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A Key to the Penstemons of New Mexico

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The key to New Mexico's penstemons in Nisbet & Jackson (1960) has been out of date for some time and Martin & Hutchins's (1980) rearrangement of that work was no improvement. My goal has been to create a beefed-up key to the beardtongues of New Mexico that incorporates species new to the state since 1960 and nomenclatural changes. This work is not revisionary, I have simply utilized the literature and the UNM and ASU herbaria. When time allows, other appropriate herbaria will be visited to gather more information to revise the key if necessary.

Before a key can be made, one must know all the taxa in the state. I used Nisbet & Jackson (1960) as the starting point. They treated 41 taxa, not including a *P. ambiguus* × *thurberi* hybrid. A list of New Mexico plants compiled by the Soil Conservation Service (1994) contained 48 taxa, seven of which were new state records. These are *P. angustifolius* var. *venosus*, *P. comarrhenus*, *P. deaveri*, *P. latus*, and the closely related trio of *P. griffinitii*, *P. inflatus*, and *P. pseudoparvus*, which were split from *P. oliganthus* by Crosswhite (1965). I have seen New Mexico specimens of all of them at UNM and/or SJNM. Heflin (1997) added one more species, *P. cobeae*. I found two additional species in the cabinets at UNM, *P. grandiflorus* and *P. virgatus* var. *asa-grayii*, which brings the total to 51 known *Penstemon* taxa for New Mexico.

There are still questions concerning the identification, presence, and distribution of certain penstemons in New Mexico. The UNM herbarium has few if any specimens of several taxa. ASU has specimens of some of these taxa whose distributions are centered west of here. San Juan College (SJNM) contains a number of specimens from that part of the country. In addition, *P. linarioides* vars. *compactifolius* and *maguirei* and *P. metcalfei* have incomplete descriptions in the literature making it hard to see how they fit into the existing framework. Additional information is needed for these plants:

Penstemon angustifolius venosus UNM: no specimens; ASU: no NM specimens; SJNM: a few specimens from San Juan County, New Mexico.

Penstemon campanulatus (*P. pulchellus*) UNM: no specimens; ASU: no specimens; SJNM: no specimens.

Penstemon comarrhenus UNM: one specimen; ASU: no NM specimens; SJNM: one specimen from Rio Arriba and two from San Juan counties, New Mex-

ico.

Penstemon dasyphyllus UNM: two specimens from Hidalgo county, NM, and two from Arizona (Cochise and Pima counties); ASU: none from NM, a few specimens from Cochise, Santa Cruz, and Gila counties, AZ; SJNM: no specimens.

Penstemon eatonii UNM: no specimens; ASU: no NM specimens; SJNM: one specimen from San Juan County, NM.

Penstemon latus UNM: one specimen from McKinley county; ASU: one specimen from San Juan county, NM, a few specimens from Apache and Navajo counties, AZ; SJNM: one from San Juan County, NM, a few from nearby parts of Colorado and Utah.

Penstemon linarioides vars. *compactifolius* and *maguirei* UNM: no specimens; ASU: no specimens; SJNM: no specimens.

Penstemon metcalfei (*P. puberulus*) UNM: no specimens; ASU: no specimens; SJNM: no specimens.

The status of *Penstemon ramosus* Crosswhite, *P. lanceolatus* Benth., and *P. metcalfei* Woot. & Standl. is up in the air. According to Crosswhite (1966), the plant known as *P. lanceolatus* to New Mexico authors is actually *P. ramosus*. True *P. lanceolatus* Bentham is not known to occur in New Mexico; its nearest location is apparently Big Bend, TX. However, Straw (1997) believes the two taxa to be conspecific, *P. ramosus* being a synonym of *P. lanceolatus*, making the latter a rather widespread species in northern Mexico extending into southwestern New Mexico and southeastern Arizona. Two specimens at UNM, originally labeled *P. lanceolatus*, were misidentified, one is *P. jamesii* and the other *Castilleja* sp. I saw two specimens of *P. ramosus* at ASU: one from Rockhound State Park, Luna county, NM and the other from Cochise county, AZ, near Portal.

Penstemon metcalfei is a mystery to me. It was described in 1909 by Wooton & Standley (I have not seen this document). In the same year they described *P. puberulus*, which they later put into synonymy under *P. metcalfei* in their Flora of New Mexico (Wooton & Standley 1915). In the original description of *P. puberulus*, which I have seen and is very incomplete, they indicated that it was closely related to *P. whippleanus*. Keck (1945) agreed and subsumed *P. metcalfei* (actually a "new name for *P. puberulus*") and *P. puberulus* under *P. whippleanus*. Nisbet & Jackson

(Continued on page 2, *Penstemon*)

Botanice est Scientia Naturalis quae Vegetabilium cognitorem tradit.
— Linnæus



(*Penstemon*, Continued from page 1)

(1960) followed suit. What is implied (but not stated in the descriptions I have read) is that *P. metcalfei*'s inflorescence is glandular and, more importantly, that the anthers are exserted as they are in *P. whippleanus*. All this seems straight forward. However, without documentation, *P. metcalfei* is treated as a distinct species in Heflin's new book [see a review in this issue-ed.]. The text states that *P. metcalfei* is a member of the Oliganthi Alliance that Crosswhite (1965) worked on. However, the anthers in members of this group are not exserted. The purported photograph of *P. metcalfei* looks more like *P. oliganthus* than *P. whippleanus*, but the anther dehiscence is not clearly visible. I have not seen the original description of *P. metcalfei* (which may help) or any specimens, so I am unable to make a judgement. To clear up the confusion will require study of the type material and other specimens, if any, as well as more field work. Consequently, I treat *P. metcalfei* as a synonym of *P. whippleanus* in this key until more information is available.

