

mature calyx-lobes lance-linear, stiff, connivent, midrib of three abaxial lobes thickened and hirsute, margins appressed short hispid-villous or loosely villous; ovules 2 or 4; nutlets 1-4, heteromorphous; odd nutlet frequently alone developing, smooth, shiny, brownish, oblong-lanceolate, 1-2 mm. long, firmly affixed, next the axial calyx-lobe, groove narrow or closed throughout or opening below into a small areola; consimilar nutlets grayish, minutely tuberculate, readily deciduous, slightly smaller but otherwise like odd nutlet; gynobase subulate, $\frac{1}{2}$ - $\frac{2}{3}$ length of nutlet; style about equalling the height of consimilar nutlets.—*Pittonia* i. 117 (1887).

Var. genuina. Ovules 2; nutlets 1 or 2; calyx not conspicuously pilose.—*Krynitzkia maritima* Greene, Bull. Calif. Acad. Sci. i. 204 (Aug. 1885). *C. maritima* Greene, *Pittonia* l. c.; Munz & Johnston, Bull. Torr. Bot. Cl. xlix. 38 (1922). *K. ramosissima* of Greene, Bull. Calif. Acad. Sci. i. 203 (Aug. 1885); not *K. ramosissima* Gray (Jan. 1885). *C. ramosissima* of most recent authors.

Nevada to Lower California.

CALIFORNIA: Mohave Desert, 1884, *Curran* (G); dry sand hills near Barstow, 700 m. alt., *Spencer 1950* (G); Maillard Canyon near Barstow, 700 m. alt., *Spencer 2088* (G); gravelly hillsides 17.6 km. west of Needles, 210 m. alt., *Munz & Harwood 3611* (UC); Needles, *Jones 3824* (G); desert sand, mouth of Tahquitz Canyon, 180 m. alt., *Spencer 1523* (G); sandy places near Palm Springs, 120 m. alt., *Spencer 1528, 2067, 2068* and *2071a* (G); rocks near Indian Wells, 8 m. alt., *Spencer 1520* (G); sandy places, Schaffer's Canyon near Mecca, 48 m. below sea-level, *Spencer 2069* (G) and *Munz & Keck 4755* (G); Signal Mt., *Abrams 3177* (G); Mason's, Colorado Desert, 1899, *Brandegee* (UC); in sand, Colorado Desert, *Spencer 195a* and *198* (G); Colorado Desert, 1890, *Wright* (UC); Point Loma, 1884, *Orcutt* (G, UC); windswept arroyos, San Nicolas Island, *Trask 56* and *57* (G); Santa Barbara Island, *Trask* (UC); Catalina Island, 1884, *Lyon* (G); Catalina Island, 1890, *Brandegee* (UC). LOWER CALIFORNIA: northern Lower California, *Orcutt 2257* (UC); Lagoon Head, *Palmer 781* (G, UC); Guadalupe Island, *Palmer 879* (G), *Anthony 241* (G, UC), *Palmer 67* (G), *Greene* in 1885 (G, UC, ISOTYPES of *K. maritima*), *Anthony* in 1896 (UC), *Brandegee* in 1897 (UC); San Benito Island, *Palmer 912* (G), *Pond 21* (G), *Anthony 276* (UC), *Brandegee* in 1897 (UC); Natividad Island, 1897, *Brandegee* (UC); Santa Margarita Island, 1889, *Brandegee* (UC).

Var. cedrosensis (Greene), comb. nov. Ovules 4; nutlets 1-4; otherwise as in preceding variety.—*Krynitzkia cedrosensis* Greene, Bull. Calif. Acad. Sci. i. 204 (1885). *C. cedrosensis* Greene *Pittonia* i. 117 (1887); *Brandg. Bot. Gaz.* xxvii. 454 (1899).

Endemic to Cedros Island.

LOWER CALIFORNIA: Cedros Island, *Palmer 691* (G), *Greene* in 1885 (G, UC, ISOTYPES), *Veitch* (G), *Anthony 289* (G, UC).

Var. pilosa Johnston. Ovules 2; nutlets 1 or 2; calyx conspicu-

ously clothed with long white villous pubescence.—Univ. Calif. Pub. Bot. vii. 445 (1922).

Nevada to Lower California, occurring with var. *genuina* but less common.

