Hiding in plain sight:

Two new species of alpine thistles, *Cirsium culebraensis* and *C. funkiae* (Cardueae) from the southern Rocky Mountains (United States)

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ABSTRACT

The circumscription of the *Cirsium eatonii* varietal complex of North American alpine thistles has changed significantly given recent molecular phylogenetic studies demonstrating that the complex was not monophyletic. To improve their taxonomy, all varieties within the *C. eatonii* complex were recognized as distinct species. However, three remaining unique evolutionary lineages corresponded to undescribed phenotypic variation. Two of these lineages from the southern Rocky Mountains in the United States are described and illustrated here as *Cirsium culebraensis* sp. nov. and *Cirsium funkiae* sp. nov. A combination of molecular, morphological, and geographical evidence, as well as, a bit of historical detective work was used to sort out the *C. eatonii* varietal complex taxonomy. A key to the recognized species is provided.

Keywords: *Funk's thistle, Sangre de Cristo Mountains, Culebra Range*

INTRODUCTION

When we think of new species discoveries, we often picture exotic places like the Amazon rainforest, the crater of an extinct volcano, or an underexplored, inaccessible island. However, new species discoveries don't just occur in these locations, but in relatively well-explored regions such as the southern Rocky Mountains (Nazaire & Hufford, 2012; Reznicek & Murray, 2013; Alexander et al., 2015; Wolfe et al., 2021). For some recently speciated groups within these regions, morphological distinction among taxa may be slight, given the short amount of geologic time for differences to accrue. Thus, undescribed species may hide in plain sight, assumed to be species already named to science simply exhibiting morphological variation across their geographic range.

Cirsium Mill. is comprised of approximately 100 species distributed across North America (Keil, 2006). Within *Cirsium*, one of the most difficult species to delimit has been the morphologically polymorphic *C. eatonii* B.L.Rob. ("mountaintop thistle") varietal complex. This complex was treated as seven varieties by Keil (2006) in the treatment for *Flora of North America*: *C. eatonii* var. *clokeyi* (S.F. Blake) D.J. Keil, *C. eatonii* var. *eatonii*, *C. eatonii* var. *eriocephalum* (A. Gray) D.J. Keil, *C. eatonii* var. *hesperium* (Eastw.) D.J. Keil, *C. eatonii* var. *murdockii* S.L. Welsh, *peckii* (L.F. Hend.) D.J. Keil, and *C. eatonii* var. *viperinum* D.J. Keil. The common name "mountaintop thistle" was derived from the distribution of these varieties on mountaintops throughout the southern Rocky Mountains and adjacent Intermountain Region in the United States.

Molecular phylogenetic inferences utilizing both Sanger and hybridization sequencing (Hyb-Seq) data to test the monophyly of this varietal complex demonstrated that *C. eatonii*, as circumscribed by Keil (2006), was polyphyletic. Each variety in turn corresponded to a unique evolutionary lineage exhibiting a distinct phenotype and geographic range (Ackerfield et al., 2020; Siniscalchi & Ackerfield, unpublished data). To resolve this polyphyly, varieties within the *C. eatonii* complex were separated out as distinct species. Previously described *C. clokeyi*

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S.F.Blake, *C. murdockii* (S.L.Welsh) Cronquist, *C. peckii* L.F.Hend., and *C. tweedyi* (Rydb.) Petr. were reinstated, and two new combinations were made – *C. harrisonii* (S.L.Welsh) Ackerfield & D.J.Keil and *C. viperinum* (D.J.Keil) Ackerfield & D.J.Keil (Ackerfield et al., 2020; Siniscalchi & Ackerfield, unpublished data).

Not only was *C. eatonii* resolved as polyphyletic, but *C. eatonii* var. *eriocephalum* and *C. eatonii* var. *hesperium* were resolved as polyphyletic as well (Ackerfield et al., 2020; Siniscalchi & Ackerfield, unpublished data). Three unique evolutionary lineages were recovered for *C. eatonii* var. *eriocephalum*, each corresponding to a unique phenotype (pale purple style branches with heads in a nodding cluster, yellow style branches with heads in a nodding cluster, and whitish-pink style branches with heads in a spiciform arrangement; Figure 1). Plants exhibiting heads arranged in a spiciform arrangement were endemic to the La Sal Mountains of Utah, and clearly represented an undescribed species. We are currently working with members of the Ute Mountain Ute tribe to find a name for this species that acknowledges their legacy of use of these mountains. Thus, this new species will be described in a future manuscript.

The binomial *Cirsium scopulorum* Cockerell then had to be applied to one of the remaining two lineages, as this was the only species previously described corresponding to *C. eatonii* var. *eriocephalum*. Before this could be done, two confounding lines of evidence had to be evaluated. The original description of *C. scopulorum* by Gray (1863) stated that the corolla color was yellow. However, the most accurate location on one type specimen indicated that the collection made by Charles Parry was within the geographic boundary of the pale purple phenotype. Upon closer inspection of additional type specimens, a handwritten note was found which stated "This is the high alpine nodding-headed yellow-flowered thistle but too young. Perhaps Parry got in better shape." This indicated that the type specimens were actually too immature to see the corolla color, and that Gray used the information in this handwritten note for the original description. Therefore, the best line of evidence was the geographic location of Parry's type specimen. The name *C. scopulorum* was thus applied to the pale purple phenotype, leaving the yellow phenotype as another undescribed species.

The final new species came from *C. eatonii* var. *hesperium*, also resolved as polyphyletic. While one lineage from the San Juan Mountains of southwestern Colorado corresponded to the already named *C. hesperium* Rydb., the other lineage represented undescribed variation (Figure 2).

