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## Restoring the original taxonomic concept for *Navarretia minima* (Polemoniaceae): a revised synonymy and new combination

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### Abstract

The taxonomic concept for *Navarretia minima*, when treated as a species or as a subspecies of *N. leucocephala*, has drifted dramatically from the protologue and original material on which the name is based. Taxonomic concepts from regional floristic works are reviewed to understand the historical context of this drift. *Navarretia minima* is re-established in a manner consistent with the protologue and original material. *Navarretia furnissii* is placed in synonymy under *N. minima*, and a new combination, *N. leucocephala* subsp. *suksdorfii* comb. et stat. nov., is established as the proper name for plants that morphologically fit the contemporary, prevailing concept for *N. leucocephala* subsp. *minima*. This new combination is based on *N. suksdorfii*, a taxon that has either been ignored or considered in synonymy under *N. minima*. Lectotypification is provided for both *N. minima* and *N. suksdorfii*.

**Keywords:** lectotype, taxon concepts, Thomas Nuttall, western United States

### Introduction

Fieldwork, fine-scale morphological examination, and comparative DNA sequencing have contributed greatly to our understanding of species diversity in *Navarretia* Ruiz & Pav. (1794: 20) over the past 20 years (e.g., Spencer & Spencer 2003; Johnson & Cairns-Heath 2010; Johnson & Gowen 2017). This accelerated period of species discovery is built on a foundation laid by pioneering naturalists of the 19<sup>th</sup> century such as David Douglas and Thomas Nuttall, and field/academic botanists of the latter-19<sup>th</sup> and 20<sup>th</sup> centuries such as Edward Greene, Thomas Howell, Willis Jepson, Herbert Mason, and Alva Day. While addressing synonymy in the genus *Navarretia* for the *Flora of North America*, we determined that the concept for *Navarretia minima* Nuttall (1848: 13) has drifted non-trivially since early in the 20<sup>th</sup> century. The entity now being circumscribed by Nuttall's name no longer matches the protologue or type material. The degree and pervasiveness of this drift led the first author to describe, as new, material indistinguishable from Nuttall's collection. Taking the concept associated with Nuttall's *N. minima* as well-established, Johnson *et al.* (2012; as others before them) proposed a taxonomic novelty without consulting the original material upon which this name is based. Here, we outline the problem, present the proper application of Nuttall's *N. minima*, and address associated issues of synonymy, nomenclature, and lectotypification.

### Material and methods

We searched herbarium records and digital images from consortia including the Consortium of California Herbaria (CCH 2022+), Consortium of Midwest Herbaria (CMH 2022+), Consortium of Pacific Northwest Herbaria (CPNH 2022+), Intermountain Region Herbarium Network (IRHN 2022+), iDigBio (2022+), and JSTOR (2022+), as well as databases for individual herbaria (acronyms following Thiers 2020+) at BM, GH, NDG, NY, OSC, PH, and US. Loaned

specimens from CAS, GH, OSC (including ORE and WILLU), PH, RSA/POM, and WS, and material housed at BRY and UC/JEPS was also examined. Regional and historical floras relevant to the plants in question were consulted to better understand the application of names through time and by various workers.

## Results

From direct comparison of types, we determined that *N. furnissii* L.A. Johnson & L.M. Chan in Johnson *et al.* (2012: 56) is synonymous with *N. minima* (Fig. 1). Both types possess identical calyx and bract pubescence of scant, retrorse eglandular hairs, acicular leaf and bract segments of the same size, the longest 1–3 calyx lobes generally 2–3 pronged, the calyx intercostal membrane white hairy at the mouth of the calyx tube, corollas shorter than the calyx lobe tips but exerted from the calyx tube and mostly 4–4.5 mm long, anthers presented no more than half the length of the corolla lobes, pollen deep yellow, and plants of similar size and low, spreading habit. This concept is substantially different from the plants presently being referred to *N. minima* (as *N. leucocephala* subsp. *minima*), which are more aptly typified by *N. suksdorfii* Howell (1901: 457; Figs. 2, 3). In light of these findings, we propose the following changes to our present understanding of *Navarretia*:

1) Recognize *N. minima* as originally intended by Nuttall, with *N. furnissii* placed in synonymy under *N. minima*. Though these are heterotypic synonyms, their circumscription is identical, and readers are referred to Johnson *et al.* (2012) to better understand *N. minima* in a manner consistent with the material collected by Nuttall (1848). As defined here, *N. minima* is allied with *N. saximontana* S.C. Spencer in Spencer & Spencer (2003:1 98), *N. intertexta* (Bentham 1833: 1622) Hooker (1838: 74), and *N. propinqua* Suksdorf (1906: 26). *Navarretia minima* occurs predominantly in the Caribou and Wasatch Mountain ranges of eastern Idaho and Utah and does not occur further west than these two states (Fig. 4). *Navarretia saximontana*, historically often collected under the name *N. minima*, retains its distinction following the differences between these taxa set forth by Johnson *et al.* (2012).

