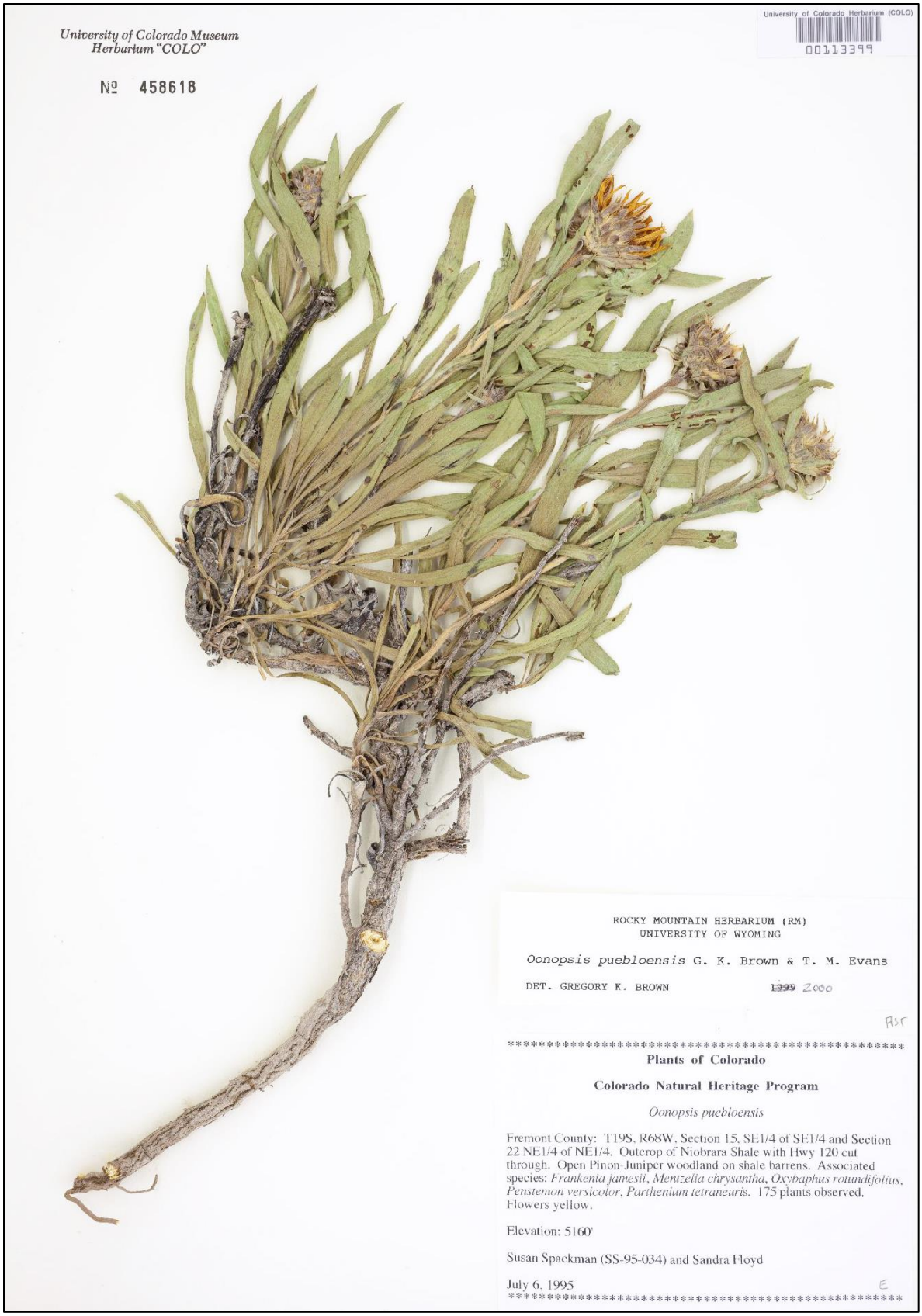

Figure 7. *Oonopsis puebloensis* Brown & Evans. Fremont Co., *Spackman 95-034* (holotype: COLO).

