

TAXONOMY OF PHACELIA SECT. MILTITZIA (HYDROPHYLLACEAE)

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ABSTRACT

The species of *Phacelia* sect. *Miltitzia* are found in the Great Basin physiographic province of western North America and are distinguished from other members of *Phacelia* by their yellow, marcescent corollas combined with transversely corrugated seeds. An artificial key is provided to the nine species and two varieties of sect. *Miltitzia* recognized in the present taxonomic treatment. One new species, ***Phacelia monoensis***, is described and *Phacelia submutica* is reduced to ***P. scopulina*** var. ***submutica***.

Phacelia is the largest genus in the Hydrophyllaceae, consisting of 150–200 species. The genus has a wide distribution, the greatest number and diversity of species being in western North America. Many of the species-groups now included in *Phacelia* were recognized as distinct genera in earlier classifications (Candolle, 1845). Section *Miltitzia* is one such group.

The species belonging to sect. *Miltitzia* are small yellow-flowered annuals found in the arid regions in and around the Great Basin (Fig. 1). These species bloom primarily in the spring and characteristically grow in clay soils having a high pH and relatively high concentrations of soluble salts. They are usually found in the sagebrush-juniper or sagebrush-rabbitbrush communities.

The first species of the *Miltitzia* group to be described was *Eutoca lutea* Hooker and Arnott (1840). However, these authors questioned the plant's affinity with *Eutoca* because it possessed a yellow, marcescent corolla; they excluded it from *Emmenanthe* because of its prostrate growth habit and lack of corolla scales. Candolle (1845) subsequently placed this species in its own new genus, *Miltitzia*. Gray (1857), while describing the second known member of the group (as *Emmenanthe parviflora* Gray), proposed that the plants be treated as the subgenus *Miltitzia* within the genus *Emmenanthe*. Heller (1912) and Brand (1913) raised subgenus *Miltitzia* to the generic rank suggested by Candolle. J. T. Howell (1944a), while preparing a monograph of *Phacelia* sect. *Euglypta*, noted the close morphological similarity between it and *Miltitzia* and, as a result, transferred the *Miltitzia* species to the genus *Phacelia*.

Miltitzia and sect. *Euglypta* have several traits in common. Both have plump, transversely corrugated seeds, and the lateral attachment

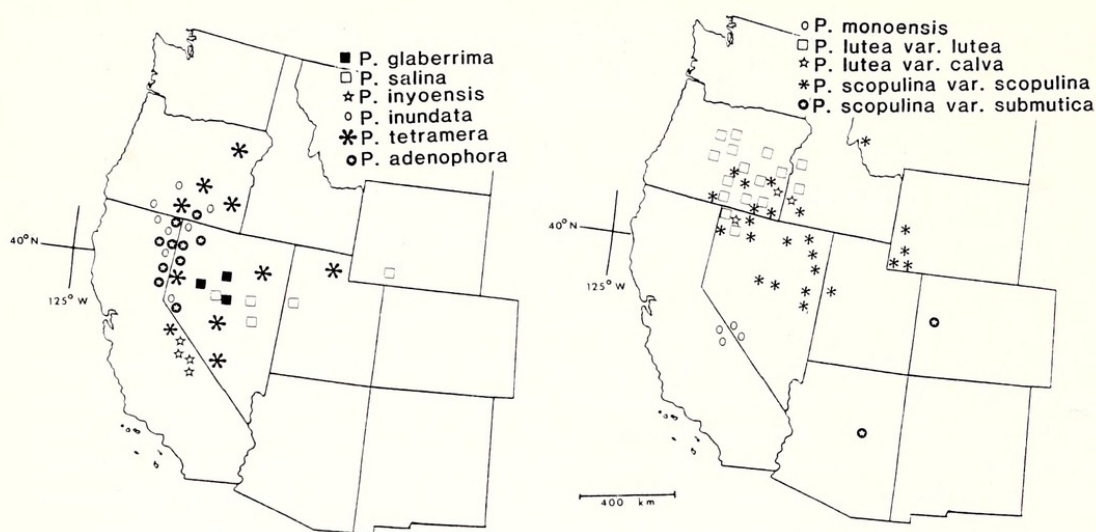


FIG. 1. Distribution of *Phacelia* sect. *Miltitzia*.

