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Rancho Santa Ana Botanic Garden

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THE CALIFORNIAN PENSTEMONS

PERCY C. EVERETT*

The genus *Penstemon* is one of the largest genera of the Figwort or Snapdragon Family (Scrophulariaceae) which includes among its members some of our most colorful and useful garden subjects. Known commonly as the Beard-tongues, they are greatly admired for their diversity of color, size and shape, as well as for their usefulness to the gardener. This seems to be sufficient reason for exploring the horticultural possibilities of such an interesting group, confining our studies to those members of the genus native to California.

Dr. John Mitchell, an English physician, founded the genus in 1748, while living in Virginia. There are now considered to be about 230 species, all native to the American continent, except one—*P. frutescens*, an inhabitant of northeastern Asia. The genus is known to nearly every section of the United States, is most plentiful in the western part, and extends from Alaska to Guatemala. California is blessed with a large proportion of the species, which, during the late spring and summer, add much welcome color to nearly all parts of the state.

Nearly seventy-five years passed after the founding of the genus before these lovely plants began to find their way into gardens and to be fully appreciated by the horticulturists, mainly those in England and Europe. During the years between 1825-1850 many of the seeds gathered by such early-day collectors as Menzies, Douglas, Hartweg, and Lobb found their way into horticultural channels, mostly through the auspices of the Royal Horticultural Society.

Among the pages of history are recorded the events leading to the rise and fall of nations and empires; likewise, through the medium of nursery catalogs and horticultural journals we can learn when certain plants became popular, the reasons for such interest, and for how many years they were commonly cultivated. We know of no journals where such trends can be followed better than in Curtis's Botanical Magazine continuously published since 1787, and the Gardener's Chronicle, first published in 1841. Interest in penstemons began some time before 1825, was greatly accelerated when the collections of Douglas became available, and continued until the early 1900's. Since then there was a decreasing interest until about 10 years ago when a number of plant hybridizers took further cognizance of their value to the gardener by studying other outstanding species for use as possible parents. Likewise, many modern writers on gardening continually point out the usefulness of penstemons and the need for further improvement.

The time when work began on improving these worthy garden plants is not definitely known, but Scotch propagators are credited as being the first

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to recognize the value of these American and Mexican wildlings. The French horticulturists also have done much to improve the penstemons and have produced many fine varieties, which we now grow in our gardens. The European and English horticulturists have always admired and widely used the many natural species and valuable hybrids, especially for their rock and alpine gardens where the conditions are more to their liking.

A writer in Paxton's Magazine, 6: 171, 1839, considers "the genus *Penstemon* is on the whole one of the greatest boons conferred upon our gardens by the discovery of the New World," and Gabrielson, in his book "Western American Alpines" has this to say, "This almost entirely American race is a vast aggregate of species containing more potential garden value than any other group of western plants. In such an assemblage, including tiny rock-hugging species three to four inches high and perennials as many feet, there are numerous beautiful things, and also many that, for one reason or another, are of little use."

Another example of how much this colorful group captured the interest and admiration of the English horticulturist is shown by a report, which appeared in the Gardener's Chronicle, p. 122, 1927, on the beautiful collection of penstemons in Victoria Tower Gardens, which stretched along the Thames Embankment in a planting 100 yards long by 9 feet wide. Beside this display was placed a sign on which was printed the following information prepared by Mr. Thomas Hay for the Royal Parks: "This genus of very ornamental plants was founded by the English physician, John Mitchell, while living in Virginia, in 1741. The name is derived from Greek, and means five stamens, each flower having five, one of which is sterile. The genus, a large one, consists of about 150 species, mostly herbaceous, only a few sub-shrubby or shrubby. One species, *Penstemon frutescens*, is native to Northeastern Asia and others all are American, a large number from the western parts of the United States and Canada. There are about 60 species in cultivation of which 20 were introduced by Douglas alone from Northwest America and California. There are also many garden varieties. These mainly have arisen from *P. Cobaea*, a species discovered by Nuttall, and first cultivated from seed sent by Drummond from Texas, and from *P. Hartwegii* (*gentianoides*) discovered by Humboldt in the mountains of Mexico at 11,500 feet altitude, and introduced in 1828. The English and Continental producers have created a large race of hardy, fine blooming plants, of which there are tall blooming and dwarf types. The genus contains many species useful for gardens, such as bedding and border plants and others especially adapted for rock or alpine gardens. Of the species in cultivation, the following seem to be of outstanding merit—*Palmeri*, *spectabilis*, *centranthifolius*, and *P. Eatonii*; of dwarfer habit: *P. heterophyllus*, *coeruleus*, *cyananthus*, *Menziesii*, and *Scouleri*, and in milder districts as a wall plant, *P. cordifolius*." It is of interest to note that Mr. Hay's list includes a number of Californians.

The question may be asked here, why are these lovely garden subjects almost unknown to American gardens, even though all but one species is native to our continent? The truth of the matter is that penstemons are difficult to raise and that a great majority of American gardeners refuse to

struggle for years to succeed with a slow and perverse plant. They want a fool-proof plant, guaranteed to blossom soon after planting and to grow without further care. Many try a plant once, knowing nothing of its needs; it is proclaimed difficult, and immediately is sent to the dump heap. That we believe answers our question in so far as the general gardening public is concerned. However, in recent years more and more do we find the more diligent American gardener willing to spend time and energy studying and practicing the tenets of good horticulture—to learn about the native haunts of a plant and to provide suitable conditions in one's garden.

NURSERY CULTURE

The majority of penstemons may be easily raised from seed, and nearly all can be increased by cuttings. Depending somewhat on the climate, seed may be planted in the late summer, fall, winter or early spring. We usually start sowing our seeds in flats in September or October, but maximum germination is not reached until January or February. If a high montane species is being grown, the seed is stratified by placing it in a small jar with wet sand and keeping it for two months in a refrigerator, where the temperature ranges between 32-38°F. All kinds of soil mixtures have been recommended for best seed germination, but after trying many combinations, we get the most plants by sowing the seed in a coarse grade of vermiculite (size of Grape-Nuts) or good quality chopped sphagnum moss. Rather than use a liquid fertilizer, the bottom of the flat is filled with a good sandy loam to provide the necessary food for the young plants. After attaining proper size, the seedlings are pricked out and put in 2-inch pots, using a light loamy soil mixture. If necessary the plants are later moved to larger pots, otherwise they are planted in the Garden from the 2-inch pot. This latter method is not recommended where climatic conditions are less stable or when adequate care cannot be given. If plenty of seed is available, broadcast sowing is in order, and usually, if the soil is porous, better results are obtained by this method than when sown in flats. At least a hardier plant is produced, which will demand much less care, and bloom earlier.

Nearly all propagators are agreed that penstemons are easily increased from cuttings, and that the proper time for taking them is between August and October. Unless a particularly fine strain or hybrid needs to be perpetuated there is little need to grow them from cuttings because so many more plants may be obtained from seed with less effort. Sharp sand, very coarse vermiculite or perlite, are the usual cutting mediums, and best results are obtained if put in a covered flat or cold frame where the humidity and temperature can be kept at a relatively constant degree.

GARDEN CULTURE

A great deal has been written regarding the garden culture of penstemons. This has come about because many are demanding subjects, especially the species native to the arid sections of our country. It is well here to quote "The Basic Formula for Maximum Success with Penstemons" which appeared in Bulletin No. 1, May 27, 1946, of the American Penstemon Society: "A very porous, stony soil, with a layer of small stones at the surface; as much sun as

possible, at least two-thirds of the day; as open a position as is obtainable; and the tops of little hills for the fussy species." To quote again from Paxton's Magazine, 6: 171, 172, 1839, we find more good cultural information, even though written especially for *P. speciosus*. "There are few general culturists able to grow the scarcer species of this genus to any state approaching the perfection they attain under the care of some two or three individuals, who, having investigated their habits, understand their peculiarities, and accommodate thereto the treatment they bestow. It is to this almost universality of failure, that the rarity of these most delightful plants is mainly due; since they are not only reduced in number by actual loss, but, owing to the general impression that they will barely exist under ordinary circumstances, are seldom sought, and still less frequently procured and perpetuated."

"Nothing contributes more materially to the maintenance of penstemons in health, than planting them in an open and dry situation; while, on the contrary, when placed beneath the shade or drippings of trees, or in any low, damp spot, they invariably perish in the winter season."

Penstemon success does require aggressive effort on the part of the gardener. Why not humor them? We do for many other plants. They are a valuable source of late spring and summer color, which is so often lacking in many of our gardens, and if planted in masses, and provided a minimum of care, will more than repay the small effort of growing them.

Warm open borders where there is little competition, excellent soil drainage, and where the water can be withheld are ideal situations for the taller growing types. The creepers, dwarfs, and medium-sized plants are useful for the rock and alpine garden, or where certain low accents are desirable in the general garden scheme. We find our native penstemons create a harmoniously, softening effect upon the rigid monotony of the Cactus Garden, as well as providing great splashes of color when massed in large beds. They are also a source of much interest to our visitors when displayed as cut flowers. The months between April and August encompass the flowering period of nearly all species, many of them blooming from one to two months. In warmer climates, volunteer plants may bloom at any time of the year.

Perhaps one of the reasons this interesting group has not been more widely used is that its members have never become quite fine enough to be considered as exhibition flowers, nor do they always remain upright and fresh after cutting. We have experienced little trouble with our California species in so far as wilting after cutting is concerned. Sometimes the new growth will not stand up, but on the whole all of the species are useful cut flowers. Usually when first cut, many open flowers quickly drop; but this may be held in check by plunging the stems in deep, cold water. It is not exceptional for many of our bouquets to last four or five days.

DISEASES AND INSECT PESTS

The most difficult problem to cope with in raising penstemons is the matter of adequate drainage and how much to water. This is more especially true of the Californian species, but it is equally true of many species outside our borders. Poor drainage and heavy watering cause a stem rot which is the

despair of all penstemon growers. The plant suddenly wilts and dies, and there is nothing that can be done but try again. Many gardeners consider some species such as *heterophyllus* worthy of constant renewal despite this weakness.

Mildew attacks some, and caterpillars eat others, but both of these problems can be remedied easily by the application of proper dusts or sprays. We have found no other disease in our plantings nor have we read of any other trouble besetting the culturist interested in this group.

PENSTEMONS AT RANCHO SANTA ANA BOTANIC GARDEN

During the past 22 years, we have grown 43 species and varieties totalling many thousands of plants, the greatest majority of them successfully, but like many others who have tried, we experienced failures, too. One of the objectives of the Garden is to find out how tolerant a species is of a wide variety of conditions. Therefore, it naturally follows that losses have been greater than would ordinarily be expected if they had been placed in more suitable sites. Then, too, there are the inevitable conditions which cannot always be controlled. Weather, rodents, deer, and our very heavy adobe soil have all been contributing factors to heavy losses. Despite these set-backs, we have managed always to have a plentiful supply of penstemons to provide colorful vistas for our visitors.

The following pages contain information pertaining to all species and subspecies native to the state of California. The names used are those provided by Dr. David Keck, who so kindly loaned us his *Penstemon* manuscript which is to be used in the third volume of Dr. LeRoy Abrams' "Illustrated Flora of the Pacific States." We are deeply grateful to Dr. Keck for his generosity and help.

We have not grown all of the species and subspecies presented herein. However after due consideration, we deemed it advisable to include all penstemons native to California in order to provide a horticultural reference for those persons not desiring to use a technical treatise. It is hoped also that species heretofore unknown to horticulturists will be made available.

PENSTEMON ALBOMARGINATUS M. E. Jones

This species was first described in 1908 by Marcus E. Jones from specimens collected by him at Goodsprings, Nevada. It is a rare species confined mainly to the deep, drifting sands of the Mojave Desert of eastern California, southern Nevada and northwestern Arizona. Ascending from a stout, fleshy root crown—sometimes an inch in diameter—are many thin stems rarely up to a foot tall. It is a pale green, glabrous, shiny herbaceous plant with entire spatulate to narrowly obovate white-margined leaves about $\frac{3}{4}$ –2 in. long. On a leafy, simple thyrus from March to May are borne a few small lavender-pink flowers about an inch long. It is not an attractive species, and as far as we know it has not been cultivated.

Our only attempt at growing this species was made in 1941 when a few bare root plants were brought in from the Mojave Desert, in January. These were put into pots with a sandy mixture, but did not long survive in the nursery. Unless other valuable features are discovered which would make this plant useful to the gardener, it cannot now be recommended for horticultural use.

A field observation of some interest indicates that to survive in the intense desert climate the plant apparently dies down almost completely and in January it was noted that the rosettes of leaves stood only an inch above the surface of moist sand, at that time in an open flat, and underground new shoots were starting to grow.

PENSTEMON ANGUINEUS Eastwood

Dwelling in the open spots of chaparral and coniferous forests from Crater Lake National Park, Oregon, southwestward to Humboldt and Glenn counties, California, this penstemon may be found at elevations between 4000 and 6000 feet. It prefers sun or semishade, dry open forest floors or brush-covered mountainsides in rocky humus or clay soils. Of rather open habit, it grows from 1-2 feet with an equal spread, has few to several thin stems, and is almost entirely glabrous. The thyrus is composed of 3-10 densely congested clusters on pedicels to 1½ in. long, the flowers being a deep lavender to pale blue-violet about ½-¾ of an inch long. Generally speaking this is not an attractive species. In fact one penstemon enthusiast has reported it to be "moderately hideous."

We have not grown it at this Botanic Garden and only rarely has it been reported on by some gardener, usually under the name *P. Rattanii* var. *minor*.

The type locality for *P. anguineus* is Shelley Creek, Del Norte County, California, and was first described as *P. Rattanii* var. *minor*, in 1879, by Asa Gray. In 1905, the name *anguineus* was applied by Miss Alice Eastwood.

PENSTEMON ANTIRRHINOIDES Bentham

This hardy shrub which will survive under the most trying conditions was discovered in 1832 by Dr. Coulter while on a pioneering expedition to the Colorado Desert. It was not given a name until 1846 when Bentham described it. Since then this name has always been applied to this species excepting in two later instances when other names were given but seldom if ever used.

Horticulturally, the Yellow Beard-tongue has been little used in gardens despite the fact that it created quite a stir among gardeners when first introduced, being in a group notable for its blues, purples, and reds. It is of interest to quote from the 1875 issue of Curtis's Botanical Magazine, plate 6157, for the English gardener has infrequently grown this species for years.

"Charming shrubby, half hardy plant discovered by Dr. Coulter in California nearly a half century ago and believed not found since till Bolander discovered it in the Santa Maria Valley of San Diego County. It was flowered at the Royal Gardens, Kew, in September 1874 from specimens sent by Mr. Niven of the Hull Botanical Garden. It is the 24th species (penstemons) figured in this work out of upwards of 50 that have been flowered in European and English gardens. It is remarkable for the lemon-yellow flowers when other species are of reds, blues, etc . . ."

