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A NEW SPECIES OF *ALLIUM* (ALLIACEAE) FROM THE SOUTHEASTERN  
KLAMATH MOUNTAINS, CALIFORNIA

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ABSTRACT

*Allium incomptum* J.A.Kierstead & L.Lindstrand III, sp. nov. (Alliaceae) is described as a new species of *Allium* from northern California. This new species is most similar to *A. yosemitense* Eastw., but differs by several features including its shorter pedicels, narrow, blunt tepals, and markedly exerted stamens, contrasted with the longer pedicels, acute tepals, and stamens not or barely exerted in *A. yosemitense*. The two species have widely disjunct geographic ranges in California, *A. incomptum* endemic to the eastern Klamath Ranges and *A. yosemitense* endemic to the central Sierra Nevada. We describe the morphological characters and habitat characteristics for *A. incomptum*, one in a series of recently discovered vascular plant taxa endemic to the eastern Klamath Ranges.

Key Words: *Allium incomptum*, California endemic, Minnesota Mountain Onion, southeastern Klamath Mountains, western Shasta County.

A new *Allium* taxon was found in 2015 by the first author at the summit of Minnesota Mountain, east of Shasta Lake in western Shasta County, California, during an unrelated botanical survey of the area. The *Allium* was growing in openings between shrubs on gravelly and shaly sedimentary rock and clay-like soils. It most closely fit the *The Jepson Manual* (McNeal 2012a, b) description of *A. yosemitense* Eastw., except that the undescribed taxon has shorter pedicels and narrowly spatulate tepals with rounded tips, compared to the acute tepals of *A. yosemitense*. The undescribed taxon also has long-exserted stamens, contrasting with *A. yosemitense* stamens that are about equal to slightly exceeding the length of the tepals, and longer pedicels. *Allium yosemitense* is narrowly endemic to the central Sierra Nevada of California and occurs on granitic substrate; its nearest known occurrence is 410 km south of the Minnesota Mountain location of the undescribed taxon. The most similar species to the new taxon in the *Flora of Oregon, Volume 1* (Otting et al. 2015) and the *Intermountain Flora* (Conquist 1977) is *Allium douglasii* Hook. However, *A. douglasii* has wider leaves, longer scapes, acuminate tepals, and longer pedicels than the undescribed taxon, and the nearest locality is approximately 400 km north of Minnesota Mountain. These geographic range and character traits, combined with our never observing a similar *Allium* during our collective 50+ years experience in the region suggested the plants to be an undescribed taxon. A specimen was sent to *Allium* authorities (Wilson, Otting, Oregon State University, personal communication) who confirmed the plant did not fit the description of any species treated in *The Jepson Manual* (McNeal 2012a, b), the *Flora of Oregon, Volume 1* (Otting et al. 2015), or the *Flora of*

*North America* (McNeal and Jacobsen 2002). We revisited the Minnesota Mountain population on 02 May 2019 and made additional observations and collections. The second author found another suspected occurrence during March 2020 near the western summit of nearby Salt Creek Mountain. Additional visits and collections from this location during April and May 2020 confirmed the plants were the undescribed species. The second author also revisited the Minnesota Mountain occurrence on 29 April 2021 and made additional observations and collections.

DESCRIPTION

*Allium incomptum* J.A.Kierstead & L.Lindstrand III, sp. nov. (Figs. 1, 2B-F) “Minnesota Mountain onion” —Type: USA, **California**, Shasta Co., Summit of Minnesota Mountain, 40°50′58″N, 122°11′12″W; 1292 m (4,240 ft), 29 April 2021, L. Lindstrand III 21370 (holotype: JEPS; isotypes: CAS, CHSC, DAV, GH, MO, NY, RSA, SPIF, US).

**Bulbs** 1–3, mostly 1; ovoid, 1.5–2.8 × 1.2–2.2 cm; outer coats enclosing 1 or more bulbs, brown, membranous, lacking cellular reticulation, without fibers; inner coats white. **Leaves** deciduous, basally sheathing at soil surface, 2, withering from tip at anthesis, blade solid, green, reddish-purple at base and along margins, turning purple with age, flat or very broadly channeled, ± falcate, 8.4–18.2 cm × 1–7 mm, margins entire. **Scape** 3–8 cm × 1–2 mm, forming abscission layer at the soil surface, frequently breaking at this level after pressing, solitary, erect, solid, terete; reddish-green at budding, reddish-purple to red at blooming, aging to pinkish. **Umbel** persistent, erect, compact, 17–55-flowered,