of the ovules to fleshy placentae in *Miltitzia* is characteristic of the entire genus *Phacelia* (Howell, 1944b). The chromosome numbers also indicate the likeness of the two groups (Constance, 1963). In *Miltitzia*, $n = 11, 12$, and 13 , whereas in sect. *Euglypta*, $n = 11, 12, 13$, and 23 . On the other hand the principal characteristic *Miltitzia* and *Emmenanthe* have in common is the persistent, yellow corolla. In *Emmenanthe* the seeds are compressed and reticulate, the pendent ovules are basally attached to the wing-like margins of membranous placentae, and the chromosome complement of $n = 18$ is unique in the Hydrophyllaceae. *Miltitzia*, as Howell (1944a) concluded, is best treated as a section of the genus *Phacelia*.

METHODS

Field observations and collections were made during the spring months of 1974–1978 throughout the range of the species of sect. *Miltitzia*. More than 600 herbarium specimens were examined during the course of this study. Measurements of vegetative and floral parts were made on herbarium specimens from CAS, CIC, DS, GH, ID, JEPS, K, MO, NY, ORE, OSC, POM, RENO, RM, RSA, UC, US, UTC, WILLU, WS, and WTU. These, together with the field observations, form the basis of the morphological and distributional data.

Floral buds for chromosome number determination were collected in the field and fixed in a modified Carnoy's solution (4 chloroform: 3 ethanol: 1 glacial acetic acid, v/v/v). Acetocarmine squashes of anthers were obtained by using the technique of Snow (1963).

CYTOLOGY

Cave and Constance (1947, 1950, 1959) determined the chromosome numbers for most of the species of sect. *Miltitzia*. Additional counts

TABLE 1. CHROMOSOME COUNTS FOR *Phacelia* SECT. *Miltitzia*. All collection numbers are those of the author. Vouchers are in OSC.

<i>P. adenophora</i> J. T. Howell; $n = 12$ CA, Lassen Co., Termo, 1198, 1201. NV, Washoe Co., 1195.
<i>P. lutea</i> (Hooker & Arnott) J. T. Howell var. <i>lutea</i> ; $n = 12$ ID, Owyhee Co., Sand Basin, 1014. OR: Harney Co., Stinkingwater Pass, 1018, 1143; Lake Co., Plush, 1023, 1025; Malheur Co., Succor Creek, 1153, 1154, 1295, 1302; Sheaville, 1016; Leslie Gulch, 1157; Rockville, 1017.
<i>P. lutea</i> (Hooker & Arnott) J. T. Howell var. <i>calva</i> Cronquist; $n = 12$ ID, Owyhee Co., 43 km sw. of Marsing, 1957.

from the present study are presented in Table 1; these confirm the reports by Cave and Constance for the taxa concerned.

The genus *Phacelia* shows great diversity in chromosome numbers and contains both polyploid and aneuploid series (Constance, 1963). One such aneuploid series is found in sect. *Miltitzia*: in *Phacelia tetramera*, $n = 11$; in *P. adenophora*, *P. inundata*, *P. inyoensis*, *P. lutea*, *P. monoensis* (cited as *M. scopulina*, Cave and Constance, 1959), and *P. scopulina*, $n = 12$; in *P. glaberrima*, $n = 13$.

TAXONOMY

PHACELIA Juss. sect. MILTITZIA (DC.) J. T. Howell, Leaf. W. Bot. 4:15. 1944.—*Miltitzia* DC., Prodr. 9:296. 1845.—*Emmenanthe* Benth. subg. *Miltitzia* (DC.) Gray, Proc. Amer. Acad. Arts 10:328. 1875.—TYPE: *Phacelia lutea* (Hooker & Arnott) J. T. Howell.

