

NEW TAXA AND NEW COMBINATIONS IN NORTH AMERICAN *CIRSIIUM* (ASTERACEAE: CARDUEAE)

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ABSTRACT

Six new varieties are proposed in North American *Cirsium* (Asteraceae: Cardueae): ***C. arizonicum*** (A. Gray) Petrak var. ***tenuisectum*** D.J. Keil var. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***viperinum*** D.J. Keil, var. nov., ***C. edule*** Nutt. var. ***wenatchense*** D.J. Keil, var. nov., ***C. occidentale*** (Nutt.) Jeps. var. ***lucianum*** D.J. Keil, var. nov., ***C. scariosum*** Nutt. var. ***robustum*** D.J. Keil, var. nov., ***C. scariosum*** Nutt. var. ***toyabense*** D.J. Keil, var. nov. Additionally, twenty new combinations are presented: ***C. arizonicum*** (A. Gray) Petrak var. ***bipinnatum*** (Eastw.) D.J. Keil, comb. nov., ***C. arizonicum*** (A. Gray) Petrak var. ***chellyense*** (R.J. Moore & Frankton) D.J. Keil, comb. et stat. nov., ***C. arizonicum*** (A. Gray) Petrak var. ***rothrockii*** (A. Gray) D.J. Keil, comb. et stat. nov., ***C. clavatum*** (M.E. Jones) Petrak var. ***americanum*** (A. Gray) D.J. Keil, comb. nov., ***C. clavatum*** (M.E. Jones) Petrak var. ***osterhoutii*** (Rydb.) D.J. Keil, comb. et stat. nov., ***C. cymosum*** (Greene) J.T. Howell var. ***canovirens*** (Rydb.) D.J. Keil, comb. et stat. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***eriocephalum*** (A. Nelson) D.J. Keil, comb. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***hesperium*** (Eastw.) D.J. Keil, comb. et stat. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***peckii*** (L.F. Hend.) D.J. Keil, comb. et stat. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. var. ***clokeyi*** (S.F. Blake) D.J. Keil, comb. et stat. nov., ***C. edule*** Nutt. var. ***macounii*** (Greene) D.J. Keil, comb. et stat. nov., ***C. horridulum*** Michx. var. ***megacanthum*** (Nutt.) D.J. Keil, comb. et stat. nov., ***C. inamoenum*** (Greene) D.J. Keil, comb. nov., ***C. inamoenum*** (Greene) D.J. Keil var. ***davisii*** (Cronquist) D.J. Keil, comb. et stat. nov., ***C. ochrocentrum*** A. Gray var. ***martinii*** (P. Barlow-Irlick) D.J. Keil, comb. et stat. nov., ***C. pulcherrimum*** (Rydb.) K. Schum. var. ***aridum*** (R.D. Dorn) D.J. Keil, comb. et stat. nov., ***C. scariosum*** Nutt. var. ***americanum*** (A. Gray) D.J. Keil, comb. nov., ***C. scariosum*** Nutt. var. ***citrinum*** (Petrak) D.J. Keil, comb. nov., ***C. scariosum*** Nutt. var. ***coloradense*** (Rydb.) D.J. Keil, comb. et stat. nov., ***C. scariosum*** Nutt. var. ***congdonii*** (R.J. Moore & Frankton) D.J. Keil, comb. et stat. nov. Lectotypes are designated for several of these taxa.

RESUMEN

Se proponen seis variedades nuevas en *Cirsium* (Asteraceae: Cardueae) de Norteamérica: ***C. arizonicum*** (A. Gray) Petrak var. ***tenuisectum*** D.J. Keil var. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***viperinum*** D.J. Keil, var. nov., ***C. edule*** Nutt. var. ***wenatchense*** D.J. Keil, var. nov., ***C. occidentale*** (Nutt.) Jeps. var. ***lucianum*** D.J. Keil, var. nov., ***C. scariosum*** Nutt. var. ***robustum*** D.J. Keil, var. nov., ***C. scariosum*** Nutt. var. ***toyabense*** D.J. Keil, var. nov. Se presentan además veinte combinaciones nuevas: ***C. arizonicum*** (A. Gray) Petrak var. ***bipinnatum*** (Eastw.) D.J. Keil, comb. nov., ***C. arizonicum*** (A. Gray) Petrak var. ***chellyense*** (R.J. Moore & Frankton) D.J. Keil, comb. et stat. nov., ***C. arizonicum*** (A. Gray) Petrak var. ***rothrockii*** (A. Gray) D.J. Keil, comb. et stat. nov., ***C. clavatum*** (M.E. Jones) Petrak var. ***americanum*** (A. Gray) D.J. Keil, comb. nov., ***C. clavatum*** (M.E. Jones) Petrak var. ***osterhoutii*** (Rydb.) D.J. Keil, comb. et stat. nov., ***C. cymosum*** (Greene) J.T. Howell var. ***canovirens*** (Rydb.) D.J. Keil, comb. et stat. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***eriocephalum*** (A. Nelson) D.J. Keil, comb. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***hesperium*** (Eastw.) D.J. Keil, comb. et stat. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. ***peckii*** (L.F. Hend.) D.J. Keil, comb. et stat. nov., ***C. eatonii*** (A. Gray) B.L. Rob. var. var. ***clokeyi*** (S.F. Blake) D.J. Keil, comb. et stat. nov., ***C. edule*** Nutt. var.