Three plants that have been suggested as being present in New Mexico are not likely. *Penstemon heterophyllus* Lindl. is listed in USDA (1997) for New Mexico, but it is found only in central California (Keck 1932). *Penstemon heterophyllus* S. Wats., a synonym of *P. sepalus* A. Nels., is a central Utah endemic (Cronquist et al.). *Penstemon parryi* (Gray) Gray grows in Arizona and northern Mexico (Sonora). *Penstemon parviflorus* Pennell, collected once near Mancos, Colorado, in late 1800s by Alice Eastwood, has not been found since and apparently never was present in New Mexico.

A penstemon that may be found in southwestern New Mexico is *P. stenophyllus* Gray, which occurs in extreme southeastern Arizona and north-central Mexico, very near New Mexico's boot heel (Crosswhite 1966).

Although many of the state's penstemons are readily identifiable, some closely related species may cause problems.

The differences among *P. strictus*, *P. comarrhenus*, and *P. strictiformis* are not always as distinctive as one would like. The important characters are the inflorescence architecture, calyx size and shape, flower color, degree and type of anther vestiture, and amount of bearding on the staminode, unfortunately all of which are variable within a taxon. The centers of their distributions are mostly separate, but there seems to be some overlap in the northwestern part of the state.

The character differences among the members of the Oliganthi Alliance (*P. griffithii*, *P. inflatus*, *P. oliganthus*, and *P. pseudoparvus*) are subtle and variable. The identification of a taxon is sometimes strongly influenced simply by where it was collected. Inspection of specimens at UNM has shown that *P. oliganthus* (s.s.) exists in Catron and Socorro counties, between the White Mountains of east central Arizona (Apache county) and the Mount Taylor area in New Mexico, the two centers of distribution known to Crosswhite (1965). In addition both *P. oliganthus* and *P. pseudoparvus* are now known to grow in the Magdalena Mountains.

The subspecies of *Penstemon barbatus* are not always distinguishable particularly in certain counties. The bearding at the base of the lower corolla lobes is variable in quantity and color, but the differences in the calyx lobe length usually help to distinguish them.

Two glaucous plants, *Penstemon latus* and *P. secundiflorus*, are very similar, although apparently allopatric. They differ in the inflorescence architecture and in the calyx.

The principal feature distinguishing *P. linarioides* from *P. crandallii*

is vestiture. However, the hairs on some plants don't allow them to be placed easily. Fortunately, the calyces differ and there is little geographical overlap between the taxa.

Rare, in this work, means that the plant is rare in New Mexico. Exserted anthers dehisce completely (including across the connective) and lay out flat (e.g., the *P. jamesii* group, *P. whippleanus*). The anthers of many plants dehisce completely also, but they do not lay out flat (e.g., the Oliganthi Alliance, *P. linarioides*).

United States Postal Service codes are used for states; New Mexico county abbreviations are those used in Sivinski & Lightfoot (1995); counties of other states are indicated by the first two or three letters of their names; MEX = Mexico; tpTX = transPecos Texas, nc = north central, etc.

When collecting penstemons, it is very important to note the glaucousness, fresh flower color, corolla shape, and presence of ridges on the bottom of the corolla floor, in addition to the usual information. Glaucousness is not always apparent in a dried specimen, especially in some that only occasionally exhibit this characteristic. Fresh flower color is an important clue in certain groups. The degree that the corolla expands, the position of the corolla lobes, and the shape of the corolla opening are key characters that sometimes are not well preserved in pressed plants. It is very difficult to detect ridges in the corolla floor in pressed specimens.

Literature cited

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1984. *Penstemon* in: Intermountain Flora 4:370-455.

Crosswhite, F.S. 1965. Revision of *Penstemon* section *Penstemon* (Scrophulariaceae) II. A western alliance in series Graciles. Amer. Midl. Nat. 74(2):429-442.

Crosswhite, F.S. 1966. Revision of *Penstemon* section *Chamaeleon* (Scrophulariaceae). Sida 2(4):339-346.

Crosswhite, F.S. 1967. Revision of *Penstemon* section *Habroanthus* (Scrophulariaceae). III: series *Virgati*. Amer. Midl. Nat. 77:1-41.

Heflin, J. 1997. Penstemons, the beautiful beardtongues of New Mexico. Jackrabbit Press, Albuquerque.

Keck, D.D. 1932. Studies in *Penstemon*. A systematic treatment of the section *Saccanthera*. Univ. Calif. Publ. Bot. 16:367-426.

Keck, D.D. 1945. Studies in *Penstemon* VIII. A cyto taxonomic account of the section *Spermunculus*. Amer. Midl. Nat. 33:128-206.

Martin, W.C. and C.R. Hutchins. 1980, 1981. A flora of New Mexico. J. Cramer. 2 vols.

Nisbet, G.T. and R.C. Jackson. 1960. The genus *Penstemon* in New Mexico. University of Kansas Science Bulletin 41(5):691-759

Sivinski, R. and K. Lightfoot. 1995. Inventory of rare and endangered plants of New Mexico. New Mexico Forestry and Resources Conservation Division, Energy, Minerals and Natural Resources Department, Santa Fe, NM.

Straw, R.M. 1997. *Penstemon* in J. Henrickson & M.C. Johnston, eds., A flora of the Chihuahuan Desert region (draft version). Privately published by James Henrickson, Los Angeles, CA.

