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STUDIES IN THE BORAGINACEAE.—IV.

THE NORTH AMERICAN SPECIES OF CRYPTANTHA.

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Krynitzkia § *Piptocalyx* Gray, Proc. Am. Acad. xx. 275 (1885).

Lappula § *Piptocalyx* Post & Kuntze, Lexicon 316 (1904).

Cryptantha § *Piptocalyx* Johnston, Contr. Gray Herb. n. s. lxxviii. 55 (1923).

Krynitzkia § *Pterygium* Gray, Proc. Am. Acad. xx. 276 (1885) and Synop. Fl. N. Am. ii. pt. 1, Suppl. 428-429 (1886) in part.

Cryptantha § *Pterygium* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 110 (1893).

Lappula § *Pterygium* Post & Kuntze, Lexicon 316 (1904).

Eremocarya Greene, Pittonia i. 58 (1887); Baill. Hist. Pl. x. 373 (1891); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 109 (1893), Howell, Fl. N. W. Amer. 483 (1901); Abrams, Fl. Los Angeles ed. 1, 331 (1904); ibid. ed. 2, 304 (1917); Frye & Rigg, Northwest Fl. 326 (1912); Wootton & Standley, [Fl. N. Mex.] Contr. U. S. Nat. Herb. xix. 544 (1915); Rydb. Fl. Rocky Mts. 719 (1917); Davidson & Moxley, Fl. So. Calif. 306 (1923); Johnston, Contr. Gray Herb. n. s. lxxviii. 56-57 (1923).

Lappula § *Eremocaryum* Post & Kuntze, Lexicon 316 (1904).

Greeneocharis Gürke & Harms in E. & P. Nat. Pflanzenf., Gesamtreg. 462 (1899); Rydb. Fl. Rocky Mts. 718 (1917).

Wheelerella Grant, Bull. So. Calif. Acad. Sci. v. 28 (1906).

Johnstonella Brand in Fedde, Repert. in press.

ARTIFICIAL KEY TO SPECIES.

Nutlets with margins decidedly winged or knife-like.

Pedicels usually evident, slender, 1-4 mm. long.

Nutlets homomorphous.....1. *C. holoptera*.

Nutlets decidedly heteromorphous.....2. *C. racemosa*.

Pedicels obscure or none, less than 1 mm. long.

Nutlets heteromorphous, the odd nutlet abaxial.

Fruiting calyx ca. 2 mm. long; nutlets 0.6-0.7 mm. long...3. *C. angelica*.

Fruiting calyx 2.5-3 mm. long; nutlets ca. 1.7 mm. long.. 4. *C. inaequata*.

Nutlets homomorphous or if slightly heteromorphous the odd nutlet axial.

Nutlets lucid, somewhat bent, margin thickish; gynobase narrowly pyramidal.....5. *C. pusilla*.

Nutlets dullish, straight, margin thin; gynobase subulate.

Nutlets very obscurely roughened, decidedly planoconvex in cross-section (the back rounded and the face flat).....6. *C. costata*.

Nutlets tuberculate or muricate, not noticeably planoconvex in cross-section.

Nutlets solitary or rarely 2; calyx obliquely conical at base.....17. *C. utahensis*.

Nutlets 4, calyx symmetrical.

Corolla conspicuous; mature calyx obviously longer than broad.....18. *C. oxygona*.

- Corolla inconspicuous; mature calyx usually almost as broad as long. 19. *C. pterocarya*.
- Nutlets with margins rounded or angled, never with marginal wing or knife-like edge.
- Nutlets all smooth.
- Hairs on calyx uncinuate or decidedly arcuate.
- Style reaching $1/2$ - $2/3$ height of nutlet, this with an open areola. 53. *C. rostellata*
- Style reaching less than $1/2$ height of nutlet; groove of nutlet closed.
- Nutlets nearly terete, rostrate; hairs on calyx usually encrusted and pale. 54. *C. flaccida*.
- Nutlets decidedly compressed, acute; hairs on calyx smoothish and less pale. 55. *C. sparsiflora*.
- Hairs on calyx straight.
- Nutlet with excentric groove.
- Nutlets 1; flowers axillary, not biserial. 57. *C. glomeriflora*.
- Nutlets 4; flowers in biserial naked spikes. 56. *C. affinis*.
- Nutlet with a centrally placed groove.
- Spikes bracteate.
- Style reaching or a little surpassing the nutlet-tips; nutlets ovate, groove usually simple or nearly so. 46. *C. leiocarpa*.
- Style reaching $2/3$ - $3/4$ height of nutlets; nutlets oblong-ovate to lanceolate, groove usually broad-forked.
- Stems reddish; nutlets 1, axial. 16. *C. maritima*.
- Stems green; nutlets 1-4, abaxial when solitary.
- Corolla less than 1 mm. broad; diffuse prostrate plants. 51. *C. Brandegei*.
- Corolla 1.5-2 mm. broad; sparsely branched erect plants. 52. *C. Abramsii*.
- Spikes naked or with a few bracts at base.
- Nutlets broadly ovate.
- Corolla conspicuous, 4-7 mm. broad; spikes commonly ternate. 36. *C. Hendersoni*.
- Corolla inconspicuous, 1-2 mm. broad; spikes usually solitary or geminate.
- Spikes usually geminate; inflorescence projected above the leafy mass of plant, well defined. 38. *C. Torreyana*.
- Spikes usually solitary, not sharply differentiated from the leafy peduncular stems.
- Nutlets homomorphous; Montana and Colorado westward. 40. *C. ambigua*.
- Nutlets slightly heteromorphous; Colorado and Wyoming. 20. *C. Pattersoni*.
- Nutlets oblong-ovate to lanceolate.
- Style reaching $1/4$ - $3/4$ height of nutlets, these 1-4.
- Calyx densely appressed hispid-villous, commonly lacking conspicuous spreading bristles; desert interior. 44. *C. gracilis*.
- Calyx sparsely hispid-strigose and evidently spreading-hirsute; coastal slopes of California.
- Hairs on upper part of calyx-lobes conspicuously retrorse. 49. *C. nemaclada*.

