

III. NOTES ON CERTAIN BORRAGINACEAE

✓ *Lappula bella*, spec. nov., perennis, circa 6 dm. alta; caulibus adpresse retrorso-strigillosis; foliis internodiis longioribus caulinis inferioribus oblanceolatis circa 10 cm. longis 1-2 cm. latis apice acutis vel obtusis, basi in petiolum attenuatis, utrinque adpresse strigillosis et margine eciliatis, caulinis superioribus sessilibus oblongis vel ovatis basi haud angustatis; inflorescentia ut apud *L. diffusam*; corollis verisimiliter albis 10-15 mm. latis; corollae appendiculis pubescentibus non latioribus quam longis; nuculae facie dorsali 6 mm. longa; aculeis permultis (24-30), anguste subulatis basi non confluentibus. — CALIFORNIA: common on open slopes, Dorleska, in the Salmon Mts. of Trinity County, altitude 2000 m., July 21, 1909, *H. M. Hall*, no. 8599 (TYPE, Gray Herb.).

Dr. Hall referred this plant to *L. diffusa*, noting on the label the "pure white flowers" and "pubescent appendages." Piper has shown, Bull. Torr. Club xxix. 535 (1902), the specific value of these characters elsewhere in the genus. Furthermore there are in this case other differences of importance. In *L. diffusa* the blue corollas are only 8-10 mm. broad and their glabrous appendages are distinctly broader than long; the dorsal faces of the nutlets are only 4-5 mm. long and the prickles are uniformly fewer (9-14), much more strongly widened, and more or less joined, at the base. The pubescence on the petioles and the lower part of the stems is looser and more spreading than in *L. bella*. *L. subdecumbens* of the Rocky Mts. has white flowers and pubescent appendages but otherwise is not so nearly related to *L. bella* as is *L. diffusa*. The latter has not been found farther south than northern Nevada, its range being from Montana to Nevada and Eastern Oregon to Alberta and British Columbia, and so is far removed geographically.

✓ *Lappula pustulata*, spec. nov., *L. pinetorum* peraffinis sed cum pilis haud patentibus papilloso-strigillosa; foliis radicalibus spatulatis circa 5 cm. longis 1-1.5 cm. latis basi in petiolum circa 2 cm. longum attenuatis, caulinis oblongo-lanceolatis apice fere obtusis, basi cuneatis 2-4 cm. longis 5-12 mm. latis; floribus ut apud *L. pinetorum*; nuculis magis muriculatis. — MEXICO: sixty miles south of Guadalupe y Calvo, Chihuahua, Aug. 1898, *E. W. Nelson*, no. 4792 (in U. S. Nat. Herb.); hills west of Chihuahua, Oct. 23, 1885, *Pringle*, no. 563 (TYPE, Gray Herb.)

Species representing perfectly the generic characters and nearest to *A. floribunda*, from which it may be distinguished by its lack of spreading pubescence, its greener hue, its long narrow leaves and the much longer fruiting calyx. In *A. floribunda* the mature calyx is rarely 5 mm. long. *A. durangensis* comes the nearest to having smooth nutlets of any of the species, their surfaces being very slightly if at all roughened.

✓ *CRYPTANTHA LEIOCARPA* (F. & M.) Greene, var. **hispidissima** (Greene), comb. nov. *C. hispidissima* Greene, Pitt. i. 118 (1887). *C. pumila* Heller, Muhl. ii. 242 (1906). Pubescence widely spreading, hispid. — CALIFORNIA: Lemmon's Ranch, June, 1887, *Lemmon*, no. 4606; Smith Creek, Santa Clara Co., May 30, 1907, *Heller*, no. 8588; Bodega Bay, Sonoma Co., May 27, 1902, *Heller*, no. 5615; Mt. Tamalpais, Marin Co., June 12, 1906, *Heller*, no. 8403; foothills west of Los Gatos, Santa Clara Co., May 27, 1904, *Heller*, no. 7458; island of Santa Cruz, April, 1888, *Brandege*; Salinas River, July, 1885, *M. K. Curran*; *Kellogg* (no data); Linda Vista, San Diego Co., July 6, 1915, *Macbride & Payson*.