United States Department of Agriculture. 1994. Plants of New Mexico. Alphabetical listing. Soil Conservation Service.

Wooton, E.O. and P.C. Standley. 1909. Plants from New Mexico. Bull. Torrey Bot. Club 36:112.

Wooton, E.O. and P.C. Standley. 1915. Flora of New Mexico. Contr. U.S. Nat. Herb. 19.

KEY TO PENSTEMON IN NEW MEXICO

1 Plants shrubby; leaves linear & < 35 mm long
2 Corolla blue, blue-purple, or reddish purple; 8-14 mm long, all lobes spreading; tube gradually expanded; desert grasslands in sNM (CA, HI, LU), sAZ, sCA, nMEX; Apr-Aug *P. thurberi* Torr.

2 Corolla pink externally, 15-24 mm long, white on the face of the lobes; upper lobes reflexed, lower lobes projecting; tube narrow and curved
3 Stems puberulous; sandy soils in eNM (BE, CU, DB, GU, LE, QU, RO, SF, TO, UN), eCO, wTX, wOK; (May) Jun-Jul (Aug) *P. ambiguus* Torr. subsp. *ambiguus*
3 Stems glabrous; sNM (ED, LU, SO), AZ, TX, NV, MEX; Jun-Jul *P. ambiguus* Torr. subsp. *laevissimus* Keck

(Continued on page 3, *Penstemon*)



(*Penstemon*, *Continued from page 2*)

1 Plants herbaceous or woody only at the base; leaves linear or broader

4 Leaves linear and short (< 35 mm long)

5 Corollas red, 25-32 mm long, tubular, strongly bilabiate; inflorescence secund, glandular; anthers exserted, glabrous; staminode bearded most of length with bright yellow hairs; base of lower lobes with long, flat, yellow hairs; stems woody well above base; leaves small, needlelike, crowded on lower part of stems; rocky areas in swNM (CA, GR, HI, SO), seAZ, nMEX; 5800-10,000 ft; Jun-Aug *P. pinifolius*

Greene

5 Corollas some shade of blue or purplish; bottom of corolla throat plicate (2-ridged) forming a low palate

6 Stems and leaves puberulous with flat, appressed scalelike hairs, especially on lower leaves (scales much smaller & stems more uniformly retrorsely puberulent in var. *linarioides*); leaves scattered on flowering stems; calyx lobes acute or very short acuminate, scarious margined almost to tip

7 Principal leaves mostly lanceolate to oblanceolate; limestone cliffs; apparently last collected in NM in 1880 (Gila valley, GR), seAZ *P. linarioides* Gray subsp. *maguirei* Keck

7 Principal leaves essentially linear; base of lower lobes lightly bearded

8 Staminode sparsely bearded with short hairs, longer golden hairs in apical tuft; base of lower lobes lightly bearded; plants shorter (1-3.5 dm); resembles *P. crandallii glabrescens* in habit; vestiture variable; common in plains & foothills with sagebrush, PJ, oak in nwNM (CI, MC, RA, SJ) & swCO; 5200-8700 ft; Jun-Jul *P. linarioides* Gray subsp. *coloradoensis* (A.Nels.) Keck

8 Staminode more densely bearded with longer hairs for most of its length; base of lower lobes strongly bearded; plants relatively tall (2-5 dm), scorpioid, stem bases more-or-less woody; common in canyons & foothills in PJ & PIPO in swNM (DA, CA, GR, HI, LU, MC, SI, SO) & seAZ; 4500-6000 ft; Jun Aug *P. linarioides* Gray subsp. *linarioides*

6 Stems and leaves puberulous with fine erect or retrorse hairs, or leaves glabrous; leaves numerous on flowering stems; calyx lobes long acuminate, scarious margined only at base

9 Leaves glabrous ventrally; dry hillsides in nwNM (CO, SA, RA, TA) & sCO; 6900-9000 ft; Jun-Aug *P. crandallii* A.Nels. subsp. *glabrescens* (Pennell) Keck var. *glabrescens*

9 Leaves puberulous with fine erect or retrorse hairs; ncNM near Taos (RA, TA) *P. crandallii* A.Nels. subsp. *glabrescens* (Pennell) Keck var. *taosensis* (Keck) Nisbet & Jackson

4 Leaves not linear or if linear, then much longer than 35 mm

10 Upper stem leaves connate-perfoliate (upper stem leaves of *P. superbus* sometimes connate-perfoliate, but not serrate); corolla pink to rose, 25-35 mm; leaves usually serrate

11 Corolla expanding gradually, pale pink to rose; staminode glabrous; anthers exserted; plants glabrous, inflorescence glandular; rocky places in PJ/oak & PIPO in swNM (CA, DA, GR, HI), AZ, sNV, nMEX; 4500-7000 ft; Apr-Jun (Aug) *P. pseudospectabilis* M.E. Jones subsp. *connatifolius* (A.Nels.) Keck

11 Corolla expanding abruptly; staminode bearded; anthers exserted or not; plants glaucous, inflorescence glandular; disjunct in NM, but now established in at least two places along I 40; cNM (BE, TO), cAZ & westward; 5000-7000 ft (in NM); May-Jun (in NM) *P. palmeri* Gray ssp. *palmeri*

10 Upper stem leaves sessile or subcordate; corollas various colors (rarely pink to rose or white); leaf margins various

12 Corolla some shade of red but not pink to rose, usually tubular or slightly expanding

13 Corolla constricted at orifice & with long yellow hairs; staminode bearded near tip; anthers minutely spinescent on sutures, opening all but the connective, & minutely puberulent