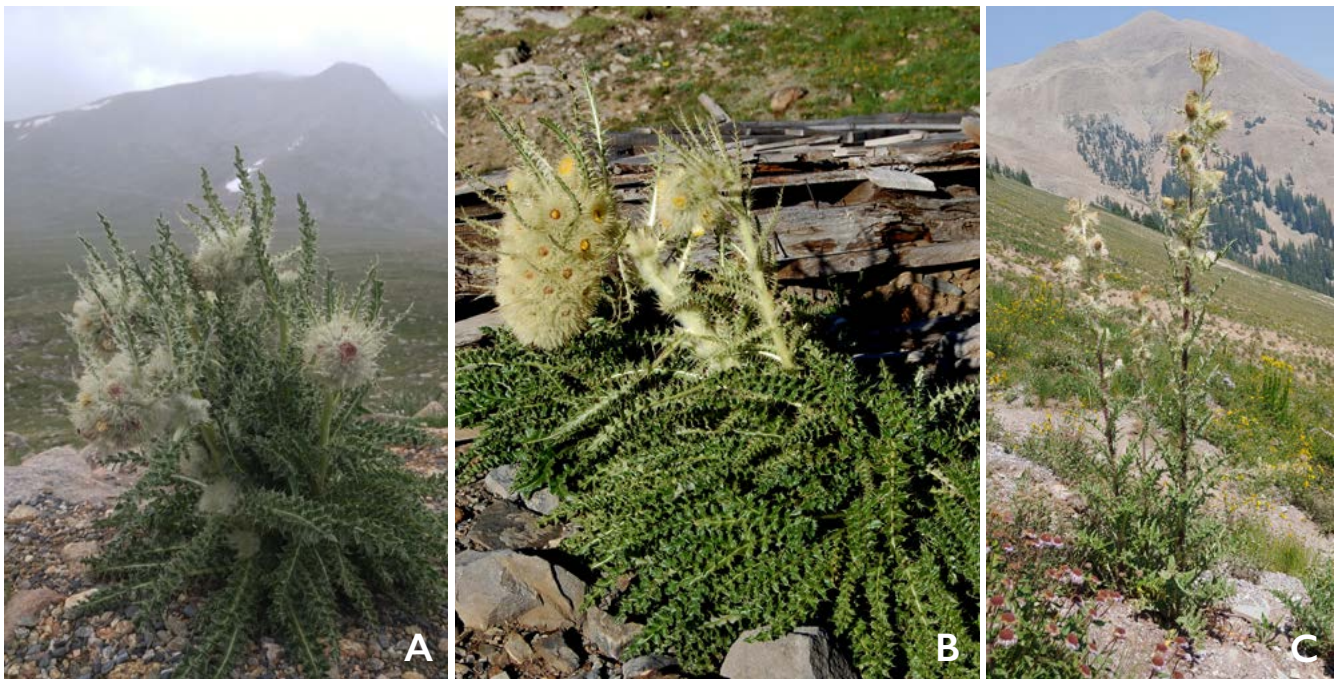

Figure 1. A. *Cirsium scopulorum* (Greene) Cockerell. **B.** *Cirsium funkiae* Ackerf. **C.** *Cirsium* **sp. nov.** 'La Sal Mts.' Photos: J. Ackerfield.

MATERIALS AND METHODS

Herbarium loans were obtained from CS, KHD, RM, and UNM. Additionally, herbarium specimens from COLO and HU were viewed online (acronyms from Thiers, 2020). All taxonomic measurements were taken from pressed specimens. iNaturalist observations were used to document the style tip color, which fades on herbarium specimens, of each species across their geographic range.

Species delimitation was performed based on morphology and phylogenetic inference. The general lineage species concept (De Queiroz, 2007) was used, which defines a species as a unique evolutionary lineage. This concept was used in conjunction with the phylogenetic concept (Nixon & Wheeler, 1990) in which a species is the smallest system of related populations with a uniquely diagnosable set of morphological character states.

RESULTS AND DISCUSSION

Style branch coloration (white, yellow, pink, or purple), corolla color, and position of the heads (erect or nodding) are the best characters to delimit among the alpine thistles of the southern Rocky Mountains (Table 1). While often labeled as corolla color on herbarium labels, the more visible coloration of the disk flowers is actually that of the anther tube and style branches. Corollas are often

Figure 2. A. *Cirsium hesperium* (Eastw.) Petr. **B.** *Cirsium culebraensis* Ackerf. Photos: J. Ackerfield.

The mountain thistle

Cirsium scopulorum, or mountain thistle, was long thought to be the only species of thistle occurring in the alpine tundra. Molecular, morphological, and geographical evidence now support the recognition of five species of thistles in the alpine tundra of the southern Rocky Mountains. Two of these species are new to science - *Cirsium culebraensis* and *C. funkiae*.

Circium scopulorum, near the top of Mt. Evans, Clear Creek Co., Colorado. Elevation 4175 m a.s.l.
Photo by J. Ackerfield

Table 1. Comparison of the alpine thistles of the southern Rocky Mountains.

TAXA	CHARACTERS			
	Style branch color	**Corolla color**	**Anther tube color**	**Head arrangements**
C. culebraensis	Pale pink	Pale pink	Pale pink with darker pink stripes	Erect terminal cluster, sometimes a few axillary
C. funkiae	Yellow	Pale yellow or brownish (in age)	White or pale yellow with brown stripes	Nodding, terminal cluster
C. griseum var. **osterhoutii**	White	White	White with purple stripes	Erect, terminal cluster or axillary
C. hesperium	Purple	Lavender	Pale purple with purple stripes	Erect, terminal cluster, sometimes a few axillary
C. scopulorum	White, pale pink, or pale purple	Pale pink or pale purple	Pale pink to pale purple with purple stripes	Nodding to spreading, sometimes a few axillary, or axillary and densely packed along the stem nearly to the ground

not readily visible, as they barely surpass the involucral bracts. The style branches are the most readily visible feature of the flowers, as they extend well past the involucral bracts and corollas. The flowers of *Cirsium* often fade to brown shortly after collecting, and thus coloration is often not discernable from herbarium specimens. Therefore, iNaturalist observations were valuable in correlating style tip coloration with geographic distribution, as each observation is a photograph of an individual plant at that exact locality. iNaturalist observations of the plants in situ were also useful at documenting the range of each phenotype, and determining if phenotypes overlapped in geographic range.

