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NOMENCLATURE OF THE CALIFORNIA *LUPINUS CONCINNUS*-*L. SPARSIFLORUS* COMPLEX

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Ten years of intensive breeding studies of members of the *Lupinus concinnus*-*L. sparsiflorus* complex suggest the need for a number of nomenclatural changes. The new names are being published at this time so that they shall be available for use by other students of *Lupinus*. Type material of all of the taxa, including those cited in synonymy, has been studied and photographed. The authors are grateful to the curators of the herbaria cited below for the privilege of examining these specimens.

1. *LUPINUS CONCINNUS* Agardh (subsp. *CONCINNUS*). Syn. Gen. Lup. Lund, Sweden. 1835. (Fig. 1-1)

Type.—*D. Douglas*, California, CGE.—*Isotype*.—K.

This taxon was described from a cismontane habitat in the south coast ranges of California.

- 1a. *LUPINUS CONCINNUS* subsp. *optatus* (C. P. Smith) Dunn, comb. nov. (Fig. 1-1a)

Basonym.—*L. concinnus* var. *optatus* C. P. Smith, Bull. Torrey Bot. Club 48: 227. 1921.—*Type*.—*S. B. Parish* 3055, Grass Valley, San Bernardino Co., Calif., US.

This is a montane subspecies, ranging from the San Bernardino Mts. southward into montane Baja California, and occurs in both the Upper Sonoran and Lower Transition zones of vegetation. It is larger, both vegetatively and in flower size, than *L. concinnus* subsp. *concinnus* and the peduncles are obsolete. Flowering takes place one to two months later than in subsp. *concinnus* or the desert subspecies, *orcuttii*.

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1b. *LUPINUS CONCINNUS* subsp. *orcuttii* (Wats.) Dunn, comb. nov.
(Fig. 1-1b.)

Basonym.—*L. orcuttii* Wats. Proc. Amer. Acad. Arts & Sci. 20: 359. 1885.—*Type*.—C. R. Orcutt, July 5, 1884, US-1336899, Cantillas Mts., Baja California, US.—*Isotypes* (?)—Japa Valley, Orcutt 1133, US, UC.

This taxon is the low desert subspecies ranging from northern Baja California and Sonora north to Utah and east to the Big Bend area of Texas. Although the material from Utah was named *L. micensis* by Jones, the intergradation and the presence of numbers of plants which are indistinguishable from the Orcutt specimen require that *L. micensis* be treated as a synonym.

2. *LUPINUS AGARDHIANUS* Heller. *Muhlenbergia* 7: 13. 1911.

Type.—D. Douglas, California, K.—*Isotype*.—GH. Heller was supplying a name for the later homonym, hence Agardh's type for *L. gracilis* is the type for *L. agardhianus*.—*Synonyms*.—*L. gracilis* Agardh. Syn. Gen. Lup. 15, Pl. lf. 1835, non. *L. gracilis* Nutt. 1834; *L. concinnus* var. *agardhianus* (Heller) C. P. Smith. Bull. Torrey Botan. Club 48: 228. 1921.

The habitat of this cismontane species extends from Monterey Co., Calif., to Baja California. The taxon has been intersterile with all other taxa in the complex. Heller never was certain to which lupine the name applied and many of the specimens that he labeled as *L. agardhianus* are *L. congdonii* (C. P. Smith) Dunn.

3. *LUPINUS PALLIDUS* Brandege. *Zoe* 4: 203. 1893.

Type.—Brandegee, June, 1893, San Vincinte, Baja California, UC.—*Isotypes*.—DS, US.—*Synonyms*.—*L. concinnus* var. *pallidus* (Brandegee) C. P. Smith. Bull. Torrey Botan. Club 48: 229. 1921; *L. desertorum* Heller. *Muhlenbergia* 2: 72. 1905 (*Type*.—A.A. Heller 7679, Randsberg, Calif.—*Isotypes*.—BKL, DS, UC, US); *L. concinnus* var. *desertorum* (Heller) C. P. Smith. Bull. Torrey Botan. Club 48: 230. 1921.

