

The Pennell collection from the Intermountain region belongs to var. *glabrescens* (Keck) N. Holmgren, which differs from var. *breviflora* in lacking glandular pubescence on the calyx. The two varieties are sympatric through the middle part of the Sierra Nevada with var. *glabrescens* extending into the northern Sierra Nevada and in the Northern Coast Ranges and var. *breviflora* southward in the Sierra

Nevada and in the Southern Coast Ranges.

Closely approaching the region in the Carson Range of western Nevada at 1830 m is *Keckiella lemmonii* (A. Gray) Straw. This species should be looked for in the adjacent Basin Ranges. *Keckiella lemmonii* is similar to *K. breviflora*, but it has smaller corollas, 10–14 mm long, which are purplish-brown, and the staminode is densely bearded.

10. PENSTEMON Mitch. Beard Tongue

Perennial herbs, some woody at the very base to suffrutescent; leaves opposite, rarely whorled (ternate to quadrate), or rarely the upper alternate, entire to toothed or rarely laciniate-pinnatifid, the lower often petioled and the upper sessile; inflorescence a cymose or thyrsoid panicle or in some a simple bracteolate raceme; bracts reduced, opposite or rarely alternate; calyx of 5 essentially distinct, subequal segments, more or less accrescent; corolla commonly blue to purple or sometimes magenta or lavender, varying to pink, or rarely red, yellow, or white, tubular to strongly ventricose-ampliate (swollen ventrally), slightly to strongly bilabiate, the upper lip 2-lobed, external in bud, the lower 3-lobed; nectaries of glandular epistaminal hairs; staminode (posterior sterile filament) well developed, filiform, often the same length as the fertile stamens, glabrous or usually bearded dorsally, inserted well down in the corolla-tube; fertile stamens 4, didynamous, the anther-cells 2, joined at the connective, confluent in some and dehiscent across the connective, or dehiscent only towards the distal ends, or most commonly the line of dehiscence continuous from one end to the other and often becoming explanate (flattened out and spread); stigmas united; capsule septicidal and often loculicidal at the apex as well, cartilaginous; seeds numerous, irregularly angled; $x = 8$.

A large genus of about 250 species, occurring in N. Amer. from Alaska and Yukon Territory to Guatemala, but mostly in w. U.S., with its greatest density in Utah. (Name from the Latin *paene*, nearly, almost, and the Greek *stemon*, thread, indicating that the staminode is almost a stamen.)

Penstemon is the largest North American genus of Scrophulariaceae. It is the third largest genus in the Intermountain region, being exceeded only by *Astragalus* and *Eriogonum*. All published accounts of *Penstemon* have relied on the "classical" approach in the assessment of specific limits and their interrelationships. The subgenera and most sections appear to be natural groups, but the alignment of species, especially within difficult sections such as *Penstemon*, *Caespitosi*, *Cristati*, *Coerulei*, and *Glabri*, may be subject to reorganization when karyotypic, chemical, anatomical, and micro characters are used along with results of cultivation and cross-breeding experiments in comparative studies. There may be too much emphasis placed on such characters as seed size in separating sections *Penstemon* and *Cristati*, staminode prominence within section *Cristati*, staminode pubescence within section *Coerulei*, and anther pubescence within section *Glabri*. The subgenera, distinguished by the manner of anther dehiscence and plant habit, appear to be natural groups.

Keck's "studies in *Penstemon*" series and his floristic treatments of the genus in Abrams' *Illustrated Flora of the Pacific States*, Davis' *Flora of Idaho*, and Kearney and Peebles' *Arizona Flora*, and Crosswhite's work with subgenus *Habroanthus* have provided most of the modern knowledge we have of the genus, but these treatments deal with only slightly more than half of our species.

The measurements used in the keys and descriptions are taken from dried herbarium specimens, and the measurements of the anther-cell length are taken from mature anthers after dehiscence. The artificial key is for the purpose of identification; the technical key that follows provides diagnostic characters for subgenera and sections, as well as a second source for species identification.

References:

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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 Thyrse distinctly glandular-pubescent on the axis, peduncles, or pedicels, sometimes sparingly so in the low, small-leaved spp.
 - 4 Anthers densely long-woolly pubescent Sect. 1. *Erianthera*, p. 375
 - 4 Anthers glabrous except for the frequent presence of papillate teeth along the sutures.
 - 5 Leaves pubescent Sect. 2. *Glabri*, p. 376
 - 6 Leaves linear, (0.7) 1–2.5 (3) mm wide, entire, often revolute or folded, opposite, subopposite, or sometimes alternate GROUP I, p. 371

KECKIELLA



Keckiella rothrockii

Keckiella breviflora var. glabrisepala

6 Leaves, at least the basal, narrowly lanceolate to broadly ovate, (2) 3–40 mm wide,
entire or dentate, flat or folded, the margins sometimes slightly revolute, always
opposite GROUP II, p. 372

5 Leaves glabrous GROUP III, p. 373

3 Thyrses glabrous or nonglandular-pubescent on the axis, peduncles, and pedicels.

7 Stems pubescent GROUP IV, p. 375

7 Stems glabrous.

8 Leaves thick and fleshy, glaucous GROUP V, p. 375

8 Leaves not thick and fleshy, usually green GROUP VI, p. 376

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*, p. 381

9 Corolla scarlet Sect. 11. *Elmigera*, p. 383

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*, p. 383

10 Corolla red to red-orange, the upper lip extended over the anthers, the lower reflexed
..... Sect. 13. *Bridgesiani*, p. 384

GROUP I

1 Palate of the corolla glabrous or glandular-puberulent, the glandular hairs not colored; Oregon, w.
Idaho, and Wash.

2 Anther-cells 0.8–1.0 (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*

GROUP IV

- 1 Anther-cells 0.3–1.0 (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 e. 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 0.4–2.0 (2.8) cm long.
- 5 Pubescence of leaves of tapered, terete, retrorsely curved hairs; sw. Wyo., ec. 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 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 long as broad and peltate-explanate.
- 7 Leaves best developed on 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; sc. Oregon, entering the region in Lake Co. 15. *P. cinicola*
- 1 Anther-cells 1.0–2.0 mm long; corolla (13) 15–23 mm long, the palate glabrous or sparsely bearded in *P. linarioides*, *P. dolius*, and *P. pumilus*.
- 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 adj. Nev. and Ariz. 21. *P. linarioides*
- 10 Plants 4–12 cm tall; leaves mostly in basal tufts; ec. Idaho 29. *P. pumilus*
- 9 Leaves (ob)lanceolate to elliptic, 4–11 mm wide; e. Nev., w., c., and ne. Utah 30. *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 1.2–2.0 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 64. *P. pseudoputus*
- 12 Leaves (ob)lanceolate, 10–12 cm long and 10–15 mm wide; staminode bearded; San Pitch Mts. and adj. Wasatch Plateau, San Pete Co., Utah 69. *P. tidestromii*
- 11 Corolla 13–15 (17) mm long; anther-cells ca 1 mm long; endemic to the s. Sevier Plateau (?), s. Wasatch Plateau, Utah 68. *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; sc. Utah .. 61. *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. 56. *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. 57. *P. confusus*
- 2 Corolla glabrous externally and glabrous or nonglandular 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. 51. *P. latus*
- 5 Cymes 3–5-flowered; corolla lavender, magenta, or sometimes purplish; s. Mono and n. Inyo cos., Calif., and Sheep Range, Clark Co., Nev. 58. *P. patens*

- 4 Inflorescence of more congested verticillasters with short, erect pedicels.
- 6 Staminode bearding of long, tangled hairs 1–2 mm long; ec. Nev., nw. Ariz., and widespread in Utah 53. *P. pachyptila*
- 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 0.2–1.0 mm long.
- 9 Corolla 10–15 mm long, the bracts broader than long with the cordate bases overlapping; anther-cells 0.7–1.0 mm long; wc. and nw. Nev., se. Oregon, and sw. Idaho 48. *P. acuminata*
- 9 Corolla 15–22 mm long, the 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. 49. *P. angustifolia*
- 10 Bracts and upper leaves gradually tapering to an acute tip; calyx-segments broad-lanceolate to ovate.
- 11 Staminode beard of hairs 0.2–0.5 (0.7) mm long; cymes 2–5-flowered; Uinta Basin, Canyon Lands, and Utah Plateaus 50. *P. canescens*
- 11 Staminode beard of hairs 0.5–1.0 mm long; cymes usually more than 5-flowered; Great Basin 52. *P. immanens*
- 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. 57. *P. confusa*
- 7 Corolla blue to bluish-purple.
- 12 Calyx-segments narrowly lanceolate; corolla 10–15 mm long.
- 13 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 47. *P. arenaria*
- 13 Plants 2.5–6 dm tall; cauline leaves lanceolate to ovate, 10–35 mm wide; se. Idaho, se. Oregon, and nw. and wc. Nev. 48. *P. canescens*
- 12 Calyx-segments lanceolate to ovate; corolla 13–22 mm long.
- 14 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 55. *P. bracteata*
- 14 Stems 1–6 dm tall, arising from a thick crown or short-branched caudex; basal leaves 3–11 cm long.
- 15 Cauline leaves linear to narrowly lanceolate, usually less than 6 mm wide; Uinta Basin 49. *P. angustifolia*
- 15 Cauline leaves lanceolate to ovate, 14–40 mm wide.
- 16 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 50. *P. canescens*
- 16 Anther-cells 0.7–1.0 (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 adj. parts of Colo. and Wyo. 54. *P. mucronata*

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. arenaria*
- 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 28. *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. rufula*

Dry, rocky, sagebrush flats and hills, 1500–2000 m elev.; Harney (s. to Steens Mt.) and Malheur cos., to Jefferson Co., Oregon and Owyhee Co., Idaho. June–early July.