NEVADA: Logan, 1909, *Kennedy* (UC). CALIFORNIA: Death Valley, *Coville & Funston 480* (G); Furnace Creek, *Parish 10005* and *10050* (UC); Calico, *Parish 9798* (UC); Inyo County, *Rixford* (UC); Kane Springs, Ord Mts., *Hall & Chandler 6807* (UC); Needles, 1884, *Lemmon* (UC); Signal Mt., 1901, *Brandegee* (UC). ARIZONA: Tempe, 1892, *Ganong & Blaschka* (G). LOWER CALIFORNIA: stony ridges, Los Angeles Bay, *Palmer 551* (UC, TYPE; G, ISOTYPE); Santa Agueda, *Palmer 2142* (UC).

A well defined and common species in the Californian deserts and on the coastal islands. The usual form is readily recognized by being biovulate and having reddish strigose stems. It has generally gone as *C. ramosissima* but that name being based on a renaming of *C. racemosa* properly falls into synonymy.

Ser. V. PTEROCARYAE. Nutlets 1-4, tuberculate or papillate or verrucose, lanceolate, with knife-like or conspicuously winged sides, homomorphous or frequently heteromorphous and with the odd nutlet (sometimes alone developing) axial and usually lacking a thin margin; style reaching to tip of nutlet-body or definitely beyond.

Nutlets solitary or rarely 2, usually with a knife-like margin;

calyx obliquely conical at base.....17. *C. utahensis*.

Nutlets 4; calyx symmetrical.

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

Corolla inconspicuous; mature calyx nearly as broad as long; axial nutlet frequently wingless.....19. *C. pterocarya*.

17. *C. utahensis* (Gray) Greene. Erectly branched herb 1-3 dm. high; stems closely strigose or more or less appressed short-hirsute; leaves not numerous, strongly reduced above, linear to oblance-linear, 1-5(-7) cm long, 1-4 mm. wide, rounded at apex, commonly pustulate and short-hirsute especially beneath; spikes geminate or sometimes solitary, commonly 0.8-2.5(-5) cm. long, dense, naked; corolla evident, 2-3 mm. broad; fruiting calyces ovate or ovate-oblong, 2-3(-4) mm. long, quite asymmetrical, sessile by a broadly conic oblique base, spreading or somewhat recurved, deciduous, usually densely appressed-hirsute and notably silky; mature calyx-lobes lanceolate, strongly connivent, midrib thick and usually brownish and infrequently bearing spreading or recurved hairs; ovules 4; nutlets 1 or rarely 2, next the abaxial calyx-lobe, 1.7-2.5 mm. long, 1-1.5 mm. broad, pale, broadly lanceolate, granulate, muricate-

papillate or rarely spinulose, back low-convex or flat, margins sharp-angled or with a very narrow knife-like margin; groove open, narrow, opening into a small areola below; gynobase subulate, ca. $\frac{2}{3}$ height of nutlet, not markedly differentiated from style; style usually a trifle shorter than the nutlet.—*Pittonia* i. 120 (1887). *Krynitzkia utahensis* Gray, Synop. Fl. N. Am. ii. pt. 1, Suppl. 427 (1886). *Eritrichium holopterum*, var. *submolle* Gray, Proc. Am. Acad. xiii. 374 (1878). *C. submollis* Cov. Contr. U. S. Nat. Herb. iv. 166 (1893).

Southern Utah and western Arizona and westward into the deserts of California.

UTAH: volcanic rocks and ashes, Diamond Valley, *Goodding* 828 (G, UC); St. George, *Palmer* 352 (G, TYPE). ARIZONA: *Yucca*, *Jones* (G); *Yucca*, *Jones* 3910 (UC). NEVADA: *Candelaria*, *Shockley* 347 (G) and 650 (UC); foot of cliffs, Meadow Valley Wash, *Goodding* 2165 in pt. (G); rocky slopes, Mesquite Well, *Goodding* 2252 (G); Rhyolite, 1080 m. alt., *Shockley* 69 (UC); Gold Mt., *Purpus* 5986 (UC). CALIFORNIA: Inyo County, 1891, *Brandegee* (UC); Surprise Canyon, Panamint Mts., 800 m. alt., *Coville & Funston* 714 (G); without locality, *Purpus* 5433 (G); Providence Mts., *Munz, Johnston & Harwood* 4241 (UC); Daggett, 1914, *K. Brandegee* (UC); sandy places near Barstow, *Spencer* 2082 and 2093 (G); in sandy places, Palm Springs, *Spencer* 1526, 2073, 2074, 2075 and 2076 (G); in sandy places, Mission Canyon, 180 m. alt., *Spencer* 1782 (G); Colorado Desert, 1889, *Orcutt* (UC).

A very neat species most readily distinguished by the appressed silky indument on the calyx. It seems to be an ally of *C. pterocarya*. Its rough nutlets at once distinguish it from *C. gracilis* and *C. Watsoni* with which it has been frequently confused.