- Hairs on upper part of calyx-lobes spreading or ascending.
 Style reaching to $2/3$ - $3/4$ height of nutlets. 50. *C. Clevelandi*.
 Style reaching to $1/4$ - $1/2$ height of nutlets. 48. *C. microstachys*.
- Style almost reaching the nutlet-tips or surpassing them.
 Margin of nutlets acute, at least above the middle.
 Corolla conspicuous; style clearly surpassing nutlets, these 2-2.5 mm. long. 42. *C. mohavensis*.
 Corolla inconspicuous; style reaching to the nutlet-tips or a trifle surpassed by them; nutlets 1.2-2 mm. long. 43. *C. Watsoni*.
- Margin of nutlets rounded or obtuse.
 Groove of nutlet opened below into a triangular areola; plants usually with a definite central axis; not Californian. . 45. *C. Fendleri*.
 Groove of nutlet closed throughout; plants irregularly branched; Californian. . 47. *C. hispidissima*.
- Nutlets all rough or at least some of them so.
 Nutlets decidedly heteromorphous.
 Mature calyces strongly appressed to the flattened rachis; decidedly gibbous on axial side, persistent. . . . 14. *C. dumetorum*.
 Mature calyces somewhat spreading, nor at all gibbous.
 Fruiting calyces widely spreading or reflexed, most hirsute on axial side. 13. *C. echinosepala*.
 Fruiting calyces ascending, most hirsute on abaxial side.
 Odd nutlet abaxial, surpassed by style.
 Spikes bracteate throughout; calyx persistent. 7. *C. micrantha*.
 Spikes naked or nearly so; calyx deciduous.
 Pedicels slender, 1-4 mm. long. 2. *C. racemosa*.
 Pedicels stout and obscure, less than 1 mm. long.
 Nutlets 0.6-0.7 mm. long. 3. *C. angelica*.
 Nutlets 1-1.7 mm. long.
 Nutlets 1.3-1.7 mm. long; calyx 2-3 mm. long. 4. *C. inaequata*.
 Nutlets ca. 1 mm. long; calyx 3-4 mm. long. 8. *C. angustifolia*.
- Odd nutlet axial; style surpassed or occasionally reaching to the nutlet-tips.
 Nutlets small 0.7-0.9 mm. long, triangular-ovate. 15. *C. micromeres*.
 Nutlets larger, 1-2.3 mm. long, ovate to lanceolate.
 Odd nutlet smooth and shiny. 16. *C. maritima*.
 Odd nutlet tuberculate or papillate.
 Spikes bracteate. 23. *C. minima*.
 Spikes naked.
 Odd nutlet spinular-muricate; calyx-lobes conspicuously thickened. 24. *C. crassisepala*.
 Odd nutlet more or less granulate; calyx-lobes moderately thickened.
 Nutlets ovate, smoothish or sparsely tuberculate, odd one ca. 1.9 mm. long. 20. *C. Pattersoni*.

Gold Hill, 1891, *Jones* (UC); without locality, 1875, *Ward 1231* (G). NEVADA: Palmetto Range, *Purpus 5921* (UC); near Reno, 1894, *Hillman* (UC); Candelaria, *Shockley* (UC); Mesia west of Goldfield, 1860 m. alt., *Heller 10970* (G). ARIZONA: Ash Fork, *Rusby 747* (UC); Grand Canyon, 2100 m. alt., *Mac Dougal 184* (G, UC); Grand Canyon, *Macbride & Payson 947* (G); El Tovar, Grand Canyon, 1907, *Setchell* (UC). CALIFORNIA: near Bonanza King Mine, Providence Mts., *Munz, Johnston & Harwood 4222* (UC); Barnwell, *K. Brandegee* (UC); Silver Canyon near Laws, *K. Brandegee* (UC).