Taxonomic confusion surrounding the delimitation of the alpine thistles in the southern Rocky Mountains is the result of several factors. First, *C. scopulorum*, *C. eatonii*, and *C. hesperium* were the only alpine thistles included in dichotomous keys for Colorado thistles (Harrington, 1954; Weber & Wittmann, 2011). However, *C. eatonii* was erroneously reported as present in the southern Rocky Mountains (Weber & Wittmann, 2011). Subsequently, specimens corresponding to *C. griseum* var. *osterhoutii* were identified as *C. eatonii*, or sometimes *C. hesperium* or *C. scopulorum* simply because of their alpine habitat. Because *C. griseum* var. *osterhoutii* can co-occur with *C. funkiae* or *C. scopulorum*, this confused the taxonomy even further (Figure 3). The majority of the alpine thistle specimens assigned to *C. eatonii* from the southern Rocky Mountains have since been annotated to *C. griseum* var. *osterhoutii* by the author.

Second, the original description for the alpine thistle *Cirsium scopulorum* erroneously stated that the corolla color was yellow, despite the lack of visible, mature corollas on type specimens (Gray, 1863). Third, in the dichotomous key to *Cirsium* for Colorado, Weber & Wittmann (2011) inadvertently switched the distribution of the two phenotypes of *C. scopulorum*, stating that the yellow phenotype was distributed in the northern counties and the pale purple phenotype in the southern counties. Fourth, most alpine thistles eventually turn brown on herbarium sheets, making accurate determination of the corolla color nearly impossible. Lastly, undescribed phenotypic variation (i.e., *C. culebraensis*) confused the taxonomy further, with no clear binomial to assign to these specimens. The taxonomic treatment here resolves these issues by describing two new species – *C. culebraensis* and *C. funkiae*. A key to the alpine thistles of the southern Rocky Mountains is provided. A comparison of the morphology of the alpine thistles is also presented for additional taxonomic clarification (Figure 4).

The Culebra thistle

The Culebra thistle is endemic to the Culebra Range of the Sangre de Cristo Mountains in southern Colorado and northern New Mexico, where it rises tall against a landscape of tiny alpine plants. Type specimens were made from this very thistle by the author and fellow botanist Lori Brummer.

Circium culebraensis, Trinchera Peak, Huerfano County, Colorado, elevation ca. 3960 m a.s.l.
Photo by J. Ackerfield

KEY TO THE ALPINE THISTLES OF THE SOUTHERN ROCKY MOUNTAINS

1. Heads in nodding to spreading arrays

2. Style branches yellow..... **Cirsium funkiae**

2. Style branches white, pale pink, or pale purple..... **Cirsium scopulorum**

1. Heads in erect arrays

3. Corollas white; style branches white to pale pink; stems usually dark maroon..... **Cirsium griseum** var. **osterhoutii**

3. Corollas pale pink to purple; style branches purple, pale pink, or white; stems green or dark maroon

4. Style branches purple..... **Cirsium hesperium**

4. Style branches pale pink ..... **Cirsium culebraensis**

TAXONOMIC TREATMENT

Cirsium culebraensis Ackerf., **sp. nov.**

Diagnosis: similar to *Cirsium scopulorum*, but differs in that the heads are in an erect, terminal cluster versus in a nodding, terminal cluster.

TYPE: U.S.A., Colorado: Huerfano Co.: Culebra Range, below summit of Trinchera Peak ca. 50 miles west of Trinidad, 12,800 ft., 8 Aug 2018, *J.Ackerfield 6540* (holotype: KHD!)

Perennial, caulescent herbs, stems 1–few, erect, 1.5–5.2 dm tall, simple or sparingly branched, tomentose. **Leaves** oblong to narrowly elliptic, undulate and pinnatifid with 8–15 pairs of lobes, or occasionally flat and nearly entire but spinose, 8.5–17 cm long and 1–3 cm wide (including lobes), midribs 5–10 mm wide, lobes 3–11 mm long and 3–6 mm apart, main spines 3–6 mm long, adaxial surfaces glabrate to villous or arachnoid-tomentose, abaxial surfaces tomentose, cauline leaves well-distributed, sessile and sometimes clasping but not decurrent on the stem, distal closely subtending heads. **Heads** 5–25, sessile or shortly-pedunculate, in a dense, erect, terminal cluster, closely subtended by reduced leaves, or often also with heads arising from the proximal 2/3 of leaf axils on the stem. **Involucres** green, broadly ovoid to broadly campanulate, 1.7–2.5 × 1.7–3.1 cm, densely tomentose. Phyllaries in 4–5 series, subequal, with entire margins, tapering to spines 6–10 mm long, apices straight. **Corollas** pale pink, 15–20 mm long, tubes 5–8 mm long, throats 4–6 mm long, lobes 3–5 mm long. **Anther** tubes pale pink with darker pink stripes, 5–7 mm long. **Style** branches pale pink, 3–4 mm long, conspicuously exserted beyond the corolla lobes. **Cypselae** dark brown, 4–6 mm long. **Pappus** 10–15 mm long. (Figure 5).

Phenology: This species flowers from late July to mid-August, and fruits from mid-August to early September.

Distribution: This species is endemic to the Culebra Range of the Sangre de Cristo Mountains, where it is primarily found on mountaintops above tree line (Figure 3). The Culebra Range runs north to south, with the northern limit at La Veta Pass in Colorado and the southern limit at Costilla Creek just south of Big Costilla Peak in New Mexico.

Habitat: This species occurs in high elevation spruce-fir forests and alpine tundra. It is primarily found on rocky scree slopes, in boulder fields, and alpine meadows. This species occurs principally with *Picea engelmannii* Parry ex Engelm. var. *engelmannii*, *Polemonium pulcherrimum* Hook. subsp. *delicatum* (Rydb.) Brand, and *Carex rossii* F.Boott at its lower elevational limits. Above treeline, in the alpine tundra, this species occurs primarily with *Geum rossii* (R.Br.) Ser. var. *turbinatum* (Rydb.) C.L.Hitchc., *Trifolium attenuatum* Greene, *Salix nivalis* Hook., and *Dasiphora fruticosa* (L.) Rydb.