macounii (Greene) D.J. Keil, comb. et stat. nov., *C. horridulum* Michx. var. *megacanthum* (Nutt.) D.J. Keil, comb. et stat. nov., *C. inanoenum* (Greene) D.J. Keil, comb. et stat. nov., *C. inanoenum* (Greene) D.J. Keil var. *davisii* (Cronquist) D.J. Keil, comb. et stat. nov., *C. ochrocentrum* A. Gray var. *martinii* (P. Barlow-Irlick) D.J. Keil, comb. et stat. nov., *C. pulcherrimum* (Rydb.) K. Schum. var. *aridum* (R.D. Dorn) D.J. Keil, comb. et stat. nov., *C. scariosum* Nutt. var. *americanum* (A. Gray) D.J. Keil, comb. nov., *C. scariosum* Nutt. var. *citrinum* (Petrak) D.J. Keil, comb. nov., *C. scariosum* Nutt. var. *coloradense* (Rydb.) D.J. Keil, comb. et stat. nov., *C. scariosum* Nutt. var. *congdonii* (R.J. Moore & Frankton) D.J. Keil, comb. et stat. nov., También se designan lectótipos de varios de estos taxa.

Preparation of a taxonomic treatment of *Cirsium* Mill. (Asteraceae: Cardueae) for the upcoming Asteraceae volumes of the Flora of North America has entailed a reevaluation of many of the published taxa. The only comprehensive treatment of North American *Cirsium* species (Petrak 1912, 1917) is long out of date. Revisions or cytotaxonomic studies have been published for several species groups (Frankton & Moore 1961, 1963; Moore & Frankton 1962, 1964, 1965, 1966, 1969, 1974; Ownbey 1952; Ownbey & Hsi 1963, 1969; Ownbey & Olson 1969; Ownbey et al. 1975), and many of the species have been included in state or regional floristic treatments (e.g., Cronquist 1955, 1994; Dorn 1992; Gardner 1974; Howell 1960; Keil & Turner 1993; Munz & Keck 1959; Munz 1974; Weber 1996; Weber & Wittmann 1987; Welsh 1983; Welsh et al. 1993), but these treatments have been uneven and limited in scope. Political boundaries often mark the application of differing taxonomic constructs. In my investigations I have examined North American *Cirsium* as a whole and across the breadth of its geographic range.

Cirsium well deserves its reputation as a taxonomically difficult genus. One of the most challenging aspects for a taxonomist studying New World *Cirsium* is the presence of species complexes that are apparently evolutionary works in progress. Some of the thistles, especially in the mountainous western part of North America, are frustratingly polymorphic with mosaic and overlapping patterns of variation and intergradation of characters. Early taxonomists, basing their work on a limited sampling of the morphological diversity, named many of the forms as species, and the literature is robust with species names. The infilling that results from more collectors visiting more localities within the ranges of these complexes has blurred the boundaries between many of the proposed species and often added forms that do not "fit" the characters of named species. As I faced the challenges of preparing the FNA treatment I recognized that maintaining some of the named entities as species would for consistency require a further proliferation of species names.

I have chosen to go the other way. Instead continuing the proliferation of ill-defined microspecies I treat the plants in question as rapidly evolving, only partially differentiated assemblages of races that have not reached the level of stability that is usually associated with the concept of species. In a molecular phylogenetic investigation Kelch and Baldwin (2003) found unusually low rates

of molecular divergence relative to the ecological diversity of New World *Cirsium* and suggested that the genus has undergone a rapid ecological diversification on a continental scale. Certainly there is much variation within these groups that deserves a level of taxonomic recognition, or that at least should be mentioned, but I think it much more prudent to recognize these as infraspecific taxa—entities that may be expected to freely intergrade—than species. I view species as entities that should be consistently recognizable. Within a large genus such as *Cirsium* the amount of infraspecific variation and the degree of geographical separation among races varies from species to species and from geographical race to geographical race. Races occupying contiguous habitats often intergrade freely in zones of contact whereas races currently isolated by geographic or habitat barriers of ten have more discrete variation patterns. Both situations may occur in a single species.

Intraspecific taxa in *Cirsium* have been recognized in various taxa at the rank of form, variety, and subspecies. In the Flora of North America (Flora of North America Editorial Committee 1996) the trivial rank of form, representing sporadic variants without a geographic range, is not used. Some *Cirsium* variants recognized in the past as varieties are the equivalent of forms. In *Cirsium* both variety and subspecies have been used in the context of morphologically distinguishable geographical races. The rank of variety has been used more widely. The Flora of North America Guide for Contributors (Flora of North America Editorial Committee 1996) stipulates that only one infraspecific rank (subspecies or variety) be recognized within a genus. As used by most workers in *Cirsium* taxonomy the choice of rank has been a matter of preference, and I view them as equivalent. I have chosen to use variety rather than subspecies because only one change from subspecies to variety has to be made to follow the Flora of North America Guidelines whereas the use of subspecies as the infraspecific rank for formally recognized geographical races would require many more nomenclatural innovations.

The overall product of my studies will be detailed in the FNA treatment (Keil, in press). Presented below are six newly proposed varieties and validation of twenty new combinations for North American *Cirsium*.

Cirsium arizonicum (A. Gray) Petrak var. ***bipinnatum*** (Eastw.) D.J. Keil, comb. nov. BASIONYM: *Cnicus drummondii* Torr. & A. Gray var. *bipinnatus* Eastw., Zoe 4:8. 1893. TYPE: COLORADO: Johnston Cañon near where it joins Mancos River, Sep 1892, Eastwood s.n. (HOLOTYPE: CAS; ISOTYPE: MIN).