7. *Penstemon deustus* Douglas ex Lindl.

Penstemon deustum Douglas ex Lindl. in Edward's Bot. Reg. 16: pl. 1318. 1830. (*Douglas*, scorched, rocky plains, "Lewis and Clark's River between the forks and confluence with the Columbia, and near the junction of Spokane River," in 1826.) *P. heterandrum* Torr. & Gray in Beckwith, Explor. & Surv. Railroad Route from Mississippi River to Pacific Ocean 2: 123, pl. 8. 1857. *P. deustus* subsp. *heterander* Pennell & Keck in Keck, Amer. Midl. Naturalist 23: 603. 1940. *P. deustus* var. *heterander* incorrectly attr. to Pennell & Keck by M. E. Peck, Manual Higher Pls. Oregon 642. 1941, not validly published; Cronq. Univ. Wash. Publ. Biol. 17(4): 380. 1959. (*Snyder* 59, Sierra Nevada, s. from the mouth of Fall River, e. Shasta Co., Calif., 30 June 1854.) – var. *pedicellatus*. *P. deustus* var. *pedicellatus* M. E. Jones, Zoc 4: 281. 1893. (M. E. Jones s.n., "Among junipers and pinons at about 8000 feet altitude on gravelly slopes of mountains," Muncy, Schell Creek Range, White Pine Co., Nev., 3 July 1891; lectotype by Keck, Amer. Midl. Naturalist 23: 602. 1940; isolectotype at NY?)

Hot-rock penstemon; scabland penstemon.

Suffrutescent perennial, 1–4 dm tall; flowering stems decumbent to erect or ascending, arising from a much-branched, thick, woody caudex, to 1 cm thick, also with leafy sterile shoots; herbage glabrous to glandular-puberulent; leaves (1) 2–5 cm long, 2.5–18 mm wide, deeply toothed to shallowly dentate, opposite or subopposite, usually not connected around the stem, the lower ones oblanceolate to obovate or spatulate, tapered to a petiolate base, the upper cauline ones lanceolate to ovate, sessile, clasping; thyrses with opposite to subopposite, few to several-flowered cymes, the peduncles and pedicels glandular-pubescent; flowers sometimes slightly fragrant; calyx 3–5 (6) mm long, the segments lanceolate to ovate, glandular-pubescent, the margins scarious proximally; corolla 10–16 (18) mm long, the throat 2.5–5 mm broad when pressed, bilabiate, the upper lip short, arched, the lower lip projecting, extending beyond the upper with longer, broadly rounded lobes, white all over or with faint lavender tinge inside the throat and brownish or purple guide-lines, glandular-puberulent outside and sometimes inside the throat, the palate glandular-pubescent; staminode included, sparsely bearded apically or glabrous; fertile stamens slightly exserted, the anther-cells 0.4–0.8 mm long, broadly ovate, dehiscing the full length, becoming opposite and explanate, essentially glabrous; capsule 3.5–5.5 mm long; seeds 0.8–1.2 mm long, with a finely reticulate surface; $2n = 16$.

Dry, rocky places, usually in basaltic rock, or sometimes limestone, in sagebrush, juniper, and pinyon-juniper communities, 800–2500 (3000) m elev.; e. Wash., Idaho, and sw. Mont., s. through Oregon to the e. Sierra Nevada (Mono Co.), Calif., the n. ½ of Nev., nw. Utah (w. Box Elder Co.), and w. Wyo. May–July.

The two varieties represented in our area can be distinguished by the following characters.

- 1 Corolla 12–18 mm long, the upper lip white; leaves 8–18 mm wide; e. Wash. and ne. Oregon, through Idaho (except the sw. portion) to adj. sw. Mont. and w. Wyo. var. *deustus*
- 1 Corolla mostly smaller, 10–12 (15) mm long, the upper lip brownish; leaves 2.5–8 (14) mm wide; se. Oregon and sw. and w. Box Elder Co., Utah var. *pedicellatus* M. E. Jones

8. *Penstemon sudans* M. E. Jones

Penstemon sudans M. E. Jones, Contr. W. Bot. 8: 13. 1893. *P. deustus* subsp. *sudans* Pennell & Keck in Keck, Amer. Midl. Naturalist 23: 600. 1940. (M. E. Jones s.n., "very dry and dry lava rocks between Amedee and Susanville," 15 mi w. of Amedee, 4000 ft., Lassen Co., Calif., 24 June 1897; holotype at POM!)

P. deustus var. *arenarius* sensu Jepson, Manual Fl. Pl. Calif. 916. 1925, misapplied; not *P. arenarius* Greene, 1889.

Robust perennial with poorly developed basal leaves, 3–7 dm tall; stems erect, stout; herbage prominently glandular-pubescent and clammy feeling throughout; leaves 3–6 cm long, 8–20 (30) mm wide, ovate and sessile, or the lower ones obovate and tapering to a petiolate base, opposite or subopposite, without a connecting ridge around the stem; thyrses not at all secund, elongate with about 9–18 condensed and distinct verticillasters, prominently glandular-pubescent throughout; calyx 3.5–5.5 mm long, the segments lanceolate to ovate, glandular-pubescent, the margins usually scarious proximally; corolla 9–11 mm long, the throat 3–4 mm broad when pressed, the lower lip slightly projecting beyond the upper one, the lobes all spreading, the upper slightly narrower, the limb cream-white with red-violet guide-lines inside the throat and middle of lobes, the throat often rose-tinged, glandular-pubescent outside and inside the lobes; staminode included, usually glabrous, white; fertile stamens included, the anther-cells 0.5–0.6 (0.7) mm long, broadly ovate, dehiscing the full length, nearly explanate, white, essentially glabrous; capsule 4–5.5 mm long; seeds ca 1 mm long.

Open rocky places, usually of igneous origin, in sagebrush and open woodlands, 1200–1700 m elev.; endemic to the vicinity of Susanville, Lassen Co., Calif., e. to adj. Washoe Co., Nev. June–July.

Penstemon sudans is closely related to *P. deustus*. The two were considered conspecific by Keck (1940). Keck felt that some of the Oregon Coast Range collections of *P. deustus* approach *P. sudans* in glandulosity, but these collections do not have the stout stems and densely flowered cymes characteristic of *P. sudans*.