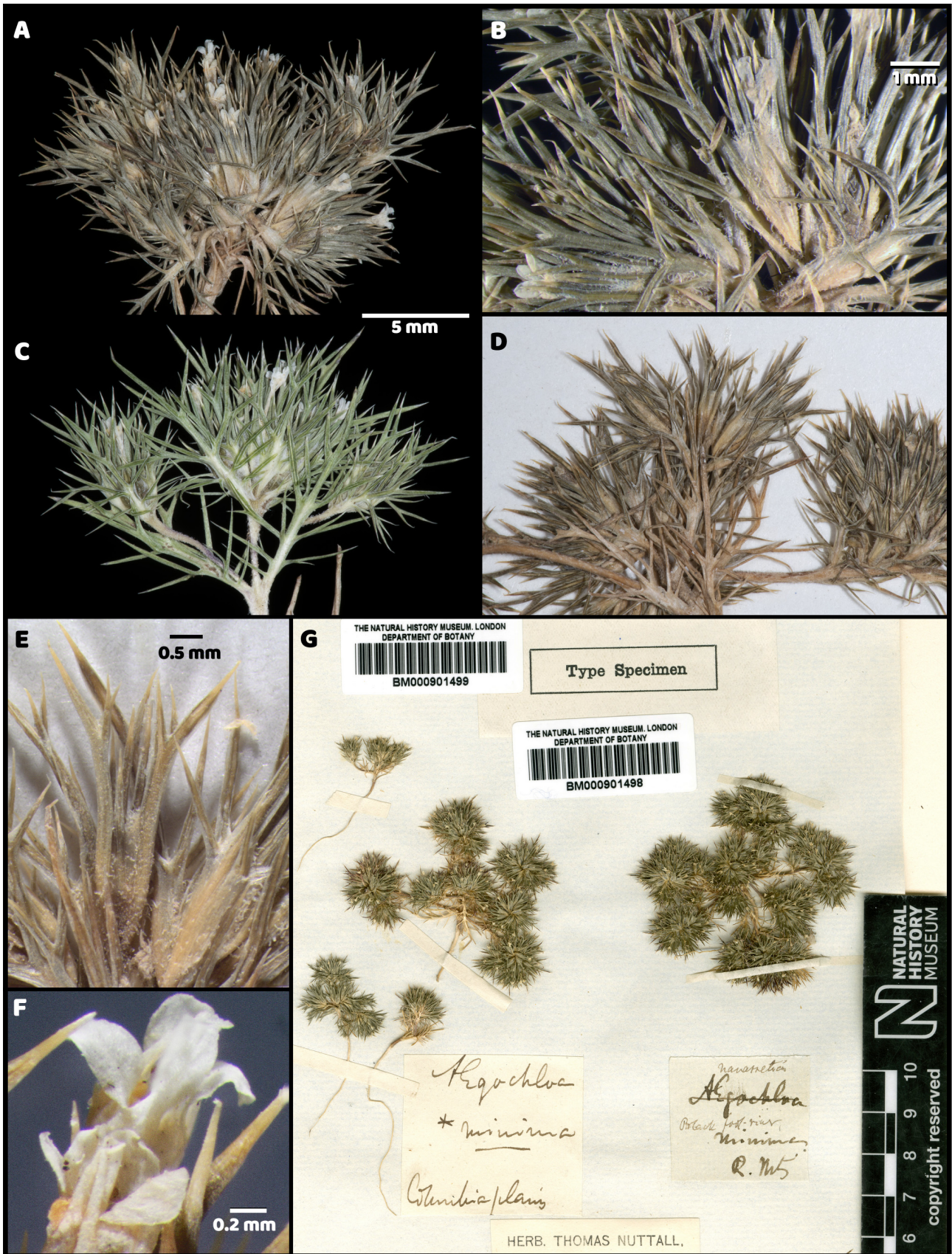
2) Recognize Howell's '*suksdorfii*' as the correct epithet for the material that has long been recognized as allied to *N. leucocephala* Bentham (1849: 324) but treated as *N. minima* by, for example, Cronquist (1984) or as *N. leucocephala* subsp. *minima* (Nutt.) Day (1993a: 337). When Day (1993a) placed *N. minima* as a subspecies of *N. leucocephala*, she simultaneously reduced *N. bakeri* (Mason 1946: 198), *N. plieantha* (Mason 1946: 199), and *N. pauciflora* (Mason 1946: 200) as subspecies of *N. leucocephala* as well. Johnson (2019) discussed the need for additional species delimitation work aided by molecular systematics to address patterns of morphological variation, genetic divergence, and evolutionary relationships in the *N. leucocephala* complex, including affinities with *N. myersii* P. S. Allen & A. G. Day in Day (1993a). At present, placing *N. suksdorfii* as a subspecies of *N. leucocephala*, effectively using its name and type in place of the concept of *N. leucocephala* subsp. *minima* of Day (1993a), is appropriate until further species delimitation work is accomplished. As defined here, *N. leucocephala* subsp. *suksdorfii* (Fig. 2) occurs predominantly east of the Cascade Mountains in Oregon and Washington, south to central California, then east to southwestern Idaho and northern Nevada (Fig. 4). Disjunct occurrences at Dry Lake in northern Utah (*Shaw* 3268, BRY barcode BRYV0298743!) and Fremont County in eastern Idaho (e.g., *Cronquist* 1628, NY barcode 03342251 image!) are known. The Utah population grows at the same locality as *N. propinqua* and *N. minima* as defined here.