Greene founded his species on three specimens in which the appressed strigose hairs that characterize *C. leiocarpa* are almost entirely replaced by a hispid spreading pubescence. The flowers, too, are slightly larger. Since then, however, specimens have been found which exhibit these characters in varying degrees. A specific instance is Mr. Heller's number 8403, the type of his *C. pumila*. He distinguishes it (l. c.) from Greene's species by its "smaller corolla and smaller calyx, the segments not 'long-attenuate'." One has only to examine a few specimens in order to become convinced that such characters are too variable to possess any specific value. In *Muhlenbergia*, ii. 315 (1907) he refers to *C. pumila* his number 8588 and remarks: "Mrs. Brandege considers this a mere state of *C. leiocarpa* but two plants differing so in habitat and appearance cannot possibly be the same." Unfortunately this specimen is distinctly strigose-canescens as well as hispid. Altogether it seems best to regard these plants which have the pubescence, at least in part, hispid-spreading as representing a recognizable variety.

✓ *Cryptantha Grayi* (Vasey & Rose), comb. nov. *Krynitzkia Grayi* Vasey & Rose, Proc. U. S. Nat. Mus. xi. 536 (1888).

Apparently nearest *C. angustifolia* (Torr.) Greene but obviously very distinct. Vasey and Rose do not cite a type but their descrip-

tion is included among a list of plants collected by Dr. Palmer at Lagoon Head. Our specimen, however, which purports to be a part of the type material, is Palmer no. 801 from San Quentin.

✓ **Cryptantha holoptera** (Gray), comb. nov. *Eritrichium holopteron* Gray, Proc. Am. Acad. xii. 81 (1877). *Krynitzkia holopteron* Gray, l. c. xx. 276 (1885). *Oreocarya holoptera* Greene, Pitt. i. 58 (1887).

When Dr. Gray described this species he compared it with *C. muricata* and *C. leiocarpa*, both typical *Cryptanthas*. Later (l. c.) he placed it between *C. pterocarya* and *O. setosissima*, and it is in *C. pterocarya* that it finds its nearest relative. Just why Dr. Greene made it a part of *Oreocarya* is not apparent. It is true that its nutlets are winged after the manner of those of *O. setosissima* but in that plant the pedicels are firmly persistent, in perfect accord with the generic character. Moreover, the plant is an *Oreocarya* in aspect, as noticed by Dr. Gray. These facts are not true of *C. holoptera*. Its pedicels are rather readily deciduous and its aspect is exactly that of a *Cryptantha*. The proper disposition of this plant must strengthen *Oreocarya* immeasurably because *Oreocarya* has very little besides aspect to keep it out of *Cryptantha* (a fact realized by its author, l. c. 115). Nevertheless, these genera are always so readily recognized in the field that no one who knows them there would think of uniting them.

✓ **CRYPTANTHA PTEROCARYA** (Torr.) Greene, var. **cycloptera** (Greene), comb. nov. *Cryptantha cycloptera* Greene, Pitt. i. 120 (1887). COLORADO: Grand Junction, May, 1892, *Alice Eastwood*. UTAH: southern Utah, 1874, *Parry*. NEW MEXICO: 1851-1852, *Wright*, no. 1570; rocky hillside, Nutt Mt., Sierra Co., May 11, 1905, *Metcalf*, no. 1573. ARIZONA: Lowell, May, 1884, *W. F. Parish*, no. 167; near Camp Lowell, April, 1881, *Pringle*, no. 366; Verde River, April 6, 1867, *Dr. Smart*, no. 132; hills near Tucson, April 15, 1884. CALIFORNIA: Surprise Canyon, Panamint Mts., April 21, 1891, *Coville & Funston*, no. 720.