9. *Penstemon arenarius* Greene

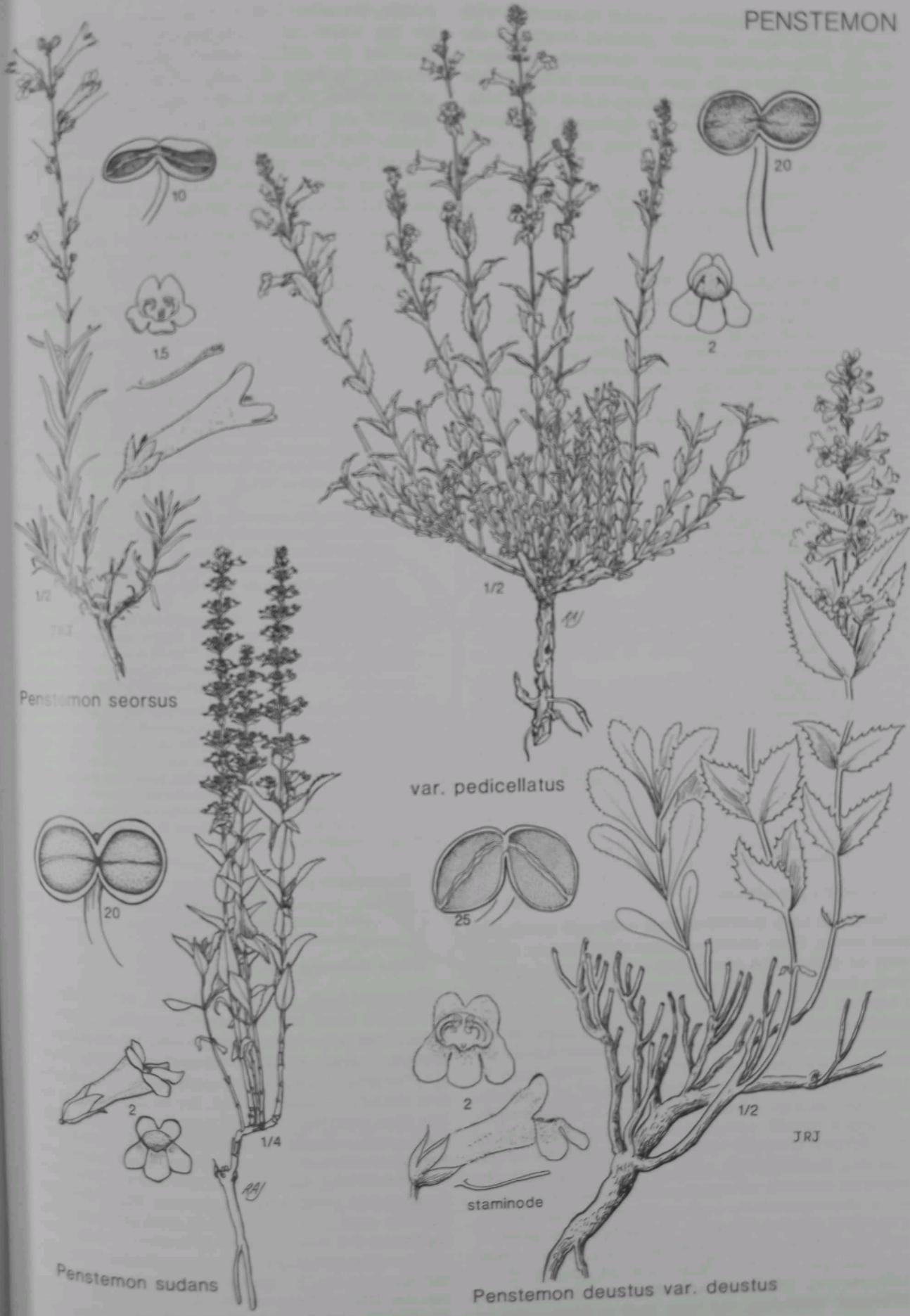
Penstemon arenarius Greene, Pittonia 1: 282. 1889. *P. deustus* var. *arenarius* Jepson, in part, Manual Fl. Pl. Calif. 916. 1925. (Shockley 348, "in loose sand," Belleville, Elmerada [now Mineral] Co., Nev., 22 May 1866; isotype at EHD)

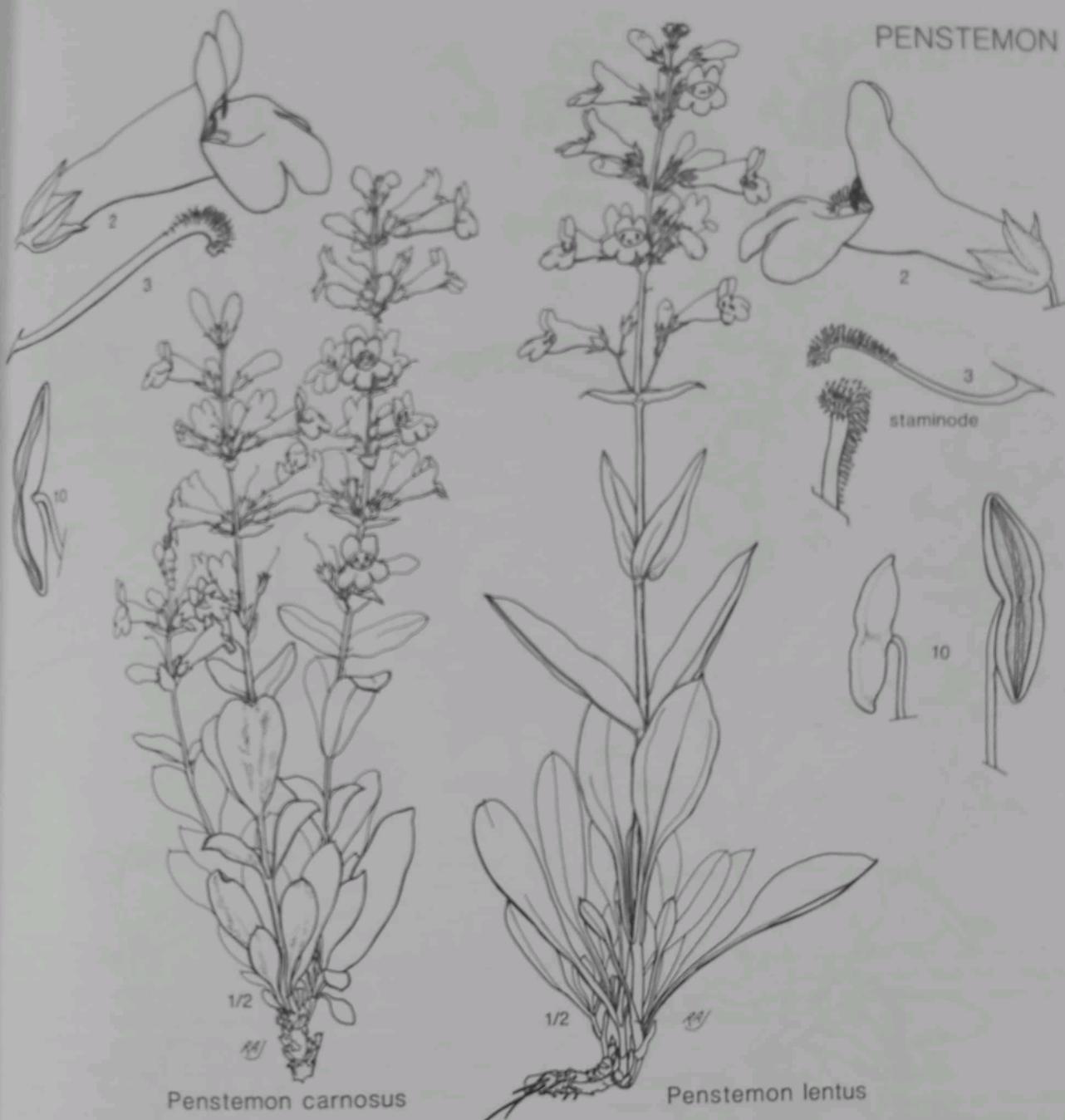
P. maguirei Crosswh. Leafl. W. Bot. 10: 171. 1965. (*Maguire* & Holmgren 25884, sandy soil, 2 mi w. of the San Antonio Range in Smoky Valley, Nye Co., Nev., 20 July 1945; holotype at US; isotype at NY!)

Nevada sand-dune penstemon.

Herbaceous perennial with the crown buried in the sand, 1–3 dm tall; stems erect or ascending, usually several arising from a buried, branched, woody caudex, also with many sterile leafy shoots; herbage glabrous but glutinous with sand-grains adhering throughout; leaves 3–4.5 (5.5) cm long, 10–24 mm wide, coriaceous, glaucous, dentate, especially apically, the basal ones not developed, the lower cauline ones obovate or spatulate, often abruptly petiolate, the upper ones ovate to lanceolate, sessile; thyrses with few-flowered cymes, the peduncles and pedicels short, glabrous to sparsely puberulent, glutinous as in the herbage; calyx 4–7 mm long at anthesis, to 9 mm in fruit, the segments ovate, caudate-tipped, the margins scarious and erose; corolla 11–15 (18) mm long, the throat 3–5 mm broad when

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yellow-orange-bearded in the upper half, the hairs 0.5–1.0 mm long; fertile stamens included, the anther-cells (1.0) 1.2–1.5 mm long, dehiscing the full length, becoming opposite but not explanate, glabrous except for the papillate-toothed sutures; capsule 8–12 mm long; seeds 2–4 mm long.

Dry, sandy or sandy-loam soil in sagebrush communities and common along roadsides in valleys and foothills, 1500–2000 m elev.; w. to Tooele and Millard cos., Utah, w. across Elko and White Pine cos., to Pershing and Lander cos., Nev. Late May–June.