## Taxonomic treatment

### *Navarretia minima* Nutt. Proc. Acad. Nat. Sci. Philadelphia 4(1): 13 (1848)

≡ *Gilia minima* (Nutt.) A.Gray, Proc. Amer. Acad. Arts 8: 269 (1870) ≡ *Navarretia leucocephala* Benth. subsp. *minima* (Nutt.) A.G.Day Novon 3(4): 337 (1993; as to type, but not circumscription). TYPE:—[U.S.A. Washington: Walla Walla County], Plains of the Oregon [Columbia River], near Walla-Walla [Wallula Junction], *Nuttall s.n.* (lectotype, first step, Day 1993a: Novon 3: 337; lectotype, second step, designated here: BM barcode BM000801499 image!, islectotypes PH01076560! [barcode PH00019022], GH barcode 01565862!).

= *Navarretia furnissii* L.A.Johnson & L.M.Chan, Phytotaxa 42: 56 (2012). TYPE:—U.S.A. Utah: Summit County, in open, disturbed spaces in a sagebrush framed meadow between Hwy 150 and the Beaver Creek picnic area, ca. 0.2 miles east of mile marker 8, 40.62242° N, 111.14703° W, 2187 m; 7 July 2005, *L.A. Johnson & C.L. Johnson 05-197* (holotype BRY barcode BRYV0006175!, isotypes NY barcode 02147669!, RM!, RSA!, UC barcode UC 2072639!).



**FIGURE 1.** *Navarretia minima*. A, B, F: isolectotype at GH (Nuttall s.n.). C: toptype of *N. furnissii* (Johnson 08-033, BRY) collected 3 July 2008. D, E: isolectotype at PH (Nuttall, s.n.). G: lectotype and associated specimen at BM (both Nuttall s.n.). A, C, D at same magnification. Calyx and bract pubescence illustrated in B, E; yellow pollen in anthers apparent in F.



**FIGURE 2.** *Navarretia leucocephala* subsp. *suksdorfii*. A, B: lectotype of basionym (*N. suksdorfii*) at ORE (*Suksdorf s.n.*). A. specimens from sheet with label and herbarium catalog stamp repositioned as insets to maximize specimen detail. B. close up of flowers.

Notes:—All of Nuttall’s *N. minima* plants, including that labeled “Rocky Mtns” (BM barcode BM0000801498 image!) are likely from a single collection in the Caribou Mountain Range near the Blackfoot River, Idaho (Table 1). Nevertheless, we formally designate only the specimens that reference the Columbia Plains, in deference to the protologue that is almost certainly in error. Day (1993a) rather than Cronquist (1984) inadvertently provided the first step lectotypification. In the first volume of the *Intermountain Flora*, Cronquist *et al.* (1972: 8) state, “When one of

several collections cited in the protologue is obviously the primary basis for a name, we have given it as the type, without further comment. Sometimes the typification is less clear and a more cautious statement is necessary. Our citation is not to be taken as the formal selection of a lectotype, except when specifically so indicated.”

**TABLE 1.** *Navarretia (Aegochloa)* collections made by Thomas Nuttall during the Wyeth expedition of 1834–1836. Date at label location is inferred by matching label locations with dates as found in Pennell (1936). Probable collection date and probable location are inferences made based on phenology of the plants, known dates when Nuttall was at the inferred locality, and where plants matching the morphology of the collections can be found today.

Nuttall's name	Herbarium barcode	Phenology	Label location	Date at label location	Probable collection date	Probable location
Ae. *eriocephala	GH 01565749	Green; early to mid flower	Wahlamet	Spring/Summer 1835	Spring/Summer 1835	Willamete Valley, Oregon
Ae. *echinopsis	GH 01565747	Brown; senesced	Dalles	5–10 Sept 1834	5–10 Sept 1834	The Dalles, Oregon
Ae. *tenella	GH 01565748	Brown; senesced	Rocky Mountains	June/July 1834	2–4 Sept 1834	Columbia plains, Washington
Ae. *minima	GH 01565862	Green; mid flower	Columbia plains or Rocky Mountains	2–4 Sept or 10 July 1834	10 July 1834	Rocky Mountains, Idaho
	BM 0000801498	Green; mid flower	Rocky Mountains at Blackfoot River	10 July 1834	10 July 1834	Rocky Mountains, Idaho
	BM 000801499	Green; mid flower	Columbia Plains	2–4 Sept 1834	10 July 1834	Rocky Mountains, Idaho
	PH 00019022	Green; mid flower	Columbia Plains	2–4 Sept 1834	10 July 1834	Rocky Mountains, Idaho