Penstemon antirrhinoides is a stiff, much-branched, upright shrub 3-8 ft. tall, 2-5 ft. broad, inhabiting the dry chaparral-covered slopes and rocky washes of the coastal interior drainage regions of Southern California from San Bernardino County to San Diego County, and thence southward to the San Pedro Martir Mountains of Lower California. It is most frequently found at elevations of 1000-3000 ft. mixed in with other shrubs or in open colonies

where its best development is achieved. From April to early June the broad, leafy, much-branched panicles are thickly covered with bright lemon-yellow flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. long and almost $\frac{1}{2}$ in. wide at the abruptly dilated throat. The broad upper lip is arching and the lower reflexed. The buds are an attractive brownish-red.

During the summer months this species should not be irrigated and when once established little or no attention need be given. Naturally it seldom receives any rain during this period and its habit is to drop nearly all its leaves giving a rather untidy aspect. One can give more water and keep it looking fresher for longer periods, but the life of the plant is likely to be much shorter. Although an interesting and different penstemon, it can only be recommended to those gardeners who have the space and are willing to forgive its untidy appearance during the summer months.

PENSTEMON ANTIRRHINOIDES subsp. MICROPHYLLUS (A. Gray) Keck

In 1857 Asa Gray described this form as a species and in 1906 Abrams described it and gave it the name of *P. Plummerae*, but since 1922, when Munz and Johnston and later Keck studied it, this plant has been referred to as a variety or subspecies of *P. antirrhinoides*. There are several technical differences which separate it from the latter species, such as size, leaf and flower characters and distribution, but on the whole the general appearance of the plant is much like *P. antirrhinoides*. The type locality is given as "On Williams' Fork of the Colorado."

Distribution for this subspecies is the desert ranges—mostly below 5000 ft.—of the Colorado Desert, southern and eastern Mojave Desert to Arizona and Lower California. In full sun on dry, rocky slopes it is often found in association with such plants as Piñons, Utah Juniper, *Yucca baccata*, Creosote Bush, and Apricot Mallow.

Our one collection of this penstemon was made in July, 1937, and although it germinated readily, considerable loss was incurred during the transplanting processes; and later when planted in the Garden, it survived only for about 2 years. Rarely some rock garden writer has included *microphyllus* in his list of recommended plants, but evidently little was known about the growth habit or other characteristics of the plant. If such a type of penstemon was to be used, *P. antirrhinoides* would be more acceptable.

PENSTEMON AZUREUS Bentham

This beautiful penstemon has been referred to in botanical and horticultural literature under several different names, mainly *glaucofolius*, *Jaffrayanus*, *azureus* var. *Jaffrayanus* and *heterophyllus* var. *azureus*. Bentham, in 1849, was the first to describe it from specimens collected by Hartweg along the dry streams of the Sacramento Valley. Apparently it was cultivated in England about 1850. Paxton's Flower Garden, 1851-52, makes reference to it as does La Belgique Horticole, in 1851. The Gardener's Chronicle, p. 119, 1855, has a note stating it was a beautiful penstemon worthy of cultivation being useful as a border plant, but was killed in the heavy frosts of that year. Curtis's Botanical Magazine, plate 5054, 1858, contains Hooker's description of *Penstemon Jaffrayanus*, which since has been ascertained to be *P. azureus*. According to

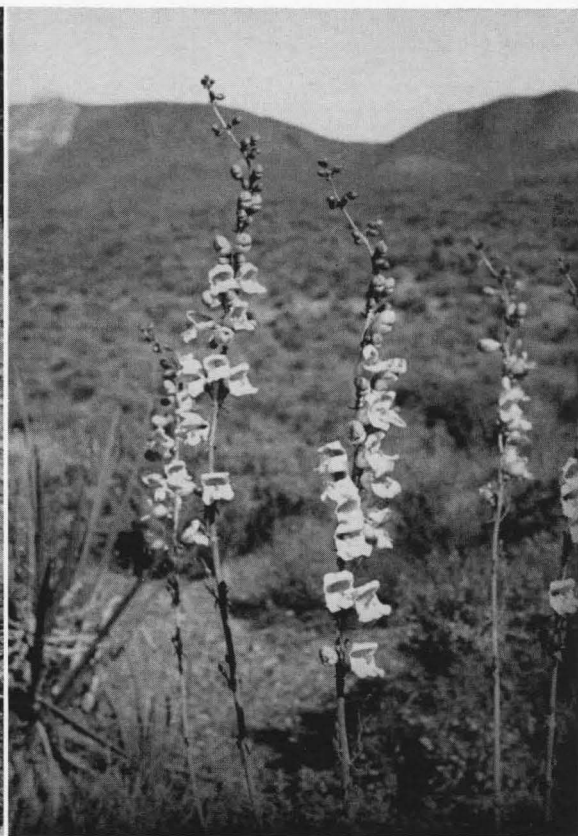


Plate XXVII—To the right, *Penstemon Palmeri*, photographed by Wolf in the Kingston Mts., Mojave Desert, May, 1941. To the left, *P. Eatonii*, growing in the Botanic Garden, May, 1949. Photo by Robinson.

this reference, a Mr. Jaffray, in 1853, sent collections made on Clear Creek, North California, but it was not known whether the seed sent home was germinated. Lobb sent seed to Messrs. Veitch & Sons, who germinated it. They presented plants to the writer of the Botanical Magazine reference who used the flowering plants for figuring the color plate. Since 1858 several horticultural notes have appeared in various magazines regarding the culture and worth of this fine penstemon.

We have successfully grown *azureus* since 1937, and consider it one of the best blue penstemons for rock gardens or low border plantings. Only fair seed germination has been recorded for this species, but it is easily handled thereafter. Volunteers appear in quantities around well-established plants, especially if the soil is somewhat porous. Tolerant of most types of soils and liking a moderate amount of summer irrigation, it is one of the hardiest types. The most serious fault we find with the plant is that the flowers are too large and heavy for the thin, wiry stems and instead of standing erect to show off the full beauty of the flowers, they nearly all flatten out on the ground and the main value of the plant is lost.

Penstemon azureus is a few- to many-flowered perennial with older plants having a somewhat woody base, 1-2 ft. tall with an equal spread; herbage is blue-glaucous and glabrous throughout with the leaves oblanceolate to obovate and about $\frac{1}{2}$ - $2\frac{1}{2}$ in. long. The thyrus is strict, the buds yellowish, and the deep purple-blue flowers, about $\frac{3}{4}$ - $1\frac{1}{2}$ in. long by $\frac{1}{4}$ - $\frac{3}{4}$ in. wide, are borne mainly on one side and near the end of the stem. The flowers are campanulate, tubular, gaping and glabrous.

Ranging from southwestern Oregon to Humboldt, Glenn and Placer counties, California, rarely to Fresno County, blooming plants may be found during May to August. On flat river benches, mesas, or among the chaparral and forested slopes this lovely penstemon seems to be at home with the Kellogg Oaks, Garry Oaks, Yellow Pines, Junipers, or nestled at the base of dry granite boulders.

PENSTEMON AZUREUS subsp. ANGUSTISSIMUS (A. Gray) Keck

In some ways we like this form better than *azureus*. We have grown it since 1933 and it always has been most satisfactory. It is more upright, taller, longer-lived and generally behaves itself better under cultivation. The flowers are not so deeply colored as *azureus* being more light purple to pale blue. The herbage is paler yellow-green, the leaves are narrower and longer, and it is a more profuse bloomer.

The dry Sierran foothills from Butte to Fresno counties, California, and rarely in Del Norte and western Glenn counties, embrace the distribution of subsp. *angustissimus*. Yosemite Valley is the type locality, and it was first described as a variety of *azureus* by Asa Gray in 1878.

PENSTEMON BREVIFLORUS Lindley

A few seeds picked off the dried specimens sent home to England by David Douglas were easily germinated and the resulting plants grown in the garden of the Royal Horticultural Society. There they bloomed and from these plants

Lindley made his description of this new species. Cultural information given with the description and the plate in Edward's Botanical Register (1837), states the plant was apparently hardy, grew well in peat and loam, and did best in the summertime. The cold, wet winters apparently were not to its liking and all had perished excepting two puny plants at the time the article was written.

Penstemon breviflorus is not one of the most attractive penstemons, but it is useful for out-of-the-way places where no care can be given or on hot, dry banks. This rather large shrub has numerous wand-like stems that droop in a most graceful manner and from May to June covers itself with a profusion of small whitish flowers flushed with pink, and the prominent purplish guide lines seem to help attract great quantities of bees which one usually finds around the plants on a sunny day.

We have grown plants from two seed collections, one made in 1933 and the other in 1937. The 1937 collection has been the most successful for we now have many plants 4-5 ft. tall and of equal spread, growing happily on a hot dry roadside bank composed of rocky clay soil, as well as in other difficult spots.

This species is entirely Californian and may be located on hot, dry slopes, in a variety of soil types and plant associations. It is found through the Coast Ranges from Alameda County to Los Angeles County, thence north into the southern Sierra Nevada, and occasionally to the Lake Tahoe region. The type locality is California.

PENSTEMON BREVIFLORUS subsp. GLABRISEPALUS Keck

In all respects this form is like the species except for the glabrous calyx and the different distribution. It is found in the North Coast Ranges from Mendocino County to Napa County, in the Sierra Nevada from Shasta County to Tulare County, California, and east to Nevada in the Lake Tahoe region. Two seed collections of this subspecies were made several years ago, but neither germinated and it has not been since re-collected.

PENSTEMON BRIDGESII A. Gray

A vivid penstemon found at elevations of 4000-7000 ft., usually growing on dry, rocky canyonsides composed mainly of decomposed granite or other rocky humus soils. It ranges in the southern Sierra Nevada from Alpine County southward to the eastern and southern California mountains to San Diego County, California, and to adjacent Lower California, thence east to Arizona and Colorado. It was first described in 1868 by Asa Gray from specimens collected in California, and since has been known by no other name.

Penstemon Bridgesii is a perennial or subshrub, the main body of which grows to about 1-2 ft. tall by 2-3 ft. wide, and above which rise few to many fairly thin stems 1 or even 2 ft. tall. The leaves are narrow, yellow-green, and from 1-3 in. long. The flowers are a vivid scarlet to vermilion, 1-1½ in. long and borne mainly on one side of the stem in a rather narrow thyrus.

Our first seed collection for this species was made in 1932 and from time to time other collections have been made, but usually the plants have not lived long. Our most recent collections are doing much better, and even though

decomposed granite or scree soils are preferable, the plants are apparently quite content growing in heavy clay soil, in semishade, where they are given a little summer watering.

The Gardener's Chronicle of July 9, 1881, gives us the first report of this species in cultivation. It reported *P. Bridgesii* as flowering beautifully at Kew. Since then cultural information about this species has appeared in various garden magazines and books. Especially has its worth been recognized by the alpine or rock gardener even though it has not been extensively used by him or other gardeners. A number of favorable reports on the behavior of this plant in various sections of this country have appeared in recent years in the Bulletin of the American Penstemon Society.

PENSTEMON CAESIUS A. Gray

Four separate attempts were made to germinate seed from a collection made in the San Bernardino Mountains, in 1937. All failed, and since then this species has not been re-collected. Possibly the seed was not viable or, if it was, then stratification for two or three months in a refrigerator might have been helpful.

Penstemon caesius, although not one of the most attractive penstemons is not entirely without some merit, especially for alpine gardens. It occurs at elevations from 6500–9800 ft., on loose stony slopes, rocky openings or on dry open forest floors in the southern Sierra Nevada and the San Gabriel and San Bernardino Mountains of California. The type specimen was collected in the San Bernardino Mountains and the description was published in 1883 by Asa Gray.

In its native habitat *P. caesius* is not a large plant. It is rather compact in appearance, the leaves being mainly basal, small and roundish, $\frac{1}{4}$ – $\frac{1}{2}$ in. long. The few to several stems rise above the plant to about 1 ft. and the thyrsus is a lax, few-flowered panicle with deep purplish-blue flowers $\frac{5}{8}$ –1 in. long by $\frac{1}{4}$ – $\frac{1}{2}$ in. wide. The corolla is gradually ampliate with lips equal.

PENSTEMON CALCAREUS Brandegee

A short-statured species, 2–10 in. high, equally broad, that is basically reddish in appearance but is covered with a dense powder giving it a "hoar frost" effect. The entire, ovate leaves are 1– $1\frac{1}{2}$ in. long, and the small, narrowly tubular, light rose to rose-purple flowers, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, are borne in 2–6 congested clusters.

The specific name, *calcareus*, "pertaining to lime" refers to the type of soil in which this species is usually found growing in the desert mountains of California. It occurs on dry canyonsides, steep limestone cliffs and ridges, at elevations of 3500–5000 ft. in the Grapevine Mountains, north end of Death Valley, and the Providence Mountains of the Mojave Desert, California. The type locality is given as "the face of perpendicular limestone cliffs of Providence Mt." It was described in 1903 by T. S. Brandegee.

Our only experience with this penstemon was in 1937 when 11 bare root plants were collected in the Providence Mountains. They grew well in pots in the nursery, but when planted in the Garden, they soon died. Some pen-

stemon enthusiasts may have grown it, but we have no knowledge of it. It is a species of little use to the gardener because of the very definite cultural requirements.

PENSTEMON CALIFORNICUS (Munz & Johnston) Keck

A little-known species which was first described in 1924 by Munz and Johnston as a variety of *P. linarioides*. In 1937 Keck raised it to specific rank. It is quite local, occurring on stony slopes from the San Jacinto Mountains, California, southward to the Sierra San Pedro Martir, Lower California. The type specimen was collected at Kenworthy, Hemet Valley, San Jacinto Mts. It is unknown in cultivation and has not been grown at this Botanic Garden.

Blooming plants may be found in its native habitat from May to July. Several tufted stems ascend to 8 or 9 in. from a branching, densely leafy root crown. The leaves are linear-oblongate to about $\frac{3}{4}$ in. long. The herbage is silvery in appearance, and the thyrus up to $3\frac{1}{2}$ in. long is somewhat leafy and narrow. A tubular-funnelform corolla, $\frac{1}{2}$ – $\frac{3}{4}$ in. long and to $\frac{1}{2}$ in. wide, is purplish-blue in color.

PENSTEMON CENTRANTHIFOLIUS Bentham. Scarlet Bugler.