Occupying part of the same range in the mountains of eastern Nevada and adjacent Utah is the closely related *P. pachyphyllus* var. *congestus*. The two taxa appear to maintain their distinctiveness. *Penstemon pachyphyllus* var. *congestus* grows on gravelly slopes at higher elevations (above 2000 m), is taller (2.5–7 dm), has better developed and larger basal leaves, has caudine leaves nearly rounded apically, sometimes with a mucronate tip, has blue flowers, and has staminode bearing of much longer, tangled hairs.

53. *Penstemon pachyphyllus* A. Gray ex Rydb.
Penstemon nitidus β (var.) *major* Benth. in A. DC. Prodr.

10: 323, 1846. *P. pachyphyllus* A. Gray ex Rydb. Fl. Rocky Mts. 770, 1066, 1917 [1918]. *P. acuminatus* var. *major* Benth. ex Rydb. ibid., p. 770, in synonymy, likely an error, meant to be *P. nitidus* var. *major*. (*Frémont* 485, "in montibus Scopulosis," "Hillsides of Du Chene Fork," Wasatch Co., Utah, 31 May 1844; isotype at NY!)

P. acuminatus var. *congestus* M. E. Jones, Proc. Calif. Acad. Sci. II, 5: 714, 1895. *P. congestus* Pennell in E. Graham, Ann. Carnegie Mus. 26: 331, 1937. *P. pachyphyllus* subsp. *congestus* Keck in Kearney & Peebles, J. Wash. Acad. Sci. 29: 490, 1939. *P. pachyphyllus* var. *congestus* N. Holmgren, Brittonia 31: 105, 1979. (M. E. Jones 5262, near Canaan Ranch [near Rockville], in sand, 5000 ft, Washington Co., Utah, 19 May 1894; lectotype by Pennell, Contr. U.S. Natl. Herb. 20: 360, 1920.)

Short-lived perennial herb, 3–6.5 dm tall, often with well developed basal leaves; stems erect or ascending, simple, few or several arising from a thick crown or short-branched caudex; herbage glabrous and glaucous; leaves entire, fleshy, the basal ones 5–10 (12) cm long, 12–35 mm wide, oblanceolate to obovate or spatulate.

61. *Penstemon palmeri* A. Gray

Penstemon palmeri A. Gray, Proc. Amer. Acad. Arts 7: 379. 1868. (*Coues & Palmer* 228, "Rocky River banks, Rio Verde," Skull Valley, Ariz., 28 Aug 1865; holotype at GH)
P. macranthus Eastw. Bull. Torrey Bot. Club 32: 207. 1905.
P. palmeri var. *macranthus* N. Holmgren, Brittonia 31: 105. 1979. (*O. F. Heizer* s.n., IXL Cañon, e. side of the Stillwater Range, 33 airline mi e. of Fallon, Churchill Co., Nev., 15 June 1902; holotype at CAS)
P. palmeri subsp. *eglandulosus* Keck, Amer. Mid. Naturalist 18: 797. 1937. *P. palmeri* var. *eglandulosus* N. Holmgren, Brittonia 31: 105. 1979. (*B. Maguire, R. Maguire & G. Piranian* 12279, "Base of red sandstone cliffs," 2.5 mi n. of Kanab, Kane Co., Utah, 29 June 1935; holotype at UTC; isotype at NY!)

Palmer's penstemon.

Robust perennial herb, 5–14 dm tall; stems erect or ascending, few to several arising from a thick crown, this surmounting a taproot; herbage glabrous and glaucous; leaves distinctly dentate or the uppermost sometimes subentire, fleshy, the basal (usually few) and lower caudine ones 6–10 (14) dm long, 1.5–3 (6) cm wide, ovate, petiolate, the mid and upper caudine ones 4–10 (12) cm long, 2.5–5 (6) cm wide, the mid caudine ovate and auriculate-clasping, the upper often triangular, with the broad bases connate-perfoliate, or auriculate-clasping in some var. *macranthus*; thyrses elongate, usually with several verticillasters, the cymes 2–4-flowered, the peduncles and pedicels divaricately branched, glandular-pubescent or glabrous in var. *eglandulosus*, secund; calyx (4) 4.5–6 (7.5) mm long, the segments ovate, acute, glandular-pubescent or glabrous, the margins narrowly scarious, undulate to erose; corolla (25) 27–35 (40) mm long, abruptly expanding into a strongly inflated throat, 12–21 mm broad when pressed, rounded ventrally, the tube 4–6 (8) mm long, the upper lip projecting and slightly arched upward, the lobes of the lower lip reflexed, white or pale pink to lavender-pink with prominent red-violet guide-lines on the lower lip and inside the throat, glandular-pubescent externally and within, or sometimes glabrous, the palate sparingly bearded with long, whitish hairs, fragrant; staminode exserted, the base glandular-pubescent, the apex scarcely dilated, uncinate, densely bearded with long, spreading, yellow hairs, these up to 3 mm long; fertile stamens included to reaching the orifice, the posterior (shorter) pair glandular-puberulent at the base, the anther-cells (1.6) 1.8–2.4 mm long, dehiscing the full length and becoming opposite but not explanate, essentially glabrous; capsule 11–16 mm long, glandular-puberulent apically; $2n = 32$.

Blackbrush, sagebrush, Joshua tree, juniper, pinyon-juniper, and ponderosa pine communities, along washes, roadsides and canyon floors, usually where subsurface moisture is available throughout most of the summer, 800–2500 m elev.; in sw. Utah from s. Millard Co. to Washington and Kane cos.; in nw. and c. Ariz. in Coconino, Mohave, and Yavapai cos.; in Nev. from s. Elko and e. Eureka cos., s. to ne. Nye, Lincoln, and Clark cos., and disjunct in Pershing and Churchill cos.; in s. Calif. in the Mojave Desert mts. of s. Inyo and e. San Bernardino cos.; collections from introductions in Farmington Canals along Interstate 80 near Mountain Home, Idaho. May–July (Aug).

Three varieties of *P. palmeri* are readily distinguishable by the following key characters. In southern Elko Co. and White Pine Co., Nevada the plants of var. *palmeri* tend to have larger corollas.

1. Corolla-tube 4–6 mm long, upper caudine leaves always connate-petiolate.

2. Peduncles, pedicels, and calyces glandular-pubescent, anther-cells 1.8–2.4 mm long; sw. Utah (absent from the range of the following var.), e. and s. Nev., s. to se. Calif. and nw. and c. Ariz. and introduced in s. Idaho and n. Utah
 var. *palmeri*

2. Peduncles, pedicels, and calyces glabrous, anther-cells 1.8–2.0 (2.2) mm long; s. end of the Utah Plateau from Cedar City and Bryce Canyon Natl. Park. and e. Pine Valley Mts., s. through Zion Natl. Park and Kanab to the Kaibab Plateau in n. Coconino Co., Ariz.
 var. *eglandulosus* (Keck) N. Holmgren

1. Corolla-tube 7–8 mm long; upper caudine leaves often not always connate; mts. of e. parts of Churchill and Pershing cos., and in Nye Co., Nev. var. *macranthus* (Eastw.) N. Holmgren

62. *Penstemon petiolatus* Brandegee

Penstemon petiolatus Brandegee, Bot. Gaz. 27: 435. 1899. (*Purpus* 6136, "rocky places," Sheep Mts., 4000–5000 ft, probably in Lincoln Co., Nev., in 1898; holotype at UC; isotype at NY!)

P. calcareus M. E. Jones, Contr. W. Bot. 12: 60. 1908; not Brandegee, 1903. *P. aboriginum* M. E. Jones, Contr. W. Bot. 14: 35. 1912. (*M. E. Jones* s.n., "very hot and dry and exposed places on rocky limestone ridges and slopes near Indian Springs," Charleston Mts., 4000 ft, Clark Co., Nev., 7 May 1906; isotype at NY!)

Low shrub, 0.5–1.5 (4) dm tall and up to 6 dm across; stems much-branched, becoming thick and woody below; herbage green to glaucous on the current year's growth, glandular-pubescent, the bark of the older stems brown, eventually becoming blackish; leaves dentate, 2–3 (3.5) cm long, 8–17 mm wide, broadly ovate, obtuse or acute, all but the uppermost petiolate; thyrses short and broad with divergent peduncles, consisting of 2–4 verticillasters, the cymes 1–3 (5)-flowered, glandular-pubescent; calyx 4.5–6.5 (8) mm long, the segments narrowly lanceolate to lanceolate, glandular-pubescent, the margins narrowly scarious; corolla 13–17 mm long, moderately ampliate, the lobes spreading, magenta with dark violet lines inside the throat, glandular-pubescent externally, the palate bearded with whitish-yellow hairs; staminode slightly exserted, short-pubescent nearly the full length; fertile stamens included to slightly exserted, the anther-cells 0.5–0.9 mm long, dehiscing the full length and becoming peltately explanate, the cells broader than long, essentially glabrous; capsule ca 6–8 mm long.