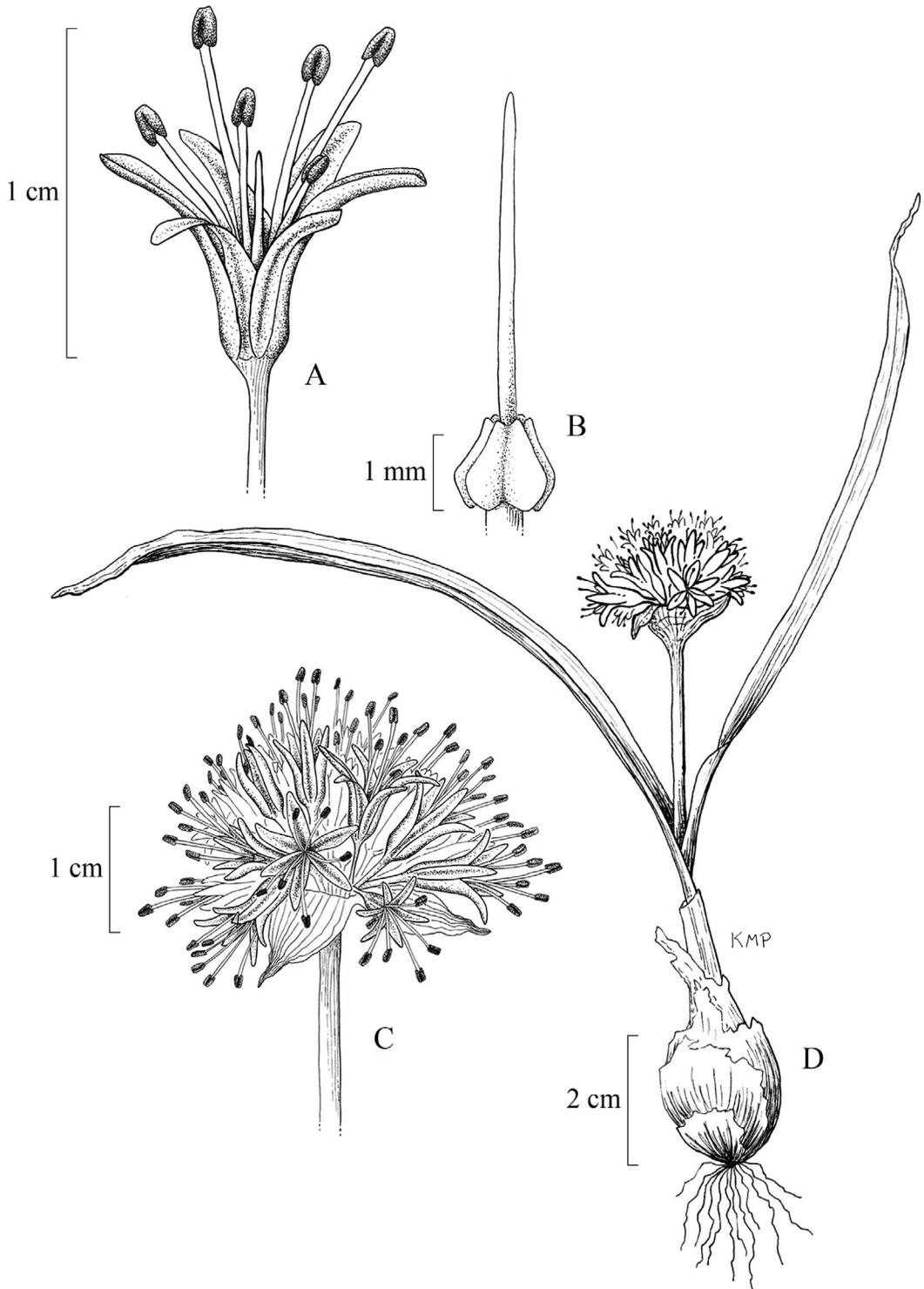


FIG. 1. *Allium incomptum*. A. Flower with exerted stamens and narrowly lanceolate, blunt-tipped tepals. B. Ovary without prominent crests. C. Umbel with flowers at varying stages of anthesis. D. Entire plant. From J. K. Nelson 2015-027, L. Lindstrand III 21258, and L. Lindstrand III 21300.



FIG. 2. *Allium incomptum*. A. Habitat at summit of Minnesota Mountain. B. Emerging plants showing purple-red color of leaf base, scape, and spathe bracts. C. Asynchronous flowering showing typical disheveled look. D. Flowers at anthesis. E. Habit. F. Entire plant. Photo credits A, C, D: Len Lindstrand III; B, E, F: Julie A. Kierstead. All photos from Minnesota Mountain, 02 May 2019.

