

A MANUAL OF THE  
*Flowering Plants*  
*of California*

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base.—Montane, 4000 to 6500 ft.: s. Sierra Nevada (Shadequarter Mt., Tulare Co.); San Emigdio, San Gabriel, San Bernardino, Santa Ana and San Jacinto mountains; Palomar Mt.; Cuyamaca Mts.; s. to L. Cal.

### 10. *ERIODICTYON* Benth.

Shrubs with aromatic herbage. Leaves alternate, pinnately veined, finely reticulated, coriaceous, dentate, and petiolate. Inflorescence a terminal, usually naked, panicle of scorpioid cymes. Sepals narrow, not dilated above. Corolla funnelform to campanulate, its tube without appendages. Filaments more or less adnate to the tube of the corolla, little or not at all exerted, sparsely hirsute. Ovary nearly or quite 2-celled by the meeting of the dilated placentae in the axis; styles 2, distinct. Capsule 2 lines long or less, first loculicidal, then septicidal, thus 4-valved, each valve with a short beak or acumination and closed on one side by the adherent dissepiment or half-partition. (Greek erion, wool, and diktuon, a net, by reason of the netted woolly under surface of the leaves.)

Leaves glutinous, nearly or quite glabrous above.

Calyx sparsely hirsute; corolla weakly puberulent outside; cent. and n. Cal. ....

1. *E. californicum*.

2. *E. trichocalyx*.

3. *E. crassifolium*.

Leaves densely tomentose on both surfaces. ....

1. *E. californicum* (H. & A.) Greene. YERBA SANTA. MOUNTAIN BALM.

Fig. 796. Shrub, 2 to 8 ft. high; leaves oblong to oblanceolate, tapering below and frequently above, dentate except at base or below the middle, very glutinous-resinous, as if varnished, the areas between the veins and cross-veinlets on the under surface with a close dense felt; calyx 1 line long with linear lobes; corolla white or pale blue, tubular-funnelform, 4 to 6 lines long; stamens and styles included. — Dry mountain slopes and ridges, 500 to 4000 ft., common and often abundant and gregarious over extensive areas: Coast Ranges from Monterey Co. to Siskiyou Co.; Sierra Nevada from Tulare Co. to Eldorado Co.; n. to southern Ore. May-June. (*E. glutinosum* Benth.)



2. *E. trichocalyx* Hel. Shrub, rather too close to no. 1; calyx densely white-hairy; corolla narrow-campanulate, 3 to 4½ lines long, densely pubescent outside. — Mesas and chaparral belt, 1200 to 5500 ft.: Santa Inez, San Gabriel and San Bernardino mountains. (*E. angustifolium* var. *pubens* Gray.) Var. *LANATUM* Jepson n. comb. Leaves very white-tomentose beneath. — Santa Rosa, Cuyamaca and Laguna mountains; s. to L. Cal. (*E. californicum* var. *lanatum* Brand.)

3. *E. crassifolium* Benth. Shrub 4 to 6 (or 12) ft. high, leafy at the top; herbage densely tomentose, sometimes snow-white, sometimes dull or greenish; leaves oblong to oval, thick and rigid, crenate, 2 to 4 in. long; cyme 2 to 3 in. broad; calyx densely villous, half as long as the slightly villous corolla; corolla somewhat salverform, 4 to 6 lines long. — Mts., 2000 to 6000 ft., Ventura Co. to San Diego Co. Var. *NIVEUM* Brand. Sepals white-silky, not glandular; corolla 2 to 2