Cracks and crevices of limestone rock in shadscale, blackbrush, *Buddleja*, and juniper communities, 1000–1700 m elev.; Beaver Dam Mts. of Washington Co., Utah, w. across s. Nev. in the Desert Range, Sheep Range, and Charleston Mts. May–June.

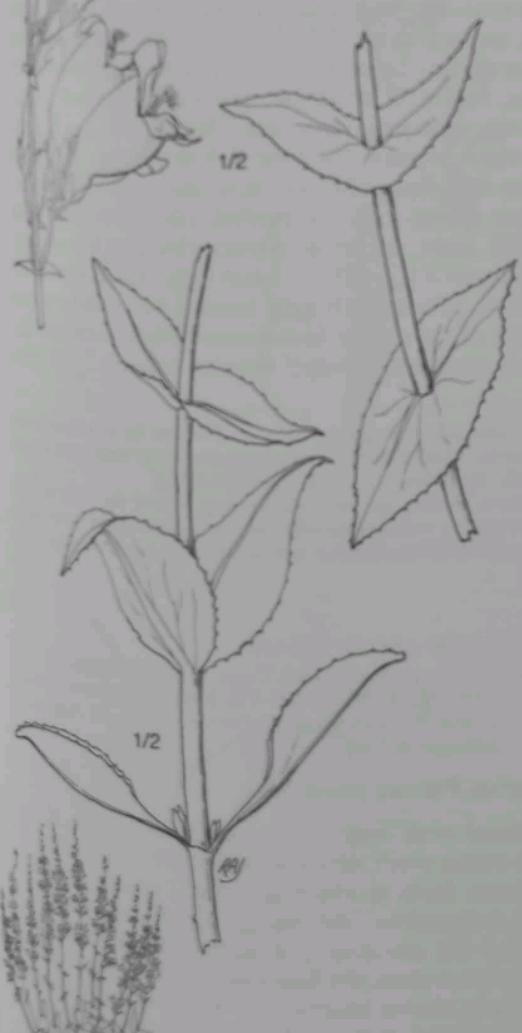
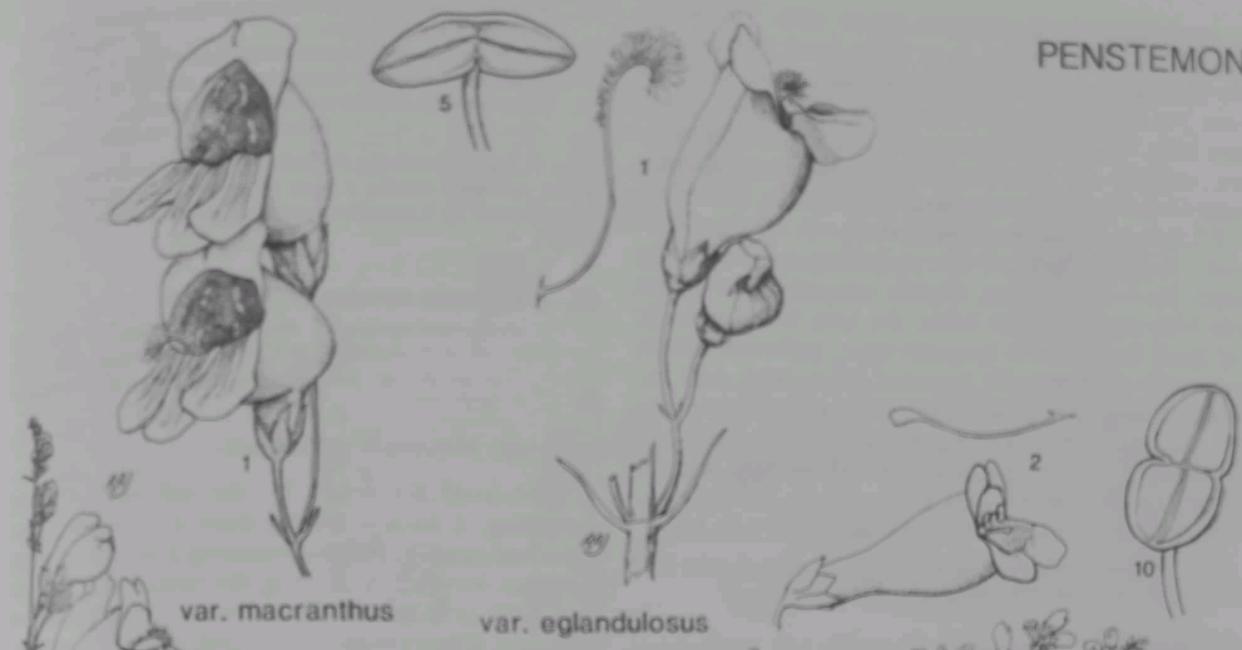
This distinctive little shrub has no apparent close relative.

63. *Penstemon ammophilus* N. Holmgren & L. Shultz

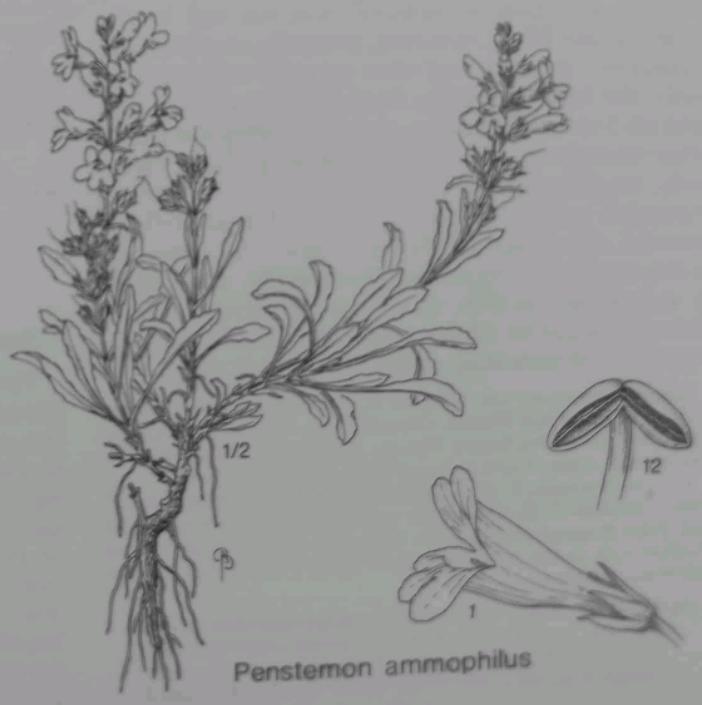
Penstemon ammophilus N. Holmgren & L. Shultz, Brittonia 34: 381. 1982. (*Shultz & Anderson* 5349, Canaan Mt. 13 km airline distance sse. of Rockville, 2120 m, Washington Co., Utah, 14 June 1981; isotype at NY!)

Herbaceous perennial, 0.5–1.5 dm tall; stems clustered, usually several arising from a buried, branched, woody caudex and ascending or decumbent above the sand surface; herbage and inflorescence glandular-pubescent and glutinous with sand-grains adhering throughout; leaves entire and crisped-margined, the lower caudine ones petiolate, 2.5–5.5 cm long, the blade obovate, 4–8 mm wide, the upper caudine sessile, 1.5–4 cm long, 2–5 mm wide, narrowly lanceolate, rounded apically; thyrses somewhat compressed, of 5–

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Penstemon palmeri var. *palmeri*



Penstemon ammophilus

tapering to a winged petiolar base, the upper caudine ones 3–7.5 (10) cm long, 5–15 (20) mm wide, narrowly lanceolate to (ob)lanceolate, sessile; thyrses of 4–7 verticillasters, the cymes 1–3 (4)-flowered, glandular-puberulent, sometimes sparsely so, the flowers secund; calyx 4.5–7.5 mm long, the segments lanceolate to ovate, acute or acuminate, glandular-puberulent to nearly glabrous, the margins narrowly scarious, moderately erose, recurved at the apex; corolla (18) 20–30 mm long, ventricose-ampliate, strongly bilabiate, the throat 7–10 mm broad when pressed, 2-ridged ventrally, the tube 6–10 mm long, the limb deep blue, the throat often whitish within, the tube violet, glandular-puberulent to glabrous externally, the palate glabrous; staminode included to more or less exserted, the yellow beard forming a tuft at the apex with a few straggly hairs below; fertile stamens reaching the orifice to exserted, the anther-cells 1.5–2.1 (2.5) mm long, dehiscing nearly the full length but not next to the connective, white-hispid on the sides, the sutures papillate-toothed; capsule ca 7–10 mm long; $2n = 16$.

