

## ARTIFICIAL KEYS TO THE SPECIES

- 1 Anther cells dehiscing the full length or at the distal ends leaving the proximal portion indehiscent.  
 2 Anther cells dehiscing the full length and across the connective, the valves of the cells usually widely spreading to explanate (spread out flat).  
 3 Thyrses distinctly glandular-pubescent on the axis, peduncles, or pedicels, sometimes sparingly so in the low, small-leaved species.  
 4 Anthers densely long-woolly pubescent ..... Sect. 1. *Erianthera*  
 4 Anthers glabrous except for the frequent presence of papillate teeth along the sutures.  
 5 Leaf blades pubescent.  
 6 Leaves linear or small, (0.7) 1–2.5 (3) mm wide, entire, often revolute or folded, opposite, subopposite, or sometimes alternate ..... Group I  
 6 Leaves, at least the basal, narrowly (ob)lanceolate to broadly ovate, 3–40 mm wide, entire or dentate, flat or folded, the margins sometimes slightly revolute, always opposite ..... Group II  
 5 Leaf blades glabrous ..... Group III  
 3 Thyrses glabrous or non-glandular-pubescent on the axis, peduncles, or pedicels.  
 7 Stems pubescent ..... Group IV  
 7 Stems glabrous.  
 8 Leaves thick and fleshy, glaucous ..... Group V  
 8 Leaves not thick and fleshy, usually green ..... Group VI  
 2 Anther cells dehiscing from the distal ends, leaving the proximal portion (or sometimes the very proximity of the connective) indehiscent, the valves of the cells hardly parting.  
 9 Corolla blue, blue-violet, or sometimes pale violet, never red ..... Sect. 10. *Glabri*  
 9 Corolla scarlet ..... Sect. 11. *Elmigera*  
 1 Anther cells dehiscing across the area of attachment leaving the free, distal ends indehiscent.  
 10 Corolla blue, violet, or lavender, never red, the lips more or less spreading but not as below ..... Sect. 12. *Saccanthera*  
 10 red to red-orange, the upper lip extended over the anthers, the lower reflexed ..... Sect. 13. *Bridgesiani*

## Group I

- 1 Palate of the corolla glabrous or glandular-puberulent, the glandular hairs not colored; Oregon, w. Idaho, and Wash.  
 2 Anther cells 0.8–1 (1.1) mm long; corolla glandular-pubescent within, the limb broader; n. parts of Harney and Malheur Cos., Oregon, northward ..... 5. *P. gairdneri*  
 2 Anther cells 1.1–1.3 mm long; corolla glabrous within, the limb relatively small; in the region on Steens Mt., Harney Co., Oregon, and in the Owyhee Mts., Owyhee Co., Idaho, and northward ..... 6. *P. seorsus*  
 1 Palate of the corolla with long, non-glandular hairs, sometimes sparsely so; sc. Idaho, Utah, Nev., Wyo., Colo., N.M., and Ariz.  
 3 Plants with ascending to erect stems, sometimes prostrate or decumbent in *P. duchesnense*.  
 4 Leaves all cauline and linear; pubescence of the inflorescence consisting of glandular hairs.  
 5 Anther-cells 1.1–1.4 mm long; staminode with a dense brush-like tuft of hairs at the apex and only sparsely bearded proximally; mts. and plateaus of Beaver, Iron, Washington, and Kane Cos., Utah, and adjacent Nev., s. through Ariz. and e. to s. Colo. and w. N.M. .... 21. *P. linarioides*  
 5 Anther-cells 0.8–1 (1.1) mm long; staminode densely bearded for most of its length; Salina Canyon, Sevier Co. and Spanish Fork Canyon, Utah Co., Utah ..... 22. *P. abietinus*  
 4 Leaves basal and cauline, the basal leaves spatulate, oblanceolate, narrowly oblanceolate, or linear in some *P. pumilus*.

- 6 Leaves linear to narrowly oblanceolate, 2–4 mm wide; e.c. Idaho ..... 30. *P. pumilus*
- 6 Leaves (ob)lanceolate to elliptic, (2) 4–11 mm wide.
- 7 Corolla lobes pale blue, the lobes oblong and not overlapping; staminode with a dense apical tuft of golden-yellow hairs, the remaining length sparsely bearded, the tip strongly curved to coiled; e. Nev. and w. and c. Utah ..... 31. *P. dolius*
- 7 Corolla lobes purplish blue or dark blue, the lobes orbicular and overlapping; staminode densely and evenly orange-bearded in the distal half, the tip slightly recurved, not coiled; w. Uinta Basin, Duchesne Co., Utah ..... 32. *P. duchesnensis*
- 3 Plants with prostrate stems or nearly acaulescent, mat-forming.
- 8 Flowering stems 2–10 cm long; sw. Wyo., nw. Colo., and e. (and Millard Co.) Utah ..... 24. *P. caespitosus*
- 8 Flowering stems very short, less than 1 cm long with much compressed internodes.
- 9 Leaves linear, 0.8–1.3 (1.5) mm wide; calyx 3.5–4.8 (5.5) mm long; s. Sweetwater Co., Wyo. And n. and e. Daggett Co., Utah ..... 27. *P. acaulis*
- 9 Leaves narrowly oblanceolate, 1.2–4.3 mm wide; calyx 5.5–9 mm long; e. Daggett Co., Utah and Moffat Co., Colo. .... 28. *P. yampaensis*

## Group II

- 1 Flowers white or whitish.
- 2 Plants suffrutescent, the lower stems becoming woody; herbage glandular-pubescent to glabrous.
- 3 Plants 1–4 dm tall; herbage glabrous to glandular-pubescent, but never densely so; corolla 10–18 mm long; widespread across the n.  $\frac{2}{3}$  of Nev., adjacent Utah, and Calif., northward, but apparently absent from the range of the following species ..... 7. *P. deustus*
- 3 Plants usually taller, to 7 dm; herbage densely glandular-pubescent throughout; corolla 9–11 mm long; endemic to the vicinity of Susanville, Calif., extending into adjacent Washoe Co., Nev. .... 8. *P. sudans*
- 2 Plants herbaceous.
- 4 Thyrses relatively few-flowered, glabrous but glutinous with sand-grains adhering; lower stems buried in the sand; w.c.. Nev. .... 9. *P. arenarius*
- 4 Thyrses of densely flowered verticillasters, glandular-puberulent; stems above the ground; e. Oregon and Idaho, northward ..... 12. *P. attenuatus*
- 1 Flowers blue, purple, violet, lavender, or magenta.
- 5 Staminode included to reaching the orifice; corolla tubular-funnelform to moderately ampliate.
- 6 Plants suffrutescent with much-branched woody stems at the base.
- 7 Leaves distinctly dentate, broadly ovate, 8–17 mm wide; anthers becoming peltate-explanate; Beaver Dam Mts. of sw. Utah and limestone mts. of s. Nev., s. of our region .... 67. *P. petiolatus*
- 7 Leaves entire, lanceolate to ovate, 1.5–4 (6) mm wide; anthers not becoming explanate (except in *P. caespitosus* var. *caespitosus* and sometimes in *P. tusharensis*).
- 8 Herbage glabrous or pubescent with terete, tapered, retrorsely curved hairs.
- 9 Leaves 1–3.5 cm long, glabrous to sparsely scaberulous-puberulent; s. Grand and San Juan Cos., Utah, eastward ..... 23. *P. crandallii*
- 9 Leaves 0.4–1 (2) cm long, densely cinereous-puberulent; sw. Wyo., nw. Colo., Utah, and nw. Ariz., absent from the range of the preceding species ..... 24. *P. caespitosus*
- 8 Herbage pubescence of closely appressed, flattened, scale-like hairs.
- 10 Stems ascending to erect; leaves pubescent on the upper surface and usually glabrous beneath; Tushar and n. Markagunt plateaus, sc. Utah ..... 25. *P. tusharensis*
- 10 Stems prostrate to spreading, often forming mats; leaves densely puberulent on both surfaces; c. and s. Nev., Kane Co., Utah, and n. Ariz. .... 26. *P. thompsoniae*
- 6 Plants herbaceous, rarely woody at the very base.