Low, diffuse, prostrate to decumbent or ascending annuals from slender taproots, usually of alkaline habitats; stems 5–30 cm long; herbage densely hirsutulous to rarely glabrous, usually more or less purplish capitate-glandular; leaves entire to toothed or pinnately lobed, 0.5–4.0 cm long, 0.2–2.5 cm wide; flowers pedicellate, in simple or branched terminal scorpioid cymes; calyx divided nearly to the base, the lobes subequal; corolla yellow to whitish, frequently purplish-tinged with age, marcescent; corolla scales present or lacking; stamens included, subequal to unequal, equally inserted at base of corolla tube; hypogynous disk prominent or inconspicuous; style persistent, 2-cleft or subentire; seeds 7–25, transversely corrugate or striate.

Key to *Phacelia* sect. *Miltitzia*

Corolla tube pubescent within, at least at base; filaments pubescent.

Corolla 2.0–3.5(–4) mm long; style and branches 0.5–1.5 mm long;

- filaments 1.5–2.5 mm long. 1. *P. monoensis*
 Corolla (3.5–)4–8 mm long; style and branches 1.5–3.0 mm long;
 filaments 2.5–4.5 mm long. 2. *P. adenophora*
 Corolla tube glabrous within; filaments glabrous.
 Seeds faintly but definitely transversely striate, 18–25 per capsule;
 style and branches 0.5–1.2 mm long. 3. *P. inundata*
 Seeds prominently transversely corrugated.
 Corolla 4–10 mm long, usually longer than the calyx; style and
 branches 2–4 mm long.
 Plants densely pubescent. 4a. *P. lutea* var. *lutea*
 Plants subglabrous, or slightly glandular in the inflores-
 cence. 4b. *P. lutea* var. *calva*
 Corolla 1.3–4.0 mm long, if longer usually equalling the calyx;
 style and branches 0.2–2.0 mm long.
 Plants glabrous or nearly so; corolla subrotate.
 5. *P. glaberrima*
 Plants densely pubescent; corolla tubular to campanulate.
 Flowers usually 4-merous; corolla 1.3–2.0 mm long.
 6. *P. tetramera*
 Flowers 5-merous; corolla 2–4 mm long.
 Style and branches 1.0–2.0 mm long; capsules with 9–15
 seeds.
 Style pubescent $\frac{1}{3}$ to all of its length; capsule apic-
 ulate. 7a. *P. scopulina* var. *scopulina*
 Style glabrous except at base; capsule nearly or quite
 without apiculation.
 7b. *P. scopulina* var. *submutica*
 Style and branches 0.5–1.0 mm long; capsules with fewer
 than 11 or more than 15 seeds.
 Seeds 18–25 per capsule, corrugations 5–8.
 8. *P. inyoensis*
 Seeds 7–10 per capsule, corrugations 9–13.
 9. *P. salina*

1. ***Phacelia monoensis*** Halse, sp. nov.

Floribus 5-meris; segmentis calycis per anthesis 2–4 mm longis, ad maturitatem 4–6 mm longis; corolla luteola, 2–4 mm longa, extus et intus pubescenti; filamentis pubescentibus, 1.5–2.5 mm longis; stylo cum ramis 0.5–1.5 mm longo; ovulis 7–10; capsula 2.5–4.0 mm longa; seminibus 1.1–1.7 mm longis, manifeste transverse corrugatis, rugis 8–11.

Annual herb; stems few or several, prostrate; herbage hirsutulous, more or less purplish capitate-glandular; leaves entire toothed or pinnately lobed; flowers 5-merous; calyx segments in flower 2–4 mm long, in fruit 4–6 mm long; corolla tubular to campanulate, yellow, 2–4 mm

long, pubescent externally and internally; corolla scales obsolete; filaments pubescent, 1.5–2.5 mm long; style and branches 0.5–1.5 mm long, style pubescent to midlength; ovules 7–10; hypogynous disk prominent; capsule 2.5–4.0 mm long, apiculate, pubescent; seeds 1.1–1.7 mm long, transversely corrugate, corrugations 8–11; $n = 12$.