When Dr. Greene described this plant, Bull. Calif. Acad. i. 207 (1885), he accredited it with three characteristics, "nutlets all winged; wings . . . continuous across the base [of the nutlet]; ventral face not muricate." Dr. Gray, commenting in the Synoptical Flora upon these characters, wrote that they "do not hold out." But more recently Mr. Coville, after collecting both species in the Death Valley, wrote (Contrib. Nat. Herb. iv. 165), that he "had not found a satisfactory series of intergrades" and accord-

ingly he considered *C. cycloptera* a good species. However, a study of the ample material in the Gray Herbarium seems to prove conclusively that it is, at best, only a geographical variety of *C. pterocarya*. In the first place, the ventral face of the nutlets may or may not be smooth in either of the proposed species. Secondly, all of the nutlets may be winged and yet the wings not extend across the base, as for example in the plants collected at Grand Junction, Colorado, by Alice Eastwood. When one considers the fact that the ventral faces of these winged nutlets are rough, one is puzzled as to whether the plants are more nearly related to *C. pterocarya* or to *C. cycloptera*. However, it must be noted that it is only the southwestern material that can be referred to *C. cycloptera*. It seems advisable, therefore, to consider *C. cycloptera* as a variety of *C. pterocarya* and to include in this variety all specimens that have four winged nutlets, irrespective of whether the wing extends across the base. Although the species ranges from Washington to Utah and southern California, the variety apparently largely replaces it, in the interior of the Southwest.

Cryptantha filiformifolia, spec. nov., humilis, 5–10 cm. alta, non vel vix ramosa cum pilis patentibus hispida; foliis fere filiformibus 0.5–3 cm. longis raro 1 mm. latis; cymis brevibus circa 1.5 cm. longis 2–3-radiatis, spicis fructiferis densifloris; floribus minimis; calycis fructiferi laciniis 1 mm. longis; nuculis (4) ovato-trigonis circa 5 mm. longis dorso muriculatis, sulco ventrali albido fere ad apicem dilatato et excavato. — MEXICO: Alamos, Sonora, March 26–April 8, 1890, *Palmer*, no. 397 (TYPE, Gray Herb.), and Feb. 2, 1899, *Goldman*, no. 308 (U. S. Nat. Herb.); Cape St. Lucas, etc., Lower California, Aug. 1859–Jan. 1860, *L. J. Xantus*, no. 76; Guaymas, 1890, *Palmer*, no. 169? (immature).

Vasey and Rose, in their report on Palmer's collections from La Paz, Lower California, *Contrib. U. S. Nat. Herb.* i. 73 (1890), refer his no. 111 from that station to *Krynitzkia micromeres* Gray, with the remark "This differs somewhat from the northern forms of this species but it seems to be the same as Xantus's no. 76, made a part of this species by Gray." I have not seen Dr. Palmer's specimen but it is evidently *C. filiformifolia*. Xantus's specimen is only a scrap and it is not surprising that Dr. Gray referred it to his species; but he based his description on the Californian material. In 1891 Dr. Rose (l. c. 107) listed what I have taken as the type of my species as *K. micromeres* Gray without other comment than,

"very common on sandy bottoms." With these several collections before me, however, the plant is seen to be nicely distinct from the Californian species *C. micromeres*. The most striking differences are its uniformly small size, almost filiform leaves, congested fruiting calyces and different nutlets. The groove is so dilated that it occupies the larger part of the ventral face of the nutlet. The nutlets suggest those of *C. Grayi* (Vasey & Rose) Macbr. but that species has conspicuous flowers and is otherwise different. *C. filiformifolia* does not seem to have crossed the mountains of Lower California to the West nor the Sierra Madre of Mexico to the east.

CRYPTANTHA MICROMERES (Gray) Greene, var. **cryptochaeta**, var. nov., hispida et adpresse strigoso-canescens; nuculis vix muriculatis vel scabridis. — LOWER CALIFORNIA: San Jose del Cabo, March-June, 1897, A. W. Anthony, no. 347 (TYPE, Gray Herb.).

The variety, because of the appressed hairs beneath the spreading hispid ones, is not green like the typical form of the species. In Anthony's specimen the branches of the inflorescence are not nearly so widely divaricate as in typical material and the calyces are less densely setose. However, ample collections are needed to prove the value of these apparent differences. Accordingly it seems better not to give the plant of Lower California specific rank at this time.

