

**SENECIO FREMONTII SENSU LATO (ASTERACEAE)
INCLUDES THREE SPECIES**

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ABSTRACT

Senecio fremontii has usually been regarded as comprising four varieties, but here it is treated as three distinct species: *S. fremontii* Torr. & Gray, *S. blitoides* Greene, and **Senecio inexpectatus** (Cronq.) Al Schneid., **comb. et stat. nov.** *Senecio fremontii* var. *occidentalis* is treated as a synonym of typical *S. fremontii*. Each of the three species has a consistent morphology and geography — a county level map shows their distribution, and representative plants for each are illustrated by herbarium sheets. A taxonomic summary and key to the taxa are provided. A lectotype is designated for *Senecio occidentalis* var. *rotundatus* Rydb.

Senecio fremontii has been divided taxonomically into four varieties (e.g., Cronquist 1994, Barkley 2006): var. *fremontii* (northern Rocky Mountains and interior ranges), var. *blitoides* (Colorado, New Mexico, Wyoming), var. *occidentalis* (California and Nevada), and var. *inexpectatus* (east-central Utah). The habitat of each of these taxa is at high elevations, typically in alpine and subalpine sites sometimes down to high coniferous associations. It seems at least a reasonable assumption that they share an immediate common ancestor — all are glabrous, non-viscid perennial herbs with lax, relatively short stems, relatively small, thick to subsucculent, mostly cauline leaves (basal usually not persistent) with toothed margins. Cronquist (1994) characterized the Intermountain West plants as "eventually taprooted, although the branches of the caudex may become slender and rhizome-like." Barkley's corresponding key character (2006) was phrased as "taprooted with subrhizomatous caudices." The species note for var. *fremontii* by Welsh et al. (2015) says this: "Subterranean caudex and commonly naked soboliferous branches, that evidently finally root and become rhizomes are common features [of var. *fremontii*], but plants with caudex superficial or nearly so are present as well."

Cronquist and Barkley apparently have provided the only treatments of *Senecio fremontii* that include all four varieties — neither botanist, however, provided an explicit rationale for the taxonomic ranks. Cronquist (p. 172) noted only that the species "consists of four geographic varieties" — in his description of var. *inexpectatus* (p. 172), he made not a single comment except in the context of the key to varieties. Barkley (p. 564) noted that "The varieties are distinguished by morphologic tendencies plus their geographic ranges" — he observed that var. *fremontii* intergrades locally with *Senecio spartioides* in the mountains of the Great Basin" but did not mention intergradation among the *S. fremontii* varieties.

The current study was undertaken as a result of the discovery of *Senecio fremontii* var. *inexpectatus* Cronq. in Dolores Co., Colorado, disjunct about 80 miles southeast from the main Utah population system (Figs. 1, 2, 3). The type of var. *inexpectatus* is from the La Sal Mountains, where the taxon occurs abundantly and where it had been thought to be endemic. In an attempt to understand the evolutionary position of var. *inexpectatus*, a study of variation over *S. fremontii* (sensu lato) has led to the conclusion that three of the four named varieties are justifiably treated at specific rank: *S. fremontii*, *S. blitoides*, and *S. inexpectatus*. *Senecio fremontii* var. *occidentalis* is treated as a synonym of typical *S. fremontii*.