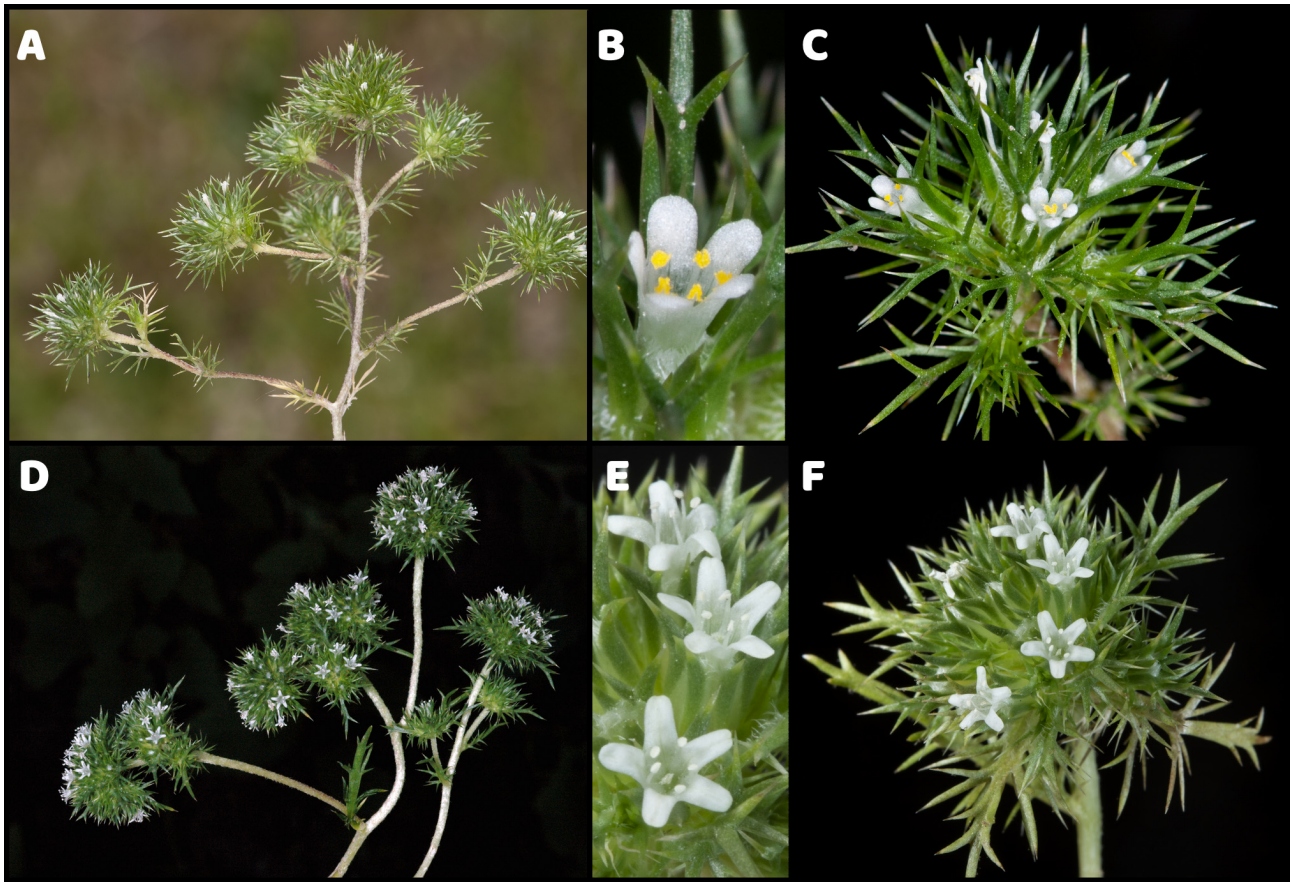
***Navarretia leucocephala* Benth. subsp. *suksdorfii* (Howell) L.A. Johnson & D. Gowen comb. et stat. nov.**

≡ *Navarretia suksdorfii* Howell. Fl. N.W. Amer. 457 (1901) ≡ *Navarretia minima* Nutt. var. *suksdorfii* (Howell) Brand. Pflanzenr. 27[IV,250]: 164 (1907). TYPE:—[U.S.A.] Washington: [Klickitat County], Falcon Valley, low grounds, 25 July 1883, *Suksdorf s.n.* (lectotype designated here: ORE 96503! [barcode OSC0000797], isolecotypes M barcode M-0185275 image!, NDG 40872 image!, NY barcode 00336965 image!, UC 185255!).

= *Navarretia pilosifaucis* St. John & Weitman. Proc. Biol. Soc. Washington 41(45): 196–197 (1928). TYPE:—[U.S.A.] Washington: Whitman County, Rock Lake, rocky sandy soil, 23 June 1927, *G. Weitman 430* (holotype: WS 43975! [barcode WS001522]).

Misapplied names: *Navarretia minima* sensu Jepson (1943), Mason (1951), Cronquist (1959, 1984), and others. *Navarretia leucocephala* subsp. *minima* sensu Day (1993a, b), Johnson (2012, 2019), and others.

Notes: Howell did not cite a specific collection of Suksdorf's or a date, and Suksdorf collected frequently in 'Falcon Valley', the swampy plateau near the southeastern base of Mt. Adams in northwestern Klickitat County, Washington (Weber 1944). We chose the specimen at ORE, which Howell would have worked from, as lectotype, which includes the exact wording found in the protologue, has been generally considered the type based on annotations, and is in good condition. When Brand reduced *N. suksdorfii* to a subspecies under *N. minima*, he noted the specimen he worked from was at the Berlin Herbarium. This specimen is presumably destroyed, but a duplicate at M bears an annotation label by Brand in 1905 using his then unpublished combination. The specimens at ORE, M, and NY have printed labels with no collection number, whereas those at NDG and UC are handwritten and include "167" before the species name, which is likely a referencing number rather than Suksdorf collection number. *Navarretia pilosifaucis* was considered a synonym of *N. intertexta* by Mason (1951) and of *N. propinqua* by Cronquist (1959), but has been largely ignored otherwise. Curiously, the holotype of *N. pilosifaucis* belongs in *N. leucocephala* subsp. *suksdorfii* as defined here, having white pollen and elongated, flattened, flexuous outer bracts that exclude it from both *N. intertexta* and *N. propinqua*. However, the single cited paratype, collected a year later in the same general vicinity (WS 48906! [barcode WS001942]), is clearly *N. intertexta* and may have been the source of Mason's and Cronquist's determination.