Cirsium arizonicum (A. Gray) Petrak var. ***chellyense*** (R.J. Moore & Frankton) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium chellyense* R.J. Moore & Frankton, Canad. J. Bot. 52:547. 1974. TYPE: ARIZONA. Apache Co.: Canyon de Chelly, 1 Jul 1961, Norman 680 (HOLOTYPE: DAO).

Cirsium arizonicum (A. Gray) Petrak var. **rothrockii** (A. Gray) D.J. Keil, comb. et stat. nov. BASIONYM: *Cnicus rothrockii* A. Gray, Proc. Amer. Acad. Arts 17:220. 1882. TYPE: ARIZONA: Rocky Canyon, 1874, *Rothrock* 289 (lectotype, here chosen from syntypes, GH). Gray (1882) described *Cnicus rothrockii* based upon two collections (*Rothrock* 289 and *Lemmon* 2794).

Moore and Frankton (1974) selected *Rothrock* 289 as the lectotype collection of *Cnicus rothrockii*. However, they cited as lectotype specimens of this gathering from both GH and US. According to Article 9.2 of the International Code of Botanical Nomenclature (Greuter et al. 2000) “a lectotype is a specimen or illustration designated from the original material as the nomenclatural type.” Moore and Frankton’s designation of two specimens at different institutions as lectotype fails the requirement that a single specimen serve in that role. I agree with their designation of *Rothrock* 289 as the lectotype collection and here choose the GH specimen as lectotype for the taxon.

Cirsium arizonicum (A. Gray) Petrak var. **tenuisectum** D.J. Keil, var. nov. TYPE: CALIFORNIA. SAN BERNARDINO CO.: New York Mountains, Keystone Canyon, 2.1 road mi from Ivanpah Road, ca. 1670 m, *Pinus monophylla*-*Juniperus osteosperma* woodland; scattered in rocky wash channel; associates: *Fallugia paradoxa*, *Prunus fasciculata*, *Gutierrezia sarothrae*, *Atriplex canescens*, *Eriodictyon angustifolium*, *Yucca brevifolia*, *Opuntia echinocarpa*, *Menodora scabra*, *Ephedra nevadensis*, *Pentstemon* sp., *Machaeranthera canescens*, *Purshia mexicana*, *Muhlenbergia porteri*, *Ericameria linearifolia*, *Salvia dorrii*, *Lycium cooperi*, *Yucca baccata*, *Berberis* sp., *Rhus trilobata*, *Sphaeralcea* sp., *Ipomopsis agregata*, *Datura wrightii*, *Artemisia dracunculul*, and *Achnatherum hymenoides*, 5 Nov 1999, Keil 28401 (HOLOTYPE—flowering stem of plant D, OBI; ISOTYPES [the letter in parentheses represents the individual], ASU (A), BRY (C), CAS (B), CDA (C), DAO (D), GH (D), MIN (D), MO (C), NY (C), OBI (A, C), RSA (A), TEX (D), UC (B), US (D)).

Caulibus et costis abaxialibus glabris ad tomentosus trichomatibus tenuibus non-septatis, spinis principalibus foliorum 5–30 mm longis, et corollis rubellopurpureis distinguatur.

Stems thinly arachnoid tomentose, \pm glabrate, without septate trichomes. Leaves deeply divided, often nearly to the midvein, abaxially arachnoid tomentose or sometimes glabrate, without septate trichomes, adaxially thinly arachnoid or glabrate; principal marginal spines 5–30 mm, often stout; cauline leaves narrowed at base to truncate or \pm clasping, but not or only slightly decurrent. Involucres cylindric to campanulate; phyllary spines 5–25 mm, stout. Corollas reddish purple, 25–35 mm, the tube 10–13, throat 5–8 mm, lobes 10–13.5 mm; style tips 1–2 mm.

PARATYPES: CALIFORNIA. San Bernardino Co.: New York Mountains. Carruthers Canyon, 1615–1645 m, 6 Nov 1999, Keil 28402 (NMC, OBI, OSC); New York Mountains, Keystone Spring, 1585 m, 13 Oct 1935, Munz 13862 (UC). Nevada. Clark Co.: SW slope of NW Spring Mts., upper Clark Canyon, yellow pine vegetation, 7000–7600 ft, 9 Jul 1970, Beatley 11355 (UNLV); Charleston Mts., Charleston Peak, gravelly wash; with *Pinus scopulorum*, 2270 m, 18 Jul 1938, Clokey 8182 (PH, UC, UTC(2), WTU(2)); Charleston Mts., Kyle Canyon at bridge, wash with aspens, 2300 m, 3 Aug 1935, Clokey 5609 (UC); Charleston Mts., Charleston Park, gravelly wash, yellow pine belt, 2300 m, 25 Jul 1936, Clokey 5609