TYPE: USA, CA, Mono Co., in red clay, Mormon Ranch, 14 km (8.5 mi) sw. of Bodie, 30 Jun 1945, *Alexander and Kellogg 4346* (Holotype: UC!; isotypes: CAS! DS! NY! POM! RSA! US! UTC! WS! WTU!).

Distribution. Alkaline mountain meadows of central Mono County, California and adjacent Nevada; flowering June–July.

Phacelia monoensis is probably closely related to *P. adenophora* because of the similarity in floral pubescence and possession of a conspicuous hypogynous disk. The two species differ in the size of the floral parts, the presence of corolla scales and the number of ovules; they occupy quite different habitats.

2. PHACELIA ADENOPHORA J. T. Howell, Leaf. W. Bot. 4:15. 1944.—*Emmenanthe glandulifera* Torrey ex Watson, Bot. U.S. Geol. Explor. 40th Parallel. 257. 1871.—*Miltitzia glandulifera* (Watson) Heller, Muhlenbergia 8:20. 1912.—TYPE: USA, NV, Virginia Mts., Jul, *Watson 885* (Holotype: GH!; isotypes: NY! US!). Not *Phacelia glandulifera* Piper, Contr. U.S. Natl. Herb. 11:472. 1906.

Miltitzia glandulifera var. *californica* Brand, Univ. Calif. Publ. Bot. 4:224. 1912.—TYPE: USA, CA, Lassen Co., Madeline Plains, Jun 1898, *Bruce 2135* (Holotype: UC!).

Stems few or several, prostrate to ascending, pubescent, capitate glands present or lacking; leaves pinnately lobed or divided, rarely entire or merely toothed, hirsutulous; flowers 5-merous; calyx segments in flower 2–5 mm long, in fruit 4–7 mm long; corolla campanulate, yellow or the lobes more or less purplish-tinged, (3.5–)4–8 mm long, pubescent externally, corolla tube sparsely to densely pubescent within; corolla scales present; filaments pubescent, unequal, 2.5–4.5 mm long; style and branches 1.5–3.0 mm long, style pubescent $\frac{1}{3}$ – $\frac{1}{2}$ its length; ovules 6–15; hypogynous disk prominent; capsule 2.5–4.5 (–6) mm long, apiculate, pubescent; seeds 1.0–1.6 mm long, transversely corrugate, corrugations 8–12; $n = 12$.

Distribution. Plains and slopes of northeastern California, western Nevada, and southeastern Oregon; flowering April–July.

Phacelia adenophora is a moderately variable species but is well characterized by the conspicuous pubescence on the filaments and within the corolla tube. In central-western Nevada the plant is rather slender and delicate; to the northward it intergrades with a larger, coarser form that Brand (1912) called *Miltitzia glandulifera* var. *cal-*

ifornica. However, var. *californica* is not sufficiently distinct to be recognized taxonomically because the variation between the two forms is continuous and the characters Brand used to distinguish the variant are found throughout the range of the species.

Phacelia adenophora is closely related to *P. lutea* and has been treated as the same species (Jepson, 1943). Some hybridization may occur between these two taxa in northern Nevada and adjacent Oregon. In these areas plants have been found in which the filaments and the inside of the corolla tube range from glabrous to subglabrous to pubescent. Nevertheless, it seems best to retain these taxa as separate species, because in *P. adenophora* usually either the filaments or corolla tube are at least slightly pubescent and plants can therefore be referred readily to one or the other of the two species.

3. PHACELIA INUNDATA J. T. Howell, Leaflet. W. Bot. 4:15. 1944.—*Emmenanthe parviflora* Gray, U.S. Pacific R.R. Reports 6:84. 1857.—*Miltitzia parviflora* (Gray) Brand, Das Pflanzenr. IV. 251:131. 1913.—TYPE: USA, OR, Klamath Lake, *Newberry s.n.* (Holotype: GH!). Not *Phacelia parviflora* Pursh, Fl. Amer. Sept. 1:140. 1814; nor *Phacelia parviflora* Phil., Anales Univ. Chile 90:226. 1895.