14 Stem leaves moderately thin, broadly lanceolate, oblong, or lance-ovate, lower ones 10-20 cm long; calyx 3 mm long; rocky areas in PIPO & PSME in scNM only (LI, OT, SO? Capitan, Sacramento, & Oscura (?) Mts); 6600-8800 ft; Jun Jul; RARE *P. cardinalis* Woot. & Standl. subsp. *cardinalis*

14 Stem leaves moderately thick, ovate or subcordate, lower ones 5-6 cm long; calyx 4-6 mm long; rocky areas in chaparral, PJ, & PIPO in seNM (ED, OT), tpTX (Guadalupe Mts of both states); 4500-5500 ft; May Jun; RARE *P. cardinalis* Woot. & Standl. subsp. *regalis* (A.Nels.) Nisbet & Jackson

13 Corolla not constricted at orifice, with hairs or not; anthers glabrous or not, spinescent on sutures or not

15 Anther sacs dehiscent by a short slit across the connective, the tips remaining closed, U-shaped, sutures spinescent; corolla glandular, strongly bilabiate, upper lip projecting & forming galeate hood, glabrous within; staminode glabrous; sagebrush, PJ, oak, PIPO in wNM (CA), AZ, swCO, sUT, NV, sCA; 5200-9000 ft; (Jun) Jul-Aug (Oct) *P. rostriflorus* Kellogg (*P. bridgesii* Gray)

15 Anther sacs completely or partially dehiscent, the tips open

16 Anther sacs exserted

17 Staminode glabrous; foliage not glaucous; corolla bright red; rocky areas in limestone, Sacramento Mts only (DA, OT); 4300-5300 ft; May-Jun; RARE *P. alamosensis* Pennell & Nisbet

17 Staminode bearded; foliage strongly glaucous; corolla orange-pink to scarlet; PJ, oak, PIPO in rocky areas & washes in swNM (GR, HI), seAZ, nMEX; 3500-5200 ft; Mar-Jun; RARE *P. superbus* A.Nels.

16 Anther sacs not exserted

(Continued on page 4, *Penstemon*)

Botany is the natural science that transmits the knowledge of plants.

— Linnæus



(*Penstemon*, Continued from page 3)

18 Corolla bilabiate but not strongly so, lower lobes short, rounded, usually spreading; throat glabrous
19 Corolla barely bilabiate, almost regular; inflorescence glabrous or puberulent; anthers U-shaped, opening at tips only, minutely puberulent, sutures denticulate; staminode glabrous to slightly bearded at tip; dry slopes & flats in sagebrush, PJ, & PIPO in nwNM (SJ, swCO, UT, AZ; 5000-9200 ft; Apr-Jun (Jul)
..... *P. eatonii* Gray subsp. *undosus* (M.E. Jones) Keck

19 Corolla definitely bilabiate; inflorescence glandular; anthers opening almost completely, glabrous; staminode glabrous; PJ & PIPO in rocky canyons in swNM (GR, HI, LU), seAZ, nMEX; about 5000 ft; Jun Aug; RARE
..... *P. ramosus* Crosswhite (*P. lanceolatus* of NM authors)

18 Corolla strongly bilabiate, lower lobes long, narrow, reflexed, upper lobes projecting; throat usually bearded
20 Base of lower lobes bearded with yellow hairs; calyx lobes 6-10 mm long; PJ, oak, & PIPO in swNM (CA, GR, HI, SI), seAZ, tpTX, nMEX; 5200-10,000 ft; Jun-Sep *P. barbatus* (Cav.) Roth. subsp. *barbatus*

20 Base of lower lobes glabrous or bearded with a few white or yellowish hairs; calyx lobes < 6 mm long
21 Anthers glabrous; dry hillsides in PJ, oak, PIPO; NM (BE, CA, CO, DA, ED, GR, LI, MO, OT, RA, SA, SM, SI, SO, TA, UN), seUT, neAZ; 5200-8200 ft; Jun-Aug (Sep)
..... *P. barbatus* (Cav.) Roth. subsp. *torreyi* (Benth.) Keck

21 Anthers bearded; dry hillsides in PJ, oak, PIPO in nwNM (CA, CI, MC, RA, SA, SJ, SO), swCO, seUT, neAZ; 5200-8200 ft; Jun-Aug *P. barbatus* (Cav.) Roth. subsp. *trichander* (Gray) Keck

12 Corolla some shade of blue or purple (rarely white or pink)
22 Foliage glabrous and slightly to heavily glaucous; leaves usually thickened or fleshy; staminode tip expanded
23 Most of the inflorescence bracts prominent; inflorescence compact, not secund, the very short internodes, pedicels, and peduncles giving the effect of a spike of flowers
24 Bracts lance-ovate to orbicular, acute to short acuminate, large, conspicuous, often overlapping, clasping
25 Plants tall (usually 5-10 dm); calyx lobes 7-13 mm long; flowers 35-48 mm long; inflorescence open; corolla pink, bluish lavender, or pale blue, abruptly inflated; sandy to loamy soils in prairies; at western edge of range neNM (UN), also scTX to neWY, ND & IN; about 5100 ft (in NM); Jun *P. grandiflorus* Nutt.