- 11 Corolla blue, blue-purple, or blue-lavender; cauline leaves 1–10 (20) mm wide; calyx 3–8 (11) mm long; pubescence of herbage of tapered, retrorsely curved hairs.
- 12 Basal leaves well developed; corolla (7) 10–16 (20) mm long.
- 13 Inflorescence of more or less loosely flowered verticillasters, the cymes relatively few-flowered.
- 14 Anther cells 0.4–1 mm long, spreading apart at anthesis.
- 15 Leaves usually entire, sometimes obscurely dentate (in var. *obtusifolius*); stems densely cespitose; widespread ..... 16. *P. humilis*
- 15 Leaves serrate to obscurely dentate; stems less cespitose; sw. Idaho, northward ..... 17. *P. albertinus*
- 14 Anther cells 1.4–1.8 mm long, remaining nearly parallel at anthesis; nw. Ariz. . 36. *P. distans*
- 13 Inflorescence of 1 or more compact, many flowered verticillasters.
- 16 Anthers not becoming explanate.
- 17 Plants (1) 2–9 dm tall; anther cells 0.7–1 mm long, more or less spreading apart after anthesis; calyx margins scarious; ne. Oregon, Idaho, and nw. Wyo., northward ..... 12. *P. attenuatus*
- 17 Plants 0.3–0.7 (1.4) dm tall; anther cells 1–1.2 mm long, remaining nearly parallel with each other after anthesis; calyx margins herbaceous; w.c. Utah ..... 33. *P. nanus*
- 16 Anthers becoming peltate-explanate; se. Utah, eastward and southward ..... 37. *P. brevicaulis*
- 12 Basal leaves not developed, all the leaves cauline; corolla 17–23 mm long; nc. and ne. Nev., across s. Idaho and n. Utah to sw. Mont., w. Wyo., and n. Colo. .... 18. *P. radicosus*
- 11 Corolla pink to magenta or rose-purple; cauline leaves 11–35 mm wide; calyx 8–11 mm long; pubescence of herbage of short, stubby, appressed hairs; Mono and Inyo Cos., Calif. .... 50. *P. monoensis*
- 5 Staminode usually conspicuously exerted; corolla distinctly ventricose-ampliate, rarely only moderately so.
- 18 Corolla 10–14 mm long, the throat 4–5 mm broad when pressed; capsule 3–6 mm long; e. Nev. .... 43. *P. barnebyi*
- 18 Corolla large, (14) 15–28 mm long, the throat (3) 6–14 mm broad when pressed; capsule 6–12 mm long.
- 19 Corolla-throat viscid-glandular within; lowermost leaves usually glabrous; se. Utah, n. Ariz., sw. Colo., and w. N.M. .... 46. *P. ophianthus*
- 19 Corolla-throat not glandular within; leaves all puberulent.
- 20 Ovary and capsule glabrous.
- 21 Corolla 14–22 mm long, the throat only moderately ampliate, 3–7 mm broad when pressed, the upper lip 4.5–7 (8) mm long, the tube 5–7 mm long; staminode just reaching the orifice to only slightly exerted, straight or slightly recurved apically, rarely recurved; e.c. Oregon ..... 41. *P. miser*
- 21 Corolla 18–28 mm long, more or less abruptly expanded into a broadly ventricose-ampliate throat, 7–12 mm broad when pressed, the upper lip (6.5) 8–13 mm long, the tube (6) 8–12 mm long; staminode conspicuously exerted and recurved-coiled apically; ne. Calif. and s. Oregon to c. Nev. and Owyhee Co., Idaho ..... 42. *P. janishiae*
- 20 Ovary and capsule glandular-puberulent at the apex.
- 22 Corolla-throat broadest at or near the orifice; Big Butte, Butte Co., Idaho, northward ..... 48. *P. eriantherus*
- 22 Corolla-throat somewhat constricted at the orifice; sw. Wyo. and adjacent ne. Utah ..... 49. *P. cleburnei*

## Group III

- 1 Corolla (7) 8-18 (22) mm long.
- 2 Herbage glutinous, sticky, with sand-grains adhering; plants of sand dunes.
- 3 Leaves 10–24 mm wide; calyx-segments ovate-caudate; anther-cells 0.8–0.9 mm long; wc. Nev.  
 ..... 9. *P. arenarius*
- 3 Leaves 2–8 mm wide; calyx-segments narrowly lanceolate to lanceolate; anther-cells 0.9–1.2 mm long; sw. Utah ..... 68. *P. ammophilus*
- 2 Herbage not glutinous or sticky; plants of various habitats, some on sand dunes.
- 4 Anther cells 1.1–1.8 mm long.
- 5 Anther cells 1.5–1.8 mm long; staminode exserted; n. Cedar Valley, Iron Co., Utah  
 ..... 34. *P. franklinii*
- 5 Anther cells 1.1–1.4 mm long; staminode included; hills w. of Cedar City, s. Iron Co. and adjacent Washington Co., Utah ..... 35. *P. pinorum*
- 4 Anther cells 0.4–1 (1.4) mm long.
- 6 Stems decumbent and spreading or ascending at an angle; se. Utah and sw. Colo. 23. *P. crandallii*
- 6 Stems erect or ascending, sometimes decumbent at the base only.
- 7 Calyx 3–5 (6) mm long.
- 8 Flowers white or whitish; plants suffrutescent; e. Calif., Nev., and nw. Utah, northward  
 ..... 7. *P. deustus*
- 8 Flowers blue to purple or violet, only rarely whitish; plants herbaceous.
- 9 Thyse of 2–4 (7) densely flowered verticillasters, sometimes reduced to a simple capitulum.
- 10 Plants 2–9 dm tall; leaves (3) 5.5–12 cm long and 5–30 mm wide; e. Oregon and Idaho, northward ..... 12. *P. attenuatus*
- 10 Plants 0.5–2 (2.5) dm tall; leaves 0.5–3.5 (5) cm long and 2–10 mm wide; Sierra Nevada and White and Sweetwater mts., Calif. and adjacent Nev., and Wassuk Range, Mineral Co., Nev.  
 ..... 13. *P. heterodoxus*
- 9 Thyse of more or less loosely flowered verticillasters.
- 11 Anther-cells 0.4–1 (1.2) mm long, dehiscent across the connective.
- 12 Anthers not explanate; corolla (7) 10–20 mm long; seeds (0.8) 1–2 mm long.
- 13 Leaves usually entire, sometimes obscurely dentate in *P. humilis* var. *obtusifolius*; stems densely cespitose.
- 14 Stems puberulent; corolla blue; staminode distinctly bearded; wide-spread  
 ..... 16. *P. humilis*
- 14 Stems glabrous; corolla violet to magenta; staminode glabrous to minutely papillate; e. Nev. and w. Utah ..... 62. *P. confusus*
- 13 Leaves serrate to obscurely dentate; stems less cespitose; Owyhee Mts., sw. Idaho, northward ..... 17. *P. albertinus*
- 12 Anthers peltate-explanate; corolla 8–13 (15) mm long; seeds about 3 mm long.
- 15 Staminode densely bearded, included in the tube; corolla 10–15 mm long; Uinta Basin near Tridell and Lapoint, Utah ..... 38. *P. goodrichii*
- 15 Staminode moderately bearded, reaching the throat; corolla 8–12 mm long; desert between the Wasatch Plateau and the San Rafael Swell, Utah ..... 39. *P. marcusii*
- 11 Anther-cells 1.1–1.4 mm long, not dehiscent across the connective; Aquarius Plateau, sc. Utah ..... 71. *P. parvus*
- 7 Calyx (5) 6–10 mm long.
- 16 Thyse of loosely, relatively few-flowered verticillasters; staminodia more or less included; corolla only moderately ampliate.
- 17 Anther-cells 0.6–1 mm long, peltate-explanate; staminodia densely bearded; corolla 10–15 (18) mm long; s. Grand and San Juan Cos., Utah, sw. Colo., and nw. N.M.  
 ..... 37. *P. breviculus*

- 17 Anther-cells 1.1–1.4 mm long, not explanate; staminodia moderately bearded; corolla 15–22 mm long; se. (and Duchesne Co.) Utah and w. Colo. .... 40. *P. moffatii*
- 16 Thyrse of densely and many-flowered verticillasters.
- 18 Staminode included to reaching the orifice; corolla only moderately ampliate; sw. Idaho and e. Oregon, northward ..... 12. *P. attenuatus*
- 18 Staminode conspicuously exerted; corolla distinctly ventricose-ampliate.
- 19 Corolla 8–12 mm long, the throat 3.5–5 mm broad when pressed.
- 20 Stems finely puberulent; anthers peltate-explanate, the cells 0.5–0.9 mm long; leaves 2–5 (8) mm wide; w. Utah in Millard and Beaver Cos., and adjacent White Pine Co., Nev. .... 44. *P. concinnus*
- 20 Stems glabrous; anthers not explanate, the cells 0.9–1.5 mm long; leaves 6–12 mm wide; endemic to the Kaiparowits Plateau and Smoky Mt., sc. Utah ..... 45. *P. atwoodii*
- 19 Corolla 14–22 mm long, the throat 7–10 mm broad when pressed; anthers 0.8–1.2 mm long, peltate-explanate; s. Utah, n. Ariz., eastward ..... 46. *P. ophianthus*
- 1 Corolla mostly larger, 20–40 mm long; anther-cells usually longer, 1–2.4 mm.
- 21 Calyx 7–14 mm long; stems and leaves puberulent or glabrous, but not glaucous, the leaves relatively thin.
- 22 Plants 2–6 (10) dm tall; corolla 20–27 (30) mm long; widespread in the Rocky Mts., in Utah and se. Idaho, absent from the Basin Ranges except in the Deep Creek Range, Utah and the Black Pine Mts., Idaho ..... 20. *P. whippleanus*
- 22 Plants 0.7–1.8 dm tall; corolla 30–37 mm long; Uinta Basin, Uintah Co., Utah and adjacent Colo. .... 47. *P. grahamii*
- 21 Calyx 4–7 (7.5) mm long; stems and leaves glabrous and glaucous, the leaves thick.
- 23 Upper leaves distinct, not connate-perfoliate; corolla-tube 7–12 mm long, the throat expanded to 6–18 mm broad when pressed, dark pink to rose.
- 24 Corolla 21–30 mm long; staminode included, glabrous or bearded.
- 25 Leavers (ob)lanceolate or broader, distinctly toothed or dentate; anther-cells becoming peltate-explanate; staminode glabrous; White and Inyo Mts., s. to the Panamint Mts. and e. to Silver Peak Range, Shoshone Mt., and Tolicha Peak, Nev. .... 64. *P. floridus*
- 25 Leavers narrowly lanceolate, obscurely dentate; anther-cells not explanate; staminode bearded; e. Mojave Desert, n. to and approaching our region in Owens Valley ..... *P. incertus* Brandege
- 24 Corolla (27) 30–35 mm long; staminode exerted, frequently uncinatate, golden-yellow-bearded; Wassuk Range and the Pine Nut Range of w.c. Nev. .... 65. *P. rubicundus*
- 23 Upper leaves connate-perfoliate; corolla-tube 4–6 (8) mm long, the throat greatly inflated, (12) 14–21 mm broad when pressed, whitish to pink; s. Utah Plateaus and e. Pine Valley Mts., and introduced elsewhere ..... 66. *P. palmeri*