Stems several, prostrate to ascending, pubescent, glandular; leaves subentire to pinnately lobed, hirsutulous; flowers 5-merous; calyx segments in flower 3–4 mm long, in fruit 5.5–8.0(–10) mm long; corolla tubular to campanulate, yellow, 3–5 mm long, pubescent externally, glabrous internally; corolla scales present or obsolete; filaments glabrous, 1.5–3.0 mm long; style and branches 0.5–1.2 mm long, style pubescent half to all of its length; ovules 18–25(–30); hypogynous disk prominent; capsule 4–7 mm long, apiculate, pubescent; seeds 1.1–1.8 mm long, tending to be flattened, transversely striate, striations 12–14; $n = 12$.

Distribution. Dried edges of alkali lakes and sinks, from south central Oregon to northeast California and adjacent Nevada; flowering May–July.

4. PHACELIA LUTEA (Hooker & Arnott) J. T. Howell, Leaflet. W. Bot. 4:15. 1944.—For synonymy and typifications see the varietal headings.

Stems several, prostrate to decumbent, glabrous to hirsutulous, capitate-glandular to eglandular; leaves usually entire or some coarsely toothed to pinnately lobed, glabrous to pubescent; flowers 5-merous; calyx segments in flower 2.5–6.0 mm long, in fruit 4.5–10.0 mm long; corolla tubular to campanulate, yellow, (3.5–)4–10(–11) mm long, glabrous or pubescent externally, glabrous internally; corolla scales pres-

ent or obsolete; filaments glabrous, 2.5–5.0 mm long; style and branches (1.5–)2–4 mm long, style glabrous or pubescent; ovules 7–15(–20); hypogynous disk prominent; capsule 3–7 mm long, apiculate; seeds 1–2 mm long, transversely corrugate, corrugations 9–12; $n = 12$.

- 4a. PHACELIA LUTEA var. LUTEA—*Eutoca lutea* Hooker & Arnott, Bot. Beech. Voy. 373. 1840.—*Miltitzia lutea* (Hooker & Arnott) DC., Prodr. 9:296. 1845.—*Emmenanthe lutea* (Hooker & Arnott) Gray, Proc. Amer. Acad. Arts 10:328. 1875.—*Phacelia lutea* var. *typica*, Proc. Calif. Acad. Sci. ser. 4, 25:364. 1944.—TYPE: USA, “Snake Fort, Snake Country, California” [Idaho], 1837, *Tolmie s.n.* (Holotype: K!).

Phacelia lutea var. *purpurascens* J. T. Howell, Proc. Calif. Acad. Sci. ser. 4, 25:365. 1944.—TYPE: USA, OR, Grant Co., Humphrey’s, 30 Apr 1925, *Henderson 5092* (Holotype: CAS!; isotypes: DS! GH! ORE!).

Herbage densely hirsutulous, from eglandular to densely purplish capitate-glandular, especially in the inflorescence; corolla pubescent externally; style hairy near the base to above the middle.

Distribution. Alkaline areas, usually clay and ash slopes and banks, from central Oregon east to southwestern Idaho and south to northwestern Nevada; flowering April–July.

Phacelia lutea is an extremely variable species. The entire to slightly toothed leaves of typical *P. lutea* in northeastern Malheur County, Oregon, intergrade to the pinnately lobed leaves of *P. lutea* in Lake County. Style pubescence and length are also variable traits, varying as much on an individual plant as between plants. Because Howell (1944b) used these traits to distinguish var. *purpurascens*, it seems best to treat this taxon as part of the variable var. *lutea*.

- 4b. PHACELIA LUTEA var. CALVA Cronquist, Vasc. pls. Pacific Northw. 4:168. 1959.—TYPE: USA, ID, Owyhee Co., roadside bank alongside U.S. Hwy. 95, 6.4 km (4 mi) ne. of the Idaho–Oregon state line, 12 Jun 1946, *Maguire and Holmgren 26386* (Holotype: NY!; isotypes: CAS! DS! GH! MO! UC! US! WS!).