Moderately moist to dry places on exposed sagebrush slopes and open Gambel oak scrub, aspen, or fir woods, 1800–3300 m elev., w. Wyo. from the Gros Ventre and Wind River mts., s. into Utah through the Uinta Mts., e. slope of the s. Wasatch Mts. from Park City southward, and in the Wasatch and Fish Lake plateaus; also in the vicinity of Pocatello, Idaho. June–early Aug.

Penstemon subglaber and *P. cyananthus* var. *subglaber* are different taxa, but they are closely related. Their distributions overlap in southeastern Idaho and western Wyoming. They can be readily distinguished by the glandular-pubescent, secund inflorescences with 1–3 (4)-flowered cymes of *P. subglaber* and the glabrous, non-secund inflorescences with 3–7-flowered cymes of *P. cyananthus* var. *subglaber*.

79. *Penstemon uintahensis* Pennell

Penstemon uintahensis Pennell, Contr. U.S. Natl. Herb. 20: 350. 1920. (*Goodding* 1221. "Crest of mountains," Dyer Mine, Uinta Mts., Uintah Co., Utah, 30 June 1902; holotype at NY!)

Uinta Mountains penstemon.

Perennial herb, 0.5–1.5 (2) dm tall, with well developed basal leaves; stems ascending, 1 to few arising from a thick, woody crown or short, branched caudex; herbage glabrous; leaves entire, often folded, the basal and lower caudine 3–6 (10) cm long, 4–12 mm wide, narrowly oblanceolate, gradually tapering to a petiolar base, the upper caudine ones 1.5–4.5 cm long, 1–4 (6) mm wide, linear to narrowly lanceolate, sessile; thyrses of 2 or 3 verticillasters, the cymes 1–(2)-flowered, raceme-like, glandular-puberulent, the flowers secund; calyx 4–6.5 (7) mm long, the segments ovate, acute to acuminate, glandular-puberulent to glabrous, the margins scarious, erose; corolla 16–20 mm long, moderately ampliate to tubular, the throat 5.5–7 mm broad when pressed, the tube 4–5 mm long, the limb sky-blue, glandular-puberulent externally, the palate glabrous; staminode included, golden-yellow-bearded; fertile stamens included to reaching the orifice, the anther-cells (0.8) 1.0–1.2 mm long, dehiscing nearly the full length but not quite to the connective, hispid on the sides, the sutures papillate-toothed; capsule ca 7–8 mm long.

Rocky, subalpine and alpine meadows and ridges, especially near timberline, 3000–3700 m elev.; endemic to the higher slopes at the e. end of the Uinta Mts. from vicinity of Red Castle Lake, e. to Dyer Mt., Utah. July.

Penstemon uintahensis appears to be related to *P. subglaber* much the same way *P. compactus* is to *P. cyananthus* (see comments under *P. compactus* above).

80. *Penstemon speciosus* Douglas ex Lindl.

- Penstemon speciosus* Douglas ex Lindl., in Edward's Bot. Reg. 15: pl. 1270. 1829. *P. glaber* β (var.) *speciosus* A. Gray, Proc. Amer. Acad. Arts 6: 60. 1862. *P. glaber* β (var.) *speciosus* Regel, Gartenflora 24: 34. 1873. *P. glaber* f. *speciosus* Voss in Vilmorin's Blumengärtn. ed. 3, I, 766. 1895. (Douglas, "Native of the banks of the Spokane river in North-west America"; a possible isotype at Kew is labeled "On the high sandy banks of the Columbia near Oukanagan, also on Spokane River.")
P. kennedyi A. Nels. Proc. Biol. Soc. Wash. 17: 97. 1904. *P. speciosus* subsp. *kennedyi* Keck, Amer. Mid. Naturalist 23: 613. 1940. (*Kennedy* 736, Truckee Pass, Virginia Mts., Washoe Co., Nev., 6 June 1903; holotype at RM!)
P. piliferus A. A. Heller, Muhlenbergia 2: 136. 1906. *P. speciosus* var. *piliferus* Munz & I. M. Johnston, Bull. S. Calif. Acad. Sci. 23: 35. 1924. (*Heller* 7991, hills w. of Yreka, Siskiyou Co., Calif., 8 June 1905; isotype at NY!)
P. rex Nels. & Macbr. Bot. Gaz. 55: 381. 1913. (*Nelson* & *Macbride* 1999, "high gravelly flats at 7,000 ft., Jarbidge, Elko Co., Nev., 9 July 1912; holotype at RM!)
P. perpulcher var. *pandus* Nels. & Macbr. Bot. Gaz. 55: 382. 1913. *P. pandus* Nels. & Macbr. Bot. Gaz. 65: 69. 1918. (*Nelson* & *Macbride* 1834, "On the high plains, near the 'Hot Hole' of East [Fork] Bruneau [River]," Owyhee Co., Idaho, 2 July 1912; holotype at RM!)
P. deserticola Piper, Proc. Biol. Soc. Wash. 32: 43. 1919. (*Leiberg* 402, "Near Desert Well 18 miles S. of B. [Button] Spgs." between Button Springs and Silver Lake, 1400 m., Lake Co., Oregon, 5 July 1894; holotype at US; isotype at NY!) A small-flowered form with small anthers.
P. glaber sensu A. Gray, Syn. Fl. N. Amer. 2(1): 262. 1878. misapplied; not Pursh, 1814.
P. glaber var. *utahensis* sensu Jepson, Manual Fl. Pl. Calif. 914. 1925. misapplied; not S. Wats. 1871.

Royal penstemon, showy penstemon.

Short-lived perennial herb, 0.5–4 (6) dm tall, compact to elongate and tall; stems ascending or decumbent, few to several arising from a thick crown or branched caudex, this surmounting a taproot, puberulent; leaves entire, glabrous or sometimes puberulent, the basal and lower caudine 5.5–9 cm long, 10–20 mm wide, lanceolate to ovate, petiolate, the upper caudine ones 3.5–7 (9) cm long, 3–12 (20) mm wide, lanceolate, subcordate, clasping, flat or folded; thyrses of 4–12 verticillasters, sometimes with thyrsoid branches from the lower nodes in robust plants, glabrous to puberulent, rarely glandular-puberulent, the flowers usually secund; calyx (4) 6–10 (13) mm long, the segments lanceolate to ovate, acute or acuminate, glabrous to minutely puberulent, the margins scarious and erose; corolla 25–32 (37) mm long, ventricose-ampliate, the lips projecting-spreading, the throat 7.5–10 (13) mm broad when pressed, 2-ridged ventrally, the tube 8–13 mm long, the limb sky-blue, the tube blue-violet, often white within, glabrous within and without, including the palate; staminode included, glabrous or bearded at the apex; fertile stamens reaching the orifice, sometimes the longer pair slightly exserted, the anther-cells (1.8) 2.0–3.0 mm long, sigmoidally twisted, dehiscing from the distal $\frac{1}{2}$, the proximal $\frac{1}{2}$ remaining indehiscent, glabrous except for the papillate-toothed sutures (short-pilose in plants from the Silver Peak Range, Nev.); capsule (8) 10–15 mm long; seeds 2–2.5 (3.5) mm long; $2n = 16$.

In open sagebrush, bitterbrush, juniper, piñon, or mountain meadow.



habitat associations, 1200–3300 m elev.; c. Wash. to s. Calif., remaining mostly e. of the Cascade-Sierran crest, e. to sw. Idaho (Owyhee and Jarbridge mts.), w. Utah (Raft River and Deep Creek mts.) and as far s. in Nev. as the Silver Peak, Toiyabe, Toquima, Monitor, White Pine, Egan, and Schell Creek ranges. June–July.

Penstemon speciosus is the most wide-ranging species both geographically and morphologically of the section *Glabri*. The presence or absence of pubescence on the herbage, in the inflorescence, and on the staminode, and short or long calyx-segments, occur randomly throughout the geographical range with little or no apparent geographical pattern (see Crosswhite, F. S. Amer. Mid. Naturalist 77: 18–21, 1967). The population in the Silver Peak Range, Esmeralda Co., Nevada has pubescence on the anthers, a character found in some other species of section *Glabri*, the closest of which is in eastern Nevada.

81. *Penstemon laevis* Pennell

Penstemon laevis Pennell, Contr. U.S. Natl. Herb. 20: 347. 1920. (*M. E. Jones* 5250 in part, "in red sand at Springdale," 1200 m. Washington Co., Utah, 17 May 1894; isotype at POM!)