This is a very distinct species and is scarcely to be confused with any other once its characters are understood. The calyx is notably conical at the base, densely covered with short appressed hairs, and apparently lacking pungent hairs on the lobes. One nutlet commonly develops; this is obscurely if at all angled on the edges; and evidently surpasses the style. Occasionally two or even three nutlets are matured, and then they appear to be unequal in length and development. The normal and fully developed nutlet is always near the axial calyx-lobe.

Ser. XII. RAMULOSISSIMAE. Nutlets 4, smooth, lanceolate, laterally rounded or obscurely angled, practically homomorphous but with the axial one minutely and obscurely though definitely larger than the others and always present when for any reason less than the normal number develop; style reaching the tips of the nutlets or barely surpassed by them.

45. **C. Fendleri** (Gray) Greene. Herb 1–5 dm. high, usually with a definite straight erect axis (commonly simple below but producing numerous ascending laterals above), more or less densely hispid and frequently appressedly so; leaves narrowly oblanceolate, acute, 2–5 cm. long, 2–4 mm. broad, appressed-hispid, frequently pustulate beneath; spikes solitary or geminate, 2–12 cm. long, sparsely if at all bracteate, loosely flowered; corolla inconspicuous, ca. 1 mm. broad; fruiting calyces ovate-oblong, 4–5(–7) mm. long, ascending, slightly asymmetrical, obscurely biserial; pedicels ca. 0.5 mm. long; mature calyx-lobes linear to lance-linear, usually loosely connivent with the tips somewhat spreading, midrib thickened and hirsute, margins strigose; nutlets homomorphous, 4 (exceptionally with 1–3 aborted, but then the axial nutlet always present), smooth, somewhat shiny, lanceolate, acuminate, 1.5–2 mm. long, back convex, sides rounded or obscurely obtuse, groove closed or nearly so but at base opening into a definite deltoid areola; gynobase subulate, twice length of style, at least $\frac{2}{3}$ height of nutlets; style equalling or barely surpassing the nutlets.—*Pittonia* i. 120 (1887). *Krynitzkia Fendleri* Gray, Proc. Am. Acad. xx. 268 (1885). *Eritrichium hispidum*, var. *leiocarpum*

Kuntze, Rev. Gen. ii. 437 (1891). *C. ramulosissima* Nels. Erythea vii. 68 (1899). *C. wyomingensis* Gandoger, Bull. Soc. Bot. France lxxv. 62 (1918).

Southern Alberta and Saskatchewan to eastern Nebraska, northern New Mexico and Arizona; also in eastern Washington and western Nevada.

ALBERTA: Hand Hills, *Macoun 165* (G). SASKATCHEWAN: Crane Lake, *Macoun 5804* (G). WYOMING: sandy dry bottom lands, Dunn's Ranch, *Nelson 7611* (G); sandy plains, Laramie, *Nelson 6886* and *7670* (G); Laramie, *Nelson 5275* (G, UC, ISOTYPES of *C. ramulosissima*); Pine Bluff, *Nelson 3510* (G); Sherman 1878, *Phillips & Sargent* (G); Cummins, *Nelson 1523* (G, UC, ISOTYPE of *C. wyomingensis*). NEBRASKA: sandy prairie, Dismal River south of Thedford, *Rydberg 1429* (G). COLORADO: dry places in Clear Creek Canyon, Georgetown, *Patterson 112* (G, UC); common on plains, Denver, *Eastwood 50* (G, UC); Denver, 1872, *Porter* (G); Rocky Mts., lat. 40°-41°, 1868, *Vasey 434a* (G); Rocky Mts., lat. 39°-41°, 1862, *Hall & Harbour 434* in pt. (G); Colorado Springs, 1873, *Greene* (G, UC); Sierra Mojado, 1877, *Brandegge* (UC); Fort Garland, 1867, *Parry* (G); Salida, *Osterhout 3425* (G); Gunnison, *Baker 780* (G). NEW MEXICO: between Santa Fe and Canoncito, 2190 m. alt., *Heller 3786* (G); without locality, 1847, *Fendler* (G, TYPE of *K. Fendleri*). UTAH: Montezuma Canyon, east of Monticello, *Rydberg & Garrett 9681* (G); sandy soil, La Sal Mts., *Purpus 6610* (UC); below Thurber, *Jones 5648* (UC). ARIZONA: Cosnino, *Rusby 750* (G); openings in yellow-pine forest, east base of San Francisco Mts., 2190 m. alt., 1920, *Hall* (G); Flagstaff, 1894, *Toumey* (UC); San Francisco Mts., 1884, *Lemmon* (UC); sand dunes, Navaho Reservation, *Vorhies 124* (G, UC). WASHINGTON: drifting sand, Pasco, *Piper 2951* (G); without locality, *Henderson 2562* (G). NEVADA: Palisade, *Brandegge* (G).