Herbage essentially wholly glabrous, or slightly purplish-glandular in the inflorescence; corolla glabrous externally; style glabrous.

Distribution. Northern Owyhee County, Idaho, adjacent Malheur County, Oregon, and northwestern Nevada; flowering May–June.

This variety is distinguished from var. *lutea* only by its glabrous condition. Mixed populations of var. *lutea* and var. *calva* have been found and in at least some of these populations there is intergradation in the amount of pubescence, plants ranging from glabrous to subglabrous to moderately pubescent.

5. *PHACELIA GLABERRIMA* (Torrey ex Watson) J. T. Howell, Leaf. W. Bot. 4:15. 1944.—*Emmenanthe glaberrima* Torrey ex Watson, Bot. U.S. Geol. Explor. 40th Parallel. 257. 1871.—*Miltitzia glaberrima* (Watson) Brand, Das Pflanzenr. IV. 251:131. 1913.—TYPE: USA, NV, Reese Valley, Jul 1868, *Watson 886* (Lectotype: GH!; isoelectotypes: NY! US!; syntype: USA, NV, Humboldt Mts., Humboldt Sink, May 1868, *Watson 886* GH! NY! UC!).

Stems several, decumbent, glabrous; leaves entire to subentire to rarely lobed, glabrous or with a few hairs on the margins and apex; flowers 5-merous; calyx segments in flower 2.5–3.0 mm long, in fruit 4–6 mm long, glabrous or with a few hairs at apex; corolla subrotate, glabrous, 2.5–4.0 mm long; corolla scales lacking; filaments 2.5–3.0 mm long, glabrous; style and branches 1–2 mm long, glabrous; ovules (4–)7–10; hypogynous disk prominent; capsule 3–5 mm long, glabrous or with a few scattered hairs at apex, apiculate; seeds 1.1–1.5 mm long, transversely corrugate, corrugations 8–12; $n = 13$.

Distribution. Localized endemic on alkaline clay bluffs or alkaline sinks of central Nevada; flowering May–July.

6. *PHACELIA TETRAMERA* J. T. Howell, Leaf. W. Bot. 4:16. 1944.—*Emmenanthe pusilla* Gray, Proc. Amer. Acad. Arts 11:87. 1876.—*Miltitzia pusilla* (Gray) Brand, Das Pflanzenr. IV. 251:132. 1913.—TYPE: USA, NV, Steamboat Springs, May, *Watson 878*, in part (Lectotype: GH!; syntype: USA, nw. Nevada, May 1875, *Lemmon s.n.* GH! UC!). Not *Phacelia pusilla* Buckl., Amer. J. Sci. 45:172. 1843; nor *Phacelia pusilla* Torrey ex Watson, Bot. U.S. Geol. Explor. 40th Parallel. 253. 1871. *Miltitzia pusilla* var. *flagellaris* Brand, Das Pflanzenr. IV. 251:132. 1913.—TYPE: USA, OR, sterile alkaline soil of the Malheur River, 20 Jun 1898, *Cusick 1946* (Lectotype: US!; isoelectotypes: GH! MO! ORE! RM! UC!; syntype: USA, OR, Union Co., dry alkaline soil, 1879, *Cusick 758* GH! NY! US!).

Stems several, prostrate to decumbent, somewhat mat forming, pubescent, glands present or absent; leaves entire to shallowly pinnately lobed, pubescent; flowers 4-merous, rarely 5-merous; calyx segments in flower 1.5–3.0 mm long, in fruit 3.5–4.5 mm long; corolla campanulate, whitish, 1.3–2.0 mm long, pubescent externally, glabrous internally; corolla scales lacking; filaments glabrous, 1.0–1.5 mm long; style 0.2–0.4 mm long, the branches indicated only by an emargination at the apex of the style, glabrous; ovules 12–24; hypogynous disk inconspicuous; capsule 2.5–4.0 mm long, shortly apiculate, pubescent; seeds 0.7–1.0 mm long, transversely corrugate, corrugations 6–9; $2n = 22$.