(UC, UTC, WTU); Charleston Mts., Lee Cañon, in limestone, 8000 ft, 4 Aug 1913, *Heller 11057* (PH, UC); Charleston Mts., Pine Cr., 6700 ft, 4 Sep 1927, *Jaeger 2202* (UC); Charleston Mts., near Charleston park resort, plentiful, 8000 ft, 12 Sep 1925, *Jaeger s.n.* (UC); Spring Range, Toiyabe National Forest, Kyle Canyon Rd. (Nevada Rte. 157) just W of junction with Nevada Rte. 157, Ponderosa pine forest, 6930 ft, 17 Aug 2002, *Keil 29112* (OBI); Spring Mountains, Toiyabe National Forest, Las Vegas Ski and Snowboard area in Upper Lee Canyon, 36.299°N, 115.696°W, subalpine forest with limber pine, bristlecone pine, white fir, quaking aspen, wax currant, and common juniper, 9200 ft, 17 Aug 2002, *Keil 29114* (OBI); Red Rock Canyon Recreation Lands, Mouth of Velvet Canyon, with *Celtis reticulata*, *Quercus turbinella*, and *Chrysothamnus paniculatus*, 4400 ft, 6 Jun 1990, *Leary et al. 4006* (UNIV); Spring Range, NW of Las Vegas, upper Lee Canyon between ski area and saddle at head of Wallace Canyon, conifer forest with *Pinus flexilis*, *P. longaeva*, *Abies concolor*, and *Populus tremuloides* on steep limestone slopes and canyon bottom, 8700–9900 ft, 31 Aug 1986, *Sanders et al. 6881* (OBI).

The *Cirsium arizonicum* complex is a group of closely related taxa of the southwestern United States and northwestern Mexico. This species complex was revised by Moore and Frankton (1974), who recognized eight species, three of them newly described. In Moore and Frankton's key to species of the *C. arizonicum* complex, var. *tenuisectum* keys to *Cirsium nidulum* (M.E. Jones) Petrak, and these authors cited a chromosome count from the Spring Mountains population of var. *tenuisectum* as *C. nidulum*. Moore and Frankton's rather imprecise range map does not include the New York Mountains for *C. nidulum* or any other member of the *C. arizonicum* complex, and there is no indication that Moore and Frankton were aware of the thistles from this mountain range. *Cirsium nidulum* is the name that has been used for the New York Mountains thistle in various floras (Howell 1960; Munz and Keck 1959; Munz 1974; Keil and Turner 1993, 2002). As a part of my research on *Cirsium* for the Flora of North America project, I have examined many specimens, including types, from throughout the range of the various members of the *Cirsium arizonicum* complex, and I have concluded that the *C. arizonicum* complex should be treated as a single polymorphic species. It has become evident that the name *Cirsium nidulum* has been widely misapplied; the type is a very spiny plant of var. *arizonicum*. The plants from the Spring Mountains and New York Mountains represent a previously unnamed variety.

Cirsium clavatum (M.E. Jones) Petrak var. ***americanum*** (A. Gray) D.J. Keil, comb. nov. BASIONYM: *Cnicus carlinoides* Schrank var. *americanus* A. Gray, Proc. Amer. Acad. Arts 10:48. 1874. TYPE: COLORADO: Rocky Mts., lat. 39–41°, *Hall and Harbour 339* (LECTOTYPE, here chosen from syntypes, GH).

The varietal epithet *americanum* was based upon syntypes from both Colorado and California. The latter are referable to *Cirsium remotifolium* (Hook.) DC. Gray (1874) cited two Colorado collections, *Greene s.n.* and *Hall and Harbour 342*. Cronquist (1994) stated that “*Hall & Harbour 342*, Rocky Mts., Colo., is the first collection cited and has been taken to be the type; original at GH!” I agree with the choice of *Hall and Harbour 342* and am validating its designation as lectotype.

Cirsium clavatum (M.E. Jones) Petrak var. **osterhoutii** (Rydb.) D.J. Keil, comb. et stat. nov. BASIONYM: *Carduus osterhoutii* Rydb., Bull. Torrey Bot. Club 32:131. 1905. TYPE: COLORADO. EAGLE CO.: Red Cliff, 1902, *Osterhout 2706* (HOLOTYPE: NY; ISOTYPE: RM).

Cirsium cymosum (Greene) J.T. Howell var. **canovirens** (Rydb.) D.J. Keil, comb. et stat. nov. BASIONYM: *Carduus canovirens* Rydb., Mem. N.Y. Bot. Gard. 1:450. 1910. TYPE: MONTANA. MADISON CO.: Jack Creek Cañon, 7000 ft, 15 Jul 1897, *Rydberg and Bessey 5213* (HOLOTYPE: NY).

Cirsium eatonii (A. Gray) B.L. Rob. var. **eriocephalum** (A. Nelson) D.J. Keil, comb. nov. BASIONYM: *Cirsium eriocephalum* A. Gray, nom. illeg.; *Carduus hookerianus* Nutt. [var.] *eriocephalus* A. Nelson, in J.M. Coult. & A. Nelson, Man. Bot. Rocky Mts. 585. 1909. TYPE: COLORADO: headwaters of Clear Creek and the alpine ridges lying E of Middle Park, 1861, *Parry s.n.* (LECTOTYPE, here chosen from syntypes, GH).

This taxon was originally named *Cirsium eriocephalum* by Gray (1863), but this name was a later homonym. Because of the illegitimate status of *C. eriocephalum*, a priorable autonym was not created by publication of *Cirsium eriocephalum* A. Gray var. *leiocephalum* D.C. Eaton (1871). However, Nelson's recognition of *Carduus hookerianus* var. *eriocephalus* established this epithet at the varietal level with Nelson as the author of the epithet, not Gray [ICBN Art. 58]. Nelson did not cite rank for infraspecific taxa but his trinomial combinations are to be treated as varieties (ICBN Art. 35.4).