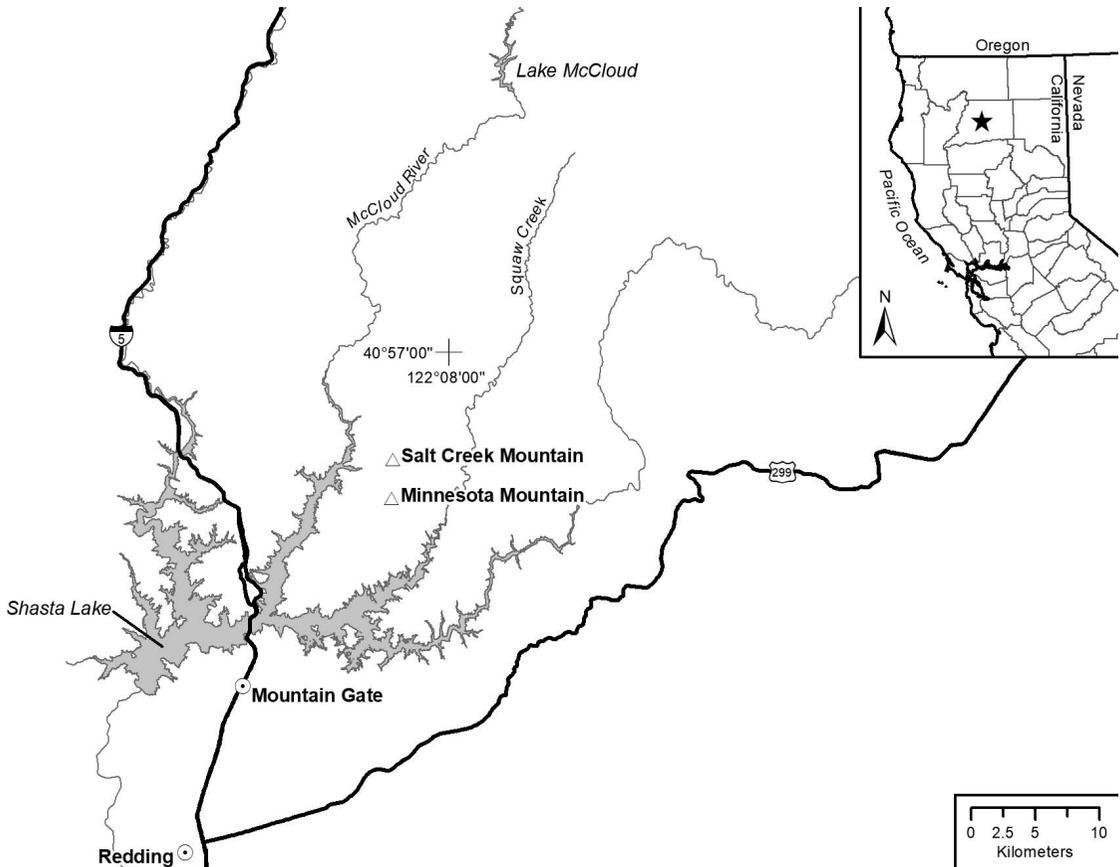


FIG. 3. *Allium incomptum* locations, Shasta County, California.

globose to hemispheric; spathe bracts persistent, 3, membranous, pale pink with darker veins, 7–10-veined, mostly 8, ovate,  $\pm$  equal, apex acuminate. **Flowers** tepals erect, 5–8 mm; narrowly lanceolate with blunt apex,  $\pm$  equal, whitish to pale-pink, often with light green midveins, margins entire; stamens exerted 1–4 mm, filaments white; anthers magenta, turning dark purple to black with age; pollen cream-colored; ovary crestless or slightly crested, processes 3; style short-exserted, linear; stigma simple, unlobed; pedicel 4–9 mm; flowers blooming asynchronously throughout umbel. **Seed** field observations and collections were made prior to fruiting, so seeds were not observed.