25 Plants usually < 5 dm tall; calyx lobes usually < 7 mm long; flowers 14-20 mm long; inflorescence congested; corolla pale lavender-blue; sandy soil in grasslands; eNM (CH, ED, LE, RO), TX, seCO, wKS; 3500-4500 ft; May-Jun
..... *P. buckleyi* Pennell

24 Bracts lance-ovate or ovate, smaller, usually caudate; inflorescence congested; corolla sky-blue, violet-blue, or pinkish (often in same inflorescence); [these two subspecies may not be worthy of distinction since only flower color is different]
26 Corollas pale blue to bluish-purple; prairies & hills in nNM (CO, MC, SJ, TA, UN), seCO, wKS, wOK (southern Great Plains); 4000-8500 ft; May-Jun *P. angustifolius* Nutt. subsp. *caudatus* (Heller) Keck

26 Corollas lavender to pinkish; sandy soils in blackbrush, sagebrush, PJ in nwNM (SJ), seUT, neAZ (Colorado Plateau); 5000-5800 ft; May-Jun *P. angustifolius* Nutt. subsp. *venosus* Keck

23 Only the lower inflorescence bracts prominent; inflorescences not spikelike, usually open, either fi to distinctly secund or not; anthers completely dehiscent but not exserted, glabrous, sutures minutely spinescent
27 Inflorescence not secund; bracts broadly ovate with a short, abruptly pointed tip; throat narrow and often somewhat curved, expanded only at the orifice, glabrous at base of lower lobes; prairies & lower mts in NM (CH, DA, DB, GR, GU, HA, HI, LE, LI, LU, MO, QU, SA, SI, SM, SO), swKS, wOK, wTX, seAZ, Chihuahua; about 4000-7000 ft; Apr-Jun
..... *P. fendleri* Torr. & Gray

27 Inflorescence at least more-or-less secund, usually distinctly so; bracts lanceolate; throat gradually expanded, usually bearded at base of lower lobes; staminode bearded, tip dilated [the following not always easy to distinguish]
28 Calyx margins broadly scarious, often pinkish or purplish; inflorescence usually strongly secund; pedicels & peduncles usually short; rocky areas in wc, c, nc & neNM (BE, CA, CO, HA, LA, MC, SA, SF, SM, TA, UN), sCO, sWY; 5000-9500 ft; May-Jun *P. secundiflorus* Benth.

28 Calyx margins narrowly scarious, usually not colored; inflorescence more-or-less secund; peduncles & pedicels usually elongate; sandy or gravelly soils in sagebrush, PJ, oak, PIPO in nwNM (MC, SJ), seUT, swCO, neAZ; 4900-8500 ft; May-Jun; RARE *P. latus* Pennell

22 Foliage glabrous, puberulent, &/or glandular, but not glaucous; leaves not thickened; staminode tip expanded or not
29 Inflorescence and corollas glandular pubescent externally
30 Fascicles of small, obscurely toothed leaves in axils of stem leaves; corolla abruptly ampliate ventricose, violet to purple color; anthers fully dehiscent but not exserted; staminode dilated distally, yellow bearded; rocky areas at middle elevations in swNM (HI) to scMEX *P. campanulatus* (Cav.) Willd. subsp. *chihuahuensis* Straw (*P. pulchellus* Lindl.)

30 No fasciculate leaves (fascicles of leaves occasionally present in *P. dasypyllus*, but then leaves much longer & not toothed and staminode glabrous & not dilated)
31 Anther sacs exserted
32 Corolla dull purple (rarely white), lower lobes projecting, 3-5 mm longer than upper lobes; subalpine to above timberline in NM (BE, CA, LI, MO, RA, SA, SF, SI, TA, TO, VA), AZ, CO, UT, WY, seID, swMT; 8200-11,800 ft; Jun-Aug (Sep) *P. whippleanus* Gray (*P. metcalfei* Woot. & Standl., *P. puberulus* Woot. & Standl.?)

32 Corolla white, pale lavender, violet-blue, blue-purple, lower lobes not projecting, not noticeably longer than upper lobes
33 Corolla not bearded at base of lower lobes; staminode sparsely to moderately bearded

(Continued on page 5, *Penstemon*)



(*Penstemon*, Continued from page 4)

34 Corolla 1-2 cm long, densely glandular pubescent within and without, white (rarely pale lavender); tube funnelform & moderately inflated; western Great Plains; NM (QU, UN) to TX & sCAN; about 5000 ft; May-Jun *P. albidus* Nutt.

34 Corolla 3.6-6 cm long, pale colored, densely glandular pubescent without but glabrous within; tube abruptly inflated; prairies, pastures, hills; escaped in NM (QU, TA) & seCO, native range in NB, MO, AR, OK, eTX; 3800-7200 ft; Apr-Jun *P. cobaea* Nutt.

33 Corolla bearded at base of lower lobes; staminode conspicuously bearded

35 Corolla 5-6 mm wide, orifice as high or higher than wide; lower lip not glandular within; staminode not or barely exserted; throat not to moderately inflated; shrub land, PJ in nwNM (MC, SJ), swCO, seUT; 5200-7600 ft; May-Jun *P. breviculus* (Keck) Nisbet & Jackson

35 Corolla 8-19 mm wide, orifice much wider than high; lower lip glandular within; staminode usually prominently exserted; throat much inflated

36 Corolla 24-35 mm long, 10-15 mm wide; plains in NM (BE, CO, CU, DB, ED, GU, LI, MO, OT, QU, RO, SA, SF, SM, TO, UN), seCO, swKS, wTX; 4200-8000 ft; May-Jun *P. jamesii* Benth.