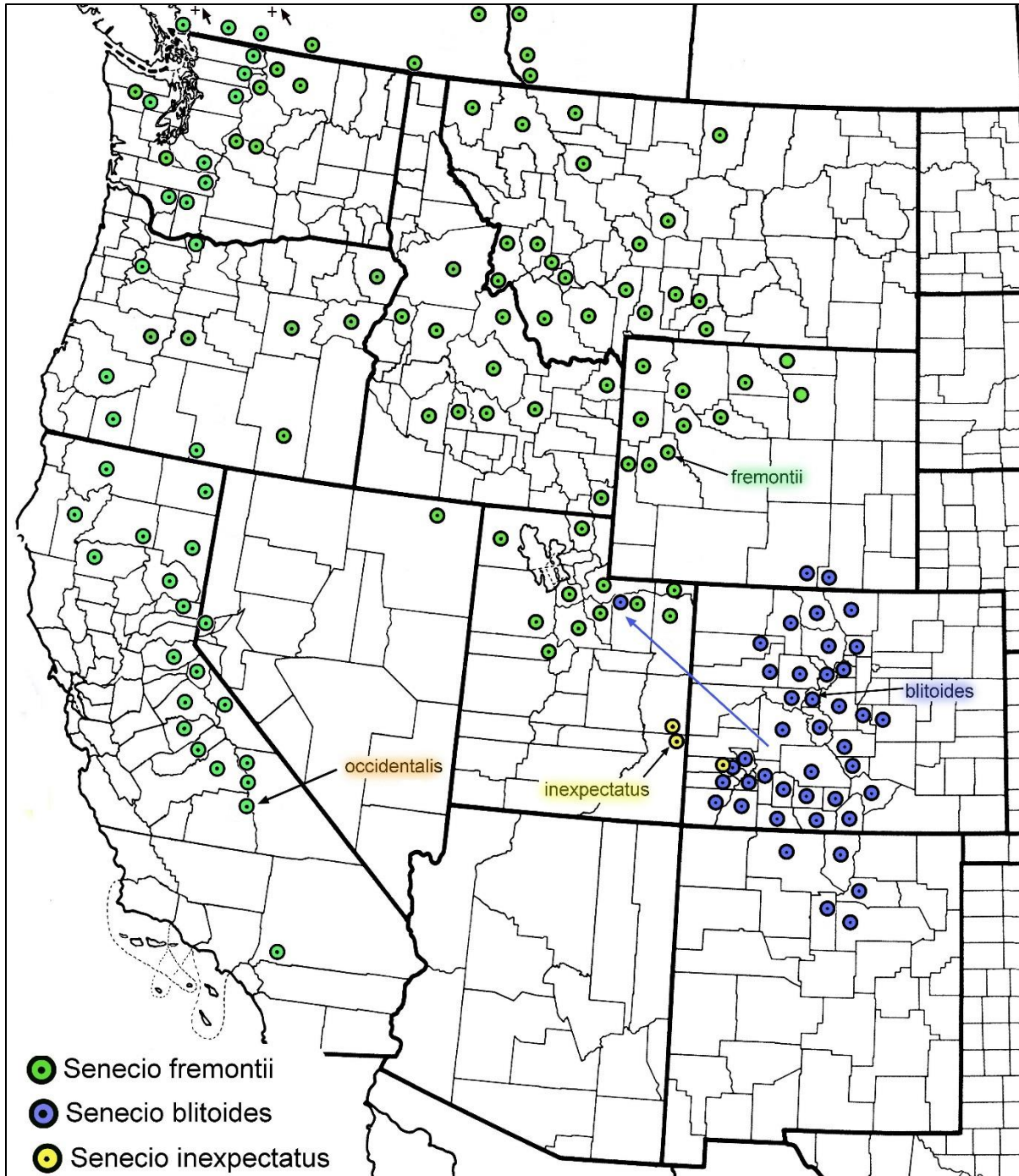


Figure 1. Distributions of *Senecio fremontii* (including *S. occidentalis*), *S. blitoides*, and *S. inexpectatus*. Records are mostly from databases (via SEINet and Consortium of PNW Herbaria); in most cases, identities have been verified through a voucher or an image. Black arrows indicate type localities. The blue arrow points to a disjunct locality in Utah for *S. blitoides*.

Morphological distinctions reported between var. *occidentalis* and var. *fremontii* (involucre size, cauline leaf distribution) are not consistent. The smallest involucre appear in California, but the whole range of size variation noted in the key below also occurs there. A similar range of variability in peduncle length occurs over the whole range of *S. fremontii*.

Compared to *Senecio fremontii*, *S. blitoides* and *S. inexpectatus* as a pair are consistent between themselves in easily observed traits: plant habit, leaf morphology and cauline distribution, features of marginal teeth, involucre size, and number of ray flowers. They probably are evolutionarily sister taxa.

The key below documents morphological contrasts among the three species identified in the current study.

1. Stems usually decumbent-ascending from the base, often rhizomatous proximally; cauline leaves ending distally well below heads, heads on distinct, bracteate or ebracteate peduncles; leaf usually petiolate to subpetiolate, sometimes epetiolate, base never subclasping; leaf margins sparsely serrulate to coarsely serrate, dentate-serrate, or shallowly lobed, teeth acute, not sharp-pointed and spinulose, often indurate; involucres 7–10 mm high, 7–10(–11) mm wide; ray flowers (7–)8(–9) **Senecio fremontii**

1. Stems usually erect to ascending-erect from the base, sometimes proximally subrhizomatous; cauline leaves continuing distally to immediately below heads; leaf sessile, base usually truncate to rounded or acute to acuminate, epetiolate, sometimes subclasping; leaf margins dentate to dentate-serrate or lacinate or lacinate-dentate, teeth sharp-pointed and spinulose or subspinulose; involucres 8–12 mm high, 9–13 mm wide; ray flowers 8–11 or (12–)13(–14).

2. Leaf margins lacinate to lacinate-dentate; involucres 8–10(–12) mm high, 9–12 mm wide; ray flowers 8–11 **Senecio inexpectatus**

2. Leaf margins mostly dentate to dentate-serrate; involucres 9–11 mm high, 9–13 mm wide; ray flowers (12–)13(–14) **Senecio blitoides**

1. **SENECIO INEXPECTATUS** (Cronq.) Al Schneid., **comb. et stat. nov.** *Senecio fremontii* var. *inexpectatus* Cronq., Intermount. Fl. 5: 172, pl. s.n. [p. 173, upper left]. 1994. **TYPE: Utah.** San Juan Co.: La Sal Mts., along the rocky, granitic crest of the ridge leading from Mt. Peale toward Mt. Mellenthin and Mt. Tukuhtnikivatz, SE of Moab, 12,200 ft, 9 Jul 1961, A. Cronquist & N. Holmgren 9464 (holotype: NY image).

The nomenclatural combination is made here (*in* Nesom) by Al Schneider, who discovered the Colorado population of these plants, identified them correctly, and recognized that they probably deserved to be recognized at specific rank. Al is the author, editor, and publisher of the Southwest Colorado Wildflowers website (Schneider 2019).

The morpho-geographic distinction of *Senecio inexpectatus* from *S. blitoides* and especially from *S. fremontii* sensu stricto is unambiguous (Figs. 1–9). Occurrence of *S. inexpectatus* in sympatry with *S. blitoides* in Dolores Co., Colorado, supports its recognition at specific rank. Plants of *S. blitoides* occasionally produce leaves with deeply toothed margins (e.g., Figs. 11, 12, 13, 19); none are consistently lacinate as in *S. inexpectatus* and the difference in ray number is consistent.