#### Group IV

- 1 Anther-cells 0.3–1 (1.4) mm long; corolla 6–16 (21) mm long, the palate bearded.
- 2 Corolla 10–16 (21) mm long; anther-cells 0.5–1.4 mm long, longer than broad, not explanate.
- 3 Stems erect, 2–6 dm tall; leaves 2.5–14 cm long.
- 4 Calyx 1.8–3 (3.5) mm long; inflorescence of more or less loose verticillasters, or the cymes few-flowered; basal leaves not developed, the leaves all cauline; c. and c. Nev., sw. Idaho, across c. Utah to sw. Wyo., and nw. Colo. .... 19. *P. watsonii*
- 4 Calyx (3) 4–8.5 mm long; inflorescence of 1 or more compact, many-flowered verticillasters; basal leaves well developed; n. Ariz., Utah, w. and n. Nev., and e. Calif., northward and eastward ..... 10. *P. rydbergii*
- 3 Stems spreading to ascending above a decumbent base, 0.2–1.2 (2.5) dm tall; leaves 0.4–2 (2.8) cm long.

- 5 Pubescence of leaves of tapered, terete, retrorsely curved hairs; sw. Wyo., e.c. and s. (also Millard Co.) Utah, and n. Ariz. .... 24. *P. caespitosus*
- 5 Pubescence of leaves of closely appressed, flattened, scale-like hairs.
- 6 Leaves pubescent on the upper surface and usually glabrous beneath; stems ascending to erect above; Tushar Plateau and vicinity ..... 25. *P. tusharensis*
- 6 Leaves densely pubescent on both surfaces; stems usually prostrate, mat-forming; c. and s. Nev., Kane Co., Utah, and n. Ariz. .... 26. *P. thompsoniae*
- 2 Corolla 6–10 (11) mm long; anther-cells 0.3–0.5 (0.6) mm long, about as broad as long and peltate-explanate.
- 7 Leaves best developed on the basal sterile stems, (ob)lanceolate to obovate, the cauline leaves ascending, not arcuate-recurved; Utah, ne. and w. Nev., westward, northward, and eastward ..... 14. *P. procerus*
- 7 Leaves mostly all cauline, narrowly lanceolate, usually folded and arcuate-recurved; s.c. Oregon, entering the region in Lake Co. .... 15. *P. cinicola*
- 1 Anther-cells 1–2 mm long; corolla (13) 15–23 mm long, the palate glabrous or sparsely bearded (in *P. linarioides*, *P. dolius*, and *P. humilis*).
- 8 Corolla glandular-pubescent, the palate usually bearded; calyx 5–11 mm long; inflorescence densely puberulent.
- 9 Leaves linear, 0.8–4 mm wide.
- 10 Plants 10–37 cm tall; leaves well dispersed; s. Utah and adjacent Nev. and Ariz. 21. *P. linarioides*
- 10 Plants 4–12 cm tall; leaves mostly in basal tufts; e.c. Idaho ..... 30. *P. pumilus*
- 9 Leaves (ob)lanceolate to elliptic, 4–11 mm wide; e. Nev., w., c., and ne. Utah ..... 31. *P. dolius*
- 8 Corolla glabrous externally, the palate glabrous; calyx 3–5 (6) mm long; inflorescence glabrous (or puberulent in *P. pseudoputus*).
- 11 Corolla 15–22 mm long; anther-cells 1.2–2 mm long.
- 12 Leaves linear, 4–6 (8) cm long and 0.5–1.5 (3) mm wide; staminode glabrous; Kaibab Plateau, Coconino Co., Ariz., and Markagunt Plateau, Utah ..... 69. *P. pseudoputus*
- 12 Leaves (ob)lanceolate, 10–12 cm long and 10–15 mm wide; staminode bearded; San Pitch Mts. and adjacent Wasatch Plateau, Sanpete Co., ..... 75. *P. tidestromii*
- 11 Corolla 13–15 (17) mm long; anther-cells about 1 mm long; endemic to the s. Sevier Plateau (?), s. Wasatch Plateau, Utah ..... 74. *P. leptanthus*

#### Group V

- 1 Leaves dentate, the upper ones usually connate-perfoliate; plants 5–14 dm tall; corolla greatly ventricose-ampliate, (25) 27–40 mm long; anther-cells (1.6) 1.8–2.4 mm long; s.c. Utah ..... 66. *P. palmeri*
- 1 Leaves entire, never connate; plants 0.3–4 (6.5) dm tall; corolla moderately ampliate to ventricose-ampliate, 10–20 (25) mm long; anther-cells 0.6–1.5 (1.6) mm long.
- 2 Corolla glandular-puberulent externally and usually within.
- 3 Calyx 2.5–4 (5) mm long; corolla 17–25 mm long, true red to crimson, sometimes pink-purple; from Emery and Grand Cos., Utah, across s. Utah, n. Ariz., and s. Nev. to e. San Bernardino Co., Calif. .... 61. *P. utahensis*
- 3 Calyx (3.5) 4–8 mm long; corolla 14–18 (20) mm long, violet to magenta; sw. Utah from Sevier and Piute Cos. to Washington and Millard Cos. and Lincoln, White Pine, and w. Nye Cos., Nev. .... 62. *P. confusus*
- 2 Corolla glabrous externally and glabrous or non-glandular bearded on the palate.
- 4 Inflorescence of open verticillasters with elongate-divaricate pedicels.
- 5 Cymes 1–3 (4)-flowered; corolla bluish-violet to white; San Juan Co., Utah to sw. Colo. and ne.

- Ariz. .... 56. *P. lentus*
- 5 Cymes 3–5-flowered; corolla lavender, magenta, or sometimes purplish; s. Mono and n. Inyo Co., Calif., and Sheep Range, Clark Co., Nev. .... 63. *P. patens*
- 4 Inflorescence of more congested verticillasters with short, erect pedicels.
- 6 Staminode bearding of long, tangled hairs 1–2 mm long; e.c. Nev., nw. Ariz., and widespread in Utah ..... 58. *P. pachyphyllus*
- 6 Staminode bearding of straight, relatively short hairs less than 1 mm long or glabrous.
- 7 Corolla lavender to pink, sometimes a pale bluish-lavender.
- 8 Cauline leaves 8–40 mm wide, lanceolate to broadly ovate; staminode beard of hairs (0.05) 0.2–2 mm long.
- 9 Corolla 10–15 mm long; bracts broader than long with the cordate bases overlapping; anther-cells 0.7–1 mm long; w.c. and nw. Nev., se. Oregon, and sw. Idaho ..... 52. *P. acuminatus*
- 9 Corolla 15–22 mm long; bracts longer than broad, not overlapping at the base; anther-cells 1.1–1.5 mm long.
- 10 Bracts and upper leaves with an acuminate or caudate tip, this tip somewhat conduplicate-folded and recurved; calyx-segments lanceolate; staminode beard of exceptionally short hairs 0.5–0.8 mm long; se., c., and ne. Utah, ne. Ariz., and nw. N.M. .... 53. *P. angustifolius*
- 10 Bracts and upper leaves gradually tapering to an acute tip; calyx-segments broadly lanceolate to ovate.
- 11 Staminode beard of hair 0.05–0.5 (0.7) mm long; cymes 2–5-flowered.
- 12 Corolla blue to purplish blue, 16–22 mm long, the palate sparsely bearded; staminode beard of hairs 0.2–0.5 mm long; anther cells 1.1–1.5 mm long; Uinta Basin, Canyon Lands, and Utah Plateaus ..... 54. *P. carnosus*
- 12 Corolla pink, 14–17 mm long, the palate glabrous; staminode beard of hairs 0.05–0.1 mm long; anther cells 0.9–1.1 mm long; c. Uinta Basin, s. of Roosevelt on both sides of the Duchesne and Uintah Co. line, Utah ..... 55. *P. flowersii*
- 11 Staminode beard of hair 0.5–1 mm long; cymes usually more than 5-flowered; Great Basin ..... 57. *P. immanifestus*
- 8 Cauline leaves 2–8 mm wide, linear to narrowly lanceolate; staminode glabrous or with short, papillate hairs less than 0.2 mm long; e. Nev. .... 62. *P. confusus*
- 7 Corolla blue to bluish-purple.
- 13 Calyx-segments narrowly lanceolate; corolla 10–15 mm long.
- 14 Plants 0.8–1.8 (3) dm tall; cauline leaves narrowly elliptic or narrowly lanceolate, 4–11 (15) mm wide; sw. Wyo. and ne. Utah ..... 51. *P. arenicola*
- 14 Plants 2.5–6 dm tall; cauline leaves lanceolate to ovate, 10–35 mm wide; sw. Idaho, se. Oregon, and nw. and w.c. Nev. .... 52. *P. acuminatus*
- 13 Calyx-segments lanceolate to ovate; corolla 13–22 mm long.
- 15 Stems low, 0.3–1 (1.5) dm tall, often arising from an elongate, spreading rhizomatous caudex; basal leaves 1–3 (3.5) cm long; endemic to the Paunsaugunt Plateau, Garfield Co., Utah ..... 60. *P. bracteatus*
- 15 Stems 1–6 dm tall, arising from a thick crown or short-branched caudex; basal leaves 3–11 cm long.
- 16 Cauline leaves linear to narrowly lanceolate, usually less than 6 mm wide; Uinta Basin ..... 53. *P. angustifolius*
- 16 Cauline leaves lanceolate to ovate, 14–40 mm wide.
- 17 Anther-cells 1.1–1.5 mm long; corolla 16–22 mm long; cauline leaves broadly lanceolate to ovate, acute; e. Uinta Basin and e. side of the Canyon Lands to the Utah Plateaus ..... 54. *P. carnosus*
- 17 Anther-cells 0.7–1 (1.1) mm long; corolla 13–17 (20) mm long; cauline leaves broadly ovate