36 Corolla 14-22 mm long, 8-19 mm wide; wNM (CA, CI, MC, SI, SJ, VA), swCO, nAZ, sUT (Colorado Plateau); 4900-7400 ft; Jun-Aug *P. ophianthus* Pennell

30 Anther sacs not exserted

37 Staminode glabrous, not dilated at tip; corolla markedly ampliate; anthers U-shaped, sutures spinescent; leaves occasionally in fascicles; gravelly slopes, desert grasslands in swNM (HI, LU), seAZ, Big Bend, ncMEX; 4500-5700 ft; Jun-Aug *P. dasypyllus* Gray

37 Staminode bearded; corolla narrow to expanded; anthers not U-shaped & not spinescent; leaves never in fascicles

38 Leaves finely toothed; corolla pale lavender to pale violet; corolla floor narrow, 2-ridged; base of lower lobes white hairy; plains in neNM (CO, SM, UN), seCO, to CAN, WI (eastern slope of Rockies); 7000-8700 ft; Jun-Aug *P. gracilis* Nutt.

38 Leaves entire or undulate (occasionally denticulate in *P. auriberbis*); corollas darker in color; corolla floor ridged or not, base of lower lobes usually hairy

39 Corolla floor without ridges on under side; base of lower lobes villous; corolla 14-24 mm long, staminode slightly included to distinctly exserted, densely golden bearded for most its length, dilated at tip; bracts leaflike and not much reduced; plains in neNM (CO, UN, barely enters NM) & seCO (common); 4500-7500 ft; May-Jun *P. auriberbis* Pennell

39 Corolla floor deeply to moderately ridged on under side; base of lower lobes with a few white or many yellow hairs; staminode usually included, densely bearded for half its length; bracts always reduced and never leaflike

40 Corolla floor deeply 2-ridged; base of lower lobes & floor of corolla and staminode densely covered with golden hairs; corolla 17-25 mm; flowers drooping to horizontal; rocky areas in forests & grasslands in ncNM (RA, TA), scCO; 7000-10,000 ft *P. griffinii* A.Nels.

40 Corolla floor less strongly ridged, glabrous; base of lower lobes with a few white hairs; staminode orange-bearded; corolla 11-27 mm; flowers ascending to drooping [these three not always readily distinguishable]

41 Corolla fairly abruptly but moderately inflated, 17-27 mm long; flowers ascending to horizontal; plants robust (1-6 dm); basal rosette usually gone at anthesis; all but uppermost cauline leaves usually well-developed & similar to basal; hillsides & meadows in c&ncNM (BE, CO, SF, SM, TA, TO); 7500-11,000 ft; (May) Jun-Aug *P. inflatus* Crosswhite

41 Corolla straight or little inflated, 11-20 mm long; plants smaller (1-4 dm); basal rosette often present at anthesis; basal leaves best developed; cauline leaves usually smaller than basal

42 Stems obviously puberulent; flowers mostly ascending, never drooping; corollas not inflated; floor obscurely ridged; plants 1-3 dm tall; basal rosette persistent; subalpine meadows in wc&cNM (SO San Mateo & Magdalena Mts); 9500-10,100 ft; Jul-Aug (Oct); RARE *P. pseudoparvus* Crosswhite

42 Stems obscurely puberulent; flowers drooping to horizontal, never ascending; corollas little inflated; floor moderately ridged; plants 1.5-4 dm tall; basal rosette present or absent at anthesis; meadows & moist woods in wc&ncNM (CA, CI, MC, SA, SO) to ecAZ (White Mts); 8200-11,400 ft; Jun-Aug *P. oliganthus* Woot. & Standl.

29 Inflorescence not glandular (glabrous or puberulous)

43 Inflorescence not at all secund; flowers 10-14 mm long, in dense fascicles usually separated by long internodes; slopes, meadows, forests in nNM (CO, RA, SA, SJ, TA), nAZ, wCO, neUT, seWY; 7000-10,800 ft; Jul-Aug (Sep) *P. rydbergii* A.Nels.

43 Inflorescence at least somewhat secund, often distinctly so; flowers 15-40 mm long, not in dense fascicles, or if so, the fascicles not separated by long internodes

44 Leaves large & broad, lance ovate or oblong; inflorescence usually broad and compact; corolla 30-40 mm long; stems usually densely leafy; plains & low mountains in neNM (CO, UN) & scCO; 5200-6700 ft; Jun-Aug *P. glaber* Pursh var. *brandegei* (Porter) Freeman (*P. alpinus* Torr. subsp. *brandegei* (Porter) Harrington)

44 Leaves linear or lanceolate; inflorescence usually narrow and elongated; corolla 15-38 mm long

45 Anthers glabrous, not exserted; staminode hairy or glabrous

46 Staminode with tuft of golden hairs at tip; corolla blue purple, violet purple, occasionally paler, 16-25 mm, base of lower lobes white bearded; sepals 4-9mm; NM (CA, CI), ecAZ (fairly common); 7500-11,280 ft; Jul-Sep; RARE *P. deaveri* Crosswhite

(Continued on page 6, *Penstemon*)

(Penstemon, Continued from page 5)

46 Staminode glabrous

47 Corolla 25-35 mm long, 10-17 mm wide, usually strongly white bearded at base of lower lobes; sepals 4-8 mm long; plants glabrous; NM (LI, OT) endemic to Capitan & Sacramento Mts but not rare; 6000-9000 ft; Jul-Aug *P. neomexicanus* Woot. & Standl.