Cirsium eatonii (A. Gray) B.L. Rob. var. **hesperium** (Eastw.) D.J. Keil, comb. et stat. nov. BASIONYM: *Cnicus hesperius* Eastw., Bull. Calif. Acad. Sci. ser. 3, 1:122. 1898. TYPE: COLORADO: La Plata Mts., Mt. Hesperus on Bear Creek Divide, Aug 1892, *Eastwood s.n.* (HOLOTYPE: CAS).

Cirsium eatonii (A. Gray) B.L. Rob. var. **peckii** (L.F. Hend.) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium peckii* L.F. Hend., Madroño 5:97. 1939. TYPE: OREGON. HARNEY CO.: Alvord Ranch, E base of Steens Mt., 6 Jun 1927, *Henderson 8521* (HOLOTYPE: ORE).

Cirsium eatonii (A. Gray) B.L. Rob. var. **clokeyi** (S.F. Blake) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium clokeyi* S.F. Blake, Proc. Biol. Soc. Washington 51:8. 1938. TYPE: NEVADA. CLARK CO.: Charleston Mts., 6 Aug 1937, *Clokey 7456* (HOLOTYPE: US; ISOTYPES: BRY, DAO, GA, MO, PENN, PH, RM, UC).

Cirsium eatonii (A. Gray) B.L. Rob. var. **viperinum** D.J. Keil, var. nov. TYPE: NEVADA. WHITE PINE CO.: Snake Range, Humboldt National Forest, Snake Creek Canyon, above Johnson Lake, steep rocky slope, granite, common, 11,000 ft [3353 m], 10 Aug 1964, *Holmgren and Reveal 1588* (HOLOTYPE: UTC; ISOTYPES: WTU, MIN).

Capitulis rare arachnoideis trichomatibus non-septatis, corollas lavandulis ad purpureis, 29–35 mm longis, setis longissimis pappi 20–25 mm distinguatur.

Plants erect, 2.5–4 dm. Leaves glabrous or nearly so on both surfaces. Capitula 1–5, subsessile or short-peduncled, in raceme-like or corymbiform capitulescence. Involucres 3–5 cm, thinly arachnoid with non-septate trichomes; outer phyl-

laries with numerous lateral spines; spine tips of phyllaries stout. Corollas lavender to purple, 29–35 mm, the tube 9–12.5 mm, the throat 9–12 mm, the lobes 9–11 mm. Longest pappus bristles 20–25 mm.

PARATYPES: **NEVADA. White Pine Co.:** Snake Range, Mt. Washington, bristlecone pine forest just S of the peak, T12N, R68E, Sect. 11, plants growing with *Pinus* on limestone gravel slopes, 11,300 ft [3444 m], 9 Aug 1985, *Tiehm 10107* (CAS, COLO, MIN, OSC, UNLV); Mount Moriah, N end of Snake Range, moist limestone derived sandy to rocky soil, on S-facing slope with *Phlox*, *Aquilegia*, *Crepis nana*, *Allium*, and *Erigeron*, T18N, R69E, Sect. 10, 11840 ft (3500 m), 2 Aug 1999, *Niles et al. 5818* (UNLV); 12 mi SW of Baker, Humboldt National Forest, Snake Range, N side of Mt. Washington, T12N, R68E, E 1.2 of Sect. 11, with scattered bristlecone pine, 11,000 ft, 12 Sep 1983, *Goodrich et al. 20063* (BRY); 13 mi SW of Baker, Snake Range, S slopes of Mt. Washington, T12N, R68E, N 1/2 of Sect. 14, upper edge of bristlecone pine–limber pine forest, 11,000 ft, 12 Sep 1983, *S. Goodrich et al. 20063* (BRY).

Cirsium eatonii var. *viperinum* is apparently endemic to upper elevations of the Snake Range of White Pine County, Nevada. Capitula of var. *viperinum* are similar in size to those of var. *clokeyi*. However, var. *viperinum* is a shorter plant (2–4 dm vs. 4–15 dm) with longer corolla tubes (9–12 mm vs. 3.5–7 mm), and longer pappus bristles (longest bristles 20–25 mm vs. 16–18 mm). Ranges of the two varieties are separated by about 340 km. Putative hybrids between *C. inamoenum* and *C. eatonii* var. *viperinum* are known from the Snake Range.

***Cirsium edule* Nutt. var. *macounii* (Greene) D.J. Keil, comb. et stat. nov.** BASIONYM: *Carduus macounii* Greene, Ottawa Naturalist 16:38. 1902. TYPE: BRITISH COLUMBIA: Chilliwack Valley, 13 Jun 1901, *Macoun 26451* (LECTOTYPE, here chosen from syntypes, NDG).

***Cirsium edule* Nutt. var. *wenatchense* D.J. Keil, var. nov.** TYPE: WASHINGTON. CHELAN CO.: Nason Creek, banks of streams, 660 m, 30 Jul 1893, *Sandberg and Leiberg 626* (HOLOTYPE: ORE; ISOTYPES: CAS, UC).

Capitulis generaliter solitariis, in pedunculis 10–30 cm portatis et involucris 3–4 cm altis et 4–5 cm diametro distinguatur.

Capitula mostly solitary; peduncles 10–30 cm. Involucres 3–4 cm, 4–5 cm diam., moderately arachnoid; phyllary apices long-acicular, widely spreading, spine tips 5–15 mm. Corollas 29–33 mm, the tube 9–11 mm, the throat 8–12 mm, the lobes 9–10 mm. Style tips 3–4 mm. Cypselae 4.5–6 mm, dark brown; longest pappus bristles 20–25 mm.