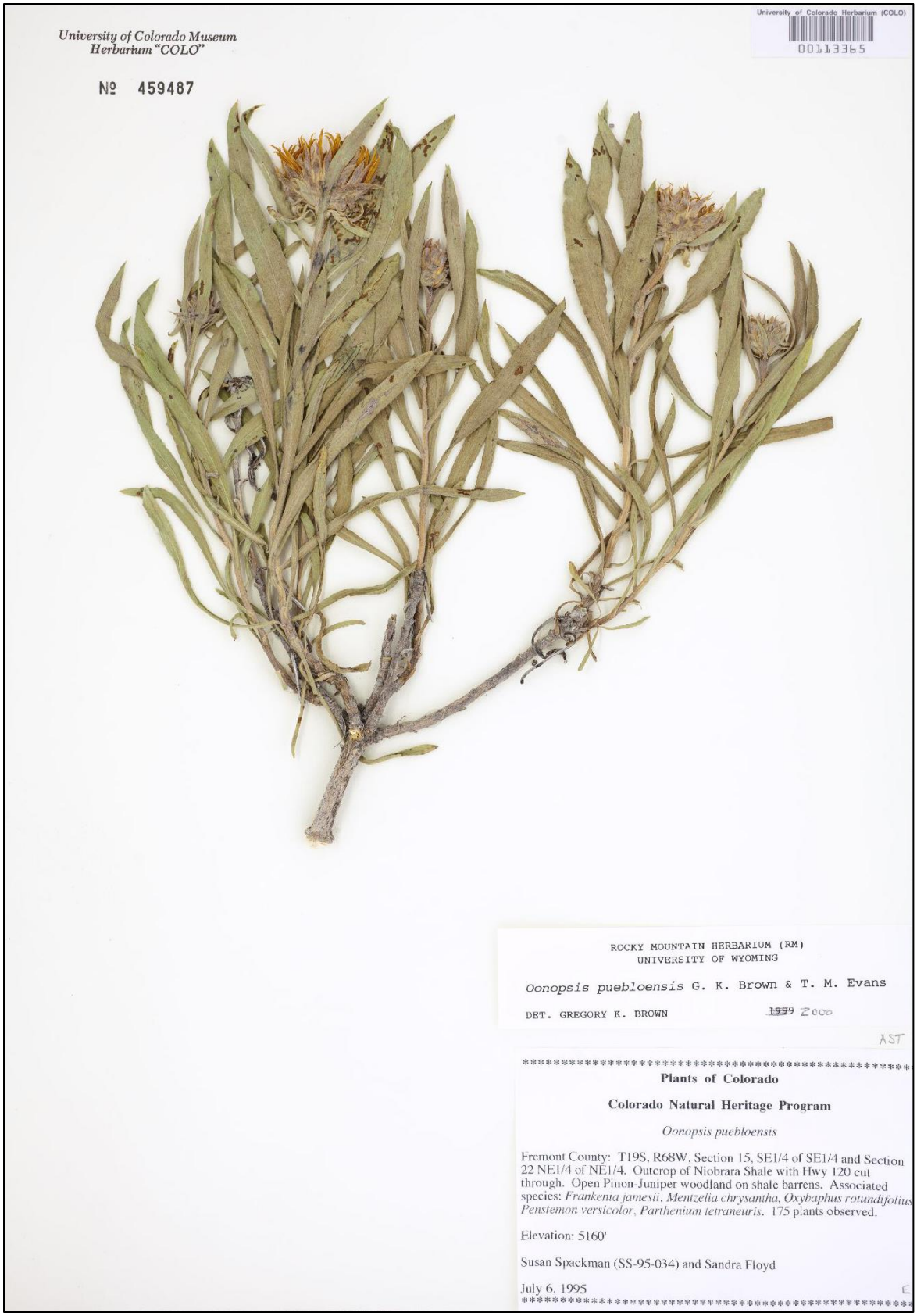

Figure 8. *Oonopsis puebloensis* Brown & Evans. Fremont Co., *Spackman 95-034* (isotype: COLO).