and rounded with a mucronate tip; e. Uinta Basin, e. Uinta Mts. of Utah, and adjacent parts of Colo. and Wyo. .... 59. *P. mucronatus*

#### Group VI

- 1 Corolla white or pink.
- 2 Corolla white or pale pink, the throat ventricose, the limb not obliquely spreading; staminode bearded; plants herbaceous or suffrutescent only at the very base.
- 3 Plants with the caudex buried in the sand; herbage glutinous, without pubescence but often with sand-grains adhering; wc. Nev. .... 9. *P. arenarius*
- 3 Plants with the caudex above the ground; herbage glabrous, not glutinous; se. Oregon, sw. Idaho, and ne. and c. Nev. .... 11. *P. pratensis*
- 2 Corolla pink, the throat hardly differentiated from the tube, the limb obliquely set on the throat; staminode glabrous; plants diffusely branched shrubs, woody well above the base; s. Utah (as far n. as the San Rafael Swell, Emery Co.) southward ..... 29. *P. ambiguus*
- 1 Corolla blue to purple or violet, only rarely whitish.
- 4 Corolla 10–23 (25) mm long; anther-cells 0.5–1.5 (1.7) mm long, longer than broad.
- 5 Verticillasters of few- to several-flowered cymes; anther-cells 0.5–1.1 mm long.
- 6 Calyx 3–8.5 mm long, acute to caudate-tipped; basal leaves well developed; e. Calif., w. and n. Nev., Utah, and sw. Idaho ..... 10. *P. rydbergii*
- 6 Calyx 1.8–3 (3.5) mm long, obtuse to acute; leaves all cauline; c. and e. Nev., sw. Idaho, across c. Utah to sw. Wyo. and nw. Colo. .... 19. *P. watsonii*
- 5 Verticillasters of 1-flowered cymes; anther-cells 0.9–1.5 (1.7) mm long.
- 7 Corolla 14–17 mm long; calyx 5–6.5 mm long, the segments narrowly lanceolate to lanceolate; Canaan Mt., Washington Co., Utah ..... 68. *P. ammophilus*
- 7 Corolla (17) 19–25 mm long; calyx 3.5–4.5 mm long, the segments ovate; Navajo Mt., San Juan Co., Utah ..... 70. *P. navajoa*
- 4 Corolla 6–10 (11) mm long; anther-cells 0.3–0.5 (0.6) mm long, about as long as broad.
- 8 Leaves best developed on basal sterile stems (ob)lanceolate to ovate, the cauline leaves usually not recurved; widespread but absent from the range of the following ..... 14. *P. procerus*
- 8 Leaves mostly all cauline, linear-lanceolate, usually folded and arcuate-recurved; s.c. Oregon, along the e. side of the Cascade Range to the Basin Ranges in Lake Co. .... 15. *P. cinicola*

## TECHNICAL KEYS TO THE SPECIES

- 1 Anthers densely long-woolly pubescent, the cells dehiscing throughout and becoming peltate-explanate; stems low and distinctly woody below [Subg. *Dasanthera* (Raf.) Pennell]  
 ..... Sect. 1. *Erianthera*
- 1 Anthers glabrous to hispid-pubescent, or if densely long-woolly pubescent, as in *P. comarrhenus* and *P. strictus*, the plants erect and herbaceous.
- 2 Anther-cells dehiscing the full length, or in the distal portion only leaving the proximal portions (near the connective) indehiscent, the cells usually becoming widely divergent.
- 3 Anther-cells dehiscing the full length and across the connective, the valves of the cells usually spreading widely apart [Subg. *Penstemon*].
- 4 Seeds 0.5–1.5 mm long (sometimes larger in species of Ser. *Gairdneriani* and *Deusti* of Sect. *Penstemon*).
- 5 Corolla tubular-campanulate to ventricose-ampliate, the tube widening towards the orifice.
- 6 Principal leaves narrowly lanceolate to broadly ovate, or if linear, as in *P. gairdneri* and *P. seorsus*, the palate glabrous or sparsely bearded with non-yellow viscid or glandular hairs  
 ..... Sect. 2. *Penstemon*
- 6 Leaves filiform to linear, or if proportionally broader the leaves mostly less than 3 cm long and the plants relatively small with prostrate to spreading or sometimes ascending stems  
 ..... Sect. 3. *Caespitosi*
- 5 Corolla salverform with a slender, curved tube, hardly widening towards the orifice, the upper lip reflexed, the lower projecting (resulting in an oblique limb) ..... Sect. 4. *Ambigui*
- 4 Seeds 1.5–5 mm long.
- 7 Leaves relatively thin and green, not thick and glaucous, or if so, as in *P. monoensis*, the leaves cinereous-puberulent ..... Sect. 5. *Cristati*
- 7 Leaves thick (succulent), glabrous and glaucous.
- 8 Leaves entire; corolla tubular-salverform to moderately ampliate.
- 9 Inflorescence congested, symmetrical, or if open and secund, as in *P. lentus*, the corolla blue or white; corolla blue, blue-violet, rose, pink, or white ..... Sect. 6. *Coerulei*
- 9 Inflorescence more open and secund or subsecund; corolla carmine to magenta or violet  
 ..... Sect. 7. *Gentianoides*
- 8 Leaves dentate; corolla ventricose-ampliate.
- 10 Corolla 21–40 mm long; plants tall herbs, 5–14 dm tall ..... Sect. 8. *Spectabiles*
- 10 Corolla 13–17 mm long; plants low shrubs, 0.5–1.5 (4) dm tall ..... Sect. 9. *Petiolati*
- 3 Anther-cells dehiscing from the distal end, leaving the proximal portion (sometimes to the very proximity of the connective) indehiscent, or if appearing to dehisce throughout, as in *P. ammophilus* and *P. pseudoputus*, the valves hardly spreading apart [Subg. *Habroanthus* Crosswh.].
- 11 Corolla blue, blue-violet, or sometimes pale violet, never scarlet, the tube moderately to abruptly ampliate ..... Sect. 10. *Glabri*
- 11 Corolla scarlet, the tube gradually expanding toward the orifice ..... Sect. 11. *Elmigera*
- 2 Anther-cells dehiscing across the confluent apices leaving the free distal ends indehiscent, the cells not spreading apart, the anthers remaining horseshoe-shaped [Subg. *Saccanthera* (Benth.) A. Gray].
- 12 Corolla blue, violet, or lavender, never red, the lips spreading but not as below  
 ..... Sect. 12. *Saccanthera*
- 12 Corolla red to red-orange, the upper lip extended over the anthers, the lower reflexed  
 ..... Sect. 13. *Bridgesiana*

Sect. 1. *Erianthera* G. Don

- 1 Leaves serrate, glandular-pubescent, all cauline on the similar sterile and flowering stems, the lowermost leaves more or less reduced and not forming a basal cluster; n. Utah and e. Idaho, northward ..... 1. *P. montanus*
- 1 Leaves entire or serrate in *P. newberryi*, glabrous, best developed on the lower sterile stems, those of the flowering stems usually smaller.
- 2 Leaves narrowly lanceolate or oblanceolate to elliptic, 2–4 (6) cm long; stems more or less ascending or erect, branching above the ground, not forming mats, 1.5–4 dm tall; Owyhee Co., Idaho, northward ..... 2. *P. fruticosus*
- 2 Leaves broadly elliptic to orbicular, (0.5) 1–2 (3) cm long; stems forming dense mats, the flowering stems erect but usually less than 2 dm tall.
- 3 Corolla rose-red to rose-purple; anthers exserted; Virginia Mts., Storey Co., Nev., westward ..... 3. *P. newberryi*
- 3 Corolla violet to blue-purple; anthers included; se. Oregon and nw. Nev., westward ..... 4. *P. davidsonii*