PARATYPES: **WASHINGTON. Chelan Co.:** Wenatchee Mts., trail to Snow Lakes, rocky granitic alpine slopes, 11 Aug 1952, 4000 ft, *Thompson 17135* (WTU); Yakima Region, 1883, *Brandegge 922* (UC); Nason City, 2000–3000 ft., Jul 1893, *Sandberg and Leiberg s.n.* (MIN); Yakima Region, Wenatchie, Aug 1883, 6500 ft, *Tweedy s.n.* (YU). **Kittitas Co.:** Mt. Stuart, Cascades, Aug 1898, *Elmer 1217* (MIN).

Cirsium edule var. *wenatchense* is apparently endemic to the Wenatchee Mountains, in the eastern Cascade Range of central Washington. Little is known of its variation or habitat. Because none of the specimens are complete individuals, the overall stature of the plant is unknown. I am not aware of any recent collections of this taxon.

Cirsium horridulum Michx. var. **megacanthum** (Nutt.) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium megacanthum* Nutt., Trans. Amer. Phil. Soc. 2nd ser., 7:421. 1841. TYPE: LOUISIANA: banks of Mississippi near New Orleans, *Little s.n.* (LECTOTYPE, here chosen from syntypes, PH).

Cirsium inamoenum (Greene) D.J. Keil, comb. nov. BASIONYM: *Carduus inamoenus* E.L. Greene Fl. Fran. 479. 1897; *Carduus undulatus* Nutt. var. *nevadensis* Greene, Proc. Acad. Nat. Sci. Philad. 44(1892):361. 1893 (homotypic synonym of *C. inamoenus*). TYPE: CALIFORNIA: E of Truckee or near that place, Aug 1883, *Greene s.n.* (LECTOTYPE, here chosen from syntypes, ND-G).

Cirsium inamoenum (Greene) D.J. Keil var. **davisii** (Cronquist) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium davisii* Cronquist, Leafl. W. Bot. 6:46. 1950. TYPE: IDAHO. BANNOCK CO.: University of Idaho farm, Pocatello, 8 Jun 1931, *Davis s.n.* (HOLOTYPE: WS).

Cirsium occidentale (Nutt.) Jeps. var. **lucianum** D.J. Keil, var. nov. TYPE: CALIFORNIA. SAN LUIS OBISPO CO.: Cuesta Ridge, along main road (USFS Rd. 29S11.3) 1.3 mi W of E boundary sign for Cuesta Ridge Botanical Area, ca. 4.3 mi W of Hwy. 101, scattered along disturbed roadside, serpentine, 2460 ft, 22 Jun 1989, *Junak and Ayers 4073* (HOLOTYPE: SBBG; ISOTYPE: OBI).

Habitu erecto, capitulis conspicue pedunculatis, involucris 2–4 cm diametro, atropurpureis, floccoso-arachnoideis, et corollas purpureo-atrorubens 20–24 mm distinguatur.

Plants erect, 3–20 dm. Capitula long-peduncled, elevated well above lower leaves; involucre 2–4 cm diameter, dark purple, floccose-arachnoid; middle phyllary tips generally 5–8 mm, 1–3 mm wide, straight or upwardly curved, ascending to spreading. Corollas 20–24 mm, dark purplish red.

PARATYPES: CALIFORNIA. San Luis Obispo Co.: Los Padres National Forest, W-facing cleared slope below TV towers just E of West Cuesta Ridge Rd. at eastern botanical area boundary sign, ca. 3 mi W of Hwy. 101, 22 Jun 1989, *Ayers and Junak 754A* (OBI, SBBG); 0.3 mi from hwy 101 along West Cuesta Ridge Rd., chaparral, S-facing slope, roadside, ca. 1540 ft, 4 Jun 2000, *Bushakra and Bushakra 35* (OBI), 36 (UC), 37 (MIN), 38 (ASU); Cerro Alto, 13 May 1958, *Hardham 3288* (SBBG); near summit of ridge W of upper Lopez Canyon, open W-facing slope, 5 Jun 1964, *Hoover 8932* (OBI); ridge NW of Cuesta Pass, serpentine area, disturbed roadside, 17 Jun 1965, *Hoover 9430* (OBI); Black Butte Research Natural Area, SE base of Peak 3, steep rocky opening at edge of *Quercus agrifolia* woodland at margin of unburned area, 2 May 1995, *Hrusa 12258* (CDA, OBI); Cuesta Ridge Botanical Area, N of main road, just S of KSBY television towers, ca. 2.7 mi W of Hwy. 101, 28 Jun 1989, *Junak and Ayers 4098* (SBBGG); Cuesta East in area burned by Gay Mt. and Las Pilitas fires, fire succession area in chaparral, 17 May 1987, *Keil et al. 20162* (OBI); San Luis Obispo, 187_, *Lemmon 41* (PH); along road to cypress forest below summit of TV peak, W of Cuesta Grade and Hwy. 101, 28 Jun 1968, *Smith 10095* (SBBG); S entrance to Cuesta Botanical Area, serpentine soil, 7 Jun 1971, 2500 ft, *Wiese 97* (OBI).