A glaucous, glabrous perennial with one to several slender, simple, strict, rather leafy stems 1–4 ft. tall ending in a virgate panicle about half as tall as the plant. The entire leaves are mainly basal, spatulate, petiolate, and the cauline linear-lanceolate to ovate-lanceolate, somewhat clasping and 1–4 in. long. The bright scarlet tubular corolla is about $1\frac{1}{2}$ in. long to $\frac{1}{4}$ in. wide with scarcely spreading lobes. Dry slopes and outwash fans at elevations ranging from near sea level to 6000 ft. are the preferred habitats of this well-known species. It occurs throughout the Coast Ranges of California from Lake County to San Diego County, south to the Sierra San Pedro Martir, Lower California. David Douglas discovered it in "Nova California," and it was described in 1835 by Bentham.

Paxton's Magazine of Botany (1836) seems to have the first note and illustration of this penstemon. Under the name of *Chelone centranthifolium*—the Valerian-leaved Chelone—this species is described as having been detected and introduced by David Douglas. In 1859, Curtis's Botanical Magazine has it figured from plants grown by a Mr. Thomson, of Ipswich. Another article appeared in the Gardener's Chronicle for Dec. 22, 1877, stating it to be a very lovely species introduced to Chiswick by David Douglas. It is highly recommended as being a plant worthy of greater use in gardens.

As the Scarlet Bugler, Californians who seek the out-of-doors pleasures, have known and loved this penstemon for many years. Since the beginning of this Garden thousands of plants have been grown and many more volunteers have appeared. It is one of the easiest to handle and most successful of the California penstemons. Although it much prefers sandy or porous rocky soils, equally well-grown plants may be established in heavy clay loams if the watering is carefully watched. In the early fall months new leaf and stem growth begins and gradually clumps well over a foot in diameter are formed by short extensions of the roots.

PENSTEMON CINEREUS Piper

This very neat penstemon may well find a place for itself in some types of gardens. Perhaps the ash-gray appearance might be a detriment, but there are possibilities and apparently it has not been cultivated. Preferring the arid volcanic gravels on sagebrush- or juniper-covered slopes, neat compact clumps to 20 in. high are formed with a well-developed basal rosette from which ascend few to several reddish stems carrying from 3-9 distinct, few-flowered clusters. The corolla is nearly tubular, about $\frac{1}{2}$ in. long, and a bright-blue to blue-indigo or blue-purple. *Penstemon cinereus* is found east of the Cascades from Wasco County, Oregon, south to Mt. Shasta, California, and east to northwestern Nevada. The type specimen was collected at Bend, Oregon, and was described in 1913 by Piper.

PENSTEMON CINICOLA Keck

A note in the American Penstemon Society Bulletin says it is not to be recommended, it is unattractive, became scraggly in an Oregon garden and is rather coarse with very small flowers and narrow pubescent foliage. It has not been cultivated at this Garden.

Penstemon cinicola is largely confined to dry, volcanic sands from Deschutes County, Oregon, to Lassen County, California. The type locality is Lapine, Deschutes County, Oregon, and Keck described it in 1940. There are numerous slender stems forming clumps from 6-14 in. high, herbage is mostly glabrous; leaves are green or grayish; corolla purple with a deep blue, spreading limb, to nearly $\frac{1}{2}$ in. long.

PENSTEMON CLEVELANDII A. Gray

Our first cultural note regarding this plant comes from the Gardener's Chronicle for January 5, 1878, where it is figured and noted as being hardy. It is further noted to be the first penstemon of the season to flower in the garden of Mr. A. O. Walker, Colwyn Bay, Wales, and said to flower between June and December. Seed must have been sent to England almost as soon as the species was described in 1876 by Asa Gray from specimens collected in "Canyon Tantillas, Lower California." It was named in honor of Daniel Cleveland (1838-1929), a San Diego attorney and early day botanical collector "whose name is perpetuated in many specific names which give reference to a life-long interest in the indigenous flora."

This hardy penstemon is restricted mainly to granite rock formations in the arid canyons bordering the desert from San Diego County, California, to Lower California. It is a glabrous perennial with a somewhat woody base from which grow few to several strong, erect stems—almost coarse in aspect. The leaves are a deep green, entire to moderately serrated, the basal ovate, 2-3 in. long to about an inch wide. The flower panicle is rather narrow, from 4-12 in. long and 1-2 $\frac{1}{2}$ in. wide; the corolla a crimson or red-purple, without prominent guide lines, $\frac{5}{8}$ -1 in. long and $\frac{1}{4}$ - $\frac{3}{8}$ of an inch wide, tubular-funnelform, the tube proper shorter than the gradually ampliate throat, and not contracted at the orifice. The staminode is feebly bearded or glabrous.

A rocky situation here at the Garden has proved to be a most satisfactory spot for growing this dry land species. No water should be applied during the

summer months as dying off will soon take place. Many of our plants are now 10 years old, and each year cover themselves with myriads of flowers. Some hybridization has been noted when seeds have been collected from garden plants and re-grown, but nothing of interest has developed as yet.

PENSTEMON CLEVELANDII subsp. CONNATUS (Munz & Johnston) Keck

Several technical features separate this plant from the typical form. Principally these are blue-glaucous leaves, strongly to finely serrate with the upper leaves connate-perfoliate; the corolla is broad for the species and the staminode is bearded. This subspecies was first described in 1923 as a variety by Munz and Johnston and was based upon specimens collected near Van Deventer's, southeastern base of the San Jacinto Mts., California. It is found in the canyons bordering the western side of the Colorado Desert, Riverside County, California.

We have grown *connatus* since 1938, and have found that the same cultural directions given for the species are applicable to this subspecies.

PENSTEMON CLEVELANDII subsp. MOHAVENSIS Keck

This subspecies is occasionally found from the Little San Bernardino Mts. to the Sheephole Mts., along the southern edge of the Mojave Desert, California. It differs from the other two subspecies in distribution and a few technical characters, such as, leaves bright green, strongly and coarsely serrate, and the corolla is narrow for the species and contracted at the orifice. It has not been grown at the Botanic Garden.

PENSTEMON CONFUSUS subsp. PATENS Keck

An entirely herbaceous, short-lived perennial with a few blue-glaucous stems up to a foot or so, which closely resembles *P. utahensis* in general habit, but the stems are often lower and more leafy. Also, in this subspecies the thyrus is more open and often decomposed. The corolla is rose-lavender or purplish, $\frac{1}{2}$ - $\frac{3}{4}$ in. long to $\frac{1}{4}$ in. wide, slightly amplate, and glabrous without and within. Habitat and range are given as being on arid sandy slopes in the hills surrounding Owens Valley, Mono and Inyo counties, California. Lone Pine is the type locality and Jones gave it varietal status in 1908. We have not grown this penstemon.

PENSTEMON CORDIFOLIUS Benth. Honeysuckle Penstemon

Anyone wandering through the chaparral-covered slopes of the coastal mountains of Southern California from San Luis Obispo County to the Mexican border during the months of May, June and July, undoubtedly will be introduced to this splendid plant. First, from a distance, one will be attracted by a red splash of color against the green hillside. Hurriedly one presses forward wondering what plant could produce so much color. At first glance it seems as if one has found a wonderful honeysuckle and that the masses of flowers belong to a stout woody shrub. Closer examination will show that the flowers are in reality hanging from the ends of long, thin, wand-like branches that belong to an entirely different plant. Thus will one become acquainted with *Penstemon cordifolius*, familiarly called—and most appropriately—the Honeysuckle Penstemon.

The Honeysuckle Penstemon is a woody-based shrub, 3-8 ft. tall, usually found on brushy hillsides at elevations below 4000 ft. Mostly such plants as chamiso, sumacs, ceanothus, scrub oaks, and other kinds of shrubs are used for supporting the long, thin branches. Herbage is dark green, mostly glabrous, and the leaves are $\frac{3}{4}$ -2 in. long by $\frac{3}{8}$ -1 $\frac{1}{4}$ in. wide, lance-ovate to cordate, remotely serrulate to sharply dentate, shiny, and strongly veined. The panicle is pyramidal in shape, rather compact, drooping in habit, and with the flowers mainly on one side of the stem. The corolla is a dull scarlet, 1-1 $\frac{1}{2}$ in. long by $\frac{1}{4}$ - $\frac{3}{8}$ in. wide, the upper lip somewhat hood-like and the lower lip widely spreading. The staminode is densely bearded with long, yellow-brown hairs, well included.

Nearly 20 years ago our first seed collection of this species was made on Catalina Island and since then hundreds of seedlings have passed through the nursery and thousands of volunteer plants have appeared. In fact, it is much easier to get plants by letting the seed drop than to try to grow them in the nursery. Germination is rapid, but the seedlings need to be carefully watched over in the nursery. We find this penstemon most useful and effective on a partly shaded bank where one can look up to the plants and thus get a better view of the drooping flower clusters.

The first references to this species of a horticultural nature are to be found in several European journals. In fact during the years 1850-51, six leading botanical and horticultural journals published illustrations and articles about *P. cordifolius*. David Douglas discovered this penstemon in 1831 and Bentham published the description of it in 1835. The type locality is given as "New California." Apparently it was lost sight of until it was discovered again by Hartweg in 1848 "on the mountain of Santa Ynez," who sent seed to the Royal Horticultural Society. There it was grown and tested in the Society's garden and described in Curtis's Botanical Magazine of 1850. It was said to be a half-hardy shrub which at first sight did not much look like a penstemon. Little if anything was published about it again until the Nov. 15, 1924, issue of the Gardener's Chronicle stated it was a beautiful half-hardy shrub which did particularly well supported against a warm wall with wire netting, blooming from June to November. Again in 1926 and 1937 further notice was taken of this plant in Gardener's Chronicle, and in 1936 it received the Award of Merit presented by the Royal Horticultural Society. After such honors, it became quite popular in English gardens.

PENSTEMON CORYMBOSUS Bentham

This species occurs wholly to the north of the other red-flowered penstemons, and its main center of distribution is in the belt of the Coast Redwoods, but penetrates freely inland to the north. It was probably first collected in the Santa Lucia Mountains, Monterey County, California, by Coulter, and described in 1846 by Bentham.

Penstemon corymbosus is a neat, low, shrubby, evergreen plant with rock garden possibilities. In fact several lists of plants for rock gardens have included this species. It grows from 1-2 ft. tall with equal spread, has dark, shiny, green leaves to about 1 $\frac{1}{2}$ in. long to $\frac{3}{4}$ in. wide, and the brick red,

tubular flowers are borne in many-flowered, terminal clusters. The plant will stand quite low temperatures, and responds to light pruning. Not until 1935 do we find any mention of it in horticultural literature when the Gardener's Chronicle has a report from the Dublin Botanical Garden stating it is a neat shrubby plant useful for massing along or on a wall, is quite long-lived and blooms a long time, mainly from June to October. In the wild it is often found on rocky cliffs or open slopes up to 3000 feet elevation. Our only seed collection of this species was made in 1937 from plants growing on rocky cliffs near the Trinity River, Trinity County, California. The seed germinated well but some loss occurred in the nursery and the plants lived only about two years in the Garden. Undoubtedly more specialized care should be given this species in the drier parts of the country.

PENSTEMON DEUSTUS Douglas ex Lindley

The "Parched Penstemon" was the common name given to this plant in the original description which appeared in Edward's Botanical Register in 1830, as a "native of North-west America, where it was found by Mr. Douglas on scorched, rocky plains, in the interior." The article goes on to say that the drawing for the illustration accompanying the description was made in the garden of the Royal Horticultural Society in September 1829. It was further stated that the plant is a hardy perennial readily increased by divisions and grows well in any common garden soil. The leaves are said to be more jagged in the wild than in cultivated specimens.

Gabrielson, in his book, *Western American Alpines*, says it is a sprawling shrub with coarsely toothed leaves. Planting among rocks on a south exposure tends to dwarf the species and make it more attractive, but on richer cooler slopes it develops all out of proportion to the size of the small, yellowish flowers. Mrs. Rowntree remarks it has disappointing, small, dull yellow flowers which seem to be much clearer at high altitudes. Under garden conditions at lower elevations the plant is apt to become lax and leggy, but has good leaf characters.

Our experience with *Penstemon deustus* tends to bear out this same sort of information. Under sterile soil conditions, a small compact plant is produced, but in shadier, richer soils the plant becomes soft and is much less attractive. Under any condition it could be made a more attractive and useful rock garden plant if a good yellow and larger flower could be developed. It is one of the most profusely blooming penstemons it has been our experience to grow.

Penstemon deustus is found in very dry, rocky soil, mostly of volcanic origin, or in rocky crevices of lava rock from the Columbia Basin, eastern Washington, to western Glenn County and the central Sierra Nevada, California, east to Wyoming. It is a woody much-branched plant forming clumps from 8-24 in. high with several erect stems. The leaves are a bright green, coarsely dentate-serrate, and the thyrus is narrow and sparingly glandular. The nearly tubular corolla is quite small, yellowish-white and marked with purplish guide lines.

PENSTEMON DEUSTUS subsp. SUDANS (M. E. Jones) Pennell & Keck

This subspecies was first recognized as a species in 1898 by Marcus Jones, but was reduced to subspecific rank in 1940 by Pennell and Keck. It is restricted

to the volcanic soils of Lassen County, California, "between Amedee and Susanville." The herbage and corolla are prominently glandular-pubescent. We have not grown this subspecies at the Garden.

PENSTEMON DEUSTUS subsp. HETERANDER (Torrey & Gray) Pennell & Keck

This penstemon was first described by Torrey and Gray in 1858 as *P. heterander* from specimens apparently collected in eastern Shasta County, California. It occupies the triangle from south-central Oregon, to northeastern California and northwestern Nevada, to the exclusion of the typical form. It is a very woody plant with reduced stems; the leaves are mostly narrow, finely toothed and glabrous. The corolla is obscurely viscid puberulent without and glabrous within. It has not been grown at this Botanic Garden.

PENSTEMON EATONII A. Gray

In the canyons, washes and open, rocky slopes of the desert ranges from the eastern and southern Mojave Desert, California, north and east to Nevada and Utah this beautiful red-flowered penstemon will be found, and rarely in abundance. It was first described in 1872 by Asa Gray from specimens collected in Provo Canyon, Wasatch Mts., Utah.

The nearly tubular, obscurely 2-lipped, scarlet flowers, about 1 in. or more long and $\frac{1}{4}$ in. wide are borne on a rather strict thyrus about $\frac{1}{2}$ the height of the plant and mostly on one side of the stem. From a perennial root, which gradually extends into a clump more than a foot wide, several stout stems ascend, from 2-3 $\frac{1}{2}$ ft. tall. One collector counted as many as 22 stems on a wild plant observed in Utah. The leaves are mainly basal, glabrous, green with a slight bloom, the basal oblanceolate tapering to a long petiolate base, the whole up to 7 or 8 in. but mostly about 5 in. long.

We have not grown the typical form as it is rather rare in California. Our collections have been only of the subspecies *undosus*, which is little different from the typical plant.