Distribution. Alkaline flats, washes, and meadows of Nevada, adjacent California, eastern Oregon and north central Utah; flowering May–June.

This species is unique in *Phacelia* in being 4-merous. Howell (1944b) writes that the reduction from the usual 5-merous condition seems to be due to the suppression of one part of the adroecium, calyx, and corolla rather than the union of adjacent parts.

7. *PHACELIA SCOPULINA* (A. Nelson) J. T. Howell, Leaf. W. Bot. 4:16. 1944.—For synonymy and typifications see the varietal headings.

Stems few to several, prostrate to ascending, hirsutulous, sparsely glandular; leaves entire to toothed to pinnately lobed, pubescent; flowers 5-merous; calyx segments in flower 2.5–4.0 mm long, in fruit 5–8 (–10) mm long; corolla tubular to campanulate, yellow, becoming purplish-tinged, 3–4(–5) mm long, pubescent externally, glabrous internally; corolla scales inconspicuous or obsolete; filaments 2–3 mm long, glabrous; style and branches 1–2 mm long, style pubescent only at base to all of its length; ovules 9–15; hypogynous disk inconspicuous; capsule 3.5–6.0 mm long, pubescent, apiculate or not; seeds 1–2 mm long, transversely corrugate, corrugations 9–12.

- 7a. *PHACELIA SCOPULINA* var. *SCOPULINA*—*Emmenanthe scopulina* A. Nelson, Bull. Torrey Bot. Club 25:380. 1898.—*Miltitzia scopulina* (A. Nelson) Rydberg, Bull. Torrey Bot. Club 40:479. 1913.—*Miltitzia lutea* var. *scopulina* (A. Nelson) Brand, Das Pflanzenr. IV. 251:131. 1913.—*Phacelia lutea* var. *scopulina* (A. Nelson) Cronquist, Vasc. pls. Pacific Northw. 4:168. 1959.—TYPE: USA, WY, Sweetwater Co., Green River, 31 May 1897, *Nelson 3056* (Lectotype: RM!; isolectotypes: GH! MO! NY! US!; syntype: USA, WY, Sweetwater Co., Green River, 30 May 1897, *Nelson 3026* RM! US!).

Fruiting calyx 5–7 mm long; style and branches 1–2 mm long, pubescent $\frac{1}{3}$ to all of its length; capsule apiculate; $n = 12$.

Distribution. Alkaline flats and slopes from southwestern Wyoming to central Nevada, north to southeastern Oregon and adjacent Idaho, disjunct in southwest Montana; flowering May–July.

Phacelia scopulina has been considered a variety of *P. lutea* because in eastern Oregon, where their ranges overlap, there are plants which may appear at first to be intermediate. The two species are, however, quite distinct; individual plants can always be referred to one or the other species after examination of the critical characters. No indication of hybridization has been found.

- 7b. *Phacelia scopulina* var. *submutica* (J. T. Howell) Halse, stat. nov.—*Phacelia submutica* J. T. Howell, Proc. Calif. Acad. Sci. ser. 4, 25:370. 1944.—TYPE: USA, CO, Mesa Co., DeBeque, 19 May 1911, *Osterhout 4458* (Holotype: Accession Number 163032, RM!; isotype: RM!).

Fruiting calyx 6–8(–10) mm long; style and branches 1.0–1.5 mm long, pubescent at the base; capsule not apiculate or insignificantly so.

Distribution. Local endemic on clay knolls in Mesa County, Colorado, near DeBeque, and disjunct along the Little Colorado River near Winslow, Arizona; flowering May–June.

This taxon is not well enough differentiated to deserve species recognition, but it does merit varietal status. The primary characters by which it is separated from var. *scopulina* are the pubescence on the style and the lack of apiculation of the capsule. The amount of pubescence on the style is a variable character. The apiculation of the capsule is the best character distinguishing the two taxa, although some intergradation is indicated; in var. *submutica* the style base on the capsule may be muticous and in var. *scopulina* the apiculation may be very small.