Additional collections. Colorado. Dolores Co.: Cross Mountain Trail, 1/4 mi S of jct with Lizard Head Trail, on gray shale, with *Penstemon harbourii*, *Smelowskia calycina*, *Mertensia lanceolata*, *Trifolium attenuatum*, *Aquilegia coerulea*, *Erysimum capitatum*, 7 Jul 2008 (vegetative), Schneider s.n. (COLO); Cross Mountain Trail, on Mancos Shale, 11,700 ft, 19 Aug 2008, Schneider s.n. (COLO). **Utah. Grand Co.:** LaSal Mts.: NW corner of Beaver Basin above mine tunnels, subalpine meadows, ca. 11,000 ft, 22 Aug 1985, Franklin 2282 (BRY); mid-slope up W side of Prospect Peak, 38° 31' 32" N, 109° 14' W, alpine cushion plant community, gravels, 11,640 ft, 28 Aug, 2013, Huber 5352 (BRY, UTC); Horse Gulch and vicinity, 3000–3200 m, 15 Jul 1911, Rydberg & Garrett 8961 (NY). **San Juan Co.:** La Sal Mts.: Forest Rd 241, Gold Basin, high mountain meadow, base of diorite scree slope amid large boulders, 10,044 ft, 2 Aug 2005, Barnes 4706 (UVSC); E flank of Mt. Mellenthin, W side of road, mixed coniferous forest, semi-barren steep open slope, rocky, E aspect, 3400 m, 4 Sep 1999, Delmatier 8128 (BRY); Dark Canyon, S-facing talus-gravel slope, 11,000 ft, 18 Jul 1984, Franklin 910 (BRY); ridge between Mt. Mellenthin and Mt. Peale, on bedrock, 26 Jul 1985, Franklin 2039 (BRY); along ridge ca. 1.1 mi N of Mt. Peale, fine gravel slope into Gold Basin, 11,920 ft, 24 Jul 1986, Franklin 3946 (BRY); 1.1 mi NNW of Mt. Peale, along ridge above

Dark Canyon, rocky, talus slope, 12,000 ft, 15 Sep 1986, *Franklin 4288* (BRY); Dark Canyon Road (FS Road 126), 3.5 mi S of Geyser Pass, spruce-fir forest, road cut on N-facing slope with damp soil, 10,470 ft, 18 Jul 2012, *Goodwin 3508* (ASC); Dark Canyon, 0.5 mi NW of Mt. Peale, alpine plant community, on sloughing, rocky slope near a stream, 11,405 ft, 27 Aug 2013, *Huber 5327* (BRY, MO, NY, UT, UTC); ridge between Mt. Tukuhnkivatz and Mt. Peale, S slope of ridge, patches of alpine meadow among talus, 11,201 ft, 27 Jul 1982, *Siplivinsky 4347* (CM, COLO, UCR); ca. 19 mi SE of Moab, first saddle on ridge SSW of Mt. Mellenthin, Mancos Shale outcrop, 12,000 ft, 28 Jul 1984, *Tuhy 1847* (BRY).