Cryptantha Fendleri is the most easterly ranging of the smooth-fruited series of *Cryptantha*. In its common typical form the erect habit and paniculate branching are very characteristic, and as a general thing the species has been well understood. A diffusely branched form from southern Wyoming has been described as *C. ramulosissima*. In floral and fruiting structures this form is quite indistinguishable from typical *C. Fendleri*. Similar material has been collected in eastern Washington. The range of *C. Fendleri* seems somewhat discontinuous. Its roots are frequently charged with a purple dye. The three extra-Californian species with narrow, smooth and more or less shiny nutlets may be distinguished as follows,—

- Calyx broadly conical at base, densely appressed hispid-villous, lacking conspicuous bristles; nutlets 1; style 2/3-3/4 height of nutlets.....*C. gracilis*.
 Calyx rounded at base, hispid or hirsute, inconspicuously strigose along margins; nutlets 4; style about equalling nutlets.
 Nutlets evidently angled at the margin; groove closed throughout; leaves obtuse or rounded; plant without a straight vertical axis.....*C. Watsoni*.

Nutlets with margins rounded or somewhat obtusish, groove opened at base to form an areola; leaves acute; plant usually with a stiffly erect straight axis.....*C. Fendleri*.

Ser. XIII. LEIOCARPAE. Nutlets 1-4, smooth, ovate or somewhat lanceolate, laterally rounded or obtuse, homomorphous with the abaxial one always developing; style reaching to $\frac{1}{4}$ height of nutlets or barely surpassing them; calyx-lobes hirsute with straight hairs.

Style reaching to the tips of the nutlets or barely surpassing them.

Nutlets ovate with a subsimple groove; spikes decidedly bracteate.....46. *C. leiocarpa*.

Nutlets ovate-oblong, usually with a forked groove; spikes naked.....47. *C. hispidissima*.

Style reaching to $\frac{1}{4}$ - $\frac{3}{4}$ height of nutlets.

Style reaching to $\frac{1}{4}$ - $\frac{1}{2}$ height of nutlets.....48. *C. microstachys*.

Style reaching to $\frac{2}{3}$ - $\frac{3}{4}$ height of nutlets.

Hairs on upper part of calyx-lobes conspicuously retrorse.
49. *C. nemaclada*.

Hairs on calyx spreading or ascending.

Spikes naked.....50. *C. Clevelandi*.

Spikes bracted.

Corolla less than 1 mm. broad; diffuse prostrate plants.....51. *C. Brandegei*.

Corolla 1.5-2 mm. broad; sparsely branched erect plants.....52. *C. Abramsii*.

46. **C. leiocarpa** (F. & M.) Greene. Laxly branched usually decumbent or prostrate herb; branches usually long and numerous, hispid-strigose or frequently loosely appressed-hispid, becoming 1-4 dm. long; leaves oblance-linear to oblanceolate, strigose-hispid and often sparsely hispid, occasionally pustulate, obtuse or rounded or rarely emarginate, 1-2.5(-4) cm. long, 1-4(-9) mm. broad; spikes solitary or geminate or rarely ternate, becoming 6 cm. long but usually shorter, conspicuously leafy-bracted, not at all sharply differentiated from the mass of the plant; corolla usually inconspicuous, limb 1-2.5(-3.5) mm. broad; fruiting calyces ovate to oblong-ovate, 2-3 mm. long, usually ascending, tardily deciduous, subsessile, usually crowded or becoming loose below, subsymmetrical; mature calyx-lobes lance-linear, loosely connivent above, midrib somewhat thickened and usually decidedly tawny-hirsute, margins strigose; nutlets 4 or very rarely fewer by abortion, oblong-ovate to ovate, 1.6-2 mm. long, smooth, polished or minutely granulate and dull, back convex, margins obtuse, face convexo-obtuse, groove closed and very shortly forked at base if at all; gynobase subulate, $\frac{2}{3}$ - $\frac{3}{4}$ height of nutlets; style equalling or slightly surpassing the tips of the nutlets.—*Pittonia* i. 117 (1887). *Echino-*

spermum leiocarpum F. & M. Ind. Sem. Hort. Petrop. ii. 36 (1835). *Krynitzkia leiocarpa* F. & M. l. c. vii. 52 (1841). *Eritrichium leiocarpum* Wats. Bot. King Exped. 244 (1871).

Along the ocean beach from southern (Curry County) Oregon to (Santa Barbara County) Southern California.