47 Corolla 17-28 mm long, 7-10 mm wide, glabrous or lightly white bearded at base of lower lobes; sepals 2-4 mm long

48 Plants puberulous; mountain valleys & hillsides in nc,wc,swNM (BE, CA, CO, GR, LU, MC, RA, SA, SF, SI, M, TA, TO) & ncAZ; 7000-11,000 ft; Jul-Aug *P. virgatus* Gray subsp. *virgatus*

48 Plants glabrous; uncommon in ncNM (CO) but abundant in Front Range, CO; 5500-9500 ft; Jul *P. virgatus* Gray subsp. *asa-grayii* Crosswhite

45 Anthers pubescent (sometimes very sparsely), not opening proximal 1/6 1/4, sutures spinescent; staminode glabrous to short bearded

49 Anthers with flexuous hairs < length of sac; staminode short bearded on distal half; calyx 8-10 mm long, segments usually lanceolate, acuminate or caudate, lower margins scarious, erose; corolla pale blue to lavender; nwNM (RA, SJ), seUT, swCO, neAZ; 5500-9200 ft; Jun-Jul *P. strictiformis* Rydb. (*P. strictus* Benth. subsp. *strictiformis*)

49 Anthers usually densely villous (sometimes sparsely so) with hairs greater than or equaling the length of the sac; staminode glabrous or with a few hairs at the tip; calyx 3-6 (8) mm long, segments usually ovate, rounded

50 Inflorescence narrow, cymes 1-2 flowered on short, usually appressed peduncles & pedicels; corolla deep blue, 18-32 mm long; anthers less densely pubescent than *P. comarrhenus*, cells not obscured, occasionally very sparse; plains, meadows, wooded slopes in sagebrush, oak, PJ, PIPO & fir in NM (BE, CA, CI, CO, MC, RA, SA, SJ, TA, TO), neAZ, wCO, UT, swY; 7200-10,500 ft; Jun-Aug *P. strictus* Benth.

49 Inflorescence usually broader, cymes often much-branched, peduncles & pedicels elongate & divaricate; corolla pale blue to lavender, 25-38 mm long; sagebrush, PJ, oak, PIPO in nwNM (SJ), swCO, UT, neAZ, NV; 5200-9000 ft; Jun-Aug *P. comarrhenus* Gray

PENSTEMONS, THE BEAUTIFUL BEARDTONGUES OF NEW MEXICO

By Jean Heflin with Photographs by Bill Heflin (and others) and Drawings by Robert DeWitt Ivey
 [Jack Rabbit Press, 2531 Griegos Pl. NW
 Albuquerque, NM 87107-2873; \$20+4.50]

Review by David L. Bleakly

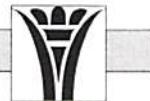
I imagine everyone likes penstemons, whether you are a botanist or not. Whenever I see even the most common or least showy one I usually smile with pleasure. Clearly Jean and Bill Heflin also love these colorful plants. Their new book, *Penstemons, the Beautiful Beardtongues of New Mexico*, with photographs mostly by Bill Heflin and drawings by DeWitt Ivey, shows their continuing fascination with this genus. In many ways, the book is a color-photo-illustrated version of one that Jean Heflin authored in 1990 (with drawings by Erma Pilz) and much of the text is identical although it is often more complete. In the new one, virtually every taxon is illustrated by three images: color photographs of both the whole plant and of the flowers and a line drawing. The photos are grouped in a center section which interrupts the text and is slightly inconvenient, although I realize it is more economical to print photos this way rather than placing them individually with each species' treatment as the drawings are arranged. The majority of the photos are very good, although a few are poor, usually because they are out of focus, blurry, or have too shallow a depth of field. I take many slides of flowers myself so I know how difficult it is to deal with wind, poor lighting, and shallow depth of field, frequently simultaneously. I usually use an electronic flash, even in daylight, when I take close ups of flowers especially when I use extension tubes to increase magnification. Such a technique would probably have helped to improve some of the closeups in the book. Three other photographers contributed three images, and perhaps more of this type of collaboration could have

eliminated missing or poor images. Nevertheless, the majority of the photographs are fine. Many books that use photographs to illustrate plants opt for either a habit shot or a closeup, when both are usually needed. I'm glad to see that the authors did the right thing by including both types of images and as well as drawings.

Even though I love color photographs, I believe that line drawings are the most economical and practical way to illustrate plants. All pertinent features can be depicted in a single, easily and cheaply reproducible plate or image. Nevertheless, color photos can be better at indicating flower color, glaucescence, and the plant's architecture, for example, than drawings or text, so the combination of photos and drawings works well. Color also helps to sell books. It is very likely everyone who will read this review knows of DeWitt Ivey's drawing talent. His images complement the photos nicely, and indeed they could easily stand as the only illustrations, as was done in the earlier book. A helpful addition to the drawings would have been an enlarged illustration of one flower, perhaps a cut away longitudinal section, showing the calyx, position of the corolla lobes, stamens, staminode, and pubescence at the base of the lower lobes (if any), many of the most important features of the genus.

The taxa are arranged alphabetically except for the Oliganthi Alliance, which was created by Crosswhite after he split *P. oliganthus* to include *P. griffithsii*, *P. inflatus*, and *P. pseudoparvus*, as well as a more narrowly defined *P. oliganthus*. All of these plants are treated in sequence after *P. oliganthus*. Most of species of the state are included, but there are a few unusual additions, changes, and omissions. A new state record for *Penstemon linarioides compactifolius* is given without verification (no detailed information or specimens cited). The record is from Hidalgo county; otherwise it grows only in the Flagstaff area, as far as I know. *Penstemon metcalfei* is treated as a separate species rather than as a synonym of *P. whippleanus*, which is how it has been considered for the last fifty years. It apparently has not been collected recently (I have seen no

(Continued on page 7, Review)



Botanical Literature of Interest

Taxonomy and Floristics:

Al-Shehbaz, I.A. 1998. **Delimitation of the genus *Nasturtium* (Brassicaceae).** *Novon* 8:124-126.