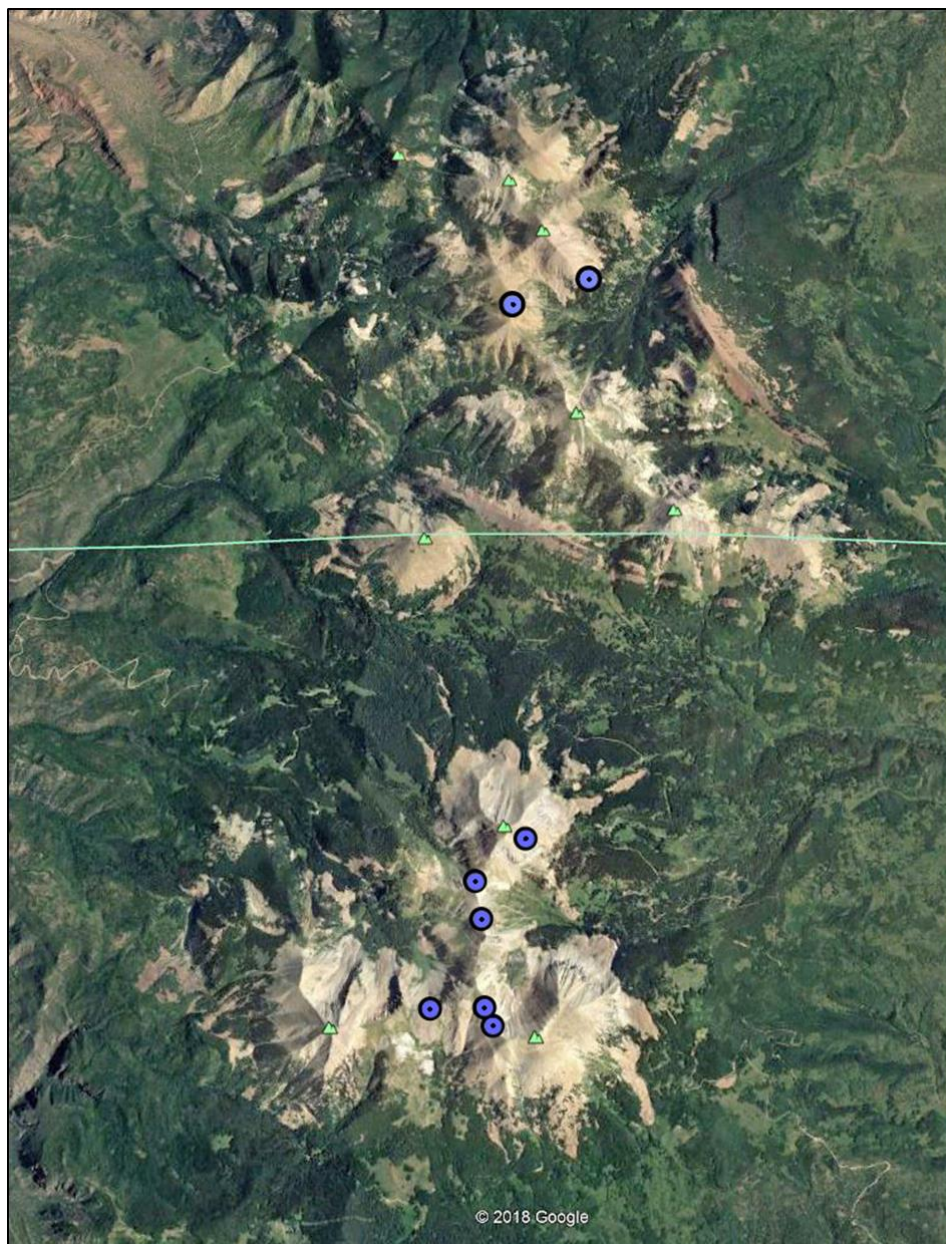


Figure 2. Distribution of *Senecio inexpectatus* in the La Sal Mountains of east-central Utah, based on collections cited in the text. Collections from this area in databases as *S. fremontii* var. *blitoides* are misidentified — all plants of *S. fremontii* sensu lato in the La Sals are *S. inexpectatus*. Base map from Google Earth; tiny green triangles are named peaks; the horizontal green line is the county line between San Juan County (south) and Grand County (north).

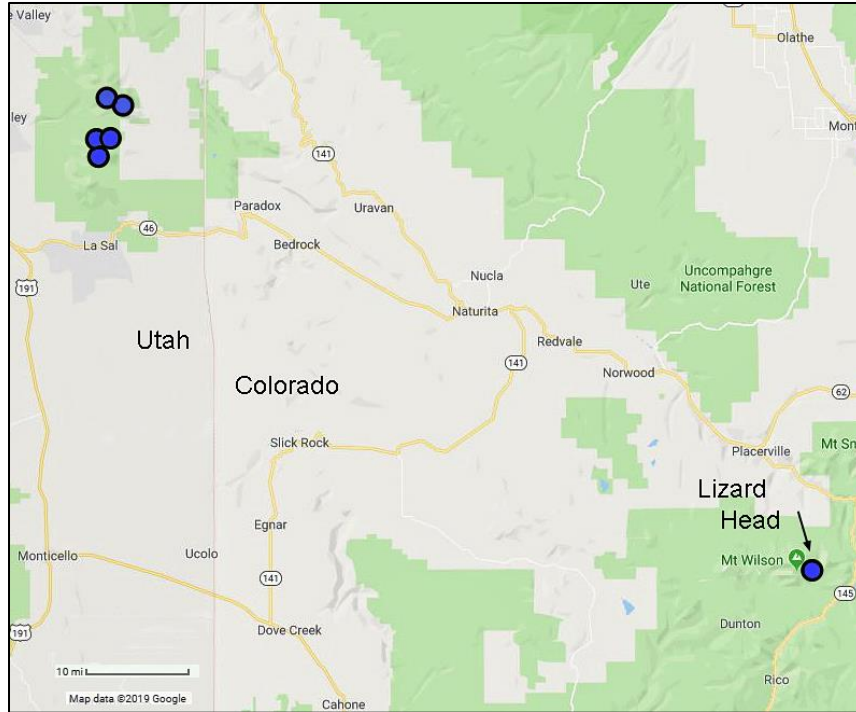


Figure 3. Distribution of *Senecio inexpectatus* in Utah and Colorado. The Colorado locality is in the San Juan National Forest near Lizard Head Peak — in the San Miguel Mountains of the San Juan Range. See Figure 1 for perspective.



Figure 4. Population and habitat of *Senecio inexpectatus* on Manco Shale along Cross Mountain Trail, Dolores Co., Colorado. Photo by Al Schneider, 8 Aug 2007, with Betty Schneider looking toward Lizard Head Peak.



Figure 5. *Senecio inexpectatus*, Dolores Co., Colorado, along Cross Mountain Trail near Lizard Head Peak. Photo by Al Schneider, 8 Aug 2007.



Figure 6. *Senecio inexpectatus*, holotype, San Juan, Co. Utah. Cronquist & Holmgren 9464 (NY).



Figure 7. *Senecio inexpectatus*, Dolores Co., Colorado. Schneider s.n. (COLO).