The material from the eastern California desert is considered here only as a disjunct segment of the species, although there are slight differences. This taxon has been intersterile with the *L. concinnus*—*L. sparsiflorus* complex but it hybridizes quite readily with *L. arizonicus* and its relatives. Its complete isolation in nature is achieved by obligate self-pollination.

4. *Lupinus brevior* (Jeps.) Christian & Dunn, comb. nov.

Basonym.—*L. sparsiflorus* var. *brevior* Jeps. Fl. Calif. 2: 277. 1936.—*Type*.—Jepson 11711, Mt. Springs Grade, Imperial Co., Calif. JEPS.—*Synonym*.—*L. concinnus* var. *brevior* (Jeps.) Dunn. *Aliso* 4: 138. 1958.

This taxon ranges from Baja California north to Imperial Co., Calif., and south along coastal Sonora. It is essentially obligately selfing and has been shown to be intersterile with *L. sparsiflorus* and *L. Concinnus*, *sensu stricto*; the two taxa previously reported as interfertile are here transferred to other taxa.

Fig. 1. The number to the left of each row corresponds to the taxon as numbered in the text, i.e. 1, 1a, and 1b refer to *L. concinnus* and its subspecies and 5 and 5c are for *L. sparsiflorus sparsiflorus* and *L. sparsiflorus mohavensis* respectively. The illustrations are drawn to the mean value for the size and shape of each part. In row 1 (*L. concinnus concinnus*) from left to right are the lateral view of the entire flower, the banner (flattened out with the ventral side down), the wing, the keel, and the calyx (internal view); the bract and the average largest leaflet are just below the row at the right. The arrangement is the same for rows 1a and 1b and differs only for 5 and 5c in that the variation in stem and leaf pubescence, instead of size, is illustrated for both because the largest leaflets of both vary from 2.5–4.5 cm in length. The leaflet width and hairs are drawn to scale but the one enlarged hair, with scaberrulous barbs, is drawn at a magnification three times the scale of the other drawings.

5. LUPINUS SPARSIFLORUS Benth. (subsp. SPARSIFLORUS). Pl. Hartw. 303. 1848. (Fig. 1-5)

Type.—Coulter, California, K.

Bentham described the plant as having been found with other lupines collected by Coulter, but he failed to mention a specific locality. However, the other identified lupines immediately preceding the type description of *L. sparsiflorus* were collected from Monterey to Santa Barbara and Ventura, apparently while Coulter was enroute from Monterey to Los Angeles. This implies cismontane southern California as the probable source of the type collection.

5a. LUPINUS SPARSIFLORUS subsp. **inopinatus** (C. P. Smith) Dziekanowski & Dunn, comb. nov.

Basonym.—*L. sparsiflorus* var. *inopinatus* C. P. Smith. Bull. Torrey Botan. Club 47: 499. 1920.—Type.—T. S. Brandege, April, 1903, as *Baker 3411*, US-444311, San Diego, Calif.—Isotypes.—BKL, GH, NY, RM, UC.

This taxon is intermediate between subsp. *pondii* and subsp. *sparsiflorus*. It occupies cismontane and coastal slopes having bare or sandy gravelly soils, primarily in San Diego Co., Calif., and northern Baja California.

5b. LUPINUS SPARSIFLORUS subsp. **pondii** (Greene) Dziekanowski & Dunn, comb. nov.

Basonym.—*L. pondii* Greene, Pittonia 1: 288. 1899.—Type.—Lt. Pond, March, 1899, San Bartolomei Bay, Baja California, probably ND-G.—Synonym.—*L. sparsiflorus* var. *pondii* (Greene) C. P. Smith. Bull. Torrey Botan. Club 47: 501. 1920.

This taxon is centered primarily on Cedros Island off the west coast of Baja California but appears on the peninsula in the mountains and on other islands approaching the southern border of California.

5c. LUPINUS SPARSIFLORUS subsp. **mohavensis** Dziekanowski & Dunn, subsp. nov. (Fig. 1-5c)

Erectus annuus 1-4 dm altus, ramosus ad basem, adpresso-pubescens et saepe pilis extensis 1-2.5 mm longis; foliolis 7-9, maximis 2.0-4.5 cm longis, 2-4 mm latis, linearibus saepe filiformibus, glabratis vel supra stigosis, infra strigosis; floribus caeruleis, 8-11 mm longis; vexillo orbiculato et emarginato 7.5-10.4 mm longo, 7.5-11.5 mm lato; carina supra et sub ad basem paucociliata; ceterae ut *L. sparsiflorus*.

