

NAVARRETIA WILLAMETTENSIS AND NAVARRETIA SAXIMONTANA
(POLEMONIACEAE), NEW SPECIES FROM EPHEMERAL WETLANDS OF
WESTERN NORTH AMERICA

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ABSTRACT

Navarretia willamettensis is a newly described species inhabiting vernal pools and similar habitats in the Willamette Valley of western Oregon. *Navarretia saximontana* is a newly described species inhabiting ephemeral wetlands of the Rocky Mountains, Colorado Plateau and Great Plains. Both species pertain to the *N. leucocephala* group of *N.* section *Navarretia* and have been confused with *N. intertexta* and *N. leucocephala* subsp. *minima*.

Key Words: *Navarretia*, vernal pools, *willamettensis*, *saximontana*, new species.

Regional floristic treatments of *Navarretia* (e.g., Cronquist 1984, 1959; Wilken 1986) have made note of frequent difficulty in distinguishing between *N. leucocephala* Benth subsp. *minima* (Nutt.) A. G. Day and *N. intertexta* (Benth.) Hook. (*sensu* Day 1993, including subspecies *intertexta* and *propinqua* [Suksd.] A. G. Day). This difficulty has been due, in part, to the existence of two undescribed species: *N. willamettensis*, sp. nov., and *N. saximontana*, sp. nov. *Navarretia willamettensis* is restricted to the Willamette Valley of western Oregon. *Navarretia saximontana* occurs in the United States and southern Canada from the Rocky Mountains and Colorado Plateau eastward into the Great Plains. The existence of these two species first became evident to the senior author during a morphological study of the *navarretias* of Oregon, and was corroborated by phylogenetic analyses of the genus using morphology and DNA sequence data (Spencer 1997; Spencer and Porter 1997; In those works, *N. willamettensis* is referred to as “Jackson-Frazier”, and *N. saximontana* is referred to as “Dog Valley”).

Phylogenetic analyses of nuclear ribosomal DNA (Spencer and Porter 1997) place *N. willamettensis* and *N. saximontana* in *N.* sect. *Navarretia* within the *N. leucocephala* group (*sensu* Day 1993), which includes *N. fossalis* Moran (of southern California and northern Mexico), *N. leucocephala* (of western North America), *N. involucrata* Ruiz & Pav. (of Chile and Argentina), *N. prostrata* (A. Gray) Greene (of central and southern California), and *N. myersii* P. S. Allen & A. G. Day (of northern and central California). Those analyses suggest that *N. saximontana* is most closely related to *N. fossalis*, while *N. willamettensis* is more closely related to the remaining members of the group. The *N. leucocephala* group and *N. intertexta*, its closest extant

relative (Spencer and Porter 1997), are unique within *N.* sect. *Navarretia* for a 2-lobed (versus 3-lobed) stigma (also derived independently in *N.* sect. *Mitracarpium*, but nowhere else in the family) and are unique within the genus for their reduced corolla venation (one instead of three veins at base of corolla lobe; Spencer and Porter 1997).

The earliest collection of *N. willamettensis* known to us was made in 1922 by L. R. Abrams, who left the specimens determined only as “*Navarretia*.” Later collections (five known to us) by other workers were referred to *N. intertexta* or *N. leucocephala* subsp. *minima*. The earliest collection of *N. saximontana* known to us was in 1839 from near Devil’s Lake, North Dakota, by C. A. Geyer. Collections of this species have generally been referred to *N. intertexta* subsp. *propinqua* or, less frequently, to *N. leucocephala* subsp. *minima*. Table 1 lists several characters differentiating *Navarretia willamettensis*, *N. saximontana*, *N. intertexta*, and *N. leucocephala* subsp. *minima*.

Navarretia willamettensis Stanley C. Spencer, sp. nov. (Fig. 1).—TYPE HERE DESIGNATED: USA, Oregon, Benton Co., SW Corvallis, 1.1 miles S of US Hwy 20 along Brooklane Drive, center of vernal pool in a field, T12S R5W S10, elevation 66 m, 11 Jul 1979, Richard R. Halse 2006 (holotype, OSC; isotypes, ARIZ, CAS).

Ab *Navarretia intertexta* (Benth.) Hook. corolla calyce inclusa, filamentis 0.2–1.1 mm longis et 0.1–0.6 mm sub sinubus corollae affixis differt. Ab *Navarretia leucocephala* Benth subsp. *minima* (Nutt.) A. G. Day calyce 6.3–8.0 mm longo, corolla dilute purpurea et polline sulphureo differt.

Annual, 3–16 cm tall and wide, the primary head caulescent, generally with 1–20 smaller heads at the tips of ascending lateral branches. Stem and

TABLE 1. SOME DISTINGUISHING MORPHOLOGICAL FEATURES OF *N. INTERTEXTA*, *N. SAXIMONTANA*, *N. WILLAMETTENSIS*, AND *N. LEUCOCEPHALA* SUBSP. *MINIMA*. All measurements are in mm.