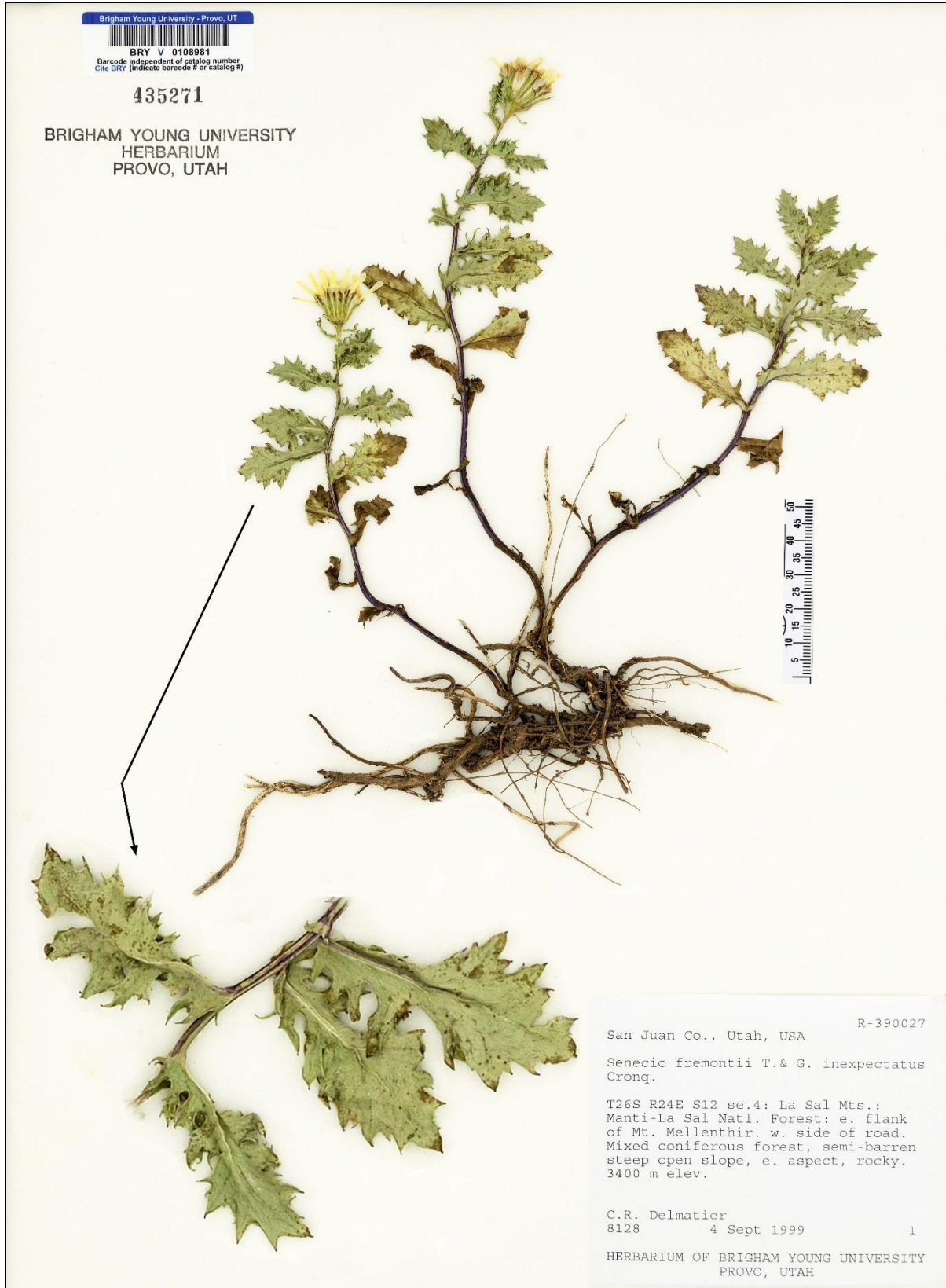


Figure 8. *Senecio inexpectatus*, San Juan Co., Utah. Delmatier 8128 (BRY).



Figure 9. *Senecio inexpectatus*, San Juan Co., Utah. Franklin 2039 (BRY).

2. **SENECIO BLITOIDES** Greene, Pittonia 4: 123. 1900. *Senecio fremontii* var. *blitoides* (Greene) Cronq. in Hitchcock et al., Vasc. Pl. Pacif. N.W. 5: 290. 1955. *Senecio fremontii* subsp. *blitoides* (Greene) W.A. Weber, Phytologia 53: 190. 1983. **TYPE: Colorado.** [Lake Co.]: Mt. Elbert near Leadville, near snowbanks, growing in dense clumps, 12,000 ft, 28 Aug 1899, *H.T. Holm 445* (holotype: NDG image; isotypes: F, WIS). The WIS sheet, with Holm's handwritten label, has "No. 445" — the NDG and F labels have no number.
- Senecio carthamoides* Greene, Pittonia 4: 122. 1900. **TYPE: Colorado.** [Saguache Co.]: Little Ouray Mtn., 3 Sep 1896, *E.L. Greene s.n.* (holotype: NDG image).
- Senecio invenustus* Greene, Pittonia 4: 124. 1900. **TYPE: Colorado.** [Archeluta Co.]: Near Pagosa Peak, 12,000 ft, 23 Aug 1899, *C.F. Baker s.n.* (holotype: NDG image; isotypes: NY, RM, US).

These three names by Greene of *Senecio* at generic rank were published 10 Jan 1900; "blitoides" has been the epithet generally used to refer to the Colorado/southern Rocky Mountain plants.

The main population system of *Senecio blitoides* is in Colorado, with extensions into adjacent Wyoming and New Mexico; a collection from a disjunct locality in Duchesne Co., Utah (Fig. 1), also is unambiguously *S. blitoides*; typical *S. fremontii* also occurs in Duchesne Co. Vouchers documenting both species in Duchesne Co. are cited here and photos are provided for contrast.

Senecio blitoides. Duchesne Co.: Uinta Mts., head of South Fork Rock Creek, 2.5 mi S of Granddaddy Lake, head of cirque basin, limestone talus slopes, 11,000 ft, 16 Aug 1994, *Huber & Goodrich 2277* (BRY, UTC). Figure 19. **Senecio fremontii.** Duchesne Co.: Uintah Mts., Swift Creek drainage, just N of Farmers Lake, alpine talus slope, 11,100 ft, 20 Aug 1992, *Goodrich 23977* (BRY). Fig. 29.

The geographic range of *Senecio blitoides* is discrete and disconnected from that of *S. fremontii* — there is no opportunity for gene flow between the two, except in the Utah locality, where both occur in typical form. The series below of herbarium specimens shows the range of morphological variation in each species: *S. blitoides*, Figs. (10-18) and *S. fremontii*, Figs. (19-31).