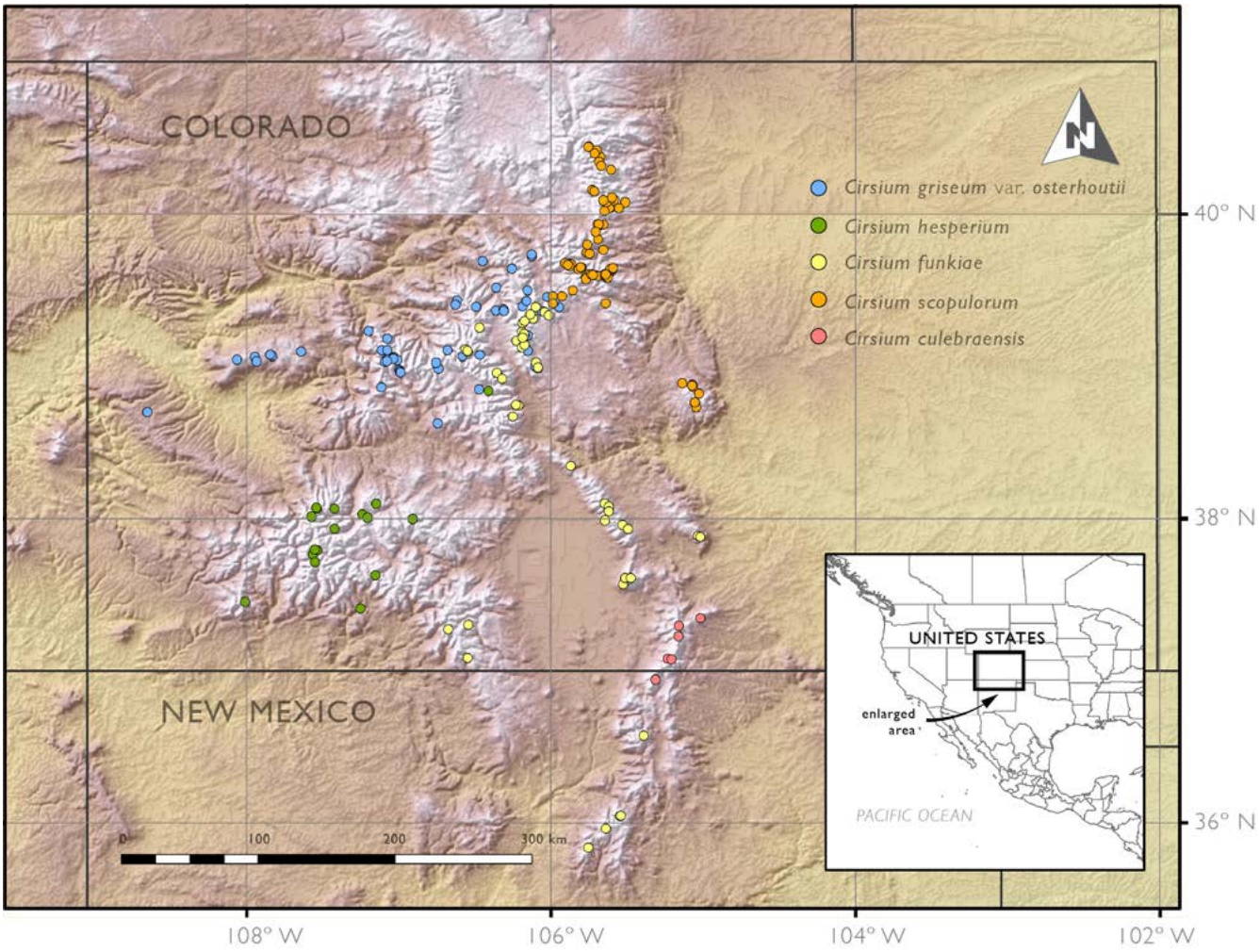

Figure 3. Distribution map of the alpine thistle species in the southern Rocky Mountains.

Conservation: This species is found primarily in the alpine zone on difficult to access mountaintops. In conjunction with inaccessibility, it occurs primarily on federally-owned land, both of which offer it protection. Although it occupies a narrow geographic range, populations appear to be stable.

Etymology: *Cirsium culebraensis* is named for the Culebra Range, to which it is endemic. The Culebra Range is part of the Sangre de Cristo Mountains.

Additional specimens examined: United States. Colorado: Costilla Co.: Upper slope of saddle at head of N Fk Whiskey Ck, Culebra Range, 16 Aug 1987, *B.Neely 4673* (CS); Costilla Co.: Culebra Range 40 air mi W of Trinidad, 7 Aug 2014, *T.Hogan 5424* (COLO); Huerfano Co.: Below summit of Trinchera Peak, 8 Aug 2018, *J.Ackerfield 6545* (CS); Huerfano Co.: Below summit of Trinchera Peak, approx. 2 mi SW of Bear Lake Campground, 8 Aug 2018, *J.Ackerfield 6551* (CS); Huerfano Co.: Approx. 3000 ft. west of Cordova Pass off of FR415, 7 Aug 2018, *J.Ackerfield 6529* (CS). **New Mexico:** Taos Co.: Sangre de Cristo Mts, 4.9 air mi SW of Angostura, 31 Jul 2013, *R.Sivinski & R.Culp 8592* (UNM); Taos Co.: Vermejo Park Ranch, Culebra Range, on E-facing slope 1.75 air mi NE of Big Costilla Peak, 25 Jul 2009, *B.Legler 11537* (RM).

Cirsium funkiae Ackerf., **sp. nov.**

Diagnosis: similar to *Cirsium scopulorum* in having heads in a nodding, terminal array, but differs in that the style branches are yellow instead of white, pale pink, or pale purple.

TYPE: U.S.A., Colorado: Park Co., Pike National Forest, near the base of Mt. Sherman near the beginning of the trailhead to the summit, ca 13 mi. west of Fairplay, scattered on scree slopes, 12,100 ft., 2 Sep 2020, *J.Ackerfield* et al. 8003 (holotype: KHD!).