OREGON: beach, Gold Beach, *Peck 8691* (G); beach near Harbor, *Peck 8755* (G); Chetco, *Howell 222* (G). CALIFORNIA: sand dunes of ocean beach, Humboldt Bay, *Tracy 2457* (G, UC); Bodega Point, *Eastwood 4815* (G); Bodega Bay, *Heller 5615* (G); Point Reyes, 1886, *Curran* (UC); San Francisco, 1895, *Davy* (UC); Golden Gate Park, San Francisco, 1881, *Jones* (UC); Lake Merced, 1901, *Jones* (UC); Presidio, San Francisco, 1894, *Eastwood* (UC); Monterey, 1883, *Parry* (G); Point Pinos, *K. Brandegee* (UC); Morro, *Barber* (UC); Casmilla Station, *K. Brandegee* (UC); Antonio Station, *K. Brandegee* (UC); Surf, 1909, *K. Brandegee* (G); Surf, 1909, *K. Brandegee a, b, c* (UC).

This is a very well marked coastal species, but has been greatly misinterpreted in the past and at various times made to include nearly all the smooth-fruited species of the genus. Study of material in the Gray Herbarium which was raised from authentic seeds received from St. Petersburg, Hamburg and Geneva, shows clearly that the name should be applied to the sea-shore plant of middle and northern California which has bracteate spikes, long styles, and small ovate smooth nutlets with a simple or barely forked groove. Occasionally it grows with *C. hispidissima* and has been confused with that species, although it is readily separable from it by its bracteate spikes, shorter ovate nutlets, simple or barely forked groove, and commonly smaller corollas. The leaves are usually 1-3 mm. broad, but in some peculiar forms from Surf, Santa Barbara County, California, which apparently grew with the common form, the leaves are broadly oblong, retuse and nearly 10 mm. broad.

47. **C. hispidissima** Greene. Erect and ascendingly branched or loosely branched and somewhat decumbent, 1.5-5 dm. high; stems hirsute or somewhat appressed-hispid; leaves oblance-linear to linear-lanceolate, ascending, 1.5-5.5 cm. long, 1.5-4 mm. wide, obtuse or acute, appressed or frequently spreading-hispid, occasionally hirsute-ciliate; spikes ternate or geminate or rarely quadrate, dense or remotely flowered, bractless or occasionally with 1-2 bracts near base, 1-8(-15) cm. long; corolla more or less conspicuous or occasionally inconspicuous, 1-5 mm. broad; fruiting calyx ovate-oblong, usually spreading, 2-5 mm. long, slightly asymmetrical, base broad, sessile; mature calyx-lobes lance-linear or almost lanceolate, connivent above with the tips somewhat spreading, margins strigose, midrib thickened and decidedly hirsute; nutlets 4, homomorphous, ovate-lanceolate,

1.5–2 mm. long, smooth or very finely granulate, usually shiny, back convex, sides obtusish, groove simple or forked at very base; gynobase elongata, ca. $\frac{2}{3}$ height of nutlets; style reaching to nutlet-tips or definitely surpassing them.—*Pittonia* i. 118 (1887). *C. leiocarpa*, var. *hispidissima* Macbr. Contr. Gray Herb. n. s. xlviii. 43 (1916).

West of and in the Coast Ranges of California, from San Francisco to Point Conception and doubtfully to near Los Angeles.

CALIFORNIA: San Francisco, 1888, *Greene* (G); grassy slopes, Lake Merced, 30 m. alt., *Tracy 1809* (G); Siersville, *Mann* (G); in sand, Gigling Station east of Del Monte, *Heller 6711* (G); Del Monte, *Elmer 3561* (G, UC); Cypress Point, Monterey, *Eastwood 86* (G); Seaside, Monterey, *Eastwood 161* (G); Monterey, 1900, *Eastwood* (G); sand hills beyond Castroville, *Heller 8493* (G); Point Pinos, *K. Brandegee* (UC); Pacific Grove, *Davy 7491* (UC); Gigling Station, 1908, *K. Brandegee* (UC); San Lucia Mts., *Summers 898* (UC); San Lucia Mts., *Summers 589* (UC); Hathaway Hill, 1888, *Summers*, (UC); Salinas River, 1885, *Curran* (G); Lemmon Ranch, Cholame, 1887, *Lemmon 4606* (G); Cholame, 1887, *Lemmon 4613* (G); Lemmon Ranch, 1887, *Lemmon 4559* (G); Casmilla Station, *K. Brandegee* (UC); Surf, 1909, *K. Brandegee d* (UC); Redondo, 1903, *Grant 5500* (UC).

Obviously related to *C. Clevelandi*, var. *florosa* and perhaps not to be kept specifically distinct, although differing in general range and length of style.