**Paratypes:** USA, CALIFORNIA, **Shasta Co.**, Summit of Minnesota Mountain, eastern Klamath Range, east of I-5; north side of Shasta Lake between McCloud and Squaw Creek arms; elevation 4245 feet.  $40^{\circ}50'58''\text{N}$ ,  $122^{\circ}11'12''\text{W}$ , 22 April 2015, *J. K. Nelson 2015-027* with *L. Lindstrand III* (JEPS); Summit of Minnesota Mountain,  $40^{\circ}50'58''\text{N}$ ,  $122^{\circ}11'12''\text{W}$ ; 1292 m (4240 ft), 2 May 2019, *L. Lindstrand III 21258* with *J. Kierstead* (CAS, JEPS, SPIF); Rock outcrop on western slope of Salt Creek Mountain,  $40^{\circ}52'36''\text{N}$ ,  $122^{\circ}11'05''\text{W}$ ; 1188 m (3900 ft), 15 April 2020, *L. Lindstrand III 21300* (CAS,

CHSC, DAV, JEPS, SPIF); Rock outcrop on western slope of Salt Creek Mountain,  $40^{\circ}52'36''\text{N}$ ,  $122^{\circ}11'05''\text{W}$ ; 1188 m (3900 ft), 28 April 2020, *L. Lindstrand III 21304* (CAS, JEPS); Rock outcrop on western slope of Salt Creek Mountain, CA.,  $40^{\circ}52'36''\text{N}$ ,  $122^{\circ}11'05''\text{W}$ ; 1188 m (3,900 ft), 4 May 2020, *L. Lindstrand III 21308* (CAS, CHSC, DAV, HSC, JEPS, OSC, RSA, SPIF).

#### DISTRIBUTION AND HABITAT

*Allium incomptum* occurs in the southeastern Klamath Mountains geomorphic province (Miles and Goudey 1997) in the vicinity of Shasta Lake, Shasta County, California. This area is characterized by mild, wet winters and hot, dry summers. The average annual precipitation is approximately 156 cm, occurring primarily as rainfall. Average annual temperatures range from  $10^{\circ}\text{C}$  in winter to  $32^{\circ}\text{C}$  in summer, with high temperatures regularly exceeding  $37^{\circ}\text{C}$ . *Allium incomptum* is currently known from two occurrences; the type locality at the summit of Minnesota Mountain, and a population approximately 3 km to the north near the western summit of Salt Creek Mountain (Fig. 3). Both populations occur within a very remote and rugged area along the

divide between the McCloud River and Squaw Creek.

Elevations at the Minnesota Mountain and Salt Creek Mountain sites are 1292 m and 1188 m, respectively. These mountains are part of the Permian Dekkas Andesite and Nosoni Formation, undivided, geologic unit, which generally extends as a narrow band from the vicinity of Mountain Gate northerly along the McCloud River watershed to the vicinity of Lake McCloud (Irwin 1994) (Fig. 3). The Dekkas Andesite portion of this geologic unit features volcanic breccia and pyroclastic rocks, and includes interbedded mudstone, tuffaceous sandstone, and local limestone; while the Nosoni Formation portion features tuffaceous mudstone and tuff, and subordinate sandstone, conglomerate, and mafic flows (Irwin 1994).

The *Allium incomptum* populations are associated with open, rocky, gravelly, mountain ridgetops in conifer forest and chaparral habitats (Fig. 2A). The area is dominated by *Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*, *Pinus ponderosa* Lawson & C. Lawson, *Pinus lambertiana* Douglas, *Quercus chrysolepis* Liebm., *Notholithocarpus densiflorus* var. *echinoides* (R.Br.ter) Manos, C.H. Cannon & S. Oh, *Arctostaphylos patula* Greene, *Cercocarpus betuloides* Nutt. var. *betuloides*, *Quercus garryana* (Hook.) var. *brewerii* (Engelm.) Jeps., and *Quercus chrysolepis* Liebm. (shrub form). Species associated with *A. incomptum* include *Aspidotis densa* (Brack.) Lellinger, *Calyptridium monospermum* Greene, *Ceanothus prostratus* Benth. var. *prostratus*, *Eriogonum ursinum* S. Watson var. *erubescens* Reveal & J. Knorr, *Fritillaria affinis* (Schult. & Schult.f.) Sealy, *Lomatium dissectum* (Nutt.) Mathias & Constance, *Lomatium macrocarpum* (Torr. & A. Gray) J.M. Coult. & Rose, *Penstemon azureus* Benth., *Pentagramma triangularis* (Kaulf.) Yatsk., Windham & E. Wollenw., and *Viola purpurea* Kellogg. Plant taxonomy follows Baldwin et al. (2012) and Jepson Flora Project (2021).