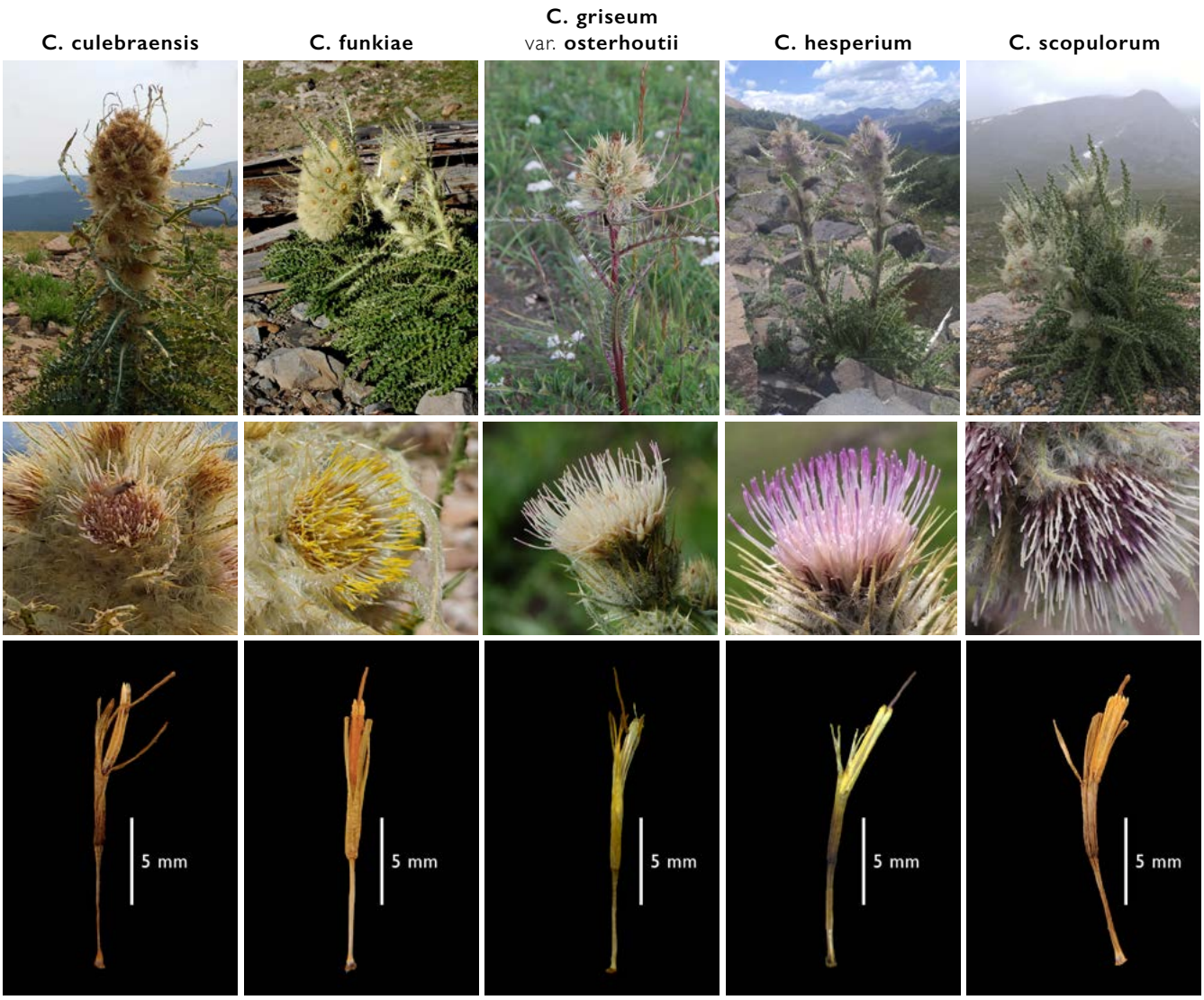

Figure 4. Morphological comparison of the alpine thistles of the southern Rocky Mountains. From top to bottom: Overall plant, close up of one head, one individual disk floret (ovary and pappus removed). Photos: J. Ackerfield.

Perennial, caulescent herbs, stems 1–few, erect, 2–7 (–12) dm tall, simple or sparingly branched, tomentose. **Leaves** oblong to narrowly elliptic, undulate, pinnatifid with 8–18 pairs of lobes, 8–25 cm long and 1.5–3.5 cm wide (including lobes), midribs 5–18 mm wide, lobes 7–11 mm long and 3–10 mm apart, main spines 3–11 mm long, adaxial surfaces glabrate to villous or arachnoid-tomentose, abaxial surfaces tomentose, cauline leaves well-distributed, sessile and sometimes clasping but not decurrent on the stem, distal closely subtending heads. **Heads** 9–35, sessile or shortly-pedunculate, in a dense, nodding, terminal cluster, closely subtended by reduced leaves, usually also with heads arising from leaf axils on the stem. **Involucres** green, broadly ovoid to broadly campanulate, 1.5–3.5 × 1.7–3 cm, densely tomentose. Phyllaries in 4–5 series, subequal, with entire margins, tapering to spines 5–17 mm long, apices straight. **Corollas** pale yellow, or brownish in age, 15–19 mm long, tubes 6–8 mm long, throats 4–5 mm long, lobes 4–5 mm long. **Anther** tubes white or pale yellow with brown stripes, 5–7 mm long. **Style** branches yellow, 2–4 mm long, conspicuously exserted beyond the corolla lobes. **Cypselae** dark brown or grayish-brown, 4–6 mm long. **Pappus** 10–17 mm long. (Figure 6).

Phenology: Flowers from mid-July to late August, and fruits from mid-August to early September.

Distribution: This species is found on mountaintops in the Sangre de Cristo, Mosquito, and Tenmile Ranges. Its northernmost distribution is south of Breckenridge, CO near Hoosier Pass and its southernmost distribution is near Santa Fe, NM (Figure 3).