48. ***C. microstachys*** Greene. Erect slender herb 1–5 dm. high; stems commonly with numerous ascending simple or rebranched laterals, hirsute or rarely more or less strigose; leaves linear, obtuse or rounded, 1–6 mm. long, 1.5–5(–8) mm. broad, broadly sessile or the lower ones with a contracted base, hispid or hirsute, rarely somewhat strigose or pustulate; spikes slender, solitary or geminate, naked, 2–8 cm. long, frequently somewhat crowded towards the end of the stem and apparently paniculate; corolla inconspicuous, usually 0.4–1 mm. or rarely even 2.5 mm. broad; fruiting calyces ovate or oblong-ovate, 1.5–3 mm. but commonly 1.5–2 mm. long, sessile, strict or ascending, asymmetrical with the abaxial lobe the longest and most hirsute; mature calyx-lobes linear or linear-lanceolate, connivent above with the tips somewhat spreading, usually united below to form a short siliceous tube, midrib slightly thickened and divaricately short-hirsute, margins ciliate; ovules 4; nutlets 1 or rarely 2, next the abaxial calyx-lobe, acute-ovate to lanceolate, 1.5 mm. long, smooth and shiny, back and sides rounded, groove closed and simple or forked at very base; gynobase very short, $\frac{1}{4}$ or less height of nutlet; style about as long as gynobase and commonly attaining about $\frac{1}{2}$ height of nutlet or when two nutlets develop reaching to beyond their middle.—*Pittonia* i. 116 (1887). *Krynitzkia microstachys* Greene in Gray, Proc. Am. Acad. xx. 269 (1885).

Coast Ranges of middle California and the coastal drainage of Southern California.

CALIFORNIA: gravelly slope east of Alder Springs, Glenn Co., *Heller 11444* (G); Colusa County, 1884, *Curran* (G); Wildcat Canyon, *Davy 7046* (UC); Mt. Diablo, 1886, *Greene* (UC); shelving gravelly slope, Mitchell Canyon, Mt. Diablo, *Baker 2810* (G); Salinas road near Del Monte, *Heller 6698* (G); Lewis Creek, 1893, *Eastwood* (UC); Estrella, *Jared* (UC); San Luis Obispo and Monterey counties, 1899, *Jared 2* (G); Santa Barbara, *Elmer 3797* (G); Painted Cave Ranch, *Eastwood 67a* (G, UC); Santa Inez Mts., 1888, *Brandegee* (UC); Fort Tejon, *Xantus 84* (G, TYPE); Tehachapi, 1889, *Brandegee* (G); at roadside, Topango Canyon, *Crawford & Hiatt 995* (G); Topango, 1898, *Barber* (UC); Eagle Rock Canyon, *Grant 241* (UC); Los Angeles, 1884, *Nevin 57b* and *57c* (G); Pasadena, *Grant 239* (UC); San Gabriel Canyon, *Eastwood 8936* (G); Evey Canyon, 900 m. alt., *Johnston 2019* (G); San Antonio Canyon, *Baker 3698* (G); hills near Claremont, *Baker 4779* and *4780* (G); Arrowhead Hot Springs, 480 m. alt., *Spencer 1305* (G); San Bernardino, *Parish 3645* (G, UC); desert slope of San Jacinto Mts., 1020 m. alt., *Jaeger 1873* (G); burn in chaparral, 8 km. northeast of Murietta, 450 m. alt., *Munz & Johnston 5346* (UC); Linda Vista, *Macbride & Payson 797a* (G); Potrero, *Orcutt 1277* (G); San Diego, 1882, *Pringle* (G); Mission Hills, San Diego, *Abrams 3415* (G).

This species is very closely related to *C. Clevelandi* from which it differs in its coarser habit, shorter style, and usually fewer nutlets. The forms most suggestive of that species come from Southern California and have more or less closely appressed pubescence and calyces becoming 2–3 mm. long. These forms are few, however, most specimens being conspicuously bristly and having calyces only 1.5–2 mm. long.

49. ***C. nemaclada*** Greene. Slender much-branched erect herb 1–3 dm. tall, minutely and sparsely strigose, finely hispid; leaves linear, rather few, 1–3 mm. long, 1–2 mm. broad, obtuse, somewhat appressed, finely hispid, very minutely pustulate; spikes solitary or geminate, slender, naked, becoming loosely flowered, 2–9 cm. long; corolla inconspicuous, less than 1 mm. broad; fruiting calyx oblong-ovate, strictly ascending, 2–4 mm. long, deciduous, obscurely biserial, subsessile by an obliquely conic base; mature calyx-lobes linear, connivent above with the slender tips spreading, midrib thickened and more or less abundantly hirsute but near the tip retrorsely setulose, margins sparsely strigose; ovules 4; nutlets 1–4, lanceolate to ovate-lanceolate, smooth, 1.7–2 mm. long, back convex, sides obtuse, the one next the abaxial calyx-lobe always developing, groove opened or closed but usually open at the broad forking; gynobase slender, about $\frac{1}{2}$ the length of the nutlets; style reaching to about $\frac{3}{4}$ the height of the nutlets.—*Pittonia* i. 118 (1887).

Coast Ranges of California from Tehachapi to Colusa County; rare.

CALIFORNIA: Keene Station, Tehachapi, 1905, *K. Brandegee* (UC); Paso Robles, *K. Brandegee* (UC); Alcalde, 1892, *Brandegee* (UC); Colusa County, 1884, *Curran* (UC, part of TYPE).