Short-lived perennial herb, 4–6 (10) dm tall; stems erect or ascending, 1 to few arising from a simple crown, this surmounting a taproot; herbage glabrous throughout, glaucous; leaves 5–10 (15) cm long, 10–30 mm wide, entire, the basal and lower cauline ones broadly oblanceolate to obovate, obtuse, petiolate, the upper

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sp. the lower spreading to nearly reflexed, the limb pale blue to lavender, the throat pinkish-white with red-violet guide-lines within, the tube pale violet or pinkish, glabrous within and without, including the palate; staminode included, white, glabrous or sometimes sparsely bearded on the expanded distal portion; fertile stamens exserted, the anther-cells 2.0–2.5 (2.8) mm long, dehiscing from the distal $\frac{1}{3}$, the proximal remaining indehiscent, nearly obscured by the dense villous-woolly white hairs, the sutures papillate-woolly; capsule ca 10–15 mm long.

Associated with sagebrush in pinyon, juniper, Gambel oak, and piñon-pine communities, (1000) 1600–2400 (2700) m elev.; throughout the Utah Plateaus and laccolithic mts. of the Canyon Lands to se. Colo. and ne. Ariz. and sporadically w. across the Great Basin to the Wah Wah and Needle ranges, Beaver Co., Utah and the White Rock Mts. (Deer Lodge) and Cave Valley of Lincoln Co., Nev. June–Aug.

90. *Penstemon eatonii* A. Gray

Penstemon centranthifolius sensu S. Wats. in King, Rep. Geol. Explor. 40th Parallel 5: 219. 1871; not Benth. 1835.

P. eatoni A. Gray, Proc. Amer. Acad. Arts 8: 395. 1872. (*D. C. Eaton & S. Watson* 225, "Dry roadsides, lower Provo Cañon," Utah, 11 July 1869; holotype at GH!)

P. eatoni var. *undosus* M. E. Jones, Proc. Calif. Acad. Sci. II. 5: 715. 1895. *P. eatoni* subsp. *undosus* Keck in Kearney & Peebles, J. Wash. Acad. Sci. 29: 491. 1939. (M. E. Jones 5110ah, "in red sand at St. George," 3000 ft, Washington Co., Utah, 26 Apr 1894; lectotype by Pennell, Contr. U.S. Natl. Herb. 20: 336. 1920; isolectotype at NY!)

P. coccineus Rydb. Bull. Torrey Bot. Club 36: 691. 1909. (*D. T. MacDougal* 173, "about Grand Cañon of the Colorado," Ariz., 28 June 1898; holotype at NY!) = var. *undosus*.

Eaton penstemon, firecracker penstemon.

Short-lived perennial herb, 4–10 dm tall; stems erect

or ascending, few to several arising from a short-branched caudex; herbage glabrous or puberulent; leaves entire, (10) 16–28 (50) mm wide, the basal and lower cauline 5–10 (20) cm long, elliptic to broadly obovate, petiolate, the upper cauline 3–9 cm long, broadly lanceolate to ovate, sessile, sometimes subcordate and clasping; thyrses of 4–12 verticillasters, the cymes 1- or 2 (4)-flowered, the peduncles and pedicels short, glabrous to puberulent, the flowers secund; calyx (3.5) 4–5 (6) mm long, the segments ovate, acute to abruptly short-acuminate, glabrous, the margins scarious, entire to slightly erose; corolla 24–30 (33) mm long, tubular, the throat 5–7 (9) mm broad when pressed, the tube often decurved near the base, obscurely bilabiate, the lobes subequal, projecting to scarcely spreading, scarlet, glabrous outside and inside, including the palate; staminode included, glabrous to sparsely bearded at the apex; fertile stamens included to reaching the orifice or evidently exserted, the anther-cells (1.4) 1.8–2.3 (2.8) mm long, dehiscing from the distal $\frac{1}{2}$ – $\frac{3}{4}$, the proximal portion remaining indehiscent, puberulent on the sides, the sutures papillate-toothed; capsule 10–14 mm long; seeds 2–3 mm long; $2n = 16$.

Dry slopes and flats in sagebrush, pinyon-juniper, mountain mahogany, and ponderosa pine communities, 1500–2800 m elev.; in the Great Basin from Nye and White Pine cos., Nev. and Juab Co., Utah, s. to s. Calif. and in the Wasatch Mts., Utah Plateaus, and Canyon Lands from Utah and Wasatch cos. s. to Ariz., nw. N.M., and sw. Colo. June–July.

Specimens of *P. eatonii* from our region can be easily sorted into two varieties. A third infraspecific taxon [called subsp. *exsertus* (A. Nels.) Keck] occurs south of our region in Arizona. It is marked by its conspicuously exserted anthers and puberulent herbage.

- 1 Herbage glabrous throughout; Nye and White Pine cos., Nev., and Juab, Utah, and Carbon cos., Utah, s. to the Mojave Desert mts. of s. Inyo Co. and e. San Bernardino Co., Calif. and s. Nev., and the plateaus and mesas of n. Ariz. and sw. Colo. var. *eatonii*
- 1 Herbage puberulent; s. Lincoln and Clark cos., Nev., Iron, Wayne, and s. Grand cos., Utah, and sw. Colo., s. to the San Bernardino Mts. of s. Calif., to Gila and Pinal cos., Ariz. and nw. N.M. var. *undosus* M. E. Jones

Penstemon × jonesii Pennell

Penstemon jonesii Pennell, Contr. U.S. Natl. Herb. 20: 338. 1920. *P. × jonesii* pro sp., Crosswh. Amer. Midl. Naturalist 77: 22. 1967, from the putative cross, *P. laevis* Pennell × *eatonii* var. *undosus* M. E. Jones. (M. E. Jones 5250 in part, the type mounted on the same sheet as the type of *P. laevis* Pennell, Springdale, 1200 m, Washington Co., Utah, 17 May 1894; holotype at US!)

The hybrid between *P. laevis* and *P. eatonii* var. *undosus* is not surprising and has been collected before. *Penstemon eatonii* commonly hybridizes with neighboring species of *Penstemon*, probably due to the shrewdness of the nectar-seeking hummingbird, the primary pollinator of this red tubular-flowered species. Some of the taxa known to be involved are: *P. palmeri*, *P. leiophyllum* var. *francisci-pennellii*, *P. speciosus*, and in this hybrid combination, *P. laevis*.

91. *Penstemon barbatus* (Cav.) Roth

Chelone barbata Cav. Icon. & Descript. Pl. 3: 22, pl. 242. 1795. *Penstemon barbata* Roth, Catalecta Bot. 3: 49. 1806. (Mex.)
P. torreyi Benth. in A. DC. Prodr. 10: 324. 1846. *P. barbatus* β (var.) *torreyi* A. Gray, Proc. Amer. Acad. Arts 6: 59.

1862. *P. barbatus* f. *torreyi* Voss in Vilmorin's Blumen-gärtn. ed. 3, 1: 766. 1895. *P. barbatus* subsp. *torreyi* Keck in Kearney & Peebles, J. Wash. Acad. Sci. 29: 491. 1939 ("versus montes Scopulosos," Colo., holotype at NY!)

P. barbatus var. *puberulus* A. Gray in Emory, Rep. U.S. & Mex. Boundary Surv. 2(1): 114. 1858. (*Thurber 402*, "Guadalupe Cañon," Cochise Co., Ariz., May 1851; holotype at GH!) – var. *torreyi*.

P. barbatus var. *trichander* A. Gray, Proc. Amer. Acad. Arts 11: 94. 1876. *P. barbatus* f. *trichander* A. Gray ex Voss in Vilmorin's Blumen-Gärtn. ed. 3, 1: 766. 1895. *P. trichander* Rydb. Bull. Torrey Bot. Club 33: 151. 1906. *P. barbatus* subsp. *trichander* Keck in Kearney & Peebles, J. Wash. Acad. Sci. 29: 491. 1939. (*T. S. Brandegee* s.n. "in Hayden's Exploration," sw. Colo., in 1875, holotype at GH!)

Short-lived perennial herb, 3–10 dm tall; stems erect or ascending, 1 to few arising from a thick crown; herbage glabrous or sometimes puberulent below; leaves entire, 3–8 (14) cm long, the basal and lower cauline ones (6) 12–25 (30) mm wide, oblanceolate, petiolate, the upper cauline ones 1–8 (15) mm wide, linear to narrowly lanceolate, sometimes filiform, sessile; thyrses of 6–10 verticillasters, the cymes (1) 2–4-flowered, the peduncles and pedicels often elongate, glabrous, tending to be secund; calyx (3) 4–6 (9) mm long, the segments lanceolate to ovate, glabrous or sometimes obscurely glandular-puberulent, the margins narrowly scarious, entire to undulate or rarely erose; corolla 26–32 (36) mm long, more or less tubular, the tube gradually expanding into the throat, decurved near the base, the throat shallowly 2-ridged ventrally, strongly bilabiate, the upper lip projecting with short lobes, its lobes united $\frac{1}{4}$ of the length, the lobes of the lower lip reflexed, orangish-red to scarlet, the palate yellow with red-violet guide-lines, glabrous externally, the palate yellow-bearded to glabrous; staminode included, pale yellow, glabrous; fertile stamens usually exserted beyond or under the projecting upper corolla-lip, the anther-cells 1.5–2.0 (2.2) mm long, dehiscing from the distal $\frac{1}{3}$, the proximal $\frac{1}{3}$ remaining indehiscent, pale yellow, glabrous or sparsely to moderately lanate-villous on the sides, the sutures papillate-toothed; capsule 10–14 mm long; seeds 2–2.5 mm long; $2n = 16$ (var. *torreyi*).