Habitat: Occurs in high elevation spruce-fir forests and alpine tundra. It is primarily found on rocky scree slopes, in boulder fields, and alpine meadows. When found at its lower elevational limits, this species is found with *Picea engelmannii* Parry ex Engelm. var. *engelmannii*, *Potentilla pulcherrima* Lehm., *Bistorta bistortoides* (Pursh) Small, and *Sibbaldia procumbens* L. When found in rocky alpine slopes and meadows, this species occurs with *Cirsium griseum* (Rydb.) K.Schum. var. *osterhoutii* (Rydb.) Ackerfield & D.J.Keil, *Carex scopulorum* Holm, *Castilleja miniata* Douglas ex Hook., *Castilleja occidentalis* Torr., *Senecio atratus* Greene, *Geum rossii* (R.Br.) Ser. var. *turbinatum* (Rydb.) C.L.Hitchc., *Trifolium dasyphyllum* Torr. & A.Gray, *Claytonia megarhiza* (A.Gray) Parry ex S.Watson, *Polemonium confertum* A.Gray, and *Senecio fremontii* Torr. & A.Gray var. *blitoides* (Greene) Cronq. When found on scree slopes at its highest elevation limits, this is often the only species found, or occasionally it grows in association with *Senecio soldanella* A.Gray.

Conservation: This species is found primarily in the alpine zone on difficult to access mountaintops. In conjunction with inaccessibility, it occurs primarily on federally-owned land, both of which offer it protection. Populations appear to be stable. However, when encountered by members of the public with preconceived notions that all thistles are invasive weeds, it is often pulled up and left along the side of trails.

Etymology: *Cirsium funkiae* is named in honor of my mentor, Dr. Vicki Funk, Senior Curator of Compositae at the Smithsonian Institution, who provided invaluable leadership and was a world leader in Compositae research. Although the correct common name is technically "Funk's thistle," I like to think of this thistle as "the funky thistle." *Cirsium funkiae*, with its dense mass of woolly, nodding heads, is funky indeed.

Additional specimens examined: United States. Colorado: Costilla Co.: Wet Mts, S of Purgatorie Peak on Peak 11929, 20 Aug 1999, *B.Elliott 11357* (CS); Fremont Co.: Wet Mts, around Bushnell Lakes, 31 Jul 1998, *B.Elliott 4691* (CS); Park Co.: E slope of Wheeler Mt. above the summit of Hoosier Pass, 9 Sep 1942, *J.Ewan 14689* (COLO); Park Co.: Mosquito Range, about 1/8 mi SW of Peak 12615, 2 Aug 1998, *R.Orthner 704* (KHD); Park Co.: Horseshoe cirque, 4 Aug 1987, *P.Bichier & N.Shelton sn* (KHD); Park Co.: Mt Sherman, 9 Aug 2015, *J.Ackerfield 15-127* (CS); Summit Co.: State Hwy 9, 0.7 mi N of Hoosier Pass, 2 Aug 1972, *S.Nelson 1091* (CS); Summit Co.: Blue Lakes SW of Breckenridge, 21 Jul 2007, *J.Ackerfield 2958* (CS); Teller Co.: Vicinity of Gillett, 30 Jul 1967, *D.Denham 1719* (CS). **New Mexico:** Mora Co.: Santa Fe National Forest and vicinity, Sangre de Cristo Mountains, Pecos Wilderness, 3 air mi NE of Pecos Falls, 10 Aug 2004, *B.Reif 10339* (RM); Santa Fe Co.: Lake Peak, 12 Aug 1926, *Bro.G.Arsene & Bro.A.Benedict 17248* (UNM).

Note: This species has been hiding in plain sight under the binomial *C. scopulorum* because of an erroneous original species description which stated that the corolla color was yellow (Gray, 1863). However, examination of the type material collected by Charles Parry and Elijah Hall helped sort out the taxonomy. In particular, a brief history of Parry's collection trips helped elucidate which phenotype (yellow or pale purple) to designate as *C. scopulorum*.

Charles Parry first visited the mountains of central Colorado in 1861, collecting alpine and subalpine plants for Asa Gray from what he labeled the "headwaters of Clear Creek and the alpine ridges lying east of Middle Park, Colorado Territory." Parry returned to Colorado in 1862 with Hall and Harbour. The collection locality listed for all specimens from the 1862 expedition is much less informative: "Colorado Territory, lat. 39°–41°, alpine and subalpine." However, through Parry's correspondences to Gray, more accurate descriptions of their 1862 collection destinations are recorded (Parry & Gray, 1861). Thanks to Parry's notes, we can infer that the 1862 expedition began at the upper waters of the Platte near South Park (Park Co.). From there, the party returned to Denver by way of Pike's Peak (El Paso Co.), ascending the mountain peak on July 1st, 1862. From Denver, the expedition returned to Parry's original collection site at the headwaters of Clear Creek (Clear Creek Co.) to determine the altitude of Torrey's, Gray's, and Engelmann peaks. They finished the expedition in the vicinity of Long's Peak (Boulder Co.). These collections were made within the geographic boundary of the pale purple phenotype.

The designation of the corolla color as yellow by Gray (1863) came from a single, hand-written note affixed to one of Hall & Harbour's specimens [U.S.A., CO Territory: Rocky Mountain Flora Lat 39°–41°, Hall & Harbour s.n. (HU)], which described the high alpine thistle as "dense, many headed yellow flowered species but too young perhaps Parry got it in [a] better state." This note indicates that these plants were in fact too immature to see any corollas, much less to determine that they were yellow. Although Gray (1863: 69) described *Cirsium eriocephalum* (name invalid, referencing *C. scopulorum*) as having "heads of yellow flowers […] crowded into a capitate cluster as large as a man's fist," the only record from Parry or Hall of the yellow corolla color is Hall's handwritten note on an immature specimen lacking visible corollas. The corolla color was therefore erroneously reported as yellow by Hall and then incorporated into the original species description by Gray. Therefore, the best line of evidence to support the pale purple phenotype as *C. scopulorum* is geographic range,