Cryptantha seorsa, spec. nov., humilis adpresse strigilosa et minute hispida a basi ipsa ramosa et florens; foliis caulinis inferioribus lineari-lanceolatis 2-2.5 cm. longis 1.5-2 mm. latis, superioribus ovatis acutis 1-2 cm. longis e basi 3-5 mm. latis supra papilloso-hispidis; cymis saepius 2-3-radiatis, spicis densifloris; calycis fructiferi laciniis linearibus 4-5 mm. longis basi ad apicem aequabiliter setoso-hispidis; nuculis (4) nitidulis 1.5 mm. longis ovatis acutis, dorso vix tuberculatis angulis lateralibus acutis faciebus ventralibus planis, sulco fere ad apicem aperto e basi furcato. — CALIFORNIA: Needles, May 6, 1884, Jones, no. 3841 (TYPE, Gray Herb.).

This seems to be very different from any described species and apparently is nearest *C. intermedia* (Gray) Greene, but the acutely angled nutlets with flat ventral surface forbid its reference to any of the members of that group. These nutlet-characters suggest the group that contains *C. oxygona* (Gray) Greene and *C. ramosissima* Greene, but the plant is obviously not related to these species.

C. AFFINIS (Gray) Greene. To the synonymy of this species may be added *C. geminata* Greene, Pitt. i. 119 (1887). The characters

Greene gives, particularly the character of the groove near the edge of the nutlet, are salient features of the type of *C. affinis*. *C. confusa* Rydb. Bull. Torr. Club xxxvi. 679 (1909) seems to be separable only by the use of superficial and arbitrary characters. The variation in leaf-breadth appears to be merely a condition and the same may be true of the slightly higher attachment of the nutlets.

C. RAMULOSISSIMA A. Nels. Eryth. vii. 68 (1899). This species is near *C. Torreyana* (Gray) Greene, but the habit and pubescence are different, the nutlets are more slender, and the areola is open instead of closed. But *C. flexuosa* A. Nels. in Coulter & Nelson, N. Man. Rocky Mt. Bot. 416 (1909), is *C. Torreyana* (Gray) Greene, var. *calycosa* (Gray) Greene (*C. calycosa* (Gray) Rydb.). The variety is more common than the typical form with which it merges. *C. incana* Greene, Leaflets i. 79 (1904), is apparently a specimen of *C. Torreyana* which is more canescent than usual.

C. MICROSTACHYS Greene. *C. Clevelandi* Greene, Pitt. i. 117 (1887), is not to be distinguished.

C. HILLMANII Nels. & Kenn. Proc. Biol. Soc. Wash. xix. 157 (1906), has been referred to *C. Watsoni* (Gray) Greene by Dr. Rydberg, Bull. Torr. Club xl. 481 (1913). This is an error, which may have been prompted by the distribution from the Rocky Mountain Herbarium of specimens determined as *C. Hillmanii*, when they really belong to *C. Watsoni*. The former species is characterized by a large solitary nutlet and is nearest *C. Suksdorfii* Greenm. *C. Watsoni*, on the other hand, matures four small nutlets and is related to *C. Torreyana*. Its stems and calyces are much more bristly than those of *C. Hillmanii*. Since these species have been confused it seems desirable to cite representative collections. Specimens in the Gray Herbarium of *C. Watsoni*: IDAHO: sandy slopes, New Plymouth, Canyon Co., May 21, 1910, Macbride, no. 81. WYOMING: Point of Rocks, June 15, 1898, Aven Nelson, no. 4736; Centennial Hills, July 16, 1895, Aven Nelson, no. 1684. UTAH: Wasatch Mountains, July, 1869, Watson, no. 858. NEVADA: Mount Grant, Mineral Co., July 2, 1913, Heller, no. 10,905, and Goldfield, July 16, 1913, no. 10,970 in part. OREGON: clay banks, Malheur Butte, Malheur Co., May 12, 1896, Leiberg, no. 2041 in part. Specimens of *C. Hillmanii*. IDAHO: Snake Plains, 1893, Palmer, no. 72, Henderson, no. 2561 (no other data). COLO-

RADO: dry mesa among junipers, Nucla, June 4, 1914, *Edwin Payson*, no. 395. ARIZONA: Grand Canyon, June 28, 1898, *MacDougal*, no. 184.