The plant is obviously related to *C. Clevelandi* and *C. hispidissima*, and further study may justify the reduction of it to one of the species named. Its outstanding feature is the possession of small stout retrorse hairs on the upper part of the calyx-lobes. The type came from Colusa County in the North Coast Range.

50. **C. Clevelandi** Greene. Usually erect freely branched herb 1–5 dm. tall; stems with long branches, strigose or hirsute; leaves linear to linear-lanceolate, usually acutish, 1–4(–6) cm. long, 1–4 mm broad, hirsute or occasionally strigose, spreading; spikes solitary or geminate or ternate, 4–10 cm. long, naked, slender, usually remotely flowered; corolla inconspicuous or conspicuous, 1–5 mm. broad; fruiting calyces ovate-oblong or nearly ovate, 2–5 mm. long, strict, asymmetrical, deciduous, sessile by an obliquely conical base; mature calyx-lobes linear or lance-linear, usually decidedly connivent with tips somewhat spreading, midrib thickened and decidedly hirsute, margins densely hispid-ciliate; nutlets 1–4, ovate-oblong to broadly lanceolate, 1.5–2(–2.5) mm. long, smooth, usually very finely granulate, back convex, sides obtuse or rounded, axial nutlet always developing; groove closed, broadly forked at base or rarely with a small areola; gynobase elongate, $\frac{1}{2}$ – $\frac{2}{3}$ as high as the nutlets; style reaching to $\frac{2}{3}$ – $\frac{4}{5}$ height of nutlets.—*Pittonia* i. 117 (1887).

Var. **genuina**. Corolla inconspicuous, ca. 1 mm. broad; leaves 1–2(–3) mm. broad; spikes solitary or geminate, not sharply differentiated from leafy mass of plant; nutlets 1–2.—*C. Clevelandi* Greene, l. c.

West of the mountains from the vicinity of Los Angeles southward to northern Lower California.

CALIFORNIA: shaded hillsides, San Jose Hills west of Pomona, 300 m. alt., *Munz & Harwood 3299* (UC); Chollas, 1884, *Orcutt* (UC); San Diego, 1898, *Purpus* (UC); San Diego, 1884, *Brandegee* (UC); San Diego, 1906, *K. Brandegee* (UC); San Diego, 1885, *Greene* (UC, ISOTYPE); Point Loma, 1895, *Brandegee* (UC); Point Loma, 1906, *K. Brandegee* (UC). LOWER CALIFORNIA: Todos Santos Island, 1897, *Brandegee* (UC); All Saints Bay, 1885, *Greene* (UC); Cariso Creek, 1893, *Brandegee* (UC); Vallederos, 1893, *Brandegee* (UC).

Var. **florosa**, var. nov., a varietate genuina differt corolla conspicua 2–5 mm. lata, foliis 1–4 mm. latis, spicis saepe ternatis et supra folia projectis, nuculis 1–4.—*C. Rattani* Greene, *Pittonia* i. 160 (1887).

In and west of the Coast Ranges of California from San Luis Obispo to San Diego, and infrequent northward to Lake County.

CALIFORNIA: ridges west of Leesville, Lake Co., *Heller 13124* (G); rocky slopes, Knoxville, *Baker 2966* (G); above San Antonio, *without collector* (UC); foot of Jolon Grade, *K. Brandegee* (UC); San Lucia Mts., *Summers* (UC); San Lucia Mts., *Summers 598 and 899* (UC); Reservoir, Hathaway Hill, 1884, *Summers* (UC); San Luis Obispo, 1905, *Roadhouse 54* (UC); San Luis Obispo, 1911, *Condit* (UC); Chorro Station near San Luis Obispo, *K. Brandegee* (UC); steep hills near Lompoc, *Suksdorf 220 and 7757* (G); Gaviota, *K. Brandegee* (UC); near Frazier Borax Mine, Mt. Pinos, *Abrams & McGregor 211* (G); Sisquoc, *Baker 22* (UC); Tehachapi, *K. Brandegee* (UC); Painted Cave Ranch, *Eastwood 31* (UC); San Miguel Island, 1886, *Greene* (UC); Santa Cruz Island, 1908, *Niedenmuller* (UC); Santa Cruz Island, 1888, *Brandegee* (UC); Santa Barbara, *Elmer 3936* (G); Santa Barbara, *Brewer 278* (UC); Santa Inez Mts., 1888, *Brandegee* (UC); Saugus, 1901, *Davy* (UC); South Beach, 1898, *Barber* (UC); Santa Monica Canyon, *Barber 116* (UC); Playa del Rey, *Hall 3780* (G, UC); San Pedro, 1889, *K. Brandegee* (UC); Santa Catalina Island, 1889, *Brandegee* (UC); grassy hillsides, Turnbull Canyon, Puente Hills, *Johnston 1935* (G); shaded hillside, Laguna, *Munz 2214* (G); roadside, Linda Vista, *Macbride & Payson 797* (G, TYPE); San Diego, 1906, *K. Brandegee* (UC).