Sect. 2. *Penstemon*

- 1 Leaves linear, 1–2.5 (3) mm wide, entire, usually revolute, alternate or opposite [Ser. *Gairdneriani* (D. D. Keck) Crosswh.].
- 2 Anther-cells 0.8–1 (1.1) mm long; corolla glandular-pubescent within, the limb broader; n. parts of Harney and Malheur Cos., Oregon, northward ..... 5. *P. gairdneri*
- 2 Anther-cells 1.1–1.3 mm long; corolla glabrous within, the limb small; Steens Mt., Harney Co., Oregon and Owyhee Co., Idaho, northward ..... 6. *P. seorsus*
- 1 Leaves broadly ovate to narrowly lanceolate, but not linear, (2) 3–35 mm wide, flat or conduplicate-folded, the margins rarely slightly revolute-creased, opposite or subopposite.
- 3 Corolla white or whitish, 9–18 mm long; leaves serrate.
- 4 Plants with the woody lower stems above the ground; herbage glabrous to glandular-puberulent, not glutinous [Ser. *Deusti* (D. D. Keck) Crosswh.].
- 5 Herbage glabrous to finely glandular-puberulent; corolla 10–18 mm long; plants 1–4 dm tall; widespread across the n. and w. parts of the region, but apparently absent from the range of the following species ..... 7. *P. deustus*
- 5 Herbage densely glandular-puberulent throughout; corolla 9–11 mm long; plants usually taller, 3–7 dm; vicinity of Susanville, Lassen Co., Calif., extending into adjacent Washoe Co., Nev. .... 8. *P. sudans*
- 4 Plants with the lower stems usually buried in the sand, the stems herbaceous; herbage glutinous, without pubescence but with sand-grains adhering; sandy soils of w. Nev. from nw. Nye Co. and Mineral Co. to Churchill Co. [Ser. *Arenarii* (D. D. Keck) Crosswh.] ..... 9. *P. arenarius*
- 3 Corolla blue to purple or violet, or if white, as in *P. pratensis* and some *P. attenuatus*, the inflorescence congested, or in some *P. whippleanus* with corolla 20–30 mm long; leaves entire to obscurely dentate.
- 6 Inflorescence of 1 or more compact, many-flowered symmetrical (not secund) verticillasters; basal leaves always well developed [Ser. *Proceri* (D. D. Keck) Crosswh.].
- 7 Corolla 10–20 mm long; anther-cells (0.5) 0.6–1.1 mm long, longer than broad, not explanate.
- 8 Inflorescence glabrous to puberulent, not glandular-pubescent.
- 9 Corolla blue-purple; more widespread and sympatric with the following species ..... 10. *P. rydbergii*
- 9 Corolla white; se. Oregon, sw. Idaho, and ne. and c. Nev. .... 11. *P. pratensis*
- 8 Inflorescence glandular-pubescent.
- 10 Plants (1) 2–9 dm tall; leaves (3) 5.5–12 cm long, 5–30 mm wide; capsule 7–8 mm long; e.

- Wash. and ne. Oregon, e. across Idaho to w. Mont. and nw. Wyo. .... 12. *P. attenuatus*  
 10 Plants 0.5–2 (2.5) dm tall; leaves 0.5–3.5 (5) cm long, 2–10 mm wide; capsule 4–6 mm long;  
 Sierra Nevada, White and Sweetwater mts., and adjacent Nev. .... 13. *P. heterodoxus*  
 7 Corolla 6–10 (11) mm long; anther-cells 0.3–0.6 mm long, about as long as broad, more or less  
 explanate.  
 11 Leaves best developed on basal sterile stems, (ob)lanceolate to ovate, the cauline leaves not  
 recurved; widespread but absent from the range of the following species ..... 14. *P. procerus*  
 11 Leaves mostly all cauline, linear-lanceolate, usually folded and arcuate-recurved; s.c. Oregon,  
 along the e. side of the Cascade Range to the Basin Ranges in Lake Co. .... 15. *P. cinicola*  
 6 Inflorescence of relatively loose verticillasters, more or less secund with few-flowered cymes,  
 sometimes densely flowered and not secund in *P. watsonii*, a species with few or no basal leaves  
 and a short, blunt calyx 1.8–3 (3.5) mm long.  
 12 Corolla 7–20 (23) mm long, tubular-funnelform to moderately campanulate; calyx 1.8–8 (10) mm  
 long [Ser. *Humiles* (D. D. Keck) Crosswh.].  
 13 Basal leaves well developed; corolla rarely pale ventrally.  
 14 Leaves usually entire, sometimes obscurely dentate in var. *obtusifolius*; stems densely cespitose;  
 widespread in all but the se. part of the region ..... 16. *P. humilis*  
 14 Leaves serrate to obscurely dentate; stems less cespitose; entering the region from the n. in the  
 Owyhee Mts., sw. Idaho ..... 17. *P. albertinus*  
 13 Basal leaves not developed, all cauline.  
 15 Calyx 5–10 mm long; leaves narrowly lanceolate, 3–10 (14) mm wide; n.c. and ne. Nev., s.  
 Idaho, and n. Utah, eastward ..... 18. *P. radicosus*  
 15 Calyx 1.8–3 (3.5) mm long; leaves lanceolate, 8–18 (35) mm wide; c. and e. Nev. and s. Idaho,  
 across c. Utah to sw. Wyo. and nw. Colo. .... 19. *P. watsonii*  
 12 Corolla 20–30 mm long, abruptly ventricose-ampliate; calyx 7–10 mm long; Wasatch Mts. and  
 Utah Plateaus, also in the Black Pine and Deep Creek Mts. of the Bonneville Basin, northward,  
 southward, and eastward [Ser. *Whippleani* Crosswh.] ..... 20. *P. whippleanus*

Sect. 3. *Caespitosi* (Rydb.) Pennell [*Ericopsis* D. D. Keck]

- 1 Flowering stems 2–30 (37) cm long, the plants obviously caulescent.  
 2 Pubescence of the leaves of tapering and retrorsely curved hairs or the herbage glabrous.  
 3 Stems ascending to erect; plants not forming mats.  
 4 Staminode with a dense brush-like tuft of hairs at the apex and sparsely bearded proximally; mts.  
 and plateaus of Beaver, Iron, Washington, and Kane Cos., Utah, and adjacent Lincoln Co., Nev.,  
 southward ..... 21. *P. linarioides*  
 4 Staminode densely bearded throughout most of its length.  
 5 Leaves linear, 0.7–1.3 (1.7) mm wide; anthers usually smaller, the cells 0.8–1.0 (1.1) mm long;  
 Fish Lake Plateau, Sevier Co., and Spanish Fork Canyon, Utah Co., Utah ..... 22. *P. abietinus*  
 5 Leaves narrowly oblanceolate to obovate, 1.5–4.5 mm wide; anther-cells 1–1.2 mm long; s. Grand  
 Co. and San Juan Co., Utah, east to Colo. .... 23. *P. crandallii*  
 3 Stems prostrate or very short; plants forming mats.  
 6 Leaves 10–20 (35) mm long, glabrous to sparsely scabrous-puberulent ..... 23. *P. crandallii*  
 6 Leaves 4–10 (20) mm long, densely cinereous-puberulent; sw. Wyo., s. through ne. Utah and Utah  
 Plateaus to n. Ariz., and disjunct in Millar Co., Utah ..... 24. *P. caespitosus*  
 2 Pubescence of the leaves of closely appressed, flat, scale-like hairs.  
 7 Leaves pubescent on the upper surface and (sub)glabrous below; stems ascending, forming small  
 shrub-like plants; anther-cells 0.6–0.9 mm long; Tushar and n. Markagunt Plateaus, e. Beaver,  
 Piute, ne. Iron, and nw. Garfield Cos., Utah ..... 25. *P. tusharensis*  
 7 Leaves densely pubescent on both surfaces; stems prostrate and mat-forming or ascending; anther-

- cells 0.8–1.4 mm long; c. and s. Nev., Kane Co., Utah, and n. Ariz. .... 26. *P. thompsoniae*
- 1 Flowering stems very short, less than 1 cm long; internodes much compressed.
- 8 Leaves linear, 0.8–1.3 (1.5) mm wide; calyx 3.5–4.8 (5.5) mm long; s. Sweetwater Co., Wyo. and adjacent Daggett Co., Utah ..... 27. *P. acaulis*
- 8 Leaves narrowly oblanceolate, 1.2–4.3 mm wide; calyx 5.5–9 mm long; e. Daggett Co., Utah and Moffat Co., Colo. .... 28. *P. yampaensis*

Sect. 4. *Ambigui* (Rydb.) Pennell

- Only one species in our area ..... 28. *P. ambiguus*

Sect. 5. *Cristati* (Rydb.) Pennell [Sect. *Arator* D. D. Keck]