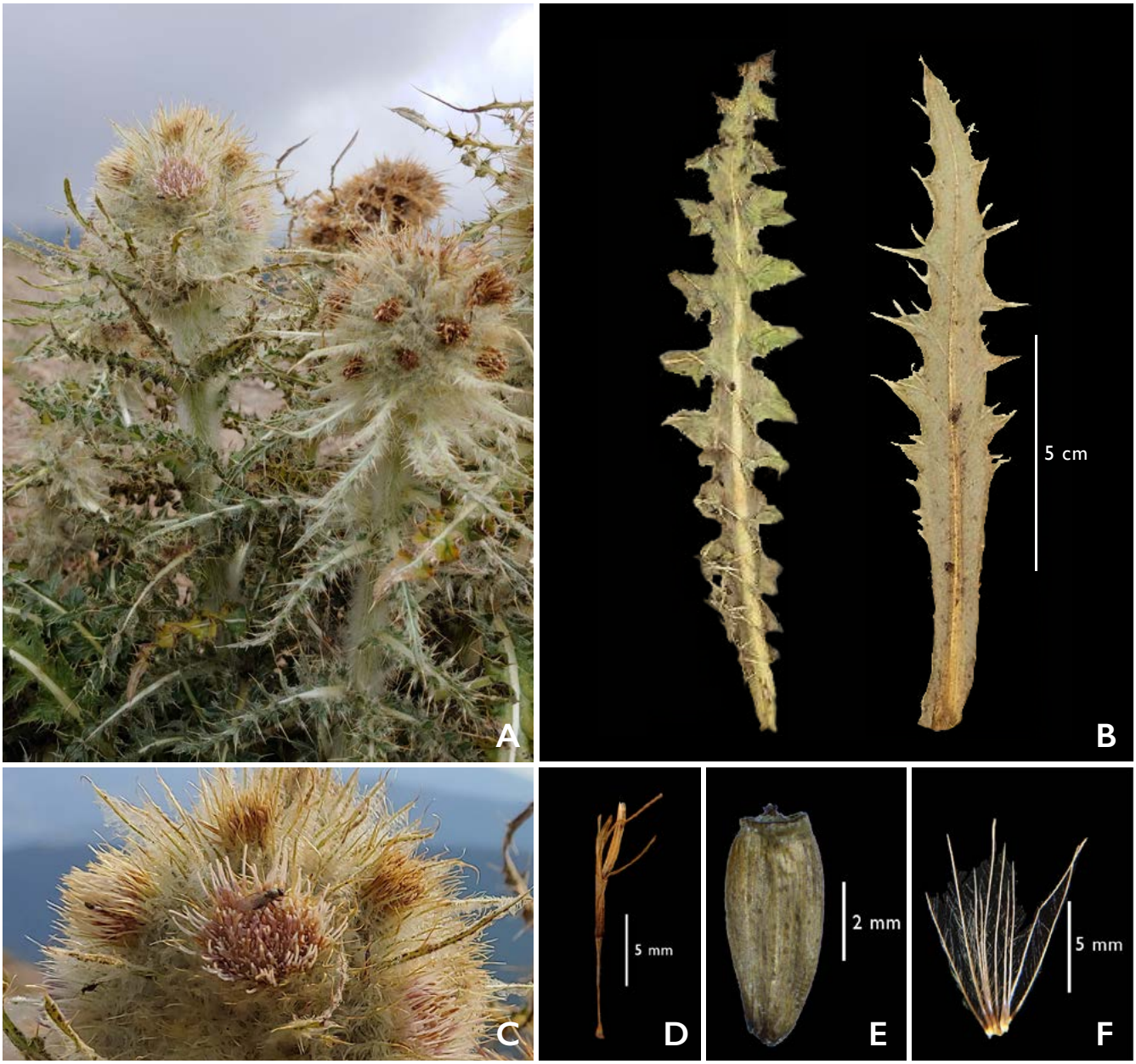

Figure 5. *Cirsium culebraensis* Ackerf. **A.** Habit. **B.** Leaves. **C.** Close-up of heads. **D.** Disk floret (ovary and pappus removed). **E.** Cypsela. **F.** Pappus fragment. Photos: J. Ackerfield.

Vicki's thistle

In September 2020, the author was joined by representatives from the U.S. Forest Service, Denver Botanic Gardens, and Colorado State University to make type collections of *Cirsium funkiae* on Mt. Sherman. Pictured here is CSU Master's student, Austin Rosén, holding one of the type specimens.

Circium funkiae, Mt. Sherman, Park County, Colorado, elevation ca. 4000 m a.s.l.
Photo by J. Ackerfield

Funky thistle

Vicki Funk had a special tune she sang when collecting thistles because of sharp spines - "*Ooh Eeh Ooh Ah Aah Ting Tang Walla Walla Bing Bang*." I will never forget the first time I met Vicki, after describing my thistle research, she broke into this song almost immediately! Vicki was a not only a leader in Compositae research, but also my mentor and friend. I can think of no better way to commemorate her memory than by naming the funkiest of all new thistles, *Cirsium* funkiae, in her honor. I hope that anyone who ever collects this thistle for scientific research also sings Vicki's little thistle song too.

Close up of *Circium funkiae*, Mt. Sherman, Park County, Colorado, ca. 4000 m a.s.l.
Photo by J. Ackerfield