A collection of this variety from Arizona forms the basis for the reported occurrence in Arizona of *P. glaberrima* (Howell, 1944b). When the plant was collected by Newberry on the Ives' Expedition it was misidentified as *Eutoca* (= *Nama*) *aretioides*. When the type description of *P. glaberrima* was written, Newberry's plant was identified as that species. As far as is known this is the only collection from Arizona of any species in sect. *Miltitzia*.

8. *PHACELIA INYOENSIS* (Macbride) J. T. Howell, Leaf. W. Bot. 4:16. 1944.—*Miltitzia inyoensis* Macbride, Contr. Gray Herb., new series, 49:41. 1917.—TYPE: USA, CA, Inyo Co., foothills w. of Bishop, 23 May 1906, *Heller 8324* (Holotype: GH!; isotypes: DS! MO! NY! US!).

Stems few to several, ascending to erect, pubescent, capitate-glandular; leaves entire to pinnately few-lobed, pubescent, glandular; flowers 5-merous; calyx segments in flower 2–3 mm long, in fruit 3.5–4.5(–6) mm long; corolla tubular to campanulate, pale yellow, 2–3 mm long, pubescent externally, glabrous internally; corolla scales lacking; filaments glabrous, 1.5–2.5 mm long; style and branches 1 mm long, style glabrous, or with a few hairs at base; ovules 16–21(–27); hypogynous disk relatively prominent; capsule 3–4 mm long, apiculate, pubescent; seeds 0.5–1.0 mm long, transversely corrugate, corrugations 5–8; $n = 12$.

Distribution. Alkaline meadows in northern Inyo and adjacent Mono County, California; flowering May–July.

9. *PHACELIA SALINA* (A. Nelson) J. T. Howell, Leaf. W. Bot. 4:16. 1944.—*Emmenanthe foliosa* M. E. Jones, Zoe 4:278. 1893.—*Miltitzia foliosa* (M. E. Jones) Brand, Das Pflanzenr. IV. 251:131. 1913.—TYPE: USA, UT, Tooele Co., Deep Creek Valley above Furber, 8 Jun 1891, *Jones s.n.* (Holotype: Accession Number

→ June 6, acc. to prologue!

72887, POM!; isotypes: CAS! DS! MO! POM! UC! US!). Not *Phacelia foliosa* Phil., Anales Mus. Nac. Chile. 53. 1891.

Emmenanthe salina A. Nelson, Bull. Torrey Bot. Club 25:381. 1898.—*Miltitzia salina* (A. Nelson) Rydberg, Bull. Torrey Bot. Club 40:479. 1913.—TYPE: USA, WY, Sweetwater Co., Bitter Creek, 2 Jun 1897, *Nelson 3105* (Holotype: RM!; isotypes: CAS! GH! MO! NY! US!).

Stems few to several, prostrate to ascending, pubescent, capitate-glandular; leaves entire to pinnately lobed, hirsutulous; flowers 5-merous; calyx segments in flower 2–3(–4) mm long, in fruit 4–5(–6) mm long; corolla tubular, yellow 2–3(–4) mm long, pubescent externally, glabrous internally; corolla scales present or absent; filaments glabrous, 1.0–1.5(–2.5) mm long; style and branches 1 mm long, style pubescent at base only or rarely pubescent to midlength; ovules 7–10; hypogynous disk prominent; capsule 3–4 mm long, apiculate, pubescent; seeds 1.1–1.5(–2) mm long, transversely corrugate, corrugations 9–13.

Distribution. Alkaline flats and clay slopes in southern Wyoming, western Utah, and central and eastern Nevada; flowering May–June.

Phacelia salina has been considered nothing more than a form of *P. scopulina* by Cronquist (1959) and even Howell (1944b) suggested that it might be an ecologically specialized variant of that species with smaller parts, but its characters are quite stable over its entire range and show no overlap with *P. scopulina*. Its nearest relative, however, is undoubtedly *P. scopulina*.

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