- 1 Staminode included or merely reaching the orifice, if slightly exerted, not conspicuously so; corolla tubular-funnelform to moderately ampliate or campanulate.
- 2 Corolla blue or blue-purple; principal cauline leaves 2–10 (15) mm wide; calyx 4–8 (9) mm long at anthesis; pubescence of the herbage of tapered hairs or glabrous.
- 3 Axis of the inflorescence, peduncles, pedicels, and calyces densely non-glandular-pubescent, sometimes mixed with a few viscid hairs.
- 4 Leaves linear to narrowly oblanceolate, 2–4 mm wide; e.c. Idaho ..... 30. *P. pumilus*
- 4 Leaves (ob)lanceolate to elliptic, (2) 4–11 mm wide.
- 5 Corolla lobes pale blue, the lobes oblong and not overlapping; staminode with a dense apical tuft of golden-yellow hairs, the remaining length sparsely bearded, the tip strongly curved to coiled; e. Nev. and w. and c. Utah ..... 31. *P. dolius*
- 5 Corolla lobes purplish blue or dark blue, the lobes orbicular and overlapping; staminode densely and evenly orange-bearded in the distal half, the tip slightly recurved, not coiled; w. Uinta Basin, Duchesne Co., Utah ..... 32. *P. duchesnensis*
- 3 Axis of the inflorescence, peduncles, pedicels, and calyces distinctly glandular-pubescent.
- 6 Staminode densely bearded.
- 7 Stems and leaves pubescent throughout.
- 8 Anther-cells 0.9–1.8 mm long, remaining parallel after dehiscence.
- 9 Corolla 11–15 mm long; plants 0.3–2 dm tall.
- 10 Plants small, 0.3–0.7 (1.4) dm tall; anther cells 1–1.2 mm long; Great Basin of Millard and Beaver Cos., Utah ..... 33. *P. nanus*
- 10 Plants (0.7) 1–2 dm tall; anther cells 1.5–1.8 mm long; Cedar Valley, Iron Co., Utah ..... 34. *P. franklinii*
- 9 Corolla 16–20 mm long; plants (2.5) 3–6 dm tall; Mohave Co., Ariz. .... 36. *P. distans*
- 8 Anther-cells 0.6–1 mm long, becoming peltate-explanate; se. Utah, sw. Colo., and nw. N.M. .... 37. *P. breviculus*
- 7 Stems and leaves glabrous, at least in the lower part of the plant; Uinta Basin, w. of Vernal, Utah ..... 38. *P. goodrichii*
- 6 Staminode moderately bearded.
- 11 Corolla 8–12 mm long; calyx 4–6 (7) mm long; anthers 0.6–1 mm long, becoming explanate; w. Carbon and Emery Cos., Utah ..... 39. *P. marcusii*
- 11 Corolla 15–22 mm long; calyx 6–8 mm long; anthers 1.1–1.4 mm long, not becoming explanate; sw. Colo. to n., c., and se. Utah, excluding the range of the preceding species ..... 40. *P. moffatii*
- 2 Corolla pink to magenta or rose-purple; cauline leaves 10–35 mm wide; calyx 8–11 mm long at anthesis; pubescence of the herbage of short, stubby hairs; Mono and Inyo Cos., Calif. .... 50. *P. monoensis*
- 1 Staminode exerted, usually conspicuously so; corolla distinctly ventricose-ampliate, rarely only moderately so.

- 12 Ovary and capsule completely glabrous.
- 13 Leaves puberulent.
- 14 Corolla (14) 15–28 mm long; capsule (6) 7–12 mm long.
- 15 Corolla 14–22 mm long, the throat not as abruptly expanded, 3–7 mm broad when pressed, the upper lip 4.5–7 (8) mm long, the tube 5–7 mm long, staminode only slightly exerted, straight or slightly recurved apically; e.c. Oregon ..... 41. *P. miser*
- 15 Corolla 18–28 mm long, more or less abruptly expanded into a broadly ventricose-ampliate throat, 7–12 mm broad when pressed, the upper lip (6.5) 8–13 mm long, the tube (6) 8–12 mm long, staminode conspicuously exerted and coiled apically; ne. Calif., s. Oregon, and sw. Idaho, to c. Nev. .... 42. *P. janishiae*
- 14 Corolla 10–14 mm long; capsule 3–6 mm long; e.c. Nev. and e.c. Calif. .... 43. *P. barnebyi*
- 13 Leaves, at least the lower ones, glabrous.
- 16 Corolla 8–13 mm long.
- 17 Anther-cells remaining nearly parallel (anthers horseshoe-shaped) after anthesis; hills w. of Cedar City in Iron and adjacent Washington Cos., Utah ..... 35 *P. pinorum*
- 17 Anther-cells widely divaricate at and after anthesis.
- 18 Leaves 2–5 (8) mm wide; anthers becoming peltate-explanate; palate of the corolla white-bearded; stems finely puberulent; w.c. Utah and adjacent Nev. .... 44. *P. concinnus*
- 18 Leaves 6–12 mm wide; anthers not becoming explanate; palate of the corolla yellow-bearded; stems glabrous; Kaiparowits Plateau, s.c. Utah ..... 45. *P. atwoodii*
- 16 Corolla 14–37 mm long.
- 19 Corolla 14–22 mm long, the throat 7–10 mm broad when pressed; s.c. and se. Utah, n. Ariz., sw. Colo., and w. N.M. .... 46. *P. ophianthus*
- 19 Corolla 30–37 mm long, the throat 11–14 mm broad when pressed; Uinta Basin, Utah and adjacent Colo. .... 47. *P. grahamii*
- 12 Ovary and capsule glandular-puberulent, at least above.
- 20 Corolla broadest at or near the orifice, never appreciably constricted; Big Butte, Butte Co., Idaho, northward ..... 48. *P. eriantherus*
- 20 Corolla broadest at the middle of the throat and somewhat constricted at the orifice; sw. Wyo. and adjacent ne. Utah ..... 49. *P. cleburnei*

#### Sect. 6. *Coerulei* Pennell

- 1 Corolla pink to lavender or violet, sometimes the limb pale bluish-lavender.
- 2 Corolla 10–15 mm long; bracts broader than long with the cordate bases overlapping; anther-cells 0.7–1 mm long; w.c. and nw. Nev., se. Oregon, and sw. Idaho ..... 52. *P. acuminatus*
- 2 Corolla (14) 15–22 mm long; bracts longer than broad, the bases not overlapping; anther-cells (0.9) 1.1–1.5 mm long.
- 3 Bracts and upper leaves more or less abruptly tapering from the widened base; calyx-segments lanceolate; staminode bearding of exceptionally short hairs, about 0.5 mm long; ne. Ariz., se. and c. Utah, and nw. N.M. .... 53. *P. angustifolius*
- 3 Bracts and upper leaves gradually tapering from the widened base; calyx-segments broadly lanceolate to ovate.
- 4 Corolla pink; staminode bearding of hairs less than 0.5 mm long; anther-cells 0.9–1.1 mm long; Uinta Basin, Utah ..... 55. *P. flowersii*
- 4 Corolla violet; staminode bearding of hairs 0.5–1 mm long; anther-cells (1) 1.2–1.5 mm long; c. and e. Nev. and w. Utah ..... 57. *P. immanifestus*
- 1 Corolla blue to bluish-purple or white in *P. lentus* var. *albiflorus*.
- 5 Staminode bearding of long, densely tangled hairs, 1–2 mm long; e.c. Nev., nw. Ariz., and widespread in Utah ..... 58. *P. pachyphyllus*

- 5 Staminode bearding of straight, relatively short or sparse hairs, less than 1 mm long.
- 6 Stems 1–4 (6) dm tall, arising from a thick crown or short-branched caudex; basal leaves 3–11 cm long.
- 7 Calyx-segments narrowly lanceolate.
- 8 Cauline leaves linear to narrowly lanceolate, 4–10 (15) mm wide.
- 9 Corolla 10–15 mm long; plants 0.8–1.8 (3) dm tall; sw. Wyo. and ne. Utah ..... 51. *P. arenicola*
- 9 Corolla 18–22 mm long; plants 2.5–4 dm tall; e. Uinta Basin, Utah ..... 53. *P. angustifolius*
- 8 Cauline leaves lanceolate to ovate, 10–35 mm wide; sw. Idaho, se. Oregon, and nw. and wc. Nev. .... 52. *P. acuminatus*
- 7 Calyx-segments broadly lanceolate to ovate.
- 10 Verticillasters mostly compactly flowered and symmetrical, the cymes many-flowered, the peduncles and pedicels usually short.
- 11 Anthers 1.1–1.5 mm long; corolla 16–20 (22) mm long; cauline leaves lanceolate to ovate, acute; w. Tavaputs Plateau, San Rafael Swell, Henry Mts., and the e. and s. side of the Utah Plateaus ..... 54. *P. carnosus*
- 11 Anthers 0.7–1 (1.1) mm long; corolla 13–17 (20) mm long; cauline leaves broadly ovate, rounded with a mucronate tip; e. end of the Uinta Mts. and Uinta Basin of Utah and adjacent parts of Colo. and Wyo. .... 59. *P. mucronatus*
- 10 Verticillasters loosely flowered and secund, the cymes 1 or 2 (4)-flowered, the peduncles and pedicels elongate; se. Utah, ne. Ariz., and sw. Colo. .... 56. *P. lentus*
- 6 Stems low, 0.3–1 (1.5) dm tall, arising from an elongate, spreading rhizomatous caudex; basal leaves 1–3 (3.5) cm long; Paunsaugunt Plateau, Garfield Co., Utah ..... 60. *P. bracteatus*

#### Sect. 7. *Gentianoides* G. Don

- 1 Corolla glandular-puberulent outside and inside, or if glabrous the thyrse of short, ascending peduncles and pedicels; anthers becoming peltate-explanate or nearly so, the sutures smooth.
- 2 Calyx 2.5–4 (5) mm long; corolla 17–25 mm long, red to crimson, sometimes pink-purple; se. Utah from Emery and Grand Cos., s. to n. Ariz. and w. through Washington Co., Utah to Clark Co., Nev. to e. San Bernardino Co., Calif. .... 61. *P. utahensis*
- 2 Calyx (3.5) 4–8 mm long; corolla 14–18 (20) mm long, violet to magenta; sw. Utah from Sevier and Piute Cos. to Washington and Millard Cos., and w. to e. Nye Co., Nev. .... 62. *P. confusus*
- 1 Corolla glabrous throughout; thyrse of elongate, divergent peduncles and pedicels; anthers not becoming explanate, the sutures papillate-toothed; s. Mono Co. and n. Inyo Co., Calif. and Clark Co., Nev. .... 63. *P. patens*