Carter, R. & S.D. Jones. 1997. **Notes on the *Cyperus retroflexus* complex (Cyperaceae) with three nomenclatural proposals.** *Rhodora* 99:319-334.

Crosswhite, F.S. 1967. **Revision of *Penstemon* section *Habroanthus* (Scrophulariaceae). III: Series *Virgati*.** *Amer. Midl. Natural.* 77(1):38-39.

Dorn, R.D. 1998. **A taxonomic study of *Salix* section *Longifoliae* (Salicaceae).** *Brittonia* 50(2):193-210.

Harriman, N.A. 1998. **(1357) Proposal to conserve the name *Bidens* (Asteraceae) with a conserved gender.** *Taxon* 47:485-486.

Herrera-Arrieta, Y. 1998. **A revision of the *Muhlenbergia montana* (Nutt.) Hitchc. complex (Poaceae: Chloridoideae).** *Brittonia* 50:23-50.

Parfitt, B.D. 1998. **New nomenclatural combinations in the *Opuntia polyacantha* complex.** *Cactus & Succ. J. (US)* 70:188.

Peterson, P.M. & Ana Maria Planchuelo. 1998. ***Bromus catharticus* in South America (Poaceae: Bromeae).** *Novon* 8:53-60.

Roalson, E.H. & K.W. Allred. 1998. **A floristic study in the Diamond Creek drainage area, Gila National Forest, New Mexico.** *Aliso* 17(1):47-62.

Soreng, R.J. 1998. **An infrageneric classification for *Poa* in North America, and other notes on sections, species, and subspecies of *Poa*, *Puccinellia*, and *Dissanthelium* (Poaceae).** *Novon* 8:187-202.

Stutz, H.C. & G-L. Chu. 1997(1998). ***Atriplex pachypoda* (Chenopodiaceae), a new species from southwestern Colorado and northwestern New Mexico.** *Madroño* 44(3):277-281.

Warfa, A.M. 1998. **Identity of *Mertensia oblongifolia* (Nutt.) G.Don (Boraginaceae) and its allies in western North America.** *Great Basin Natural.* 58(1):38-44.

Rare, Threatened, and Endangered Plants:

[There are numerous reports and discussions concerning rare New Mexico plants on the New Mexico Rare Plant Technical Council web site: <http://biology.unm.edu/~chelo/nmrptc1.html>]

Miscellaneous, Agriculture, Ecology, Etc.:

Journals, Newsletters, Etc.:

Native Plant Society of New Mexico Newsletter. Tim McKimmie, 1105 Circle Drive, Las Cruces, NM 88005.

New Mexico Naturalist's Notes. P. Knight & R. Sivinski, eds. Sponsored by Marron & Associates, Inc. 7809 Fourth St. NW, Albuquerque, NM 87107. (505) 898-8848.

New Plant Distribution Records

New records for New Mexico are documented by the county of occurrence and the disposition (herbarium) of a specimen.

— Stutz & Chu (1997; see literature)

Atriplex pachypoda Stutz & Chu (Chenopodiaceae): Rio Arriba Co. (BRY).

— David Bleakly (3813 Monroe, NE, Albuquerque, NM 87110)

Penstemon comarrhenus Gray (Scrophulariaceae): San Juan Co. (SJN, UNM); Rio Arriba (SJM).

Penstemon virgatus Gray subsp. ***asa-grayii*** Crosswhite (Scrophulariaceae): Colfax Co. (UNM).

Penstemon cobeae Nuttall (Scrophulariaceae): Quay & Taos Cos. (UNM).

Penstemon deaveri Crosswhite (Scrophulariaceae): Catron Co. [fide Crosswhite 1967].

(Review, Continued from page 6)

specimens anywhere). Nevertheless there are two photos identified as this taxon from the Black Range in the book. I believe the jury is still out as to the status of this plant — is it a distinct species or a synonym of *P. whippleanus*? [See the lead article in this issue for a more complete discussion of this problem-ed.] There are two taxa that should have been included. The literature shows that *P. deaveri* is known from Catron county (I have seen no New Mexico specimens). No list or treatment of the genus for the state has ever included *Penstemon virgatus asa-grayii*, as far as I'm aware, although there are specimens from New Mexico at UNM and Crosswhite cites a New Mexico collection in one of his articles.

The text is presented in a more or less standard botanical format including the scientific name (with the authorities); a nomenclatural history with synonyms, and descriptions of habit, flowers, leaves,

calyx, stamens, and other information. The technical information presented in Nisbet & Jackson, Pilz & Heflin, and this book is very similar and seems to be mostly derived from Nisbet & Jackson; there appear to be few additions or adjustments to the descriptions in this book based on personal observation or experience. Although the information contained in the species' descriptions is generally adequate, it could be more detailed and complete, particularly for the anthers, which are one of the critical features of the genus. Since the book targets laypersons, the terminology is mostly nontechnical. What is very useful are introductory comments that relate important, easily observed features, blooming time and so on. One thing that is conspicuously missing, from a botanist's point of view, is a key to the species. Despite some shortcomings, it is still a useful book. I like it particularly for its photographs and illustrations and I can recommend it to anyone interested in penstemons or the flora of the state.



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Kelly W. Allred, Editor

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