3. **SENECIO FREMONTII** Torr. & Gray, Fl. N. Amer. 2(3): 445. 1843. *Senecio ductoris* Piper, Contr. U.S. Natl. Herb. 11: 601. 1906 [intended replacement name for *S. fremontii* because of prior *Senecio filifolius* var. *fremontii* Torr. & Gray]. **TYPE: Wyoming.** [Sublette Co.]: Wind River Mts., 15 Aug 1842, *Lieut. [J.C.] Fremont s.n.* (holotype: GH image). **Protologue:** "On the Wind River Chain of the Rocky Mountains, just below the limits of perpetual snow, *Lieut. Fremont!* Aug."
- Senecio fremontii* var. *occidentalis* A. Gray in Brewer et al., Bot. California 1: 618. 1876. *Senecio occidentalis* (A. Gray) Greene, Pittonia 4: 122. 1900 [19 Jan]; not *S. occidentalis* (A. Gray) Rydb., Mem. New York Bot. Gard. 1: 437. 1900 [15 Feb]. *Senecio fremontii* subsp. *occidentalis* (A. Gray) G.W. Douglas & Ruyle-Dougl., Canad. J. Bot. 56: 1710. 1978 [nom. illeg., basionym not cited]. **Lectotype** (Cronquist 1994, p. 171): **California.** [Tulare/Inyo Co.]: Mt. Whitney, 12,000 ft, Sep 1875, *J.T. Rothrock 388* (GH image). **Protologue:** "Sierra Nevada, on Mount Whitney at 12,000 feet, and S. Fork of Kern River down to 9,8000 feet, Rothrock in Wheeler's Exped., 1875." Three Rothrock collections referred to by Gray are mounted on the same sheet (**349**—S Fork Kern River (Fig. 17), **380**—S Fork Kern River, and **388**—Mt. Whitney); Rothrock (1878) also cited all three collections. Barkeley annotated the GH sheet in 1973 as "holotype" with a centrally placed label, without indicating which collection he was referring to. Cronquist (1994) noted that "*Rothrock 388* ... is regarded as the type, at GH!".
- Senecio occidentalis* (A. Gray) Greene var. *rotundatus* Rydb., Mem. New York Bot. Gard. 1: 438. 1900. **Lectotype** (designated here): **Idaho.** [Fremont Co.]: Mt. Chauvet, 10,000 ft, 29 Jul 1897, *P.A. Rydberg & E.A. Bessey 5268* (NY image). The Rydberg and Bessey sheet is annotated as the holotype, but Rydberg's protologue cited two collections — the other is "Wyoming [Teton Co.]: Breccia Peak, 1897, *Tweedy 589*."



Figure 10. *Senecio blitoides*, isotype, Lake Co., Colorado. Holm 445 (F).



Figure 11. *Senecio blitoides*, Conejos Co., Colorado. Douglas 1367 (COCO).



Figure 12. *Senecio blitoides*, Gunnison Co., Colorado. Russell 28.21 (ASU).



Figure 13. *Senecio blitoides*, Hinsdale Co., Colorado. Dixon 5391 (ALAM).



Figure 14. *Senecio blitoides*, El Paso Co., Colorado. *Lath-House 1/2* (COCO). Large leaves, a populational variant as in the type of *S. carthamoides* from Saguache County.



Figure 15. *Senecio blitoides*, Boulder Co., Colorado. Wolcott 6 (COLO).



Figure 16. *Senecio blitoides*, Hinsdale Co., Colorado. Regensberg 1917 (KHD).



Figure 17. *Senecio blitoides*, El Paso Co., Colorado. Headington & Blauvelt 71 (COCO).