18. *C. oxygona* (Gray) Greene. Sparsely branched herb 1–4 dm. tall; stems usually solitary with several well-developed ascending branches from near base, appressed villous-hispid or strigose, often sparsely hispid, leaves linear or lance-linear, 1–4(–6) cm. long, 1–2(–3) mm. broad, strigose or short-hispid, ascending, obtusish, densely and inconspicuously pustulate, upper ones evidently reduced; spikes geminate or ternate, usually short and dense, 1–3(–6) cm. long, naked; corolla conspicuous, limb 4–7 mm. broad; fruiting calyces ovate or oblong-ovate, ascending, 2.5–4 mm. long, deciduous, obscurely biserial, symmetrical, base rounded, pedicel ca. 0.5 mm. long; mature calyx-lobes lanceolate, somewhat connivent above, margin more or less silky-strigose, midrib slightly thickened and frequently sparsely hirsute; nutlets 4, homomorphous; body of nutlets oblong-ovate, 2 or rarely 3 mm. long, only slightly shorter than the calyx-lobes, muricate or tuberculate, back low convex; margin of nutlet narrowly winged or knife-like; groove closed or rarely open, broadly forked below where always opened to form a triangular areola; gynobase columnar-

subulate, about $\frac{2}{3}$ height of nutlets; style clearly surpassing the nutlets.—*Pittonia* i. 120 (1887). *Eritrichium oxygonum* Gray, Proc. Am. Acad. xix. 89 (1883). *Krynitzkia oxygona* Gray, Proc. Am. Acad. xx. 277 (1885).

Borders of the San Joaquin Valley and southward along the desert margins to the northern end of the Colorado Desert.

CALIFORNIA: Alcalde, 1892, *Brandegee* (UC); Estrella, 1897, *Jared* (UC); open places in rich ground, McKittrick, *Heller* 7789 (G, UC); northern slope of Tehachapi, 1905, *K. Brandegee* (UC); Tehachapi, *K. Brandegee* (G, UC); hills bordering the Mohave Desert, 1882, *Pringle* (G, TYPE); mountain slopes, San Bernardino Co., 1200 m. alt., *Spencer* 415 (G); without locality, *McLean* (UC); near Minerets, Madera Co., 1899, *Congdon* (UC); hillsides, Erskin Creek, *Purpus* 5369 (G, UC); Deep Spring, *Purpus* 5825a (UC); Coyote Canyon, 150 m. alt., *Hall* 2849 (UC); between San Jacinto and El Toro Mts. at Van Deventer Ranch, 1350 m. alt., *Hall* 1161 (UC). NEVADA: Palmetto Range, *Purpus* 5897 in part (UC).

This species, although having the gross habit of *C. muricata*, is clearly related to *C. pterocarya* and particularly to the variety *cy-cloptera*. In fact, decisive characters for separating the two species appear to be lacking. As a general rule, however, *C. oxygona* differs in having conspicuous corollas, narrower usually more silky calyces, and brownish nutlets rarely if ever with scalloped or lobed wings. It is maintained as a species largely because of its natural range, which, generally speaking, is apart from that of *C. pterocarya*. The most satisfactory character for separating *C. oxygona* from *C. pterocarya* seems to be corolla-size. It is significant, however, that a specimen (*Purpus* 5715a) from the South Fork of the Kern River, occurring within the range of *C. oxygona* and having the characteristic habit, calyx and nutlets of that species, nevertheless has minute corollas. For practical purposes this specimen has been referred to *C. pterocarya*.

19. *C. pterocarya* (Torr.) Greene. Erect ascendingly branched herb 1–5 dm. high, finely strigose or short-hirsute; leaves broadly linear or the reduced, upper ones somewhat lanceolate, 1–2.5(–4) cm. long, 1–3(–5) mm. broad, obtuse, strigose or hispid, coarsely pustulate below but usually finely so above, spikes geminate or rarely ternate or solitary, naked or inconspicuously bracted below, 2–6(–12) cm. long, becoming loosely flowered; corolla inconspicuous, 0.5–1(–2) mm. broad; fruiting calyces becoming notably accrescent, usually broadly ovate, (2–)3–5 mm. long and usually about $\frac{3}{4}$ as broad, tardily deciduous, symmetrical, base obtuse or rounded, pedicels 0.5–1 mm. long; mature calyx-lobes ovate to lanceolate, connivent, only a little surpassing the nutlets, margins more or less tawny appressed-hispid, midrib slightly thickened and weakly and sparsely hispid; nutlets 4,