Dry hillsides in pinyon-juniper, Gambel oak, and ponderosa pine communities, 1600–2500 (3400) m elev.; s. parts of Utah and Colo. s. through n. and e. Ariz., N.M., and Trans-Pecos Texas to Mex. June–July.

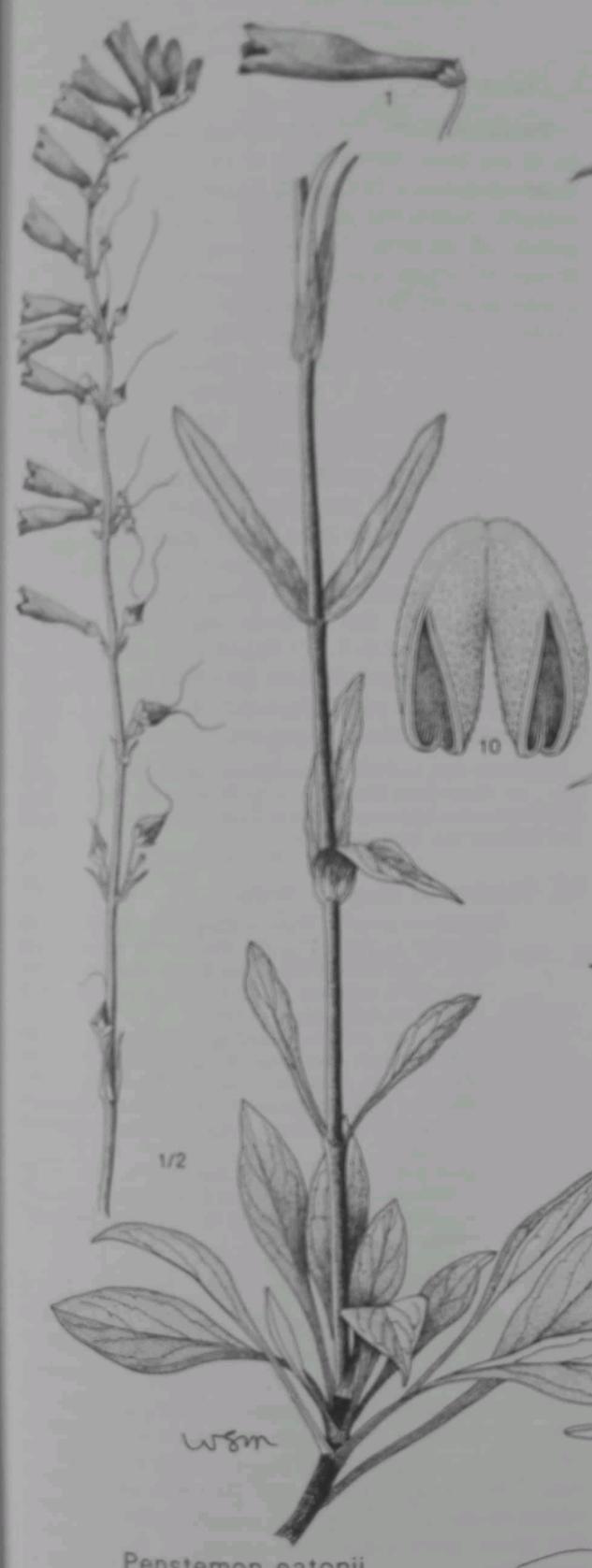
Typical *P. barbatus* with a densely yellow-bearded palate is the common form in Mexico. Northward in the United States, however, the occurrence of bearded forms gradually decreases along with a gradual decrease in the amount of pubescence. Most plants in the northern part of its distribution bear glabrous palates and are referable to var. *torreyi*. A third variety, var. *trichander*, has varying degrees of pubescence on the anthers. The concept that this variety originated through introgression of woolly anthered *P. strictus* genes into *P. barbatus* was proposed nearly simultaneously by G. Moore (Proc. Utah Acad. Sci. 42: 161–162. 1965) and Crosswhite (Southw. Naturalist 10: 236. 1968). Crosswhite observed that the distribution of var. *trichander* coincides with the region of overlap between *P. barbatus* var. *torreyi* and *P. strictus*.

1 Anthers villous; palate of the corolla glabrous; sw. Colo., ne. Utah (Abajo Mts.), ne. Ariz., and nw. N.M. var. *trichander* A. Gray

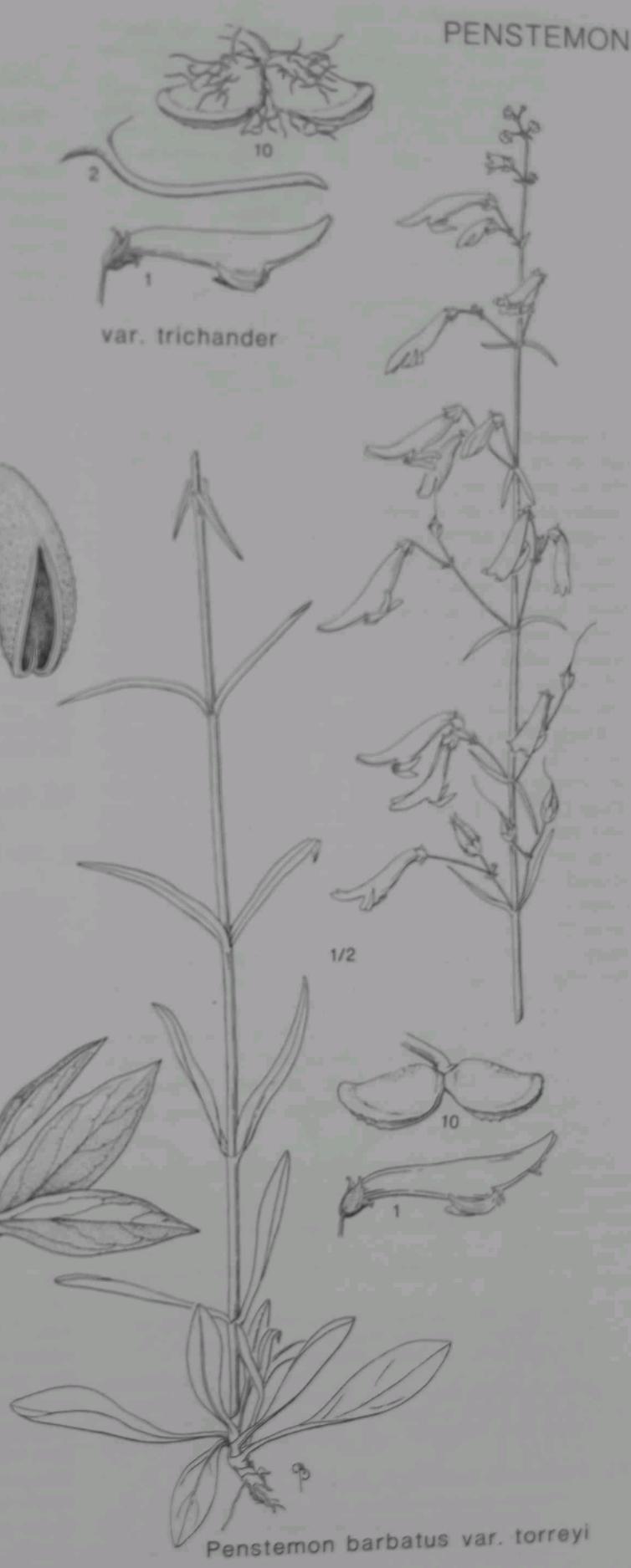
1 Anthers essentially glabrous.

2 Palate of the corolla bearded with yellow hairs; range of the sp. except not in se. Utah and sw. Colo. var. *barbatus*

2 Palate of the corolla glabrous to sparsely bearded with whitish hairs; range of the sp. except not in most of n. Mex. var. *torreyi* (Benth.) A. Gray



Penstemon eatonii



Penstemon barbatus var. *torreyi*