#### Sect. 8. *Spectabiles* Pennell

- 1 Upper leaves distinct, not connate; corolla-tube (6) 7–12 mm long, the throat 6–18 mm broad when pressed, darker pink to rose.
- 2 Leaves linear-lanceolate, obscurely dentate; anthers not explanate; e. Mojave Desert n. to and approaching our region in Owens Valley ..... *P. incertus* Brancegee
- 2 Leaves (ob)lanceolate to (ob)ovate, distinctly toothed or dentate; anthers becoming peltate-explanate.
- 3 Corolla 21–30 mm long; staminode included and glabrous; White and Inyo Mts., s. to the Panamint Mts. of Calif. and e. to Silver Peak Range, Tolicha Peak and Shone Mt. of sw. Nev. .... 64. *P. floridus*
- 3 Corolla (27) 30–35 mm long; staminode exserted, uncinat, yellow-bearded; Wassuk Range and Pine Nut Mts. of wc. Nev. .... 65. *P. rubricundus*
- 1 Upper leaves usually connate-perfoliate; corolla-tube 4–6 (8) mm long, the throat (12) 14–21 mm broad when pressed, whitish to pink; widespread in the s. half of the region from Pershing Co. to White Pine Co., Nev. and Millard Co. to San Juan Co., Utah, southward and introduced in s. Idaho and n.

- Utah ..... 66. *P. palmeri*
- Sect. 9. *Petiolati* (Rydb.) Pennell
- Only one species ..... 67. *P. petiolatus*
- Sect. 10. *Glabri* (Rydb.) Pennell
- 1 Anthers glabrous except for the frequent presence of papillate teeth along the sutures.
- 2 Anther-cells 0.9–1.8 (2.2) mm long, if greater than 1.8 mm the palate bearded.
- 3 Calyx 3–5 (6) mm long; stems puberulent or glabrous.
- 4 Anther-cells 1–1.4 (1.5) mm long, if greater than 1.4 mm the leaves narrowly linear to filiform.
- 5 Corolla 15–22 mm long; cauline leaves linear.
- 6 Calyx and corolla glabrous; thyrse non-glandular-puberulent to glabrous.
- 7 Herbage puberulent; corolla-tube 4–6 mm long; Kaibab Plateau, Coconino Co., Ariz., and Garfield Co., Utah ..... 69. *P. pseudoputus*
- 7 Herbage glabrous; corolla-tube 7–8 mm long; Navajo Mt., San Juan Co., Utah . 70. *P. navajoa*
- 6 Calyx and corolla glandular-puberulent; thyrse (axis, peduncles, and pedicels) glandular-pubescent; Aquarius Plateau, Utah ..... 71. *P. parvus*
- 5 Corolla 13–15 (17) mm long; cauline leaves lanceolate; n. Sevier Plateau (?), s. Wasatch Plateau ..... 74. *P. leptanthus*
- 4 Anther-cells 1.4–2.2 mm long.
- 8 Corolla 15–22 mm long, the palate glabrous.
- 9 Calyx segments broadly rounded and erose or mucronate-tipped, sometimes acute, the margins broadly scarious and erose; corolla 18–22 mm long; Snake River Plain and surrounding foothills of s. Idaho ..... 78. *P. perpulcher*
- 9 Calyx segments acute to acuminate, the margins not or only narrowly scarious, nearly entire; corolla 15–20 mm long; San Pitch Mts. and n. Wasatch Plateau, Sanpete Co., Utah ..... 75. *P. tidestromii*
- 8 Corolla (17) 21–30 mm long, the palate bearded; s.c. Nev. .... 80. *P. pahutensis*
- 3 Calyx (4) 5–10 mm long, if shorter than 5 mm the corolla glandular-puberulent within; stems glabrous.
- 10 Corolla 14–17 mm long; anther-cells 0.9–1.2 mm long; se. Washington and Kane Cos., Utah ..... 68. *P. ammophilus*
- 10 Corolla 17–35 mm long; anther-cells 1.2–1.8 mm long.
- 11 Calyx and corolla glabrous; cauline leaves broadly lanceolate to ovate, (10) 15–40 mm wide; ne. Oregon and c. and sw. Idaho ..... 77. *P. payettensis*
- 11 Calyx and corolla glandular-pubescent; cauline leaves linear to lanceolate, rarely broadly lanceolate, 1.5–15 (20) mm wide; sw. and c. Utah and White Pine and Clark Cos., Nev. .... 79. *P. leiophyllus*
- 2 Anther-cells (1.8) 2–3 mm long; palate of the corolla glabrous.
- 12 Corolla glabrous; leaves glabrous or finely puberulent in some *P. speciosus*.
- 13 Plants 0.5–4 (6) dm tall; stems puberulent or sometimes glabrous; cauline leaves 3–12 (20) mm wide; staminode glabrous or bearded in some; nw. Utah, Nev., and e. Calif., n. through e. Oregon to Wash. and adjacent sw. Idaho ..... 86. *P. speciosus*
- 13 Plants 4–10 dm tall; stems glabrous; cauline leaves 10–25 (30) mm wide; staminode always bearded; sw. Utah and adjacent Ariz. .... 87. *P. laevis*
- 12 Corolla glandular-puberulent; leaves densely cinereous-puberulent; Fish Lake Plateau and adjacent Wasatch Plateau, Sevier and Sanpete Cos., Utah ..... 88. *P. wardii*
- 1 Anthers pubescent on the sides.
- 14 Anthers short-pubescent, the hairs relatively stiff and straight, not exceeding the width of the cell.

- 15 Herbage and inflorescence densely cinereous-pubescent,  
 16 Leaves basal and cauline, the basal and lower cauline petiolate, the blades 8–25 mm wide, oblanceolate; corolla (14) 18–25 mm long; calyx glabrous to non-glandular puberulent; ne. Utah, sw. Wyo., and nw. Colo. .... 72. *P. fremontii*
- 16 Leaves all cauline, sessile, 2–5 mm wide, linear to narrowly oblanceolate; corolla 9–13 (15) mm long; calyx densely glandular puberulent; s.c. Wyo., nw. Colo., and adjacent Utah (Daggett Co.) ..... 73. *P. gibbensii*
- 15 Herbage and inflorescence glabrous to puberulent, but never densely pubescent.
- 17 Anther-cells dehiscent only partially from the distal  $\frac{2}{3}$ – $\frac{4}{5}$ , the proximal portion remaining indehiscent.
- 18 Mature anthers with cells 1.3–2.2 (2.8) mm long, usually not twisted and the line of dehiscence more or less straight.
- 19 Thyrses distinctly secund, the cymes 1–3-flowered.
- 20 Anther-cells 1.8–2.8 mm long; corolla (20) 24–32 mm long, the tube 8–11 mm long; calyx 4.5–7 mm long, with ovate, glabrous segments; herbage usually puberulent below; plants taller, 2.5–6 dm, the stems erect or ascending; Tushar and Pavant Plateaus and Mineral and Canyon Mts. of sc. Utah ..... 81. *P. longiflorus*
- 20 Anther-cells 1.3–1.8 mm long; corolla 18–23 (26) mm long, the tube 5–7 mm long; calyx 6–9 mm long, with lanceolate, usually glandular-puberulent segments; herbage glabrous; plants low, 1–2 (3) dm tall, the stems decumbent; Bear River Range of n. Utah and adjacent Idaho ..... 83. *P. compactus*
- 19 Thyrses subsecund to symmetrical, densely flowered, the cymes (3) 5–7-flowered; se. Idaho, n. Utah, and w. Wyo. .... 82. *P. cyananthus*
- 18 Mature anthers with cells 1.8–3 mm long, distinctly twisted so line of dehiscence becomes somewhat S-curved.
- 21 Calyx (4) 6–10 mm long, with lanceolate to narrowly ovate segments; plants 0.5–4 dm tall; this pubescent-anthered form endemic to the Silver Peak Range, Esmeralda Co., Nev. .... 86. *P. speciosus*
- 21 Calyx 4–7 (8) mm long, with broadly ovate segments; plants 3–7 dm tall; sw. Mont., nw. Wyo., and c. and s. Idaho ..... 89. *P. cyaneus*
- 17 Anther-cells dehiscent nearly the full length but not next to the connective.
- 22 Inflorescence glandular-puberulent, sometimes sparsely so.
- 23 Plants 2.5–10 dm tall; corolla (18) 20–30 mm long, the tube 6–10 mm long; anther-cells 1.5–2.5 mm long; se. Idaho and w. Wyo. to c. Utah ..... 84. *P. subglaber*
- 23 Plants 0.5–1.5 (2) dm tall; corolla 16–20 mm long, the tube 4–5 mm long; anther-cells 0.8–1.2 mm long; e. end of the Uinta Mts., ne. Utah ..... 85. *P. uintahensis*
- 22 Inflorescence glabrous.
- 24 Plants 2–6 dm tall; leaves crisped-margined; n. half of Canyon Lands of e. Utah and adjacent Colo. .... 90. *P. cyanocaulis*
- 24 Plants 0.8–1.8 (2.5) dm tall; leaves flat-margined; sw. Wyo. .... 76. *P. paysoniorum*
- 14 Anthers villous or woolly, the flexuous to tangled hairs mostly exceeding the width of the cell.
- 25 Calyx (3) 5–11 mm long, with lanceolate, acute, acuminate, or caudate segments.
- 26 Anther-cells (1.3) 1.4–2 (2.6) mm long.
- 27 Inflorescence glandular-pubescent, sometimes sparingly so.
- 28 Herbage glabrous; corolla (15) 22–33 mm long; staminode bearded; anther-cells (1.3) 1.6–2.6 mm long; c. and ne. Utah and adjacent Colo. .... 91. *P. scariosus*
- 28 Herbage glandular-puberulent; corolla 17–20 mm long; staminode glabrous; anther-cells 1.1–1.6 mm long; nw. Utah, ne. Nev., and adjacent Idaho ..... 92. *P. idahoensis*
- 27 Inflorescence glabrous; se. Utah and adjacent states ..... 93. *P. strictiformis*