Cirsium occidentale var. *lucianum* is restricted to San Luis Obispo County, California where it occupies a narrow corridor along and adjacent to the main ridge of the southern Santa Lucia Mountains. In *The Jepson Manual* Keil and Turner (1993) treated these plants as an atypical race of *C. occidentale* var. *californicum*. They resemble small-headed plants of var. *californicum* but differ in their dark, reddish purple corollas and darkly pigmented involucre. They approach the

ranges of var. *californicum* and var. *venustum* but are not known to grow with either of these varieties. Wells (1983) and Keil and Turner (1992) reported the occurrence of hybrid swarms between these taxa in which emergent phenotypes differing from either parent have been observed. *Cirsium occidentale* var. *lucianum* may represent a stabilized emergent form derived by prehistoric hybridization between var. *californicum* and var. *venustum*.

Cirsium ochrocentrum A. Gray var. **martinii** (P. Barlow-Irick) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium ochrocentrum* A. Gray subsp. *martinii* P. Barlow-Irick, Novon 9:320. 1999. TYPE: NEW MEXICO. CATRON CO.: NM Hwy. 12, 5 mi E of San Francisco River bridge at Reserve, 5800 ft. elev., 28 Jul 1997, *Barlow 97-8* (HOLOTYPE: US; ISOTYPES: ASU, MO, NMC, UNM).

Hsi (1960) in an unpublished dissertation proposed recognition of this taxon as a species, noting its resemblance to *C. ochrocentrum*. Barlow-Irick (1999) formally described it as a subspecies of *C. ochrocentrum*, demonstrating its intergradation with typical *C. ochrocentrum*. As indicated above I have chosen to recognize varieties rather than subspecies in my FNA treatment of *Cirsium*, and I make the change from subspecies to variety in deference to the FNA Guide for Contributors.

Cirsium pulcherrimum (Rydb.) K. Schum. var. **aridum** (R.D. Dorn) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium aridum* R.D. Dorn, Vasc. Pl. Wyoming, 2nd ed. 304. 1992. TYPE: WYOMING. FREMONT CO.: ca. 6 mi N of Sweetwater Station, barren chalky hills, 6700 ft, 26 Jul 1990, *Dorn 5105* (HOLOTYPE: RM).

Cirsium scariosum Nutt. var. **americanum** (A. Gray) D.J. Keil, comb. nov. BASIONYM: *Cirsium acaule* Allioni var. *americanum* A. Gray, Proc. Philad. Acad. Nat. Sci. 1863:68. 1863. TYPE: COLORADO: Rocky Mts., lat. 39–41, *Hall and Harbour 339* (HOLOTYPE: GH).

Cirsium scariosum Nutt. var. **citrinum** (Petrak) D.J. Keil, comb. nov. BASIONYM: *Cirsium quercetorum* (A. Gray) Jeps. var. *citrinum* Petrak, Bieh. Bot. Centralbl. 35:363. 1917. TYPE: CALIFORNIA. SAN DIEGO CO.: Warner's Hot Springs, 10 Apr 1913, *Eastwood 2629* (HOLOTYPE: CAS).

Cirsium scariosum Nutt. var. **coloradense** (Rydb.) D.J. Keil, comb. et stat. nov. BASIONYM: *Carduus coloradensis* Rydb., Bull. Torrey Bot. Club 32:132. 1905. TYPE: COLORADO: Pagosa Springs, 28 Jul 1899, *Baker 644* (HOLOTYPE: NY; ISOTYPES: MO, ND-G, POM).

Cirsium scariosum Nutt. var. **congdonii** (R.J. Moore & Frankton) D.J. Keil, comb. et stat. nov. BASIONYM: *Cirsium congdonii* R.J. Moore & Frankton, Canad. J. Bot. 45:1738. 1967. TYPE: CALIFORNIA. MONO CO.: Bridgeport Valley, 3.5 mi NW of Bridgeport along U.S. Hwy. 395, edges of winter overflow of Buckeye Creek, 6505 ft, *Bacigalupi et al. 8015* (HOLOTYPE: DAO).

Cirsium scariosum Nutt. var. **robustum** D.J. Keil, var. nov. TYPE: CALIFORNIA. SISKIYOU CO.: N side of Stateline Rd., Hwy 161 to Tulelake, 5.2 km E of Hwy 97, 10.5

km NE of Dorris, T48N, R1E, sect. 16, 14 Jun 1977, *Fuller 20216* (HOLOTYPE: mounted on 3 sheets, CDA; ISOTYPE: CDA).

Habitu caulescente caulibus proximale ramosis, capitulis evidenter pedunculatis, apicibus phyllariorum interiorum expansis scariosis erosodentatis, et corollas albidis distinguatur.

Plants caulescent, 2.5–7 dm. Stems solitary from base, often very stout, proximally simple and distally branched or branched throughout, leafy, glabrous, villous with septate trichomes, or arachnoid-tomentose. Leaves oblanceolate to elliptic, deeply pinnately lobed, villous with septate trichomes or thinly arachnoid-tomentose, abaxially thinly to densely arachnoid-tomentose, villous with septate trichomes along the midvein. Capitula 3–many, evidently peduncled at stem tips (in age clustered axillary capitula sometimes developing), subtended and \pm overtopped by upper leaves or these \pm reduced. Involucres 2.5–4 cm; outer and middle phyllaries lanceolate to ovate, the spine tips 1–6 mm, slender to \pm broad and flat; tips of inner phyllaries linear-acuminate or more commonly expanded as a scarious, erose-toothed appendage, often contorted. Corollas white, 30–36 mm, the tubes 14–22 mm, the throats 7–12 mm, the lobes 5–10 mm; style tips 6–8 mm. Cypselae 4–6.5 mm; pappi 22–32 mm.