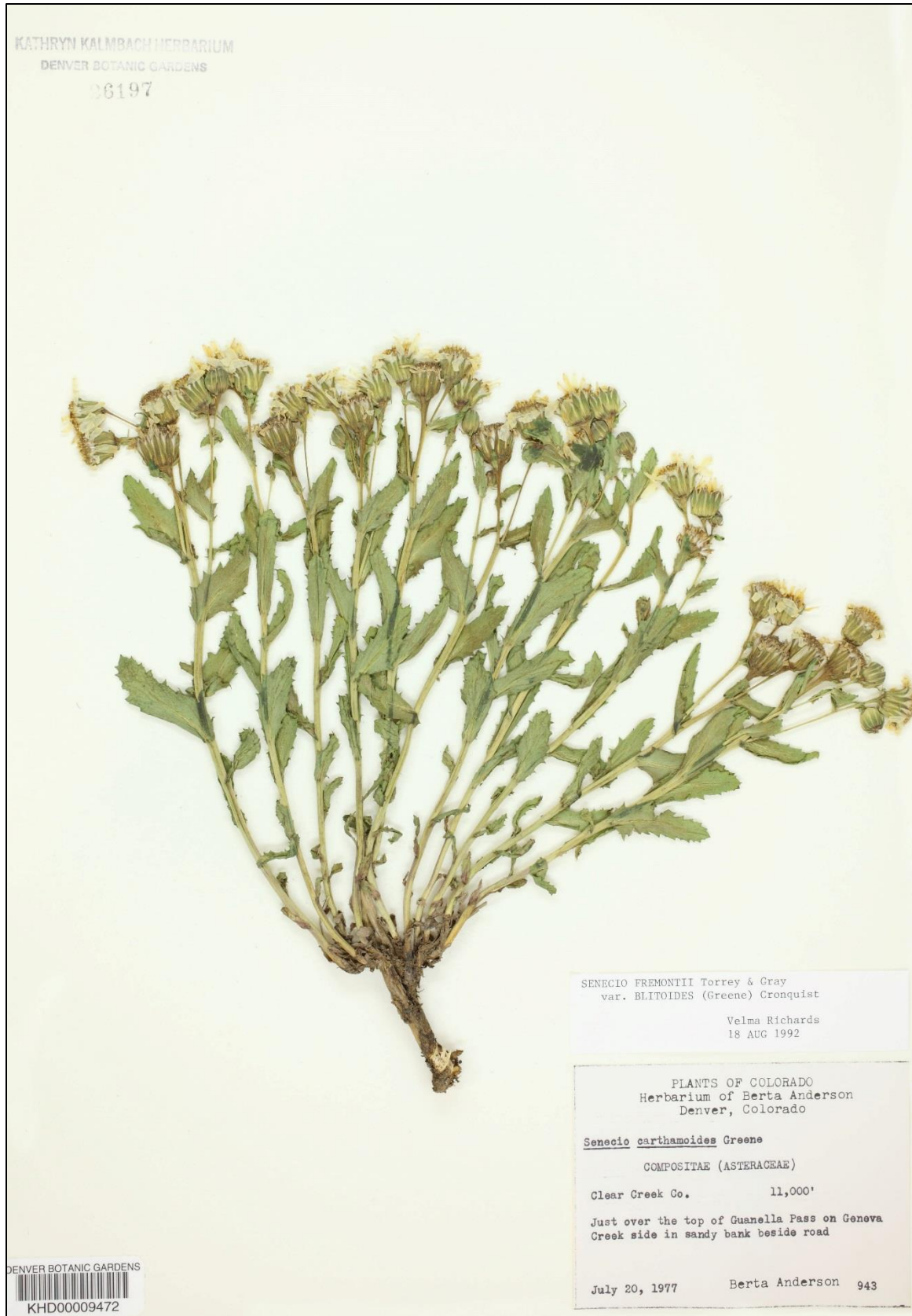


Figure 18. *Senecio blitoides*, Clear Creek Co., Colorado. Anderson 943 (KHD).

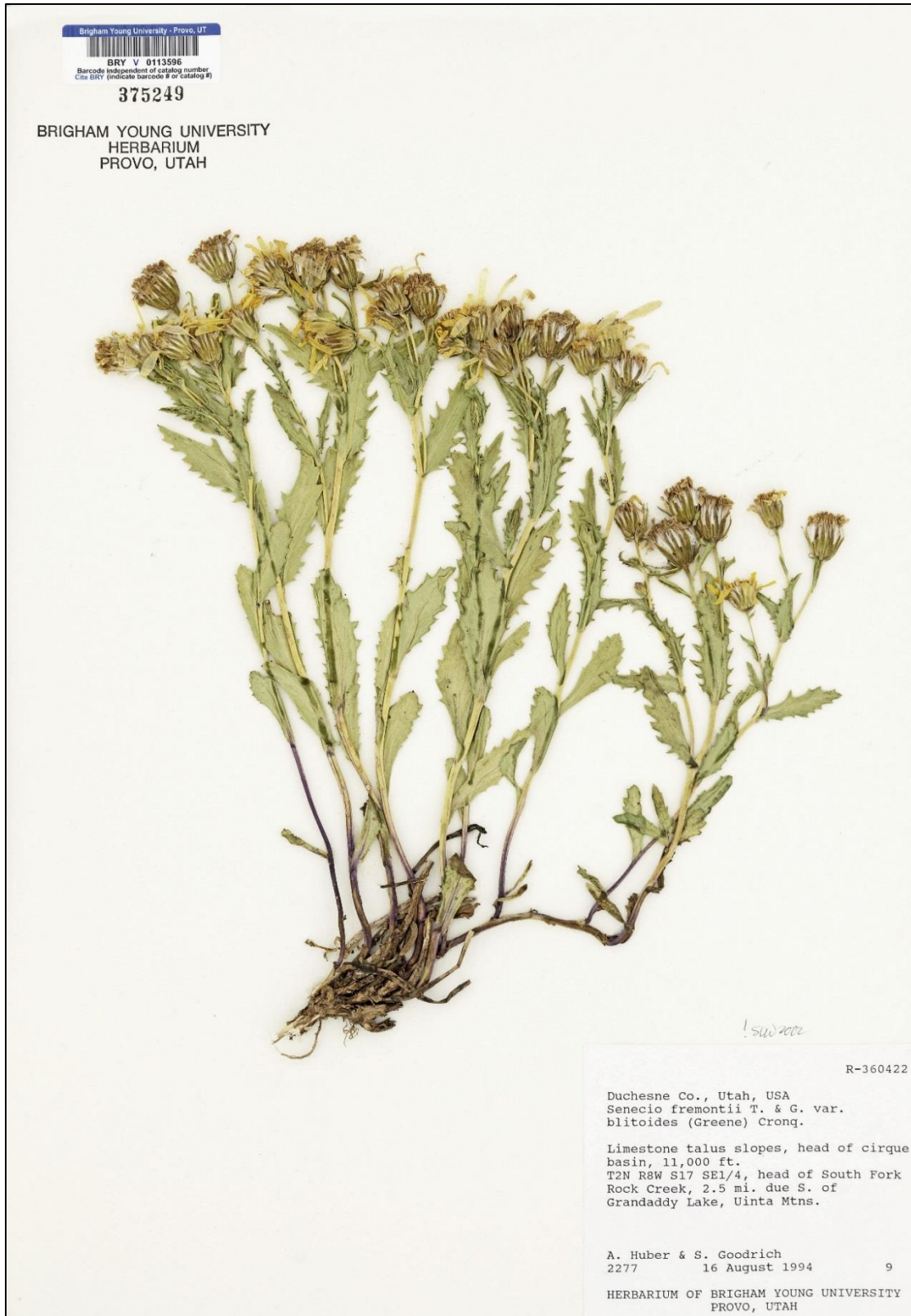


Figure 19. *Senecio blitoides*, Duchesne Co., Utah. Huber & Goodrich 2277 (BRY). Disjunct from main population system of *S. blitoides* (see Fig. 1) but of characteristic morphology and distinct from *S. fremontii* in Duchesne Co. (see Fig. 29).