Mr. Thomas Hay, long-time superintendent of Hyde Park, London, has a note in Part 2, of the 1927 issue of the *Gardener's Chronicle*, highly recommending this species and saying that it has done very well for him in Hyde Park. Again in 1930 the *Gardener's Chronicle* has another note and a color plate of *P. Eatonii*. It says, "Although it doesn't compare in size of flowers with the many lovely florist varieties, it nevertheless is a very attractive garden subject. It was introduced from California, in 1883, and is by no means common in gardens, nor has it been used as a possible parent of new garden forms. It was exhibited before the Royal Horticultural Society, July 30, 1929, by Mr. T. Hay, of Hyde Park, and received an Award of Merit . . ." It has been included in lists considering the best species of penstemons, and also many of the American Penstemon Society members consider it among the best.

PENSTEMON EATONII subsp. UNDOSUS (M. E. Jones) Keck

Found with the species in California, where it is the more abundant form, and east to Arizona and southern Utah. The type specimen was described as a variety in 1895 by Marcus Jones. This plant differs from the typical form in

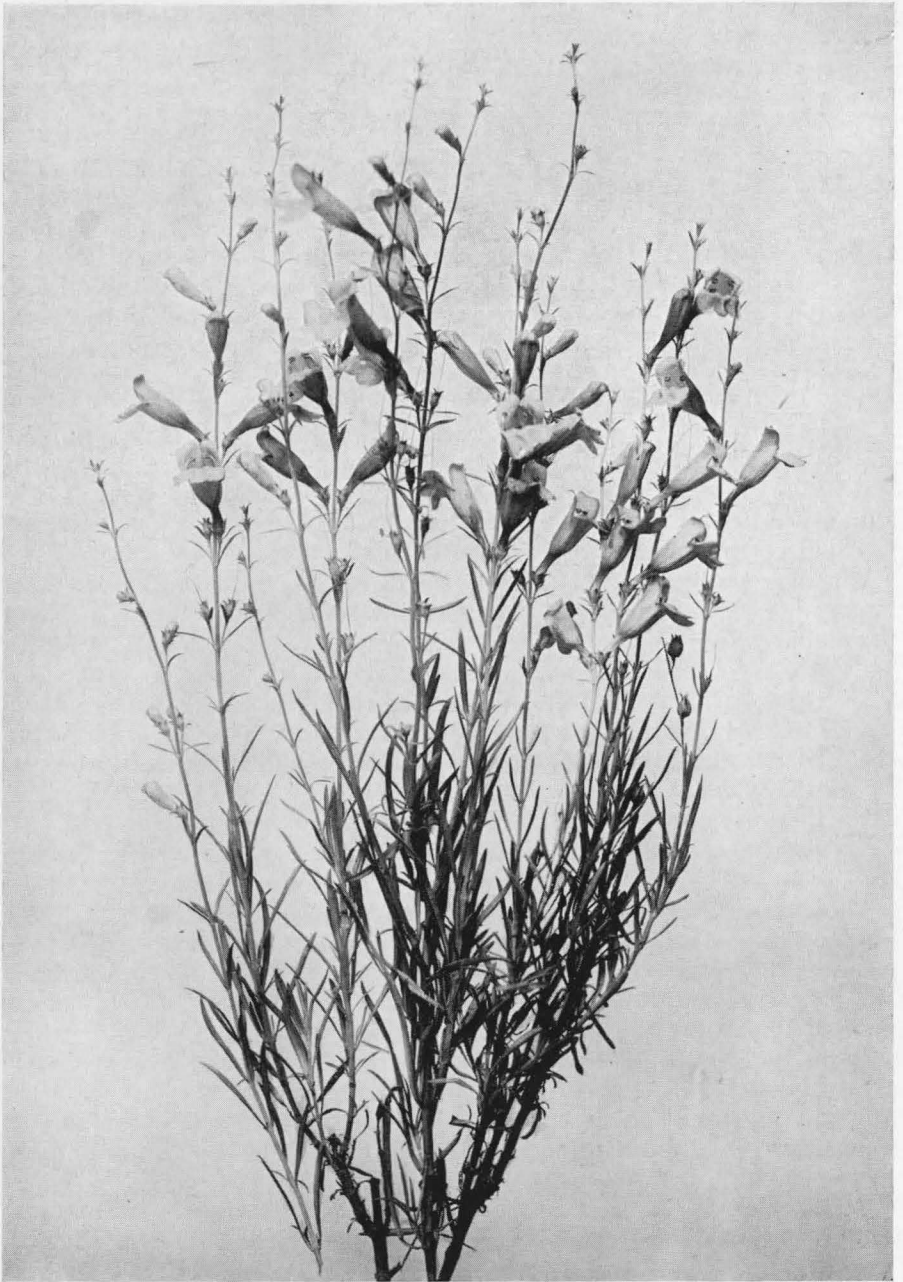


Plate XXVIII—*Penstemon heterophyllus* subsp. *australis*, by courtesy of Theodore Payne, veteran California nurseryman interested in the use of native plants.

having puberulent stems and leaves and the anthers often slightly exserted.

We have grown only this form at the Garden, and although we have no trouble in germinating the seed, a large number of seedlings have never been raised from a particular lot of seed. Being an inhabitant of dry gravelly slopes and washes, it does best where given such conditions in our Garden. It has been only during the last four or five years that our plants have lived more than two or three years at the most. We now have clumps a foot or more in diameter with flower stalks 2-3 ft. tall. Properly situated, it would be a handsome species for a rock garden.

PENSTEMON FILIFORMIS (Keck) Keck

This penstemon was first described in 1932 by Keck as a subspecies of *P. laetus*, but since then he has raised it to specific rank. It is an endemic species of very narrow limits, being found only between Lemoine and Sims in the Sacramento River Canyon, Shasta County, California. Open rocky gulches and flats seem to be its natural habitat, and it is remarkable for the thread-like leaves, 1-3 in. long. The deep blue flowers are $\frac{1}{2}$ - $\frac{3}{4}$ in. long by nearly $\frac{1}{4}$ in. wide, usually borne singly on short, spreading peduncles. It is an open subshrub, very woody at the base, 8-20 in. tall, and with a glabrous bright green herbage below the glandular-pubescent inflorescence. June is the month to find it in flower.

We have not grown *filiformis* at the Garden, but a few members of the American Penstemon Society have reported favorably on its behavior in their gardens. Even then it has been only rarely cultivated, and probably will become little known except to the penstemon connoisseur.

PENSTEMON FLORIDUS Brandegee

After one unsuccessful attempt with four small bare root plants brought in from the wild, we now have plants growing from seeds, and as these plants are vigorous and healthy we should have flowering specimens this coming spring. The young plants look a great deal like *P. Palmeri* or *spectabilis* although they are more blue-gray in appearance than the latter species.

Penstemon floridus is characterized by having several erect, slender stems $1\frac{1}{2}$ -3 ft. tall with blue-glaucous herbage and glabrous below the inflorescence. The leaves are somewhat spiny to dentate and the uppermost almost entire, the largest to 4 in. long by $1\frac{1}{2}$ in. wide. The short corolla is rose-pink to pink-vermilion with dark guide lines, abruptly inflated, has a conspicuous pouch and the lips are short and blunt, the orifice oblique.

An inhabitant of the White and Inyo Mountains and adjacent Nevada, *P. floridus* is most often found at 6000-8000 ft. elevation, growing in arid canyons or on rocky hillsides. It has been cultivated rarely and only then for testing.

PENSTEMON FLORIDUS subsp. AUSTINII (Eastw.) Keck

Miss Eastwood described this penstemon as a species in 1905. It was collected on July 4, 1899, by Mr. S. W. Austin, husband of Mary Austin who wrote "Land of Little Water." Mr. Austin was in charge of the U. S. Land Office, Bishop, California, at the time he made the collection.

This subspecies is different from the typical form by having a corolla that

is not strongly inflated beneath, the orifice not oblique, the tube gradually ampliate and not so wide. It occurs in similar habitats as the species, but to the south in the Inyo and Panamint Mountains, California, and in adjacent Nevada.

A few bare root plants brought in from the wild survived a little over a year in our Cactus Garden. We have not grown it since and horticultural records shed little light on its use in gardens.

PENSTEMON FRUTICIFORMIS Coville

A stiff, much-branched plant from a slightly woody base with glaucous and glabrous herbage throughout. The leaves are essentially entire, very narrow, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long and rather stiff. The thyrus is lax and short, somewhat like *P. Grinnellii*, and the corolla is mainly white or flesh-colored, with a pale lavender limb, the purple guide lines evident, $\frac{3}{4}$ –1 in. long by nearly 1 in. wide, and similar to *P. Palmeri*.

Arid, rocky or gravelly slopes and canyon bottoms at elevations between 3000–6000 ft. is the preferred habitat for this species, in the Panamint, Argus and Inyo ranges west of Death Valley, Inyo County, California. The type locality is given as, "Wild Rose Canyon, Panamint Mts."

We have always liked this penstemon. It is one of the easiest to germinate and since 1937 when our first collection was made we have grown many hundreds of plants. The tiny seedlings were not particularly difficult to raise, but as much of our soil here is heavy clay, the plants did not last very long after going into the Garden. Various sites have been tested and we now seem to have one where these plants are quite happy. It is a floriferous species, not too high being a foot or two with equal spread, and neat in appearance. Nowhere in horticultural literature do we find any mention of this species being used in gardens.

PENSTEMON FRUTICIFORMIS subsp. AMARGOSAE Keck

Mainly different from the typical form in the calyx, and the corolla is externally glandular-puberulent, but internally less glandular than the typical form. The distribution is given as: Kingston Mts., eastern San Bernardino County, California, north to the Amargosa Desert, Nevada, east of Death Valley. The type locality: Amargosa Desert, Nye County, Nevada.

PENSTEMON GRACILENTUS A. Gray

A little known penstemon found growing in rather dry soils of open coniferous forests between 5000–8000 ft. elevation, from southern Lake County, Oregon, to Lake Tahoe, California, and adjacent Nevada. The type locality is, "At the base of Lassen's butte, N. California."

We have had no experience with this plant, but from the description it might be considered useful for alpine gardens. It is a compact plant with the leaves mainly basal, entire, thin, the basal oblanceolate, on short, slender petioles, 1–4 in. long, $\frac{3}{8}$ – $\frac{5}{8}$ in. wide and of a bright green color. From the compact crown ascend many thin stems to 2 ft. in height. The inflorescence is a compact panicle of about 3–5 nodes with deep purplish-blue to red-blue

flowers about $\frac{1}{2}$ in. long by $\frac{1}{4}$ in. wide. The throat is slightly ampliate and moderately 2-lipped.

When not in flower, the leaves of the plant stand only an inch or two above ground, but during the flowering season numerous stems shoot up and although the individual flowers are not brilliant, the clumps, often 3 ft. across, make an outstanding display. Apparently *P. gracilentus* has not been cultivated.

PENSTEMON GRINNELLII Eastwood

If this penstemon had been blessed with brilliant colors, it would have been known to gardeners soon after Miss Eastwood's description appeared in 1905. Even though there are certain similarities to *Palmeri*, such popularity attained by the latter species has never been known by *Grinnellii*. In many respects it is just as attractive as *Palmeri* and certainly more useful to most gardeners, and yet no reference can be found telling of *Grinnellii*'s use in gardens. A lover of rocky soils, especially granitic formations, our heavy clay is not to its liking, but despite this shortcoming, we now have a number of plants 4-6 years old, growing thriftily under a variety of conditions, such as near the base of large shrubs, in the open with light shade or on a hot rocky bank where we give it more water.

Penstemon Grinnellii is a neat, rounded, profusely blooming bush 1-2 or even 3 ft. tall with a spread often to 3 ft. and sometimes more under cultivation. Seldom does it grow more than 1 ft. tall for us. The stems branch below and in shade the bush will be somewhat open, but in a sunnier situation the stems are more erect, and the plant is quite compact. The leaves are a bright green, finely to coarsely spinulose-dentate, somewhat like *Palmeri* but not connate; the thyrsus is more lax and open, $1\frac{1}{2}$ -3 in. wide; corolla is nearly white or pale purplish or bluish with color paler without than within, $\frac{3}{4}$ - $1\frac{1}{4}$ in. long by $\frac{3}{8}$ - $\frac{5}{8}$ in. wide, similar to *Palmeri*, with the guide lines prominent.

The type locality for *Grinnellii* is "Mt. Wilson." It occasionally occurs on the dry rocky slopes or ridges of the South Coast Ranges from the Mount Hamilton Range to the Santa Lucia Mountains, and in the southern Sierra Nevada, and is common from the Greenhorn Range and Mount Piños to the San Jacinto and Santa Rosa Mountains, California.

PENSTEMON HETERODOXUS A. Gray

The proper name for this attractive high montane species has been greatly confused in horticultural literature because the same names have been applied to it or to other similar penstemons. The names most commonly used are *confertus* var. *caeruleo-purpureus*, *geniculatus*, *procerus* f. *geniculatus*, and *confertus* var. *geniculatus*. The name *heterodoxus* was first applied by Gray in 1878, and all other names have appeared in print since that date.

On disintegrated granite slopes or in rocky crevices at the higher altitudinal limits of this useful alpine garden plant, it may reach only 2-6 in. in height, but it is equally at home in high mountain meadows where under more lush conditions a height of 18 in. will be attained. Depending on the type of soil in which it is growing, there may be one or several clusters of deep blue-purple flowers $\frac{1}{4}$ - $\frac{3}{4}$ in. long, which is quite a good size for the group. Spreading

through means of creeping rootstocks, a bright green mat of small leaves may form a plant several inches in diameter. At elevations of 8000–12,000 ft., one will find this fine penstemon in association with gentians, pedicularis, potentillas, and other high mountain perennials; and during July and August, one may be fortunate enough to see whole meadows turned to blue.

Judging from the number of articles about this penstemon, it would seem that *Penstemon heterodoxus* has not attained any sort of popularity with gardeners. This may be partly due to difficulty in handling at lower altitudes or because it has not been collected enough to get widely distributed. We have not grown it at the Garden and cannot give any information as to its behavior under our conditions.

PENSTEMON HETERODOXUS subsp. CEPHALOPHORUS (Greene) Keck

Greene described this penstemon as a species in 1904, and Keck reduced it to subspecific rank in 1945. It is much like the typical form, except it is stouter and taller and occurs to the south of *heterodoxus*. It is found also at lower elevations and in the southern Sierra Nevada in Fresno and Tulare counties, California, largely to the west of the Kern River.

Our first seed collection of this subspecies was made in October, 1948. In November, 1948, two lots of seeds were planted, one lot without any treatment and the other was stratified in a refrigerator for two months at 32° F. The untreated seed did not germinate, however the stratified lot germinated about 2 weeks after being planted in a seed flat in January, 1949. Only a trace of seed was used for each lot, but we potted 104 plants from the stratified lot. These seedlings did well in the nursery throughout the summer months and have since been planted in a shady spot with good drainage. At the present time, the plants look very healthy, and we hope to record their flowering and seeding this next spring.