**FIGURE 3.** Comparison photos of fresh plants and flowers of *Navarretia minima* and *N. leucocephala* subsp. *suksdorfii*. A–C: *N. minima* (Johnson 09-073, BRY). D–F: *N. leucocephala* subsp. *suksdorfii*. D: Johnson 05-198, BRY. E, F: Johnson 16-085, BRY.

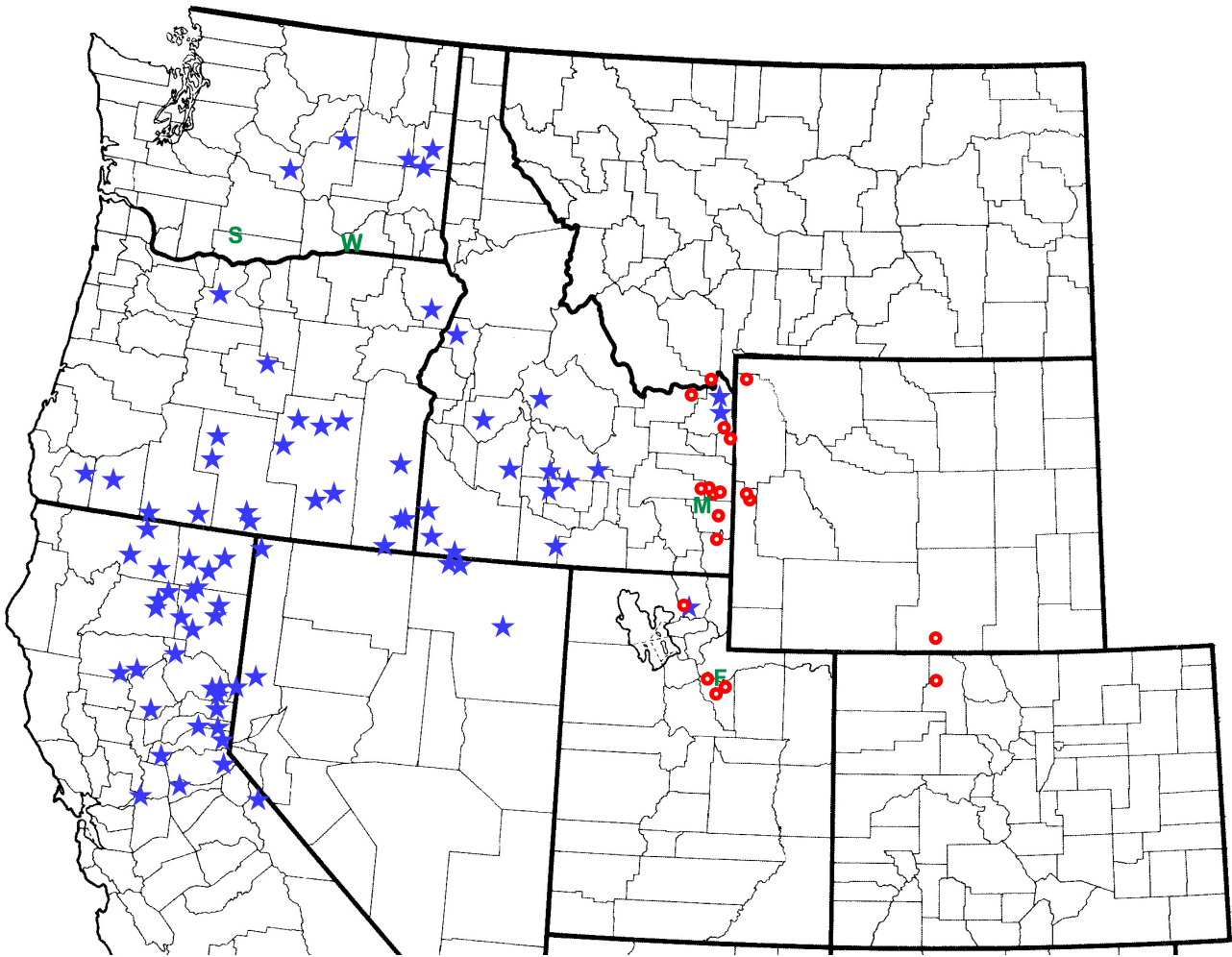
## Discussion

In recognizing *Navarretia saximontana*, Spencer & Spencer (2003) circumscribed one of only two *Navarretia* that occur entirely east (or south in Arizona) of the Great Basin in the United States of America. The protologue for *N. saximontana* contrasts it with *N. intertexta* and *N. leucocephala* subsp. *minima*, the names used for taxa that prior collections of *N. saximontana* had been commonly placed in. From *N. intertexta*, including *N. propinqua* that at that time was considered a subspecies of *N. intertexta*, *N. saximontana* differs by having a shorter style, shorter filaments, anthers presented below the corolla lobe tips rather than equal to or beyond the tips, and having shorter and much less dense pubescence in the inflorescence. However, all of these taxa share rigid, acicular leaf and bract segments and deep yellow pollen. The characteristics shared with *N. intertexta* and *N. propinqua* by *N. saximontana* distinguish it from *N. leucocephala* subsp. *minima* as understood by Spencer & Spencer (2003), the latter taxon having more flexuous leaves and bracts often with flattened rather than acicular divisions, and white/cream pollen.