*Allium incomptum* is an addition to several recently described vascular plants endemic to the southeastern Klamath Ranges, including Shasta limestone monkeyflower, *Erythranthe taylorii* G.L. Nesom (Nesom 2013), Shasta maidenhair fern, *Adiantum shastense* Huie & A.R. Sm. (Huie et al. 2015), Shasta fawn lily, *Erythronium shastense* D.A. York, J.K. Nelson, & D.W. Taylor (York et al. 2015), Shasta huckleberry, *Vaccinium shastense* subsp. *shastense* J.K. Nelson & L. Lindstrand III (Nelson and Lindstrand 2015), and Damnation Pass phacelia, *Phacelia* sp. nov. (Kierstead et al. unpublished data). This region is geologically old, featuring Devonian (358–419 mya) through Jurassic (145–201 mya) rocks (Irwin 1966; Miles and Goudey 1997) and has been subject neither to glaciation nor overlain by volcanic material as adjacent regions (Lindstrand and Nelson 2006). The area is characterized by high annual precipitation at relatively low elevations, producing a combination of mesic

conditions and relatively mild temperatures. The combinations of these geologic and climatic factors result in conditions favorable for a diverse flora and fauna, including rare relict species such as *Neviusia cliffonii* Shevock, Ertter, and D. Taylor (Shevock et al. 1992). Numerous plant and animal taxa are either endemic, have isolated disjunct populations, or have distributions with peripheral populations in the area (Lindstrand et al. 2016; Bingham et al. 2018).

#### ETYMOLOGY

The specific epithet *incomptum* means disheveled, unpolished, untidy; in other words, unkempt, and refers to one notable characteristic of this onion, that not all flowers in the same inflorescence bloom simultaneously; often there are buds, partly opened flowers and fully opened flowers in the same umbel, giving the umbels a disheveled look (Fig. 2C). We suggest the common name “Minnesota Mountain onion.”

#### PHENOLOGY

*Allium incomptum* emerges during early-March and flowers from mid-April to mid-May. We observed plants in early-bud, older bud, anthesis, and late-flowering during the 02 May 2019 visit to Minnesota Mountain. The same observations occurred during 15 April, 28 April, and 04 May 2020 visits to the Salt Creek Mountain site, and the 29 April 2021 visit to Minnesota Mountain. *Allium incomptum* leaves wither as flowering proceeds and the plant is likely unrecognizable by mid- to late-summer.

#### RARITY AND CONSERVATION STATUS

*Allium incomptum* is endemic to the southeastern Klamath Mountains east of Shasta Lake in the vicinity of the lower McCloud River and Squaw Creek divide, Shasta County, California. The species is currently known from two occurrences; Minnesota Mountain and Salt Creek Mountain, which contained approximately 1800–2000 and 750–850 plants, respectively, based on estimates made during the 2021 visit to Minnesota Mountain and 2020 visits to Salt Creek Mountain. The Minnesota Mountain and Salt Creek Mountain occurrences occupy approximately 1.0 and 0.05 acres, respectively, and additional potential habitat occurs in the vicinity of both locations. Potential habitat for this species appears likely limited to the Dekkas Andesite and Nosoni Formation geology and further limited in that area to ridgetop sites with gravelly or shaly rock and clay-like soils.

Despite their proximity to Shasta Lake, both known *Allium incomptum* locations are very remote and difficult to access. Roads to access the area are rugged, require off-road vehicle capability, and are

not regularly maintained. Habitats at both locations are undisturbed. Minnesota Mountain receives very little, if any, regular human visitation, while the Salt Creek Mountain site lies within an area subject to very infrequent and light recreational use. Immediate use at both sites is limited to activities such as hunting and peak bagging. The Minnesota Mountain occurrence is located on land managed by the U.S. Forest Service (USFS), while the Salt Creek Mountain site occurs on private property and is immediately adjacent to USFS land. Surrounding land use includes dispersed recreation and timberland management. The open, rocky ridgetop locations in which these populations occur are not subject to timberland or other management activities and would not be exposed to potential threats from high intensity wildfire. *Allium incomptum* is rare in terms of the number of known occurrences and narrow geographic distribution. However, based on the undisturbed habitat conditions and remoteness of these populations with lack of known or potential threats, other than stochastic threats associated with few populations and restricted habitat, the species is not endangered or threatened at present. The species is, however, narrowly endemic and uncommon such that its status should be monitored and efforts made to locate additional populations. Other areas with potential habitat occur throughout the Dekkas Andesite and Nosoni Formation geologic unit, and it is unknown if potential habitat is limited to this geologic unit. We recommend that *A. incomptum* be considered for a California Rare Plant Rank of 1B.3 (Plants Rare or Endangered in California and elsewhere; not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known) in the California Department of Fish and Wildlife Special Vascular Plants, Bryophytes, and Lichens list (CDFW 2021) and the California Native Plant Society's Inventory of Rare and Endangered Plants of California (CNPS 2021).

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