- 26 Anther-cells 2–2.8 mm long; c.e. Nev. .... 94. *P. moriahensis*  
 25 Calyx 2.5–5 (7) mm long, with ovate, rounded to obtuse, sometimes acute or obtuse segments.  
 29 Corolla 14–23 (25) mm long; anther-cells 1.2–1.7 mm long.  
 30 Staminode glabrous; cauline leaves 1–1.5 (4) mm wide, filiform to linear, the margins not  
 crisped; Navajo Mt., s.c. Utah ..... 70. *P. navajoa*  
 30 Staminode densely bearded; cauline leaves 4–15 mm wide, lanceolate to narrowly elliptic,  
 crisped-margined; n. half of Canyon Lands of e. Utah and adjacent Colo. .... 90. *P. cyanocaulis*  
 29 Corolla (18) 25–38 mm long; anther-cells 1.7–2.8 mm long.  
 31 Inflorescence narrow, the cymes few-flowered and the peduncles and pedicels appressed, usually  
 short; corolla deep blue, 18–32 mm long; anthers not as densely pubescent, the cells not  
 obscured; s. Wyo., and the e. half of Utah, eastward and southward ..... 95. *P. strictus*  
 31 Inflorescence usually broader, the cymes often much-branched with the peduncles and pedicels  
 elongate and divaricate; corolla pale blue to lavender, 25–38 mm long; anthers-cells nearly  
 obscured by the densely woolly hairs; s. Utah and adjacent parts of Colo. and Ariz., w. to Lincoln  
 Co., Nev. .... 96. *P. comarrhenus*

Sect. 11. *Elmigera* (Reichb.) Benth.

- 1 Corolla nearly regular, the lobes subequal and projecting ..... 97. *P. eatonii*  
 1 Corolla distinctly bilabiate, the upper lip projecting with short lobes, the lower lip reflexed with longer  
 lobes ..... 98. *P. barbatus*

Sect. 12. *Saccanthera* Benth.

- 1 Staminode glabrous.  
 2 Leaves entire; calyx 2–8 mm long; herbage non-glandular-pubescent.  
 3 Leaves puberulent (sometimes papillate and visible on the upper surface with 10× magnification).  
 4 Corolla glabrous; pedicels puberulent with non-glandular hairs.  
 5 Corolla 16–21 mm long, the limb bright blue; herbage retrorsely canescent-puberulent; anther  
 cells 1–1.3 mm long, dehiscent less than half the length of the cell; sw. Idaho and e. Oregon  
 ..... 102. *P. cusickii*  
 5 Corolla 27–38 mm long, the limb violet to pale violet; herbage glabrous except minutely granular-  
 puberulent on the upper leaf surfaces; anther cells 2–3 mm long, dehiscent more than half the  
 length of the cell; nw. Nev. in the Jackson Mts. .... 99 *P. floribundus*  
 4 Corolla glandular-pubescent; pedicels glandular-pubescent.  
 6 Anther-cells 1.6–2.1 mm long, buff to purplish.  
 7 Corolla 20–30 mm long; anthers narrowly sagittate, dehiscent 3/5–4/5 their length; s. Lake Co.,  
 Oregon, near Summer and Paisley Lakes, southward (var. *sagittatus*) ..... 100. *P. laetus*  
 7 Corolla 14–20 mm long; anthers broadly oval and dehiscent 1/2–3/5 their length; Storey and  
 Washoe Cos., Nev., Lassen Co., Calif., and Lake Co., Oregon ..... 101. *P. roezlii*  
 6 Anther-cells 0.9–1.6 (1.8) mm long, usually purple-black.  
 8 Leaves sessile, linear to oblanceolate, usually folded and arched; plants on flat or gentle slopes  
 with stems clustered on a woody crown; vestiture densely cinereous-pubescent, the hairs 1–2  
 mm long; 1500–2100 (2300) m elevation; c. and n. Nev. and adjacent Oregon 103. *P. kingii*  
 8 Leaves predominantly petiolate, the blade more or less flat and not arched; plants mostly on talus  
 with the associated spreading underground branches connecting aerial stems that form loose  
 mats; vestiture different; 2200–3250 m elevation.  
 9 Leaf blades ovate to broadly lanceolate, 7–24 mm wide; pubescence of the stems and leaves of  
 hairs 1–1.5 mm long; 2200–2900 m elevation; Shoshone Range, known only on Mt. Lewis,  
 Lander Co., Nev. .... 104. *P. tiehmii*  
 9 Leaf blades oblanceolate, elliptic or lanceolate, 3–6 (7) mm wide; pubescence of the stems and

- upper leaf surfaces of minute hairs 0.05 mm long, the lower leaf surfaces glabrous;  
3000–3250 m elevation; c. Schell Cr. Range, White Pine Co., Nev. .... 105. *P. rhizomatosus*
- 3 leaves glabrous.
- 10 Corolla 14–20 mm long, blue to violet or lavender; anther cells 0.9–1.4 mm long.
- 11 Corolla lobes blue to blue-violet; stems ascending to sprawling; Wasatch Range, n. Utah  
..... 106. *P. leonardii*
- 11 Corolla lobes lavender; stems erect to ascending; Washington Co., Utah ..... 107. *P. higginsii*
- 10 Corolla 20–30 mm long, violet to lavender; anther cells (1.2) 1.4–2.1 mm long.
- 12 Calyx 3.5–7 mm long, the segments lanceolate to narrowly ovate, attenuate to caudate; stems  
puberulent.
- 13 Pedicels glabrous; leaves lanceolate to oblanceolate or linear, 1.5–3 (4.5) cm long, 2–7 (9) mm  
wide; Deep Creek, House, and Canyon Ranges, Utah, and Kern Mts., Nev. .... 108. *P. patricus*
- 13 Pedicels granular-puberulent at the summit; leaves elliptic, (3) 3.5–6 cm long, 7–16 (20) mm  
wide; c. Wasatch Range, Utah ..... 109. *P. platyphyllus*
- 12 Calyx 2–3.2 mm long, the segments broadly obovate, rounded, obtuse, or mucronate, minutely  
ciliolate apically; stems glabrous; s. Wasatch Range and disjunct in Sevier and possibly  
Washington Cos., Utah ..... 110. *P. sepalulus*
- 2 Leaves serrate; calyx 9–15 mm long; herbage strongly glandular-pubescent; se. Wash., ne. Oregon,  
and w. Idaho ..... 115. *P. glandulosus*
- 1 Staminode pubescent.
- 14 Corolla 13–20 mm long.
- 15 Anthers dehiscing across less than half the length of the cells; Washoe, Ormsby, and Douglas Cos.,  
Nev., westward ..... 111. *P. gracilentus*
- 15 Anthers dehiscing across more than  $\frac{3}{4}$  the length of the cells; Owyhee Co., Idaho 12. *P. attenuatus*
- 14 Corolla 24–35 mm long.
- 16 Plants with well developed cauline leaves.
- 17 Leaves entire; calyx 7–12 mm long, the segments narrowly lanceolate, entire, glandular-pubescent,  
the margins herbaceous; staminode included, the hairs yellow.
- 18 Corolla 24–30 mm long; herbage cinereous-puberulent; e. flank of the Sierra Nevada and  
adjacent areas in Mono and Inyo Cos. .... 112. *P. papillatus*
- 17 Corolla (25) 30–35 mm long; herbage glabrous below; Kawich Range, Nye Co., Nev.  
..... 113. *P. pudicus*
- 18 Leaves serrate, 3.4–5 (6.2) mm long, the segments lanceolate to ovate, glabrous or sometimes  
ciliolate, the margin scarious, erose-toothed; staminode slightly exerted, the hairs long, white;  
native to ne. Oregon, se. Wash., and c. Idaho, introduced here and there in our area  
..... 116. *P. venustus*
- 16 Plants subscapose, the leaves mostly basal; calyx 3–4.5 (5) mm long, the segments oblanceolate to  
broadly ovate; Inyo and White Mts. .... 114. *P. scapoides*
- Sect. 13. *Bridgesiani* (Rydb.) Pennell
- Only one species ..... 117. *P. rostriflorus*