PENSTEMON HETEROPHYLLUS Lindley

Among the soft brown chaparral-covered hillsides of the Coast Ranges of California from Humboldt County to San Diego County, the traveller will find this lovely penstemon in full bloom from April to July. All gardeners from far and wide give their unstinted praise to this universally accepted species. From the time it was described by Lindley in Edward's Botanical Register, Vol. 22, 1836, to present-day horticultural literature, we find *P. heterophyllus* included in all acceptable lists of penstemons, rock garden plants and hardy, herbaceous plants. Here is what we find in several leading horticultural and botanical journals:

Edward's Botanical Register: Seeds collected by Douglas and the figure drawn from specimens in the garden of the Royal Horticultural Society where it grew in common soil, and is recorded as being a hardy herbaceous plant, which if not supported, throws a number of lateral branches.

Curtis's Botanical Magazine: One of the many handsome and hardy species introduced by Mr. Douglas to the garden of the Royal Horticultural Society, and by that institution spread far and wide in the collections of this and other countries.

The *Revue Horticole* from 1875 to 1907 has at least four articles about *P. heterophyllus* amounting to much the same information as for the other references. The first article to appear in the *Gardener's Chronicle* highly recommends it for the rock garden, and states it is easily grown from seeds and cuttings. Again in 1924 the same journal notes that it was introduced into England in 1834, and the plant is useful for rock gardens and warm borders, and should be planted in deep sandy loam. In 1925 the *Gardener's Chronicle* again highly recommends it for a hardy border plant, noting it withstood temperatures of less than 20° F. when others supposed to be more hardy died. One serious fault, that of suddenly withering and dying, was recorded in many articles, but the consensus of opinion was that *heterophyllus* despite this weakness, should be cultivated as it is considered one of the handsomest of all penstemons. A variety "True Blue" was given an Award of Merit in 1929.

Throughout the issues of many leading American journals we also find that *P. heterophyllus* has been successfully grown and appreciated in many parts of this country. Our own experience has borne out the preceding facts, but we have never grown the quantities of plants that we have of the subspecies *australis*.

Penstemon heterophyllus is a shrub 1-2 ft. tall with many thin stems glabrous throughout, base of stems occasionally minutely puberulent, green or glaucous. The inflorescence is strict, subracemose and glabrous, the gaping rose-violet flowers with blue or lilac lobes are 1-1½ in. long, and about ½ in. wide. The buds are greenish-yellow making an unusual contrast to the expanded flowers and pale green foliage. The leaves are linear, usually fasciculate, ¾-2 in. long, and narrow.

PENSTEMON HETEROPHYLLUS subsp. AUSTRALIS (Munz & Johnston) Keck

This is the most successful of all of the native species as far as our experience is concerned. Each year thousands of volunteer seedlings appear in many parts of the Garden, and where not disturbed or over-watered will live for several years. Individual plants if not crowded will develop into beautiful specimens well over two feet in diameter and will be so covered with blossoms the plant will seem to be devoid of foliage.

The main differences between this plant and the typical form are that *australis* is puberulent almost throughout the plant, usually densely so; the leaves are narrow and fasciculate, being more crowded at the base and the calyx is slightly different. Our plants have clear pinkish-rose colored flowers. This subspecies occurs in the chaparral belt from Monterey County to San Diego County, California, and Claremont, Los Angeles County, is the type locality.

PENSTEMON HETEROPHYLLUS subsp. PURDYI Keck

Named in honor of the late Mr. Carl Purdy of Ukiah, California, a long-time California plantsman, this penstemon was introduced as the "California Blue Bedder," and is probably the best known of the several forms grown under *heterophyllus*. Mr. Purdy's son states in "Horticulture" magazine, that he has counted as many as 400 stems on a plant situated on a dry road bank,

and that the average number per plant will range from 10-50. The average height is about 1 ft. with a spread of 2 ft.

We have only recently acquired *Purdyi* and have not had time to test it sufficiently, but judging from reports by other gardeners throughout the country, we should have no difficulty in maintaining this subspecies here.

This penstemon is different from the other two forms in the lower height of the plant, larger, rarely fasciculate leaves, plant puberulence, and calyx differences. The flowers are mainly a deep gentian blue. The main center of distribution is in the North Coast Ranges from Trinity and Humboldt counties south to San Benito County, and rarely in the Sierran foothills from Butte County to Placer County, California. Mount Hamilton is the type locality.

PENSTEMON HUMILIS Nuttall ex A. Gray

During the year 1874, a book and a journal featured this plant, and we may assume it was then first introduced into cultivation. Wooster's book, *Alpine Plants*, 1874, and Curtis's *Botanical Magazine*, 1874, both illustrate this little penstemon. Curtis says it was "one of the indefatigable Nuttall's discoveries in the Rocky Mts. and since gathered by various naturalists . . ." and that their colored plate was figured from a plant flowered in June, 1874. It was described in 1862 by Asa Gray. Occasional notes since that date indicate the plant is rarely cultivated, although mention is made of it in several books on rock gardening.

Penstemon humilis is usually found growing on dry, sagebrush- or piñon-covered slopes. It is rare with us in Mono County, California, and Wallowa County, Oregon, but more abundant eastward and northward to western Colorado and Wyoming and central Idaho. The type locality is "Rocky Mts."

The stems of *humilis* are densely tufted, forming clumps 4-12 in. high, grayish, and with the basal rosette well developed. The leaves are firm and entire. The thyrus is glandular-pubescent, of 3-6 more or less confluent, few-flowered clusters. The $\frac{1}{2}$ - $\frac{3}{4}$ in. long flowers are a deep azure-blue to blue-lavender with a purplish tube. We have not attempted this species, but it is said to be difficult to grow.

PENSTEMON INCERTUS Brandege

In habit similar to *fruticiformis*, usually shrubby, forming broad clumps to 3 ft. or more in diameter and 2-2 $\frac{1}{2}$ ft. high, the numerous stems branching from below, the herbage glabrous and grayish. The leaves are narrow, linear-lanceolate, and the thyrus is loose and slender with violet flowers an inch or so long to nearly $\frac{3}{4}$ in. wide, tending to a reddish cast or purple, the limb deep blue, without guide lines. The long tube of the corolla gradually expands into an ample throat which is strongly 2-lipped, the lips reflexed. The staminode is well included, short, straight, and densely bearded almost throughout.

A native of the dry, sandy, rocky benches and slopes of the western borders of the Mojave Desert, California, *P. incertus* ranges from the eastern base of the Sierra Nevada and Argus Mts., Inyo County, to Antelope Valley and the base of the San Bernardino Mts. The type locality is Walker Pass.

We have cultivated this species since 1941 with inconsistent results. The seed is easily germinated and the resulting seedlings have given little trouble in the nursery, but the plants have been short-lived in some instances, and quite long-lived in other cases, more especially if the site happens to be rocky loam. Under cultivation an abundance of flowers is produced and we think it an attractive species useful for dry, sunny places where no summer irrigation is applied.

PENSTEMON LABROSUS (A. Gray) Hooker f.

Found in 1875 by Dr. Rothrock in Southern California during Wheeler's Expedition on Mt. Piños at 7000 ft. elevation. The specimen figured in Curtis's Botanical Magazine, plate 6738, 1884, with Hooker's description, was grown by Mr. Thompson of Ipswich, an introducer of many new and rare American plants. Mr. Thompson's plants first bloomed for him in August, 1883. Gray, in 1876, described *labrosus* as a remarkable form of the Mexican species *barbatus*, but Hooker felt it to be sufficiently distinct to raise it to specific rank.

In the Gardener's Chronicle for Oct. 27, 1883, is a note, accompanied by a colored plate, about these same plants grown in Mr. Thompson's garden. Mr. Thompson considered *labrosus* quite an acquisition and it was hardy with him.

Our first seed collection of *labrosus* was made in 1937, and from a very small amount we grew well over 400 seedlings without any treatment. Despite adverse conditions many of these plants survived in the Garden for 7 years and one clump lived over 12 years. A hardy plant preferring open rocky humus soil, light shade, and a little summer irrigation for best results, it can be used for rock or alpine gardens or for massing under trees providing high, light shade.

The native habitat for *labrosus* is on open wooded slopes or grassy open meadows where it becomes quite dry during the summer months, and the soil is a gritty loam. Rarely found in abundance, this penstemon ranges between 5000–10,000 ft. in the mountains of Southern California, to the Sierra San Pedro Martir, Lower California.

Penstemon labrosus is a bright green, glabrous perennial herb with a few slender, simple, erect, rarely branched stems 2–3 ft. high. The leaves are nearly all basal and the main body of the plant seldom gets over 4 in. high and is gradually enlarged by creeping rootstocks. The scarlet, tubular flowers are few and mainly on one side of the stem, spreading horizontally, 1–1½ in. long, the limb about ¾ the length of the corolla, the upper lip erect, its lobes only ¼ its length, the lower lip divided to the base with strongly reflexed linear divisions.

PENSTEMON LAETUS A. Gray

Judging from the rare notes that appear in horticultural literature about this species, there seems to be some confusion between *heterophyllus* and *laetus*. The name *heterophyllus* constantly appears in penstemon literature and yet some descriptions seem to fit *laetus* better than *heterophyllus* even though the latter name is used. Also, it seems rather strange that such a fine penstemon as *laetus* should go unnoticed for so long. Gray's description appeared in 1859, and it is surprising this very hardy plant was not introduced

into English gardens soon afterwards; for the English have grown many others almost immediately after the description was published even when such publication first appeared in America. Apparently, the subspecies *Roezlii* has been cultivated to some extent, but otherwise seldom do we find anything regarding *laetus*, nor has the date of its introduction to horticulture been determined.



Plate XXIX—*Penstemon*, Six Hills hybrid, growing in an English garden. Courtesy of E. K. Balls.

We have grown the typical *laetus* since 1933, and in the heavy clay soils where water is applied more frequently many new volunteers appear each year to replace the older plants, which seldom live more than a year or two. However in other spots, where drought-like conditions prevail, the plants are longer lived, an expected result, since the species is an inhabitant of dry, wooded slopes or chaparral covered hillsides. Usually found at elevations of 1500–8000 ft. on the western slopes of the Sierra Nevada, California, *laetus* occurs from Yuba County south to the Tehachapi Mountains, and Frazier Mountain, Ventura County. The type locality is "Fort Tejon and vicinity."

Penstemon laetus is a gray- or yellow-green subshrub, 1–2½ ft. high by 1–2 ft. wide, mostly densely puberulent or finely pubescent, the few to many stems often becoming purplish and loosely open in habit. The inflorescence is always glandular-pubescent. The leaves are linear to oblanceolate, 1–4 in. long to ½ in. wide; the thyrsus is somewhat open but rather narrow and containing few to many blue-lavender to blue-violet, tubular-campanulate flowers ¾–1¼ in.

long and about $\frac{1}{2}$ in. wide. The 2-lipped limb is widely gaping and glabrous within.

PENSTEMON LAETUS forma ALBUS*

In so far as we have been able to determine, this form is in all respects the same as the typical *laetus*, except for the white flowers and light grayish-green herbage. Mr. Allen L. Chickering, of San Francisco, first drew our attention to this plant in 1933 by presenting us with seed collected from plants in his garden, which were grown from seed originally collected in Watts Valley, Fresno County, California.

Mr. Chickering states that all of his plants have come true from seed, but our seeds usually produce about 50 per cent white-flowered plants. This discrepancy may be accounted for by the fact our two forms are not segregated, and therefore have a chance at re-crossing. The *albus* form may be readily recognized in the seedling stage by the lighter green herbage, and then can be easily separated if one is desirous of a pure strain.

Although this albino form is just as easily grown as typical *laetus*, horticulturally it is less useful because the white flowers upon maturing turn a dirty brown, giving the plant an unsightly appearance. Otherwise, the clear white flowers produce a welcome accent among the purple and blue penstemons.

PENSTEMON LAETUS subsp. LEPTOSEPALUS (Greene) Keck

A rather local variety described by Greene in 1886 from specimens collected in Butte County, California. It is mainly different from the typical form in the thin, delicate sepals, and somewhat longer and wider leaves, as well as in distribution. It occurs on chaparral slopes, roadside banks, and openings in pine and fir forests, mainly from 1500–3500 ft. elevation, from Tehama County to Placer County, California. We have never collected seed of this subspecies.

PENSTEMON LAETUS subsp. ROEZLI (Regel) Keck

Occasionally one finds a reference to this penstemon in horticultural literature, and it may be assumed that it was grown in Germany sometime in the early 1870's as it was described as a species by Regel in 1872. The generally shorter leaves, calyx differences, and smaller flowers separate this plant from the typical form. The flowers are often a bright blue. This penstemon is a montane species found on dry, open, rocky slopes, in juniper-sagebrush formations or grassy hillsides from Wheeler County, Oregon, southward into the Cascade Range and Sierra Nevada, more commonly on the eastern slope, to Lake Tahoe and Mono County, California and adjacent Nevada. The type locality is "Sierra Nevada."

Two collections of small amounts of seeds failed to germinate for us and it has not been re-collected.

PENSTEMON LAETUS subsp. SAGITTATUS Keck

The leaves of this subspecies are a little shorter and narrower than the species and the flowers are larger than in *Roezlii* but only as large as the smaller

**Penstemon laetus* Gray subsp. *typicus* Keck forma *albus* Everett, forma nova. Caules et costae foliorum albi; corollis albis. Type *C. B. Wolf 7778* (Rancho Santa Ana Botanic Garden Herbarium 17133), collected in the Botanic Garden April 28, 1936, from plants grown as second generation from the wild. Original wild plants taken by Mr. A. L. Chickering at Watts Valley, Fresno County, California.

flowers of the typical form. The corolla, gradually curving upward and with an orifice of less diameter than the throat, has an appearance unlike that of the other subspecies; and the very narrow, deeply dehiscent, acuminate-tipped anthers are also different. In habit the plant is often quite depressed with slender ascending branches.

This subspecies may be found on lava or serpentine slopes, in the Siskiyou Mountains, Oregon, and Modoc County to Del Norte and Humboldt counties, California. The type locality is "Mt. Shasta."

PENSTEMON LEMMONII A. Gray

An open branching sparsely-leaved shrub of bright green herbage and mostly glaucous, glabrous, vigorously erect stems up to 5 ft. high. The leaves are $\frac{1}{2}$ - $2\frac{1}{2}$ in. long, $\frac{1}{4}$ -1 in. wide, ovate-lanceolate, serrulate to almost entire, and the inflorescence is rather narrow and up to about 8 in. long with the lower part branching. The small corolla is a dull yellow with the upper part brownish, and the guide lines are purplish. The staminode is densely yellow-bearded and exserted. Blooming plants may be found from June to August on brushy wooded slopes at elevations of 1500-6000 ft. It occurs in California from Siskiyou County southward to Humboldt, Solano, and Eldorado counties, and extending slightly into Nevada. The type locality is, "Long Valley, Mendocino County, California."