Type.—D. B. Dunn 9131, Picacho Pass, State Hwy. 84, Pinal Co., Ariz. UMO.—Isotypes.—RSA, SMU.—Representative Materials.—ARIZONA: Cochise Co., Benson, *Demaree* 42045, UMO; Gila Co., Miami, *Demaree* 43721, UMO; Maricopa Co., Sunflower, *Demaree* 42147, SMU, UMO, Wickenburg, *Dunn* 9128, DAO, LA, SMU, UMO, RSA; Pinal Co., north of Casa Grande, *Dunn* 9129, SMU, UMO.—CALIFORNIA: San Bernardino Co., Providence Mts., Kelso, *Blakley* 3259, SBBG, UMO, *Ferris & Bacigalupi* 8173, DS, UC, *Wolf* 10694, DS, RSA, Vidal Jct., *Isely & Bragonier* 7247, ISC, UMO.—NEVADA: Clark Co., 5 miles north of the Calif. state line, Hwy. 95, *Isely & Bragonier* 7223, ISC, UMO.—UTAH: Washington Co., Terry's Ranch, sec. 36, T42S, R20W, *Welch* 1458, BRY.—SONORA, MEXICO: San Pedro, 7.5 miles north west of Tajitos, *Wiggins* 8294, DS, GH.

This is the desert subspecies which occupies the Mojave Desert of California and Arizona and extends into the state of Sonora, Mexico. It is similar to the species but is generally smaller vegetatively, and consistently smaller in the floral characteristics; and it has physiological traits that adapt it to the desert habitat. This is the taxon most American authors have misinterpreted as Watson's *L. arizonicus* and are routinely labeling as a variety of *L. sparsiflorus*. It is the taxon that C. P. Smith was describing as var. *arizonicus*, but that name must go with Watson's *L. arizonicus*, which is intersterile in all tests made to date with *L. sparsiflorus*. *Lupinus arizonicus* Wats. has yellowish pink to magenta flowers when fresh, but these become bluish when dry (reacting like litmus paper), whereas the flowers of *L. sparsiflorus* are blue when fresh and dry to a darker blue.

A KEY TO THE CALIFORNIA TAXA

- A. Keel glabrous.....B.
- AA. Keel ciliate above and/or below the claws.....C.
- B. Leaflets linear spatulate, very sparsely strigose above or glabrous above; plants sparsely supplied with spreading pilose hairs; flowers blue-purple.....*L. agardhianus*
- BB. Leaflets spatulate-oblongate to obovate, amply pubescent above; whole plant abundantly supplied with spreading pilose hairs; flowers pinkish white to lavender*L. concinnus*
- C. Flowers off-white to bluish or purplish, 5-7 mm long or less; plants usually less than 15 cm tall, commonly less than 10 cmD.
- CC. Flowers blue to pink or purple, 7-13 mm long; plants generally more than 15 cm tall.....E.
- D. Plants sericeous to strigose, often decumbent or prostrate; leaflets pubescent on both sides.....*L. pallidus*
- DD. Plants appearing glabrous or with a few scattered pilose hairs; leaflets glabrous above.....*L. brevior*
- E. Flowers pink to magenta with a yellow center spot; leaflets obovate to oblongate with the tip rounded, fleshy in texture; plants appearing succulent.....*L. arizonicus*
- EE. Flowers blue or purplish, with a yellowish white center spot; leaflets linear to filiform, not fleshy; plants not appearing succulentF.
- F. Flowers 10-13 mm long; cismontane Calif., Ventura to Riverside Counties.....*L. sparsiflorus sparsiflorus*
- FF. Flowers 7-11 mm long; San Diego Co., Calif., or the desertG.
- G. Banner oblong-oval, longer than wide; San Diego Co., Calif., and northern Baja California.....*L. sparsiflorus inopinatus*
- GG. Banner orbicular, emarginate, as wide or wider than long; desert areas eastward through Arizona into Sonora*L. sparsiflorus mohavensis*