Figure 20. *Senecio fremontii*, syntype of *S. fremontii* var. *occidentalis* A. Gray. Tulare Co., California, South Fork of Kern River, 10,400 ft, Sep 1875, Rothrock 349 (GH).



Figure 21. *Senecio fremontii*, Tulare Co., California. Rice 493 (IND).



Figure 22. *Senecio fremontii*, Washoe Co., Nevada. Tiehm 14,338 (RENO).

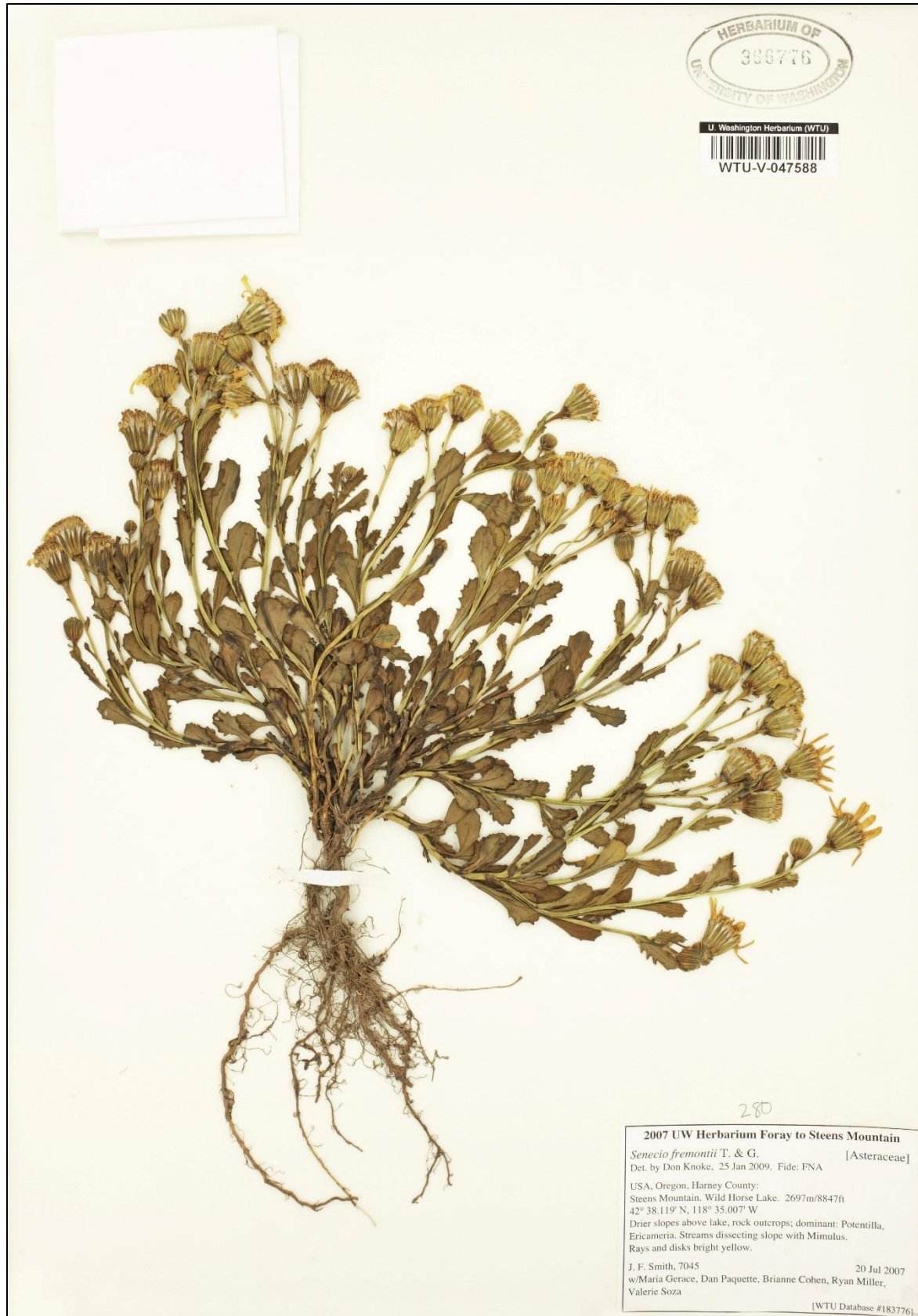


Figure 23. *Senecio fremontii*, Steens Mountain, Harney Co., Oregon. *Smith 7045* (WTU).



Figure 24. *Senecio fremontii*, Pierce Co., Washington. Flett 3213 (WTU).



Figure 25. *Senecio fremontii*, Skagit Co., Washington. Zika 18884 (WTU).



Figure 26. *Senecio fremontii*, Chelan Co., Washington. *Thompson 12,616a* (WTU).



Figure 27. *Senecio fremontii*, Tooele Co., Utah. Neese 9666 (BRY).



Figure 28. *Senecio fremontii*, Box Elder Co., Utah. Holmgren 8179 (NY).



Figure 29. *Senecio fremontii*, Duchesne Co., Utah. Goodrich 23977 (RENO). See Figure 19 for a collection of *S. blitoides* from Duchesne Co.



Figure 30. *Senecio fremontii*, Summit Co., Utah. Goodrich 26,111 (BRY).



Figure 31. *Senecio fremontii*, Park Co., Wyoming. Jones 38,648 (COLO).



Figure 32. *Senecio fremontii*, Johnson Co., Wyoming. *Fonken 903* (COLO).

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