C. OXYGONA (Gray) Greene is either little known or very rare. The type came from "hills bordering the Mohave Desert," and on April 28, 1905, Mr. Heller secured it at McKittrick, Kern County. Unfortunately he distributed it (under his number 7789) as *C. cycloptera* Greene. One plant of this number in the Gray Herbarium is *C. intermedia* (Gray) Greene, but the rest of the collection is very typical *C. oxygona*. The discovery of a new station for this unusual species is of interest.

C. AMBIGUA (Gray) Greene. *C. simulans* Greene, Pitt. v. 54 (1902) is merely a tall specimen of this species. The nutlets are broadly ovate, dull, and are roughened with papillae of two sizes, — the really diagnostic characters of *C. ambigua*. *C. multicaulis* A. Nels. Bot. Gaz. xxx. 183 (1900) is closely allied to *C. ambigua* but is clearly distinct by its more compact habit and glossy, sparsely muriculate fruit. Its range in the Coulter & Nelson Rocky Mt. Bot. is given as "Wyoming and probably southward into Colorado." In reality specimens indicate that it is not infrequent from Montana to Nevada and north to Washington. *C. trifurca* Eastw. Bull. Torr. Club. xxxii. 203 (1905) is nearer *C. multicaulis* than *C. ambigua*, and is probably confined to extreme northern California and southwestern Oregon, an area noted for species peculiar to it.

C. SCOPARIA A. Nels. Bot. Gaz. liv. 144 (1912) is another member of this group and is to be distinguished from *C. multicaulis* by its narrowly conical nutlets with narrow open groove and scarcely forked basal areola. A specimen which has long proven troublesome to students is to be referred to this species. It is W. N. Suksdorf's no. 405, collected June 8, 1884, on plains, at Morgan's Ferry on the Yakima River, southeastern Washington. The original label bears the name *Krynitzkia angustifolia*?, in Dr. Gray's hand. This has a line drawn through it and on a slip bearing the abbreviation "Syn. Fl.," Dr. Gray wrote, "K. Fendleri." It was on the basis of this specimen that in the Syn. Fl. ii. pt. 1, Suppl. 424 (1886) he extended the range "northwestward to the borders of Washington Territory." Then Piper, in Contrib. U. S. Nat. Herb. xi. 485 (1906), wrote: "Suksdorf's specimen, on the basis of which *C. Fendleri* is included in his list [of the plants of Washington],

seems to be *C. ambigua*." However, the specimen represents perfectly *C. scoparia*, heretofore known only from the plains of western Idaho. This extension of range is not surprising as it simulates the ranges of many other plants, such as *Astragalus Spaldingii* Gray and *Oreocarya spiculifera* Piper.

C. INTERMEDIA (Gray) Greene. *C. echinella* Greene, Pitt. i. 115 (1887), should be referred to this species.

C. RAMOSA (Lehm.) Greene has an exact synonym in *Krynitzkia mexicana* Brandege, Zoe v. 182 (1904), which was wrongly compared with the very different *C. pusilla* (T. & G.) Greene.