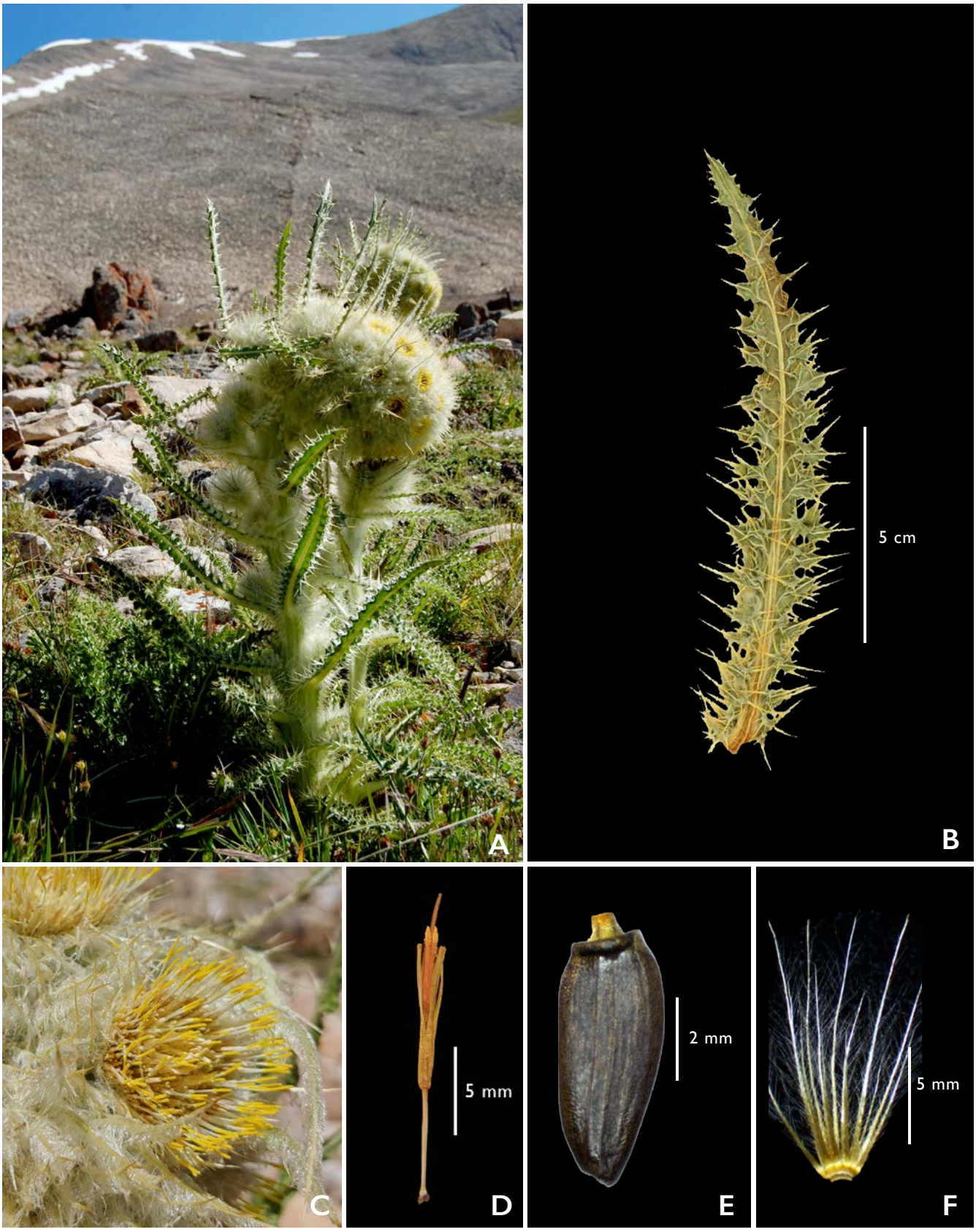

Figure 6. *Cirsium funkiae* Ackerf. **A.** Habit. **B.** Leaf. **C.** Close-up of head. **D.** Disk floret (ovary and pappus removed). **E.** Cypsela. **F.** Pappus fragment. Photos: J. Ackerfield.

as all of Parry's and Hall & Harbour's collections were made within the geographic boundary of this phenotype (Figure 3).

It has been noted by the author that American pika (*Ochotona princeps*) forage on *C. funkiae*, and are often seen running around with bundles of thistle leaves in their mouths during August and September. Additionally, the author has noted that *C. funkiae* is frequently visited by bumble bees (*Bombus* sp.), which also overnight for warmth within the densely tomentose heads.

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LITERATURE CITED

Ackerfield, J.R., Keil, D.J., Hodgson, W.C., Simmons, M.P., Fehlberg, S.D. & Funk, V.A. 2020. Thistle be a mess: Untangling the taxonomy of *Cirsium* (Cardueae: Compositae) in North America. *J. Syst. Evol.* 58: 881–912.

Alexander, P.J., Windham, M.D., Beck, J.B., Al-Shehbaz, I.A., Allphin, L. & Bailey, C.D. 2015. Weaving a tangled web: divergent and reticulate speciation in *Boechera fendleri* sensu lato (Brassicaceae: Boechereae). *Syst. Bot.* 40: 572–596.

De Queiroz, K. 2007. Species concepts and species delimitation. *Syst. Biol.* 56: 879–886.

Gray, A. 1863. Enumeration of the species of plants collected by Dr. C.C. Parry and Messrs. Elihu Hall and J.P. Harbour, during the summer and autumn of 1862, on and near the Rocky Mountains, in Colorado territory. *Proc. Acad. Nat. Sci. Philadelphia* 15: 55–80.

Harrington, H.D. 1954. *Manual of the Plants of Colorado*. Chicago: The Swallow Press.

Keil, D. 2006. *Cirsium*. Pp. 95–164 in: Committee, F.o.N.A.E., (ed.), *Flora of North America north of Mexico*. Oxford and New York: Oxford University Press.

Nazaire, M. & Hufford, L. 2012. A broad phylogenetic analysis of Boraginaceae: implications for the relationships of *Mertensia*. *Syst. Bot.* 37: 758–783.

Nixon, K.C. & Wheeler, Q.D. 1990. An amplification of the phylogenetic species concept. *Cladistics* 6: 211–223.

Parry, C.C. & Gray, A. 1861. Charles Christopher Parry letters to Asa Gray. Biodiversity Heritage Library. [https://www.biodiversitylibrary.org/]

Reznicek, A.A. & Murray, D.F. 2013. A re-evaluation of *Carex specuicola* and the *Carex parryana* complex (Cyperaceae). *J. Bot. Res. Inst. Texas* 7: 37–51.

Thiers, B. [continuously updated]. Index herbariorum: A global directory of public herbaria and associated staff. New York: New York Botanical Garden's Virtual herbarium. [http://sweetgum.nybg.org/science/ih/]

Weber, W.A., & Wittmann, R.C. 2011. *Colorado Flora: Eastern Slope*. Boulder: University Press of Colorado.

Wolfe, A.D., Blischak, P.D. & Kubatko, L. 2021. Phylogenetics of a rapid, continental radiation: diversification, biogeography, and circumscription of the beardtongues (*Penstemon*; Plantaginaceae). *bioRxiv*.