Feature	<i>N. intertexta</i>	<i>N. saximontana</i>	<i>N. willamettensis</i>	<i>N. leucocephala</i> subsp. <i>minima</i>
Number of primary lobes of upper leaf	6–13	5–7	9–13	4–10
Calyx length	5.8–12	(5.6)6.0–8.0	6.3–8.0	4.6–6.0
Calyx lobe (longest) length	3.0–7.5	3.0–5.0	3.0–4.5	1.2–2.2
Style length	3.6–10	1.9–3.0(3.4)	2.7–3.7	2.2–3.9
Corolla relative to calyx	exserted	included	included	included to slightly exserted
Corolla color	white or pink to pale blue	white or pink to pale blue	pink to lavender	white
Stamen filament length	1.6–4.0	0.6–1.1	0.2–1.1	0.4–1.0
Distance from filament base to corolla lobe sinus	0.6–2.0	0.6–1.1	0.1–0.6	0.2–0.4(0.6)
Stamen position relative to corolla throat	exserted beyond corolla lobe tips	included or exserted, but not to corolla lobe tips	exserted, but not to corolla lobe tips	variously exserted
Pollen color	orange-yellow	orange-yellow	pale yellow	cream

branches green to reddish brown, puberulent. Cotyledons linear. Lower leaves opposite or alternate with linear segments, glabrous to puberulent, 10–50 mm long, with up to 13 entire or branched lobes. Upper leaves alternate, acerose, 10–22 mm long; the rachis puberulent and 4–10 mm long; the primary lobes 9–13, more or less glabrous, the lowermost often simple, the remainder (including the terminal lobe) 2–5-branched. Outer bracts similar to upper leaves but 9–13 mm long; the rachis 4–5 mm long and widened toward the base, the primary lobes (5)9–11. Inner bracts progressively smaller, with fewer lobes. Heads 12–25 mm wide, of 3–50 subsessile flowers. Calyx 6.3–8.0 mm long; the tube membranous and glabrous to gland-dotted or rarely puberulent between ribs, 2.3–3.5 mm long,

with 3–4-celled unbranched trichomes at orifice and along ribs; the lobes 5, glabrous, acerose, the two longest lobes 3.0–4.5 mm and often 2–3 pronged, the three shorter lobes 2.2–3.2 mm and simple. Corolla funnellform, pink to lavender, 4.7–6.5 mm long, exceeding the shortest but not longest calyx lobes; the limb 1.8–2.8 mm wide; the lobes oblong, 0.7–1.5 mm long, each with a single unbranched vein. Stamen filaments 0.2–1.1 mm long and inserted 0.1–0.6 mm below sinuses; the anthers exserted from throat but not to tips of the corolla lobes; the pollen pale yellow. Pistil 4.0–5.0 mm long; the ovary oblong, 2-celled; the style 2.7–3.7 mm long; the stigma 2-lobed, often exserted from corolla before anthesis, but finally included in corolla throat. Capsule 2.3–3.0 mm long, membranous, remaining in the dried heads and rupturing with autumn rains as the seed coat fibers imbibe water and expand. Seeds 2–6, brown, ovoid-angular, 1.3–2.0 mm long, reticulate-pitted, mucilaginous when wet.

Paratypes. USA, Oregon, Benton Co.: wetland prairie at confluence of Frazier and Jackson Creeks, N city limits of Corvallis, E of Hwy 99W, T11S, R5W, S13, in dried clay, in vernal pools, 29 Jul 1978, *Chambers 4541* (OSC); clay flats at end of Brook Lane, S of Corvallis, T12S, R5W, S10, in center of dried pools, in cracked bare mud, 3 Jul 1979, *Chambers 4563* (OSC); SW Corvallis, 1.1 mi S of U.S. Hwy 20 along Brooklane Drive, center of vernal pool in a field, 11 Jul 1979, *Halse 2006* (OSC); McFadden Pond, 12 mi S of Corvallis, ditchbank along road, 25 Jun 1952, *Clarkson s.n.* (OSC); Junction City to Corvallis, 5 Jul 1922, *Abrams 8729* (POM, RM); NW Corvallis at S end of Jackson-Frazier Wetlands, in swale, 9 Sep 1995, *Spencer 595-11, 61c-7* (RSA, MARY). Lane Co.: McKenzie Hwy, 6 mi E of Springfield, dried ground, 15 Jun 1934, *Andrews 137* (ORE).

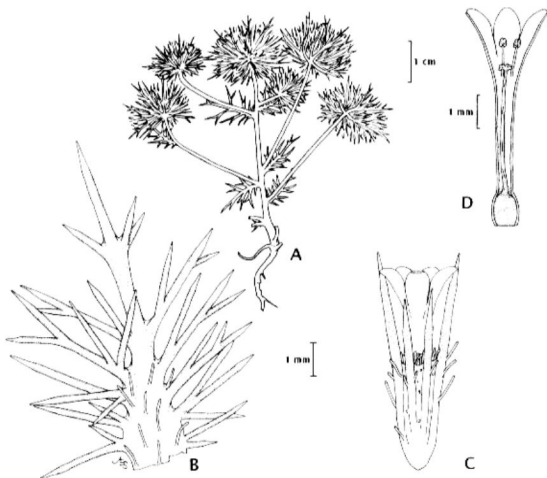


FIG. 1. *Navarretia willamettensis*. A. Habit. B. Outer bract, adaxial view. C. Flower. D. Corolla, longitudinal section, with pistil and stamens. Based on: A, *Halse 2006*; B–D, *Spencer 61c-7*.