In searching for the diploid parents of the tetraploid *N. propinqua*, Johnson *et al.* (2012) determined that Spencer & Spencer's (2003) *N. saximontana* was composed of two distinct entities: 1) a tetraploid taxon encompassing the type that possesses slightly larger flowers, has only occasionally a calyx with one (rarely two) lobe 2–3-pronged, and possesses 6–12 ovules per capsule; and, 2) a diploid taxon with smaller flowers, having the longest one to three lobes of most calyxes 2–3-pronged, and possessing 4–6 ovules per capsule. Johnson *et al.* (2012) segregated the diploid material under a new name, *N. furnissii* and emended the description and circumscription of *N. saximontana*. The diagnosis for *N. furnissii* compared this species with *N. saximontana*, the only species it was likely to be confused with, building upon the comparative work of Spencer & Spencer (2003).

Just a year prior to the recognition of *N. saximontana*, Björk (2002) described a new subspecies of *N. leucocephala* endemic to the central of three scabland channels in eastern Washington. This subspecies was contrasted with each of the other subspecies of *N. leucocephala*, especially subsp. *minima* with which it shares small corollas and geographic

proximity. *Navarretia leucocephala* subsp. *diffusa* Björk (2002: 165) is distinguished from subsp. *minima* by having less dense and fewer flowered heads, a greater tendency for pubescence on the calyx, and mostly entire calyx lobes.



**FIGURE 4.** Approximate distributions of *Navarretia minima* (red circles) and *N. leucocephala* subsp. *suksdorfii* (blue stars) based on representative specimens. Green letters indicate the following: F = type location of *N. furnissii*. M = approximate collection location of *N. minima* by Nuttall near the Blackfoot River north of Soda Springs, Idaho. S = type location for *N. leucocephala* subsp. *suksdorfii*. W = Ft. Walla Walla, the approximate location published as the type locality of *N. minima*.

Following the regional floras of the Pacific states and Intermountain region (e.g., Day 1993a, b; Cronquist 1959, 1984), each of the studies above (Björk 2002, Spencer & Spencer 2003, and Johnson *et al.* 2012) accepted as established the circumscription of *N. leucocephala* subsp. *minima* as a small-flowered taxon with white/cream pollen of ephemeral pools, moist meadows, and similar open, seasonally wet sites predominantly in California, Oregon, and Washington, and extending through northern Nevada and southern Idaho.

Cronquist's (1984) treatment for the *Intermountain Flora*, as those before him, treated *N. leucocephala* subsp. *minima* at the species level, as *N. minima*. He indicated having viewed the type at BM, lending authority to his work. His morphological description, geographic range, and illustration were taken with only slight modification from his earlier treatment for the *Vascular Plants of the Pacific Northwest* (Cronquist 1959). Cronquist's concept is consistent with the concept put forth by respected California botanists that preceded him.

Crampton's (1954) evolutionary study of *Navarretia* recognized *N. minima* as a small-flowered vernal pool species following the concept of his advisor, Herbert Mason. In his treatment for Abram's *Illustrated Flora of the Pacific States*, Mason (1951) positioned *N. minima* between *N. leucocephala* and three California endemic species now treated, with *N. minima*, as subspecies of *N. leucocephala*. The accompanying illustration is faithful to today's prevailing concept, and the listed distribution includes only the three Pacific states where material that fits this concept is concentrated.

In his *A Flora of California*, Jepson (1943) listed *N. minima* between *N. leucocephala* and *N. prostrata* (Gray 1882: 223) Greene (1887: 130), both vernal pool species with white/cream pollen and flexuous leaves and bracts, and

commented, “In most respects *Navarretia minima* may be viewed as a dwarfed form of *N. leucocephala* with many small heads and with short corollas. On technical grounds, it has some claims to rank as a variety of *N. leucocephala*.” The combination reducing the status of *Navarretia minima* to a subspecies of *N. leucocephala* was effected by Day (1993a) in preparation for her treatment of *Navarretia* for the first edition of *The Jepson Manual: Higher Plants of California* (Day 1993b). Even before his 1943 flora, Jepson’s concept for *N. minima* was developing from observations of plant material that would naturally fit in his 1943 concept (e.g., Jepson 1925). Although he stated the distribution for *N. minima* as extending to Nebraska, this may have been from consulting works such as Howell (1901) or communication with others rather than from having seen specimens from that region personally given that his description, such as “calyx perfectly glabrous outside (rarely partially hairy)...style not cleft or very shortly 2-cleft” applies to plants from the Pacific states but not *Navarretia* occurring well east of the Great Basin such as in Nebraska.