This species is probably the least attractive of any California penstemon, and need have little claim on the gardener's time. When rarely cultivated, the gardener soon discards the plant after once flowering. It is closely related to *P. breviflorus* but is usually found in less exposed situations. We have grown two collections, the first one in 1934, but neither lot grew satisfactorily here.

PENSTEMON MENZIESII subsp. DAVIDSONII (Greene) Piper

A diminutive, prostrate, alpine penstemon with a woody base and root-stocks which creep along the fissures of rocks or surge over gravelly slopes forming mats covered with tiny, fat, bright green, entire, roundish leaves. Usually the plant attains not more than 2 inches in height and the flower stems seldom reach over 4 in. The flowers have been described variously, such as attractive blues, clear purples, an occasional clear pink, purple-violet, and aniline red-mauve; there may be few or several $\frac{3}{4}$ - $1\frac{1}{2}$ in. long, on the tiny stem. It is much like the species except for flower size and leaf characters.

Described in 1892 as a species by Greene from specimens collected on Mt. Conness, California, and later reduced to varietal and subspecific rank by Piper, this inhabitant of the boreal zones ranges from Mount Rainier, Washington, south through the Cascades and Sierra Nevada (also in Steens Mountains, Oregon) to Tulare County, California.

This dwarf penstemon has been mentioned numerous times in various journals and books on alpine gardens and undoubtedly correctly so; but there is also little doubt that sometimes the plant mentioned should have been referred to as *P. rupicola*, especially in some of the English journals and nursery catalogs. In any case, this penstemon is particularly useful for the alpine garden and on the whole behaves itself better than do many alpines when brought into cultivation. It shows more restraint, and thrives in light open places in

perfectly drained, warm soil or granitic moraine. It is essentially a rock plant for a sunny, deep crevice, and withstands temperatures as low as -6°F .

We managed to germinate a few plants from a trace of seed by stratifying it for two months in a refrigerator at 32°F . Untreated seed failed to germinate. We also have a few plants which were brought in from the wild, and although both lots have been with us only a few months, the plants look healthy and we expect to see our first flowers next spring.

PENSTEMON NEMOROSUS (Douglas) Trautvetter

Our only reference to this penstemon which gives any horticultural information appears in Edward's Botanical Register, 1829, in which this plant is described by Douglas under the name *Chelone nemorosa*. The article records the plant as being a native of mountain woods near rivulets and springs in Northwest America where it was discovered by Douglas flowering from July to September. Specimens were raised from seed in the garden of the Royal Horticultural Society in 1827, and flowered July-August, 1828, at which season the drawing for the colored illustration was made. Trautvetter placed it under *Penstemon nemorosus*, in 1839. Cultural information indicates the plant is best suited in rich vegetable mold among other plants, is most advantageously grown in east and west borders, and that too much sun is harmful.

The above description of this penstemon's native home, the cultural data, and the more recent determination of its distribution would indicate that this species will stand more water and richer soil than most of our Californian species. We find it in wooded country, largely west of the Cascades, from Vancouver Island through Washington and Oregon to northernmost California. It is a plant with few, erect, puberulent stems from an unbranched base, 1-2½ ft. high, with all leaves closely attached to the stems, equally spaced, thin, finely to coarsely toothed, and 2-4 in. long by ½-1½ in. wide. The few flowers are mainly terminal, rose-purple to maroon red, 1-1½ in. long by ⅜-⅝ in. wide, and strongly 2-lipped.

This penstemon has never been grown in this Botanic Garden, nor do we find any recent record of its use in other gardens.

PENSTEMON MISER A. Gray

A small gray, entire-leaved plant with stems 4-10 in. high, and a compact inflorescence composed of dull purple flowers, quite variable in size being from ¾-1¼ in. long to nearly ½ in. wide. The rather long tube abruptly flares into an ample throat with purple guide lines and strongly 2-lipped. The staminode is prominently exerted, hooked, and strongly bearded throughout with stiffish deep-orange velvety hairs. The distribution is given as growing on sandy or gravelly slopes of the Great Basin region from southeastern Oregon and adjacent Idaho to Lassen County, California, and central Nevada. The type locality is "Malheur River, Oregon."

We have never grown this species and only once have we found any horticultural reference which stated it had been attempted but without any success.

PENSTEMON MONOENSIS Heller

An uncommon species found mostly in sandy washes, on dry hills, and open rocky flats of the juniper-piñon belt of the desert ranges surrounding Owens

Valley in Mono and Inyo counties, California, at elevations of 5000–6000 ft. Described in 1906 by Heller, this penstemon was first collected at the base of the White Mountains near the Southern Belle Mine.

This penstemon has not been grown by us and no other information seems to be available about this plant other than in technical journals. It is very gray, has entire leaves and few to several stems that ascend to 15 inches from a thick, heavy rootstock. The inflorescence is quite sticky and hairy and the rose-purple or wine-red, tubular-funnelform flowers, up to $\frac{3}{4}$ in. long by $\frac{1}{4}$ in. wide, are borne in several dense clusters. If the flower size of this species could be enlarged and the clusters made less dense, a plant of striking contrast would be made available to the dry rock gardener.

PENSTEMON NEOTERICUS Keck

A lovely species of the dry, open pine woods, usually found growing in rocky, red clay soils or soils of volcanic origin at elevations of 3000–6000 ft. from Lassen and Shasta counties to Sierra County, California. The original specimens were collected halfway between Chester and Westwood in Plumas County and were described by Keck in 1932, who pointed out this species is a derivative of *P. laetus* and *P. azureus*.

Penstemon neotericus has numerous erect, wiry stems from a woody base, the herbage being glabrous and blue-glaucous below the somewhat glandular hairy inflorescence. The leaves are mainly crowded toward the base of the stems and more open above, leathery in texture, the basal narrowly oblanceolate to spatulate, $\frac{3}{4}$ – $2\frac{1}{2}$ in. long and quite narrow. One or two 1– $1\frac{1}{2}$ in. flowers stand out from the stiff stems in a narrow panicle, the tubular-campanulate corollas being a blue-purple with a bright azure limb, gaping and glabrous within, the buds yellowish with the unopened lobes a burnt orange.

Our first and only attempt to grow this species was not successful. We were unable to get more than 57 plants from $1\frac{3}{4}$ oz. of seed. These did not flower here even though they lived for at least three years. No other information has come to hand giving any further details about its use in gardens.

PENSTEMON NEWBERRYI A. Gray. Mountain Pride

Justly deserving the common name of "Mountain Pride," this very useful and brilliantly colored penstemon was named by Dr. Gray, in 1857, in honor of Dr. J. S. Newberry, a member of Lt. Williamson's party that made one of the first surveys of California, beginning in 1853. According to what can be deduced from various horticultural records, this species was first introduced to gardeners in 1872 under the name *P. Menziesii*—Robinson's Penstemon, but soon thereafter was changed to a variety of that species. Since then it has been in cultivation almost continuously, but has been submerged under either *P. Menziesii* var. *Robinsonii*, *P. Davidsonii* or *P. rupicola*. In more recent years this confusion has been somewhat straightened out, and we find numerous references to this penstemon as doing well in almost all sections of the country, being particularly valuable as a rock garden plant.

Penstemon Newberryi is mainly a prostrate plant with creeping rootstocks and a woody base, forming mats 1–2 ft. in diameter and several inches high,

from which ascend few to many 12–18 in. stems. In a loose cluster near the ends and mostly to one side of the stems are few to several rose-red or cerise-crimson flowers to $1\frac{1}{2}$ in. long. The small, leathery, green leaves, to $1\frac{1}{4}$ in. long are lightly covered with a whitish bloom giving a faintly grayish appearance to the plant.

Our penstemon grows in various situations, but it prefers rock crevices, scree formations or dry, rocky ridges at elevations from 4000-10,000 ft. We will discover it in California, from Mt. Shasta through the higher Sierra Nevada to Kern County, and adjacent Nevada. The type locality is, "Mt. St. Joseph's" (near Mt. Lassen).

Insufficient experience makes it impossible to judge fairly how well we can grow this lovely penstemon here, but it has not been happy with us in the past. Recently seedlings have been planted in a specially prepared plot where we can give the close attention it needs, and to date a number of them are growing vigorously, a hopeful sign to the gardener. We have found that although we can germinate seed without treatment, much superior results are obtained when seed is stratified in a refrigerator at 32°F . for two months. We grew as many plants from a trace of seed with refrigeration as we did from $\frac{1}{2}$ oz. in past trials.

There are two subspecies of this penstemon which may be in horticulture, and if so are probably being grown as the typical form, which in reality does not greatly matter. We have not grown any plants which can be considered under the following subspecies.

PENSTEMON NEWBERRYI subsp. BERRYI (Eastw.) Keck

Larger flowers, a more ampliate throat and other minor floral differences constitute the main factors by which this plant is separated from the typical form. Its distribution is from Josephine County, Oregon, to Humboldt and Glenn counties, California, and the original description was made by Miss Eastwood in 1905, based upon specimens collected on Canyon Creek, Trinity County, California.

PENSTEMON NEWBERRYI subsp. SONOMENSIS (Greene) Keck

First described as a species by Greene in 1891 from collections made at the summit of Hood's Peak, Sonoma County, California. The floral leaves are scarcely reduced in size, the inflorescence is very compact and the corolla is a dark rose-purple.

PENSTEMON OREOCHARIS Greene

Seldom do we find penstemons that tolerate wet feet, at least for part of the time, but such seems to be the case for this neat, medium-sized plant that is found in both wet and dry meadows at elevations from 4000-8000 ft., from Kittitas County, Washington, southward, mostly east of the Cascades, to Inyo and Fresno counties, California; local in the Coast Range in Glenn County, California; east to western Idaho and northern Nevada. Type locality is "Pine Ridge, Fresno County, California."

It is a 1–2 ft. plant with bright green, glabrous herbage with a well-developed basal rosette, and thin leaves. The strict panicle is composed of 1–6

rather distinct many-flowered clusters in which are borne blue to blue-violet flowers to $\frac{3}{4}$ in. long, and with equal lips.

No reference to this species has been found in horticultural literature, and it has not been grown at this Botanic Garden.

PENSTEMON PALMERI A. Gray

"A Noble Plant!" Such are the beginning words of an illustrated article which appeared in Van Houtte's "Flore des Serres . . ." in 1874. Little does an author know how much or how little he is honoring one when he gives that person's name to a plant. We believe Dr. Gray fully honored Dr. Palmer by using his name for such a fine penstemon. Dr. Edward Palmer, 1831-1911, was an ethnobotanist, a well-known botanical explorer in the southwestern United States and Mexico, and one of the plant collectors for the California State Geological Survey in 1861.

Penstemon Palmeri is one penstemon that seems to have captured the imagination of a number of people from widely scattered parts of both the United States and Europe. In 1873 illustrated articles appeared in the *Gardener's Chronicle* and *Curtis's Botanical Magazine*. In the latter periodical we find that Asa Gray drew up his description for this species from a garden plant grown from seed supposed to have been collected in Utah. The article further states that a Mr. Thompson, of Ipswich, flowered it in August, 1873, and it appeared to be quite hardy.

People who do not admire this species are the exception; but one needs to have this plant close at hand to appreciate fully the delicately colored flowers. There are many who enthusiastically look forward to having plants comparable to the descriptions but after struggling to raise it, resignedly come to the conclusion it should be left for those who most nearly can duplicate the rigid conditions this plant must have to bring out its full beauty. It needs warmth and lots of it, and above all other requirements it must have perfect drainage. We have grown this demanding species for nearly 20 years, and seldom does it live more than 2 or 3 years, being longer-lived only when kept very dry especially during the summer months, and grown in rather sterile, rocky soil. The 5-foot stems are covered half their length with delightfully—but faintly—scented flowers which Keck says may be likened to the odor of clover blossoms.

In the dry desert washes and on sagebrush-covered slopes, one will find *P. Palmeri* in the ranges west of Death Valley and in the Providence and New York Mountains, California, north to Nevada, and east to Utah and Arizona. The type locality is "Skull Valley, Arizona."

Penstemon Palmeri is either a biennial or perennial with one or few coarse, erect stems 5 or 6 ft. tall, with coarse, gray-green, irregularly toothed leaves, the largest near the base to 6 in. long and 3 in. wide. The pouchy, almost as wide as long, whitish, suffused with pink and lilac flowers arrange themselves mostly on one side of the slender stem on 2-3-flowered, suberect peduncles. The prominent guide lines extend into the throat from the lower lip, and the exserted sterile filament is bearded with shaggy, yellow hairs almost $\frac{1}{8}$ in. long.

PENSTEMON PAPILLATUS J. T. Howell

A recently described species from open rocky slopes and under pines of the higher montane regions of a flank of the Sierra Nevada in Mono and Inyo counties, California. The type locality is "South end of Long Valley near Hilton Creek, Mono County."

This penstemon is characterized by having a few erect stems, 8–15 in. tall and gray-green herbage moderately ash-colored up to the glandular-pubescent inflorescence. The leaves are moderately thick, the basal elliptic to spatulate-orbicular, and drawn down to a narrowly winged petiole, to $2\frac{1}{2}$ in. long by $\frac{1}{2}$ –1 in. wide. In a compact panicle composed of 3–6 nodes, the flowers are on short pedicels, purplish-blue, to $1\frac{1}{4}$ in. long to nearly $\frac{1}{2}$ in. wide, the throat moderately enlarged.

We have not found any horticultural record pertaining to the use of this plant in gardens, nor have we grown it at this Botanic Garden.

PENSTEMON PARVULUS (A. Gray) Krautter

First described by Gray in 1878, as a variety of *azureus*, which it most closely resembles in general aspect, although not as tall, open or with as large flowers as *azureus*. The stems are woody at the base, often creeping, 8–15 in. tall, and the herbage is blue-glaucous and glabrous throughout. The petioled basal leaves are narrowly to broadly oblanceolate or spatulate, mostly $\frac{3}{8}$ – $2\frac{1}{2}$ in. long by nearly $\frac{1}{2}$ in. wide, and the purplish-blue corolla is to $\frac{3}{4}$ in. long.

No references have appeared in horticultural literature regarding this species, and we have not grown it at this Garden, but being a more compact plant it should be a useful addition to the garden.

Penstemon parvulus is a montane species occurring on rocky slopes and ranging from the Siskiyou Mountains of southwestern Oregon to the Scott Mountains, Trinity County, California, reappearing in the high Sierra Nevada of Fresno and Tulare counties, California. The type locality is "mountains above Jackson Lake, California."