CRYPTANTHA KELSEYANA Greene, Pitt. ii. 232 (1892). This species was described by Greene (l. c.) from one collection, made by him August 6, 1889 at Elliston, Montana. He compared it with *C. Pattersonii*. In 1900 Dr. Rydberg (Mem. N. Y. Bot. Gard. i. 332) referred two other collections to *C. Kelseyana* and, continuing Greene's comparison, wrote, "three [nutlets] are gray, ovate, acuminate, and sparsely tuberculate, the fourth much smaller, red and smooth." This statement agrees in substance with Greene's original description but it does not coincide with the facts as they are illustrated in the Montana specimens. Actually the fourth nutlet is the largest, the species, in this respect, agreeing perfectly with *C. crassisepala*. I have talked with Dr. Rydberg in regard to this discrepancy in the description and he informs me that he is certain that Greene's characterization is incorrect, the error being due, probably, either to the immaturity or the poor development of the original specimen. I had also reached this conclusion because specimens invariably have the fourth and smooth nutlet the largest, and in the twenty-five years elapsing since the discovery of *C. Kelseyana* no plant answering to the original description has been found. Thus interpreted, the species is nearest *C. crassisepala*. It differs in the acute and narrower nutlets, the groove open toward the base and there forked but not excavated; and in the sepals which are not connivent over the mature fruit but open, the midrib only slightly thickened. Since collections representing *C. Kelseyana* have often been confused with *C. crassisepala*, *C. Pattersonii*, *C. ambigua*, or *C. multicaulis*, it seems worth while to cite the following material of the New York Botanical Garden (N. Y.) and the Gray Herbarium (Gr.).

SASKATCHEWAN: 1858, *E. Bourgeau* (Gr.). ASSINIBOIA: Medicine Hat, June 2, 1894, *Macoun*, no. 5803 (N. Y.). MONTANA: Virginia City, June 25-30, *G. N. Allen* (N. Y.); Melrose, July 6, 1895, *C. L. Shear*, no. 3218 (N. Y.). WYOMING: Pole Creek, Albany County, June 28, 1895, *Aven Nelson*, no. 1335 (N. Y.); Powder River, Natrona County, June 27, 1910, *Aven Nelson*, nos. 9415, 9377a (Gr.); open woods near the river, Fort Steele, Carbon County, June 16, 1907, *Aven Nelson*, no. 9049 (Gr.); Laramie, Albany County, July 7, 1894, & June 12, 1900, *Aven Nelson*, nos. 412, 7280 (Gr.); Natrona County, July 5 & 10, 1901, *Goodding*, nos. 197 & 234 (Gr.). COLORADO: mountain sides near Georgetown, August, 1885, *H. N. Patterson* (Gr.); Walsenburg, June 5, 1900, *Rydberg & Vreeland*, no. 5699 (N. Y.); Platte River, Evans, May 30, 1910, *E. L. Johnston*, no. 628 (N. Y.). UTAH: deep sand, Ogden, June 23, 1902, *Goodding*, no. 1176 (Gr.).

ERITRICHIUM. Mr. F. W. Wight in his treatment of the American species of this genus, Bull. Torr. Club xxix. 407 (1902), fails to indicate clearly the relationship of our plants to those of Asia and Europe, although he states that there has been "much misapprehension, in regard to some of them, at least." It may be noted that the only constant difference between the European plant, *E. nanum* (All.) Schrad. and *E. elongatum* (Rydb.) Wight, its American representative, concerns the fruit. The nutlets of the European plant have a distinct spreading border or flange (whether entire or toothed); this is lacking in ours, the edges of the dorsal face being slightly elevated as a rather sharp ridge, — or in some species the edges bear a row of teeth. I have seen no indication in our plants that the presence or the absence of these teeth is not a constant, and therefore a good specific, character. *E. elongatum* and *E. argenteum* Wight include most of the material referred to *E. nanum*, var. *aretioides* by Gray, Syn. Fl. ii. pt. 1, 190 (1886). I am unable to see that *E. Chamissonis* A. DC. is distinct from true *E. aretioides* (Cham.) A. DC. The vegetative characters that Mr. Wight relies upon to separate them break down completely in any considerable series of specimens. The real relationship of *E. aretioides* is with *E. villosum* (Ledeb.) Bunge of Siberia. That species has very similar fruits; and it agrees with all the American species in lacking the border to the nutlet which characterizes the European plant, *E. nanum*.

✓ *Amsinckia Lemmonii*, spec. nov., planta ut apud *A. tessellatam* sed corolla infundibuliformi 15-18 mm. longa, tubo calyce 2-3-plo