Greene’s (1887) treatment is more like Nuttall’s original than any of Jepson’s treatments, describing the plants as being more rigid than *N. leucocephala* in agreement with a collection he made in Wyoming of a plant today recognized as *N. saximontana* (GH barcode 01565858!; NDG 40871B image!). His mention of material from California “near the Mexican border where it seems to be confluent with *N. prostrata*” suggests he may have incorporated plants into his concept that are now recognized as *N. fossalis* Moran (1977: 155). Howell’s (1901) *Flora of Northwest America*, similar to Greene, presents a description of *N. minima* based more on Nuttall’s original description than plants from the Pacific Northwest, though he deviated from Nuttall’s description by describing all calyx lobes as entire rather than only three of the five. This may be because he collected, and placed in *N. minima*, diminutive *N. leucocephala* subsp. *leucocephala* from Stein’s [Steen’s] Mountain, Oregon that possesses entire calyx lobes (OSC barcode OSC-V-047243!). Also, plants from Arizona and Nebraska, which Howell noted in the distribution for *N. minima*, are now recognized as *N. saximontana* and have predominantly entire calyx lobes. In the same work, Howell proposed a new species, *N. suksdorfii*, with a description that aligns closely with today’s prevailing concept of *N. minima*/*N. leucocephala* subsp. *minima*. Howell noted that *N. suksdorfii* differed from *N. minima* by its “dense heads and 3-lobed calyx teeth” affirming that Howell’s concept for *N. minima* was different than the other Pacific states botanists that followed him. Jepson (1943) did not mention *N. suksdorfii*, but Peck (1941), Mason (1951), and Cronquist (1959) all included this name in synonymy under *N. minima*.

Gray (1870, 1878) treated *N. minima* in his polymorphic *Gilia*. In Gray’s (1876) *Botany of California*, the species is excluded save a comment under his *Gilia intertexta* (Benth.) Steudel (1840: 683): “*G. minima* (Nutt.) Gray (1870: 269), a dwarf and tufted nearly glabrous white-flowered species, related to [*G. intertexta*] and [*G. breweri* Gray (1870: 269)], inhabits the interior dry region, but has not been found west of Utah.” However, in both earlier and later works (Gray 1870, 1878), Gray included “interior of Oregon and Nevada” in the range of *G. minima*. Mounted on the same sheet as the *N. minima* type material at GH, Gray included one additional collection of *N. minima*, three of *N. saximontana* including a collection by Vasey, which Gray cited with his description of *G. minima* (Gray 1870), and one of *N. minima* var. *suksdorfii* (this specimen lacks an annotation by Gray). The other two collectors cited by Gray (1870) as representative of *G. minima* are represented by barcodes NY03341943 (Nicollet; image!) and US01160318 (Geyer; image!); both were collected during Nicollet’s 1838–39 exploration of the land between the Mississippi and Missouri Rivers south of Canada (Bray & Bray 1976), and both represent *N. saximontana*.

Gray’s concept for *G. minima* essentially mirrors Spencer & Spencer’s (2003) broad concept for *N. saximontana* that encompassed both taxa. This concept has been used in more eastern regions where *N. saximontana* occurs but *N. leucocephala* does not. For example, Moss’ (1959) *Flora of Alberta* (Canada) applies the name *N. minima* to plants today recognized as *N. saximontana*. The use of *N. minima* in the regions covered by both Weber’s (1990) *Colorado Flora: Eastern Slope* and Dorn’s (1977) *Manual of the Vascular Plants of Wyoming* applies to both *N. minima* (as redefined here) and *N. saximontana*. Crampton indicated that material of *N. minima* in Arizona (= *N. saximontana*) was atypical and approached *N. propinqua* in features (Kearney & Peebles 1951). Wilken (1986), in the *Flora of the Great Plains*, mentions the disparity among authors in how they separate *N. minima* from *N. propinqua*. Although he recognized only the latter, the plants in the Great Plains region are *N. saximontana*. Descriptions in these floras are generally minimal (with the exception of Wilken 1986), lacking in detail, and from them it is not immediately obvious that the plant material under consideration is different from that being given the same name in the more western states.

The prevailing concept of *N. minima* today aligns with neither the original description provided by Nuttall, nor the type specimens deposited at PH, GH, and BM (Fig. 1). Of works we reviewed, only Cronquist (1984) indicated having viewed the type, and we know Gray did as well. However, it is clear Cronquist’s observation was not done in concert with the development of his taxonomic concept. His concept, and Day’s (1993a, b) when treated as a subspecies of *N. leucocephala*, is a well-articulated formulation of the prevailing morphological concept of today that applies to



the same taxon named by Howell (1901) as *N. suksdorfii* (Fig. 2), but not the plant originally collected and named by Nuttall (1848). Handwritten notes on an isoelectotype of *N. suksdorfii* (NY barcode 00336965 image!) confirm that Cronquist equated this material to *N. minima*.