This species includes almost all the material from South California passing as *C. leiocarpa*. It is related on one hand to *C. hispidissima* and on the other to *C. microstachys*, apparently intergrading with both. In having a very short style, elongate nutlets and bractless spikes, it differs from *C. leiocarpa*. Doubtfully included in the species are several collections from the North Coast Ranges.

51. **C. Brandegei** Johnston. Much branched decumbent or prostrate herb; stems numerous, slender, hispid-strigose, 1–4 dm. long; leaves oblong-lanceolate or lanceolate, spreading, 5–15 mm. long, 2–3(–4) mm. broad, obtuse or acute, hispid-strigose and often sparsely hispid, minutely pustulate; spikes solitary or occasionally geminate, 2–8 cm. long, dense or loose and elongate, slender, more or less evidently leafy-bracted; corolla inconspicuous, less than 1 mm. broad; fruiting calyx ovate-oblong, 2–4 mm. long, strictly ascending, asymmetrical, becoming obscurely biserial, sessile; mature calyx-lobes lance-linear, usually connivent above with the tips spreading, midrib thickened and hirsute, margins strigose; nutlets 1–4, ovate-lanceolate, 1.5–2 mm. long, smooth or very minutely granulate, usually shiny, back convex, sides rounded, face flattened, groove closed with a well developed basal fork; gynobase subulate, about $\frac{1}{2}$ – $\frac{2}{3}$ height of nutlets; style reaching to $\frac{2}{3}$ – $\frac{4}{5}$ height of nutlets.—*Contr. Gray Herb.* n. s. lxxviii. 53 (1923)

Known only from Santa Rosa off the coast of California.

CALIFORNIA: Santa Rosa Island, 1888, *Brandegee* (G, TYPE; UC, ISOTYPE).

In habit much suggesting *C. leiocarpa* but differing in its more elongate nutlets, widely forked groove, short style and more southern insular range. It is much more closely related to, and perhaps it is

only a phase of, *C. Clevelandi* with which it agrees in nutlets although differing in its longer style and bracteate inflorescence. *Cryptantha Clevelandi*, var. *florosa* occurs on Santa Cruz and San Miguel islands which are adjacent to Santa Rosa Island.

52. **C. Abramsii** Johnston. Erectly and sparsely branched herb 1-3 dm. high; stem slender, finely strigose; leaves linear, rather numerous, 1-3 cm. long, 1-1.5 mm. broad, acutish, hispid-strigose, usually sparsely hirsute-ciliate towards the base; spikes solitary or rarely geminate, 2-10 cm. long, evidently leafy-bracted; corolla evident, 1.5-2.5 mm. broad; fruiting calyx ovate, strict, 2.5-4 mm. long, asymmetrical, becoming distant and obscurely biserial, sessile by an oblique broadly conic base; mature calyx-lobes lance-linear, loosely connivent, midrib somewhat thickened and on abaxial lobe sparsely and very shortly hirsute, margins strigose; nutlets 1-4, lanceolate, acuminate, ca. 2 mm. long, smooth, shiny, back convex, sides obscurely obtuse, groove closed and broadly forked at very base of nutlet; gynobase narrow, about $\frac{2}{3}$ height of nutlets; style reaching to $\frac{3}{4}$ - $\frac{4}{5}$ height of nutlets.—Contr. Gray Herb. n. s. lxxviii. 52 (1923).

Southern California, known only from the type locality.

CALIFORNIA: San Pedro Hills near Malaga Cove, *Abrams 3139* (G, TYPE; UC, ISOTYPE).

Although suggesting *C. leiocarpa* in its bracteate inflorescence, this species differs in its shorter style and elongate nutlets with a broad decidedly basal forking of the groove. It is most related to *C. Clevelandi*, var. *florosa* and possibly is only a bracteate phase of it.

Ser. XIV. FLACCIDAE. Nutlet 1, smooth, somewhat ovate, laterally rounded or obscurely angled, always abaxial; style reaching to $\frac{1}{4}$ - $\frac{2}{3}$ height of nutlet; calyx-lobes armed with pallid encrusted arcuate or uncinat hairs.

Style reaching to $\frac{1}{2}$ - $\frac{2}{3}$ height of nutlet; nutlet with an open areola; rather coarse plants.....53. *C. rostellata*.
Style reaching to less than $\frac{1}{2}$ height of nutlet; nutlet with a

closed groove; more slender plants.
Nutlets nearly terete, rostrate; hairs on calyx usually decidedly encrusted and pale.....54. *C. flaccida*.
Nutlets evidently compressed, acute; hairs on calyx rather smooth and less pale.....55. *C. sparsiflora*.

53. **C. rostellata** Greene. Stems stiffish, usually somewhat reddish, 1-2 dm. high, with few ascending branches above, strigose, canescent; leaves few, notably persistent and opposite, thickish, firm, oblanceolate, 10-15 mm. long, 2-3 mm. broad, ascending; spikes