PENSTEMON PERSONATUS Keck

A rare perennial herbaceous penstemon that derives its specific name from the fact that the throat of the flower is closed in the same manner as a snapdragon. Growing on dry hillsides, it is known from only three local colonies in the Sierra Nevada of Butte County, California. The type locality is "Flea Valley," and Keck's description appeared in 1936.

It is described as being a plant 1–2 ft. tall with few erect stems; the leaves are entire or with a few small teeth, overcast with a light bloom, glabrate above and puberulent below, ovate to ovate-oblong, $1\frac{1}{4}$ – $2\frac{1}{2}$ in. long, $\frac{3}{4}$ – $1\frac{1}{4}$ in. wide. The panicle is open, $2\frac{3}{4}$ –10 in. long, and with blue-purple (?) flowers up to 1 in. long, densely bearded within. Blooming plants are found in July.

Horticultural notes on penstemons do not include this species.

PENSTEMON PSEUDOSPECTABILIS M. E. Jones

We have never grown this species even though many of our collecting trips have been made through its distributional range. Marcus Jones in 1908 based

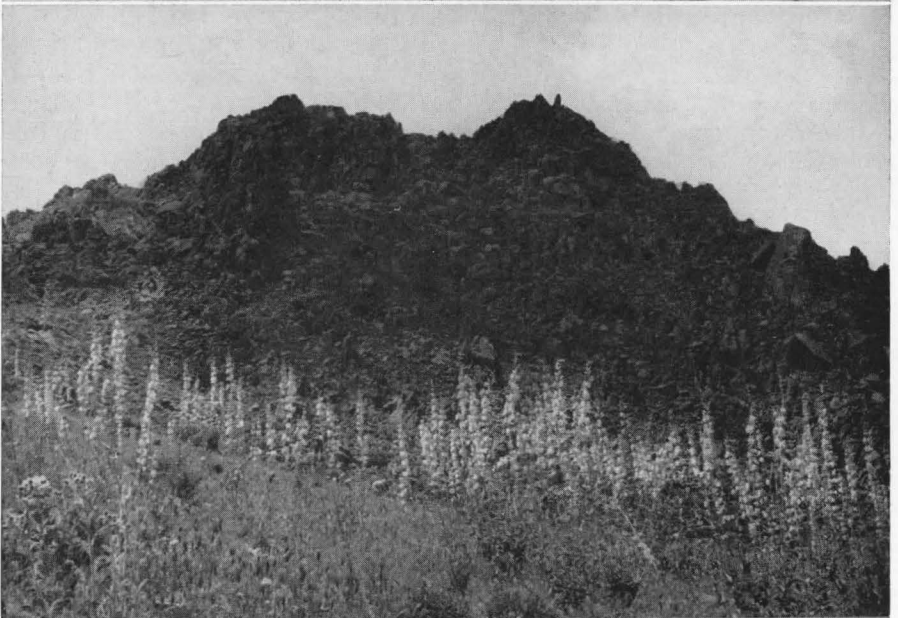


Plate XXX—Upper picture, *P. spectabilis*, in the Botanic Garden, May, 1949. Below, *Penstemon Palmeri*, in the Kingston Mts., Mojave Desert, as seen by C. B. Wolf in 1941. Photo by L. D. Robinson.

his description of the species upon specimens collected in the Chimihuevis Mountains of northwestern Arizona, and since then its range has been extended to include the southeastern Mojave and Colorado deserts of California.

This tall, erect perennial has much the habit of *floridus* to which it is closely related. The several stems reach a height of 4 feet; the leaves are ovate to lanceolate, jagged-serrate, the lower ones petioled, the upper ovate, connate. The strict, narrow panicle is 4–20 in. long and somewhat puberulent. The corolla is purplish-red, often yellowish in bud, narrowly funnelform, to $1\frac{1}{4}$ in. long, and the filaments are glabrous.

An occasional garden note is found about this species, but generally speaking it has not been cultivated to any extent, and probably is one not to be highly recommended.

PENSTEMON PURPUSII Brandegee

This small plant with its densely white herbage and violet-blue flowers creates an interesting contrast that is very effective for the gray garden. From a woody crown the plant grows to 4–8 in. tall, the older stems spreading and rooting, the newer shoots decumbent or ascending, to a foot long. The herbage is densely white except for the glandular-pubescent inflorescence. The leaves are mostly entire but shallowly dentate, the lower oval to rotund with a petiole half as long as the blade. The thyrsus is crowded and short and the violet buds and flowers shade to blue, $\frac{3}{4}$ – $1\frac{1}{4}$ in. long and $\frac{1}{4}$ in. wide. The ample throat is slightly constricted at the orifice and the lips are scarcely spreading.

Penstemon Purpusii was described in 1899 by T. S. Brandegee from specimens collected on Snow Mountain, Lake County, and the species occurs on rocky ridges in the Coast Range peaks of California from Humboldt and Trinity counties to Lake County, California.

PENSTEMON RATTANII A. Gray

It has been our considered opinion that this penstemon might advantageously be used in hybridizing work. The flower color, although not the best, is good, there are many shiny dark green leaves of an interesting habit, it roots profusely along the prostrate stems and inhabits moister situations than most penstemons. Our only seed collection of *Rattanii* was made in 1937, where it was found on a semishaded, open forest floor composed of moist, rich humus soil. The plants were about 1 ft. tall with a spread to 3 ft. Seed germination was relatively poor, but we were able to grow easily more plants from cuttings. While the plants did well in the lath house, they did not long survive in our more arid climate, especially under the conditions prevailing during their time here. Only in recent years do we find a rare garden record about this species, so apparently it has not been considered very useful.

Penstemon Rattanii occurs in the coastal zone from Lane County, Oregon, to Mendocino County, California, and in 1879, Gray based his description upon specimens collected on Humboldt Ridge, Humboldt County, California. It is usually found in scattered colonies on grassy slopes or in woods. The several stout stems are from a branching root crown, rooting where touching the ground, entirely glabrous, and 1–4 ft. high. The leaves are glabrous, somewhat dentate, basal leaves to 7 in. with petioles nearly half as long, upper

clasping leaves to 2 in. long quite thickly clothe the plant. The thyrsus is composed of 2-7 clusters, the corollas to $1\frac{1}{4}$ in. long, shaped somewhat like *P. anguineus*, a pale lavender to red-purple or violet-purple, the limbs sometimes bluer.

PENSTEMON RATTANII subsp. *KLEEI* (Greene) Keck

Mainly separated from the typical form by calyx characters, and solely found in the Santa Cruz Mountains, California, in light soil, and often in second growth chaparral.

PENSTEMON ROTHROCKII A. Gray

An unattractive species described in 1878 by Gray from specimens collected on Little Olanche Mountain, California. An inhabitant of rocky canyons, this penstemon is found at elevations of 6000-10,000 ft. in Inyo and Tulare counties, California, and adjacent Nevada. It is a low bush, 1-2 ft. high with numerous, slender, strict stems arising from a much-branched woody base. The leaves are numerous, about $\frac{1}{2}$ in. long and quite narrow, entire or nearly so, lance-oblong to ovate. The inflorescence is spike-like, and the corolla is a dull yellow or yellowish-white with purplish guide lines, narrow, about $\frac{1}{2}$ in. long, the upper lip erect, the lower reflexed. This penstemon has not been grown by us nor do we find other references to its use.

PENSTEMON ROTHROCKII subsp. *JACINTENSIS* (Abrams) Keck

Dr. H. M. Hall found this penstemon on San Jacinto Mountain at an altitude of 9000 ft. and Dr. Abrams described it as a species in 1906. Solely found in the San Jacinto Mountains of Riverside County, California, this penstemon is separated from the typical form by having longer and wider flowers. Otherwise it is much the same as the species. To our knowledge, it has not been cultivated.

PENSTEMON RUPICOLA (Piper) Howell

One of the most brilliant of all rock garden penstemons, of which Gabrielson in "Western American Alpines" says "of the creeping group, this is the gem with its mass of tiny, leathery, blue-green ovate leaves on creeping woody stems sprinkled with short stems on which are flowers of an amazing size . . . and that it does best on the north sides of rocks." In 1916, Curtis's Botanical Magazine reports this charming little penstemon recently had found its way into cultivation through the Six Hills Nursery, Stevenage, which started growing it in 1910 under the name *P. Davidsonii*. At Kew it proved hardy in a sunny position in the rock garden facing south with moraine conditions. It flowered there in May and failing to ripen seed, it was found to be easily increased from cuttings. It has never been attempted at the Botanic Garden, and if so would need very careful treatment. During the last several years an outstanding white-flowered form has been cultivated, and apparently is much easier to handle in gardens.

Through the pages of American horticultural literature we find many references to this fine rock garden plant which haunts the steep rocky cliffs of our mountains from the northernmost part of California through both slopes of the Cascades to central Washington. The type specimen was collected on Mt.

Rainier, Washington, and Piper described it as a variety of *Newberryi* in 1900, and in 1901 Howell gave it specific rank, which treatment has been accepted since that date.

Penstemon rupicola is a low-growing plant forming depressed mats from a woody base with the flowering stems mostly less than 4 in. high, glabrous, or the stems, petioles, and under surfaces of the leaves in particular more or less densely white-woolly. The herbage is usually glaucous, leaves elliptic to orbicular, very thick, and all but the much-reduced floral leaves are petioled and small. The condensed, few-flowered raceme is composed of deep rose colored, moderately dilated flowers 1–1½ in. long and nearly ½ in. wide. The flowering period is from May to August, and one's attention is immediately drawn to this bright flowered cliff-dweller hanging in solitary grandeur high above one's head.

PENSTEMON SCAPOIDES Keck

Among the rocky gorges of the White and Inyo Mountains, Inyo County, California, one finds this strange penstemon, which was originally collected in Westgard Pass and named by Keck in 1932. From a branching matted base not more than 4 in. high, a few very slender, almost completely leafless stems rise to a height of perhaps 18 in. The roundish leaves are often folded and the thyrsus is a few-flowered, lax panicle. The pale lilac or blue flowers, 1–1¼ in. long and ¼ in. wide, are borne singly on ascending pedicels. The flower tube is darker in color, the throat is whitish beneath and within, and is slightly enlarged.

It is believed not to be in cultivation.

PENSTEMON SHASTENSIS Keck

A tetraploid species often confused with the diploid *heterodoxus*, but not as worthy for garden culture as the latter plant. The basal rosette is well developed, and the 8–20 in. stems are slender or rather stout. The leaves are deep green, thin and glabrous, and the thyrsus has 2–6 dense clusters or sometimes reduced to only one. The corolla is a blue-purple, nearly ½ in. long and much like *heterodoxus*. In Siskiyou County and adjacent Modoc County to Shasta County, California, we generally find this penstemon growing in the rich loam of sunny meadows, or scattered under Incense Cedars and Yellow Pines. The type locality is Grass Lake, Siskiyou County. It is believed unknown to cultivation.

PENSTEMON SPECIOSUS Douglas ex Lindley

An aptly named plant, this is probably one of the best and earliest penstemons introduced to cultivation. Our first reference to this lovely penstemon is found in Edward's Botanical Register, 1829, in which it is stated that *Penstemon speciosus* is a fine perennial collected by Douglas on the banks of the Spokane River, in Northwest America, whence seed was sent to the Royal Horticultural Society in 1827. It was flowered in Chiswick Garden from June to September. The plant was figured from a drawing made in July (presumably 1829). The article further states great quantities of flowering stems and flowers were produced, and although the plant increased little by

roots, copious amounts of seeds were gathered. It proved to be quite hardy for them in common garden soil.

Paxton's Magazine says it was first known to British collections about the year 1826, being one of the worthy fruits of Douglas's labors on the North American continent.

The Gardener's Chronicle from 1842 on gives numerous references to this showy species which was greatly appreciated in England and France, being listed a number of times among the best penstemons introduced to cultivation. As American horticultural journals appeared, much the same information as that of the English gardener is recorded in them.

From the time of its appearance even though thousands of plants were distributed, it did not create the admiration it should have, due no doubt, to difficulty in raising it. It is quite hardy, not being injured by frost except be it intense nor will it endure excessive moisture or a too exposed position where it has to withstand bleak winds. It likes a rich, loamy soil and special care should be taken not to get an adhesive one. Give very little water if any, and always grow it in open beds where it will provide a gorgeous mass of color.

Our results here at the Garden have been generally unsatisfactory with this species. Germination of seed has been good in most instances, but our efforts to grow it in the out-of-doors have not produced many worthwhile specimens. Undoubtedly it needs closer attention and a more suitable location than we have provided in the past.

Several specific and varietal names have been applied to this penstemon and judging from horticultural descriptions the name *glaber* has been applied to *speciosus* as much as to the true form. This also seems to be true of herbarium collections. Open stony flats, dry plains and hillsides, sagebrush formations, juniper and yellow pine forests at elevations between 3500-8000 ft., appear to be the main habitual preferences of this species. It occurs from California, mostly east of the Sierra-Cascade axis, north to central Washington, east to Idaho, Nevada, and Box Elder County, Utah.

Penstemon speciosus is a perennial plant with numerous glabrous, grayish stems in erect clumps to 2½ ft. high; leaves are entire, thickish, the basal lanceolate to oblanceolate, to 6 in. long; the thyrsus is elongated and composed of numerous showy clusters more or less on one side of the stem; the corolla is a bright blue-purple, 1-1½ in. long and nearly ½ in. wide. The rather long tube abruptly flares into the ample throat, the large limb being strongly 2-lipped, and the sterile filament is glabrous or rarely bearded.

PENSTEMON SPECIOSUS subsp. KENNEDYI (A. Nelson) Keck

In 1904 Nelson based his description of this penstemon upon collections made in Truckee Pass, Virginia Mountains, Washoe County, Nevada, and in 1940 Keck combined it with *speciosus*. It is confined mainly to California in the Warner Mountains, the east flank of the Sierra Nevada from Sierra County to Inyo County, White Mountains, and adjacent Nevada. It is not as tall as the typical form and is further separated from the species by calyx differences as well as other minor features.

PENSTEMON SPECTABILIS Thurber

In our opinion this is the showiest and finest of all the tall-growing penstemons native to California. In disturbed areas where competition is small, great masses of color are produced in April or May that surpass the most colorful gardens. This grand penstemon was discovered by William A. Wallace, an old-time collector of the Southern California flora, and was described by Thurber in 1856. The type locality is given as "San Pasqual, San Diego County." Our earliest record of its use in gardens appears in Curtis's Botanical Magazine for 1861, in which it is described as a coarse plant, but one of the showiest and most stunning of penstemons when massed. It was introduced to English gardeners by Messrs. Low, of Clapton, and flowered in May, 1861.