PARATYPES: **CALIFORNIA. Siskiyou Co.:** Gazelle, moist meadows, 20 Jun 1905, *Heller 8077* (PH); Butte Valley W of Dorris, occurring in large patches, 16 Jul 1982, *Shaw s.n.* (CDA); E of McCloud along Hwy. 89, 7.7 mi W of Shasta Co. line, roadside drainage in lodgepole pine forest, 24 Jul 1992, *Keil and Keil 23571* (OBI); 5 mi N of Gazelle, 14 Jul 1948, *Pryor 3704* (CDA); 4 mi N of Gazelle, 26 Jul 1950, *Pryor s.n.* (CDA); without locality, 22 Jul 1954, *Huse s.n.* (CDA); Hwy. 99, 2 mi S of Gazelle, T42N, R6W, roadside meadow, 9 Jul 1959, *Fuller 2738* (CDA). **OREGON. Klamath Co.:** Keno, bank of Klamath River, 6 Jul 1920, *Peck 9279* (DS); 15 mi S of Diamond Lake, moist ground, 7 Jun 1937, *Peck 19736* (WILLU). **Lake Co.:** 9 mi S of Summer Lake PO, swampy meadow, 19 Jun 1941, *Peck 20809* (UC, WILLU); along Johnson Creek, Summer Lake, 12 Jul 1928, *Constance 9478* (ORE); 6 mi NE of Lakeview, 29 Jun 1937, *Peck 19624* (WILLU).

Cirsium scariosum var. *robustum* is known only from northern California (Siskiyou County) and south-central Oregon (Klamath and Lake counties).

***Cirsium scariosum* Nutt. var. *toyabense* D.J. Keil, var. nov. TYPE: NEVADA. LANDER CO.:** N of Toiyabe Range, Silver Creek, 10.5 mi E of Nevada 8A, 12 airline mi N of Austin, T21N, R44E, Sect. 22, edge of wet meadow, 17 Jul 1970, 7000 ft, *Holmgren and Holmgren 4476* (HOLOTYPE: MIN; ISOTYPES: ASU, WTU).

Habitu caulescente corollas purpureis lobis 5.5–8 mm longis distinguatur.

Plants subcaulescent to erect, 0.5–5.5 dm. Stems usually simple, leafy, glabrous to villous or tomentose with septate trichomes, sometimes thinly arachnoid tomentose. Leaves oblong to oblanceolate or elliptic, pinnately lobed or often unlobed, adaxially green, glabrous or villous with septate trichomes, abaxially green and \pm glabrous to white-tomentose. Capitula 1–10+, sessile or short-peduncled, crowded at stem tips, usually subtended and \pm overtopped by upper leaves. Involucres 2–3 cm; outer and middle phyllaries lanceolate to ovate, the spine tips 2–4 mm, slender; tips of inner phyllaries acuminate and entire or

abruptly expanded into a scarios, erose-toothed appendage. Corollas rose-purple, 23–31 mm, the tubes 11–16 mm, the throats 4.5–8.5 mm, the lobes 5.5–8.5 mm; style tips 3.5–4.5 mm. Cypselae 4–6 mm; longest pappus bristles 22–25 mm.

PARATYPES: **NEVADA. Humboldt Co.:** Paradise Valley, NE of Winnemucca, T42N, R39E, Sect.14, irrigated meadow, 24 Jun 1967, 4700 ft, *Gentry and Davidse 1627* (ASU, DS, KANU, WTU); Virgin Valley, Virgin Valley campground, banks of pond, 16 Jun 1978, 4820 ft, *Tiehm and Rogers 4457* (CAS); Buckskin Mt.-Hinkey Summit road 2 mi from Buckskin Mt. summit, wet meadow, 1 Jul 1978, *Grimes and Packard 1183* (COLO); Kings River, Disaster Peak Range, 28 Jun 1924, *Archer 123* (ASU). **Lander Co.:** Toiyabe Range, hills around Austin, 22–25 Jul 1913, *Kennedy 4400* (PH, UC); Reese River, ca. 10 mi W of Austin, moist pasture, 31 Jul 1939, 5400 ft, *Hitchcock and Martin 5580* (UC, WTU); Toiyabe Mts., Jul 1868, 6000 ft, *S. Watson 689* (YU). **Nye Co.:** Millett, 4 Jul 1931, 5500 ft, *Linsdale and Linsdale 637* (CAS). **Washoe Co.:** near Glendale, Truckee meadows, 18 Jul 1913, 4500 ft, *Kennedy 3054* (PH, UC); White Pine, Steptoe Valley, Monte Neva Hot Springs, 21 mi N of McGill, white salt-crusted loam around spring, 4 Jul 1966, 6000 ft, *Holmgren and Reveal 2810* (WTU). **OREGON. Harney Co.:** Sod House School S of Malheur Lake, in marsh with *Typha*, 21 Jun 1958, *Raven and Solbrig 13368* (CAS); McDermitt Canyon, wet meadow, 4 Jul 1927, *Henderson 8522* (CAS); vicinity of Malheur Field Station, ca. 1/4 mi E of North Butte, edge of marsh with invading weeds, 11 Aug 2000, 4080 ft, *Keil 29092A, B* (OBI).

Cirsium scariosum var. *toiyabense* occurs from northern Nevada to southeastern Oregon and southern Idaho.

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