Today's prevailing concept for *N. minima*/*N. leucocephala* subsp. *minima* likely evolved from a mistake initiated by Nuttall himself. With an intense passion for natural history and discovery, Nuttall resigned his position at Harvard to participate in a transcontinental expedition led by Nathaniel Wyeth to the Pacific Northwest in 1834 (Pennell 1936). Only a handful of *Navarretia* species had been named by that time, with most having been named just a year earlier in the genus *Aegochloa* Bentham (1833). Understandably, Nuttall coined provisional names for many of the plants he collected on this trip, and he placed an asterisk by the species epithet of these provisional names (many were never published). Nuttall's personal herbarium was purchased by the British Museum following his death and Asa Gray acquired portions of some of Nuttall's collections from BM that now reside at GH. Among these are four *Navarretia* collections, each labeled in Gray's hand with Nuttall's provisional names and locations copied from Nuttall's original labels (Table 1). Three of these collections were considered by Gray to belong to *Gilia* (*Navarretia*) *intertexta* and were mounted by Gray on the same sheet: "Ae \*tenella Nutt. Rky Mts [Rocky Mountains]," "Ae. \*echinopsis Nutt. Dalles [The Dalles]," and "Ae \*eriocephala Nutt. Wahlamet [Willamette Valley]." The fourth Nuttall collection, "Navarretia \*minima Columbia Plains Rky Mts. [Rocky Mountains]" is mounted on a separate sheet along with several specimens from other collectors that Gray considered representative of *G. minima*.

Pennell (1936) provides a timeline for the locations the Wyeth expedition visited. Passing through the Rocky Mountains in 1834, the expedition was at Soda Springs (Idaho) on July 9<sup>th</sup> and traveled north to the head of the Blackfoot River (Idaho) on July 10. A specimen of *N. minima* at BM is labeled, in Nuttall's hand, "*Aegochloa minima* R. Mtns" with annotations also from Nuttall of "Navarretia" and "Black foot river" subsequently added, that corresponds to this date and location (Fig. 1G). This specimen is identical in morphology and phenology to the remaining *N. minima* material of Nuttall's, whether it is labeled as Columbia Plains (PH, BM) or both Columbia Plains and Rocky Mountains (GH; Fig. 1A–B, D–G). As noted above and on the specimen, the GH plant was acquired from BM and Asa Gray recorded the localities of both BM specimens on the label kept in the envelope in which the single specimen resides. An unattributed note recorded as metadata with the GH sheet image on JSTOR Global Plants (2022+) reads, "This specimen clearly came from the Columbia Plains collection at (BM) which has three other plants like this one. The Rocky Mountain specimen consists of a single multibranched plant." This interpretation is not necessarily definitive, but perhaps also moot as they most likely came from the same collection near the head of the Blackfoot River in Idaho.

The Wyeth expedition did not arrive in the vicinity of the "Columbia Plains" until September, traveling to Fort Walla Walla (Washington; Wallula Junction; ± 680 air km from the Blackfoot River) on Sept 2–3<sup>rd</sup>. They departed along the south bank of the Columbia River to The Dalles (Oregon) September 5–10<sup>th</sup>, and then gradually made their way to the Pacific Coast at Cape Disappointment before voyaging to the Hawaiian Islands for the winter. Nuttall's \*echinopsis collection from The Dalles is brown and senesced, as is the \*tenella collection labeled as being collected in the Rocky Mountains. Both were likely collected in this September time frame, with the \*tenella locality unintentionally mixed-up with \*minima's. In 1835, Nuttall sailed back from Hawaii to Cape Disappointment, arriving in mid-April. From that point his itinerary is less clear, but he apparently spent the next four months in the Willamette Valley and along the Columbia River, perhaps as far east as The Dalles (Oregon; Pennell 1936). Nuttall's \*eriocephala from the Willamette Valley is green, in flower, and was likely collected during this time.

Over a decade later, Nuttall published descriptions of many plants collected by William Gambel from the Rocky Mountains and Upper California, wherein Nuttall also described *N. minima* and other plants of his own collecting. This paper was published twice (see Reveal & Spevak 1967), with no difference in the description of *N. minima* between the two versions. Nuttall is known to have made other locality errors in this same publication such as with *Gilia aurea* (Porter & Patterson 2015) and *Chorizanthe angustifolia* (Gowen & Johnson 2020). Graustein (1967: 297) describes confusion in localities from this same expedition, which she describes as "an inadvertence not unique in Nuttall's writings." This is perhaps not surprising given the 14-year interval between when the plants we are concerned with were collected and when they were published, and Nuttall's considerable travels and residencies over that period of time (Pennell 1936). The consequence of Nuttall's error is that a plant that can be found in the Pacific Northwest, in deference to the locality provided by Nuttall, has been equated to Nuttall's published name and brief description without comparing with Nuttall's original material.

The holotype of *N. furnissii*, at a similar phenological state as Nuttall's *N. minima* material, was collected on 7 July 2005 about 250 km south of the Blackfoot River, and about 300 meters higher in elevation. Johnson *et al.* (2012) list several paratypes of *N. furnissii* ± 20 km from portions of the Blackfoot River that Nuttall likely traveled along on

10 July 1834. The only *Navarretia* approaching the morphology of the type for *N. minima* with acicular leaf segments located in the general region of Ft. Walla Walla in Washington are *N. propinqua* and *N. intertexta*, but those species are coarser, larger plants having more abundant and longer pubescence on the bracts and calyces, and larger flowers, among other distinguishing features.

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