Although not one of the most popular native penstemons, due, no doubt, to its inability to withstand much moisture and frost, generally enthusiastic reports infrequently appear in both American and English journals regarding its behavior in various types of gardens. We have grown *P. spectabilis* since the earliest days of the Garden, and although the heavy clay soil is not conducive to a very long life, we do not find it necessary to propagate new plants or re-sow seed. It maintains itself by the hundreds of volunteers that appear each year and the large 5-foot plants produce a mass of color in the most conspicuous parts of the Garden. A sterile, sandy or coarse soil, full sun, and little or no irrigation is essential for growing the most satisfactory plants and having them stay with you for several seasons. However, they will survive for a year or two if planted in heavier soils and water is withheld as much as possible.

Plants of *spectabilis* will grow to 5 ft. tall and 3 ft. broad under the best conditions. Each plant will have few to several stout, coarse stems clothed with large coarsely toothed leaves, the basal to 4 or 5 in. long by 2 in. wide, the upper leaves somewhat clasping. The large inflorescence is open and branched, and enlarges as the flowering season progresses. It is covered with many lavender-purple flowers with blue lobes, often quite blue or reddish-purple, whitish within, to 1½ in. long and ½ in. wide, tubular-funnelform in shape, the tube proper shorter than the gradually ampliate throat which is not contracted at the orifice. The sterile filament is glabrous or only with occasional hairs. Flowers usually begin to appear in March but in cultivation the many volunteer plants may bloom at all times of the year.

The dry washes and rocky, open hillsides are the preferred habitats of this plant from eastern Los Angeles County, California, to northern Lower California.

PENSTEMON SPECTABILIS subsp. SUBVISCOSUS Keck

This is the common form in California from the Liebre and Santa Monica Mountains to the outwash fans of the San Gabriel and San Bernardino Mountains. The type locality is Claremont, Los Angeles County. It is somewhat sticky whereas the typical form is glabrous.

PENSTEMON STEPHENSII Brandegee

This rare plant is to be found on the rocky slopes of the Kingston and Providence Mountains of the eastern Mojave Desert, California. It has the appear-

ance of *Clevelandii*, having been considered a variety of the latter by Munz & Johnston, but it was described as a species in 1903, honoring Mr. Frank Stephens, 1849-1937, a well-known mammalogist and collector from San Diego, California.

The stems of this penstemon are few to several, 1-3½ ft. high, reddish, clothed with thinnish leaves to 4 in. long by 1½ in. broad, mostly finely and sharply denticulate, the several cauline pairs connate-perfoliate, forming disks. The inflorescence is small and narrow. The few rose to pink-lavender flowers without prominent guide lines are a little over ½ in. long and very narrow, essentially tubular or the throat slightly dilated, the tube equalling the throat.

A lone plant brought in from the wild and grown for a few months in the lath house, died shortly after being transferred to a specially prepared Garden site. No other horticultural history is known to us about this species.

PENSTEMON TERNATUS Torrey

A straggly shrub, 5 ft. or more high, with thin, glabrous, wand-like branches found in the chaparral of the coastal drainage zones from the San Gabriel and San Bernardino Mountains, south to the San Pedro Martir Mountains of Lower California, usually at elevations of 1000-7000 ft. It was originally found in the mountains east of San Diego, and was described by Torrey in 1859.

Apparently this species has been used little if any in cultivation, although it is not unattractive. The same condition and use in gardens should be given it as for *cordifolius*, although the narrow, inch-long, light scarlet flowers are perhaps not so attractive. The narrow leaves, even though thickly clothing the glabrous plant, give an appearance of nakedness to it. We have grown *ternatus* at the Garden since 1930, the first group being situated in a most undesirable area, but despite this condition, the plants lived over 10 years. Our plants are planted now in a more suitable area, are nearly 10 years old and will probably live many additional years.

PENSTEMON TERNATUS subsp. SEPTENTRIONALIS (Munz & Johnston) Keck

This subspecies inhabits an area to the west and north of the typical form being found in much the same situations but in the inland drainages in adjacent portions of Kern, Ventura and Los Angeles counties, California. The type locality is Oakgrove Canyon, Liebre Mountains. The glandular-pubescent calyces and pedicels separate it from the species.

We have grown this form nearly as successfully as the species, many of our plants living for 10 years, but we do not have living plants at the present time.

PENSTEMON THOMPSONIAE (A. Gray) Rydberg

Asa Gray named this tiny penstemon in 1878, honoring Mrs. Thompson, a little-known collector from Utah, who discovered it in southern Utah. Gray made *Thompsoniae* a variety of *P. pumilus*, but in 1909 Rydberg raised it to specific rank.

In California, *Thompsoniae* is known only from Clark Mt. in the eastern Mojave Desert, where it was first collected by Dr. Wolf, formerly the Garden botanist, on May 25, 1935. It was growing in full sun on the limestone slopes near the Coliseum Mine at an elevation of approximately 6000 ft. In south-

eastern Nevada, southern Utah (type locality), and northern Arizona, the species is more frequently collected.

Our only experience with this species was with a few bare root plants taken from Clark Mt.; however they did not survive transplanting. A few members of the American Penstemon Society have had some luck growing it, and have stated that if it could be easily grown, this little penstemon would be one of the best of the dwarf varieties.

Penstemon Thompsoniae forms a gray mat 1-4 in. high and to 10 in. across, spreading from a woody base by scarcely creeping, fibrous-rooted, underground stems. The small, entire leaves clothe the little prostrate or ascending stems, from which are borne in a leafy inflorescence tiny intense blue-violet flowers, which make an effective contrast with the very gray herbage.

PENSTEMON THURBERI Torrey

This most attractive penstemon is found in the open sandy ground of the Providence and Little San Bernardino Mountains, and San Felipe, California, to northern Lower California, Arizona and New Mexico. Torrey, in 1856, named this lovely plant in honor of George Thurber, 1827-1890, who collected it in the Burro Mountains of New Mexico. Mr. Thurber, an eminent collector and horticulturist, was botanist on the Mexican Boundary Survey, 1850-1854, at the time this collection was made.

Penstemon Thurberi is much like *P. ambiguus*, but the latter plant has been cultivated more than the former, although it is difficult to say so truthfully; for *Thurberi* was for many years retained as a variety of *ambiguus*. Disregarding these nomenclatorial problems, we consider *Thurberi* a most attractive plant which should find its way into gardens if properly handled.

Penstemon Thurberi is an intricately branched bush, 1-2 or rarely 3 ft. tall and equally broad with numerous tiny stems ascending from a woody base. The herbage is glabrous throughout, and the very narrow bright green leaves are seldom more than an inch long, equally distributed throughout the entire plant. The inflorescence is a raceme and from the many branching 1-flowered peduncles, there seem to spring hundreds of small, salverform, lavender-rose or clear rose flowers with a rather large limb.

Germination of seed is very rapid and excellent in this species, taking from 4-10 days. The seedlings must be carefully watered, but give little trouble once growth is started. Due to improper conditions, mature plants have not lived long with us, except for one plant that survived for over 8 years, only to be cultivated out by mistake. Each year the plant died back completely, to reappear vigorously each spring after its winter dormancy.

PENSTEMON TOLMIEI subsp. FORMOSUS (A. Nelson) Keck

Although no record has been found regarding the use of this subspecies in gardens, the typical form is one of the most useful of rock garden plants and has been successfully cultivated for a number of years in various parts of the country. This little plant is densely tufted in habit, forming mats several inches across and not more than 6 in. high. The leaves are much reduced in size on the short stems that bear a cylindrical cluster of deep blue-purple

flowers. It is a resident of the alpine peaks of California in the Marble Mountains, Mt. Eddy, and of the central Sierra Nevada, the Mount Rose region in Nevada and the Wallowa Mountains of Oregon.

PENSTEMON *TOLMIEI* subsp. *FORMOSUS* (A. Nelson) Keck

A high montane form found in the rocky crevices and on grassy slopes of the Salmon and Trinity Alps of California, northward through the Cascades to Mt. Hood, Oregon. The stems of this subspecies are 6–12 in. tall, and are prominently leafy, and the 3–5-clustered thyrus is sometimes reduced to 1.

Neither of the above two subspecies has been cultivated at this Botanic Garden; and we have no record of their introduction into cultivation unless they have been grown as the typical form of *Penstemon Tolmiei*.

PENSTEMON *TRACYI* Keck

“A very distinctive species known only from the type locality, at the head of White’s Creek, Devil’s Canyon Mountains, Trinity County, California, where it grows in rock crevices at 7000 ft. altitude.” Blooms from July to August, and is a subshrub, 3–5 in. tall, the light green glaucescent herbage glabrous throughout. The leaves are leathery, and the thyrus contracted, dense, $\frac{3}{4}$ –1½ in. long and composed of 2 or 3 clusters with pink, tubular flowers about ½ in. long.

Unknown to cultivation.

PENSTEMON *UTAHENSIS* Eastwood

Named by Miss Eastwood in 1893 in honor of the state in which it was originally found “between Hatch’s Wash and Monticello, Utah,” this little-known penstemon occurs occasionally in canyons and on mesas in the ranges of the eastern Mojave Desert, California, to southern Nevada and Utah and northern Arizona. It is a plant with several slender, glabrous stems, 1–2 ft. high, and leathery leaves that are glaucous, glabrous, somewhat rough to the touch, and with clasping base, 1–3 in. long and to ½ in. wide. The nearly tubular, carmine flowers are about 1 in. long and ¼ in. wide with the lobes rotately spreading or reflexed. The inflorescence is racemiform and glabrous.

Little has been done with this penstemon in cultivation, it being rather unattractive, and we have had little experience with it in the Botanic Garden. Poor seed germination resulted in only a few plants which did not long survive here.

PENSTEMON HYBRIDS

One can readily expect a number of natural hybrids within a group as large as the genus *Penstemon*, but strangely enough the plant breeder has not altogether capitalized on the value of these colorful plants. True, wonderful hybrids have been produced for many years from a few of the most promising species, but in reality little has been done with the untapped resources in this widely divergent group, and it would seem that a more careful survey by the plant breeder would produce some interesting results. Listed below are the penstemons of which known or suspected crosses have been made either artificially or naturally.

x PENSTEMON PARISHII (*P. centranthifolius* x *spectabilis*) (Gray) Keck

This penstemon was first described as a species by Dr. Gray, in 1882, based upon specimens collected near Cucamonga, San Bernardino County, California by the Parish Brothers, botanists who added greatly to the knowledge of California plants. This uncommon plant is found at scattered points from Los Angeles County to San Diego County, wherever the two parents occur together. In 1902, Dr. H. M. Hall concluded *P. Parishii* was a hybrid, and since then it has been suspected as such by a number of botanists but never fully decided upon until Dr. Keck carried on his studies in penstemons. His conclusion was well substantiated by our records for this cross has appeared from time to time in the Garden over a period of 20 years, and only when the two parents were closely associated.

x *P. Parishii* has much the habit of *centranthifolius*, although there may be quite a variation in a given group of plants. The fibrous root system is like that of *centranthifolius*, as well as the slender 2-3 ft. stems. The flowers are a red-purple and resemble *spectabilis* in shape but are not so large. The first generation cross is not particularly attractive, but seeds gathered from this cross will often produce vigorous plants with quantities of brilliantly colored flowers varying greatly in shade and shape.

x PENSTEMON BRYANTAE (*P. Palmeri* x *spectabilis*) Keck

In June, 1935, three volunteer seedlings were found growing near the Botanic Garden Administration Building which appeared to be different from other nearby seedlings and were suspected of being hybrids. Close at hand were two or three plants of *P. Palmeri* and many more of *P. spectabilis*. The seedlings, about 1 ft. tall at the time, were growing in heavy adobe soil. To insure their continued existence until they flowered, it was deemed advisable to move two of them to the lath house area where they could be watched more closely and where the soil condition was more favorable for their survival. These two plants were moved successfully, and on June 2, 1936, the flowering specimen upon which Keck based his description in 1937 was collected.

At the request of Dr. Wolf, Garden botanist at that time, Dr. Keck named this lovely penstemon in honor of Mrs. Susanna Bixby Bryant, founder of Rancho Santa Ana Botanic Garden. The general growth habit of this hybrid is more like *P. spectabilis* with minor resemblances to *Palmeri*. The outside of the corolla is a pale lavender almost pink, the face a deep lavender with reddish-purple stripes, and is quite inflated. The sterile filament is well bearded. The plant at the time the type specimen was collected stood about 3 ft. tall and 2 ft. wide.

A number of second generation plants were grown from the fertile seed of *Bryantae*, and although there were many fine segregates none was as beautiful as the original. Unfortunately trouble in growing the original from cuttings was encountered and we do not now have any x *Penstemon Bryantae*.

x PENSTEMON EDITHAE (*P. rupicola* x *Barretae*) English

This is one of the most recent and noteworthy crosses of native penstemons made during the past several years. Mr. Carl S. English, Jr., a Seattle nursery-

man, was the producer and he described it in the National Horticultural Magazine for April, 1947, naming it in honor of his wife. Although the plant has not been widely distributed, from the several reports noted it is becoming one of the favored rock-garden plants.

x *P. Edithae* is a smooth, much-branched plant forming a wide, flat-topped mound, 6–10 in. high and 1–2 ft. broad; the leaves are glaucous, toothed, and intermediate between those of its parents. The flowers are a rosy purple and about $1\frac{3}{8}$ in. long.

PENSTEMON SIX HILLS HYBRID

The definite date of introduction of this hybrid is unknown to us, but one of the supposed parents, *P. rupicola*, was introduced as *Davidsonii* by the Six Hills Nursery, in 1910. A 1926 Six Hills Nursery catalog lists the hybrid form, but the first horticultural record we found was in the Gardener's Chronicle for 1936, in which it is stated that this plant appeared in the penstemon collection of the famous Six Hills Nursery, Stevenage, England, as a spontaneous cross between *Davidsonii* and *cristatus*. Since then the Six Hills Nursery reports that the plant they have been selling as *Davidsonii* is really *rupicola*, even though their so-called *Davidsonii* is only 2 in. high; but other descriptive characters of their plant point to *rupicola*. The hybrid is a very compact plant, in habit intermediate between the parents, producing masses of big lilac flowers, and is most suitable for rock or alpine gardens.

A number of suspected hybrids have been reported about which little is known other than what has appeared in technical treatises. Apparently they have not been of sufficient interest to attract the penstemon fancier or rock gardener. These hybrids are as follows:

P. antirrhinoides x *cordifolius*, as reported by Keck

x *P. Crideri* (*pseudospectabilis* subsp. *connatifolius* x *Eatonii* subsp. *undosus*) A. Nelson

x *P. dubius* (*centranthifolius* x *Grinnellii*) A. Davidson [*dubium*, sphalm]

x *P. Peirsonii* (*Grinnellii* x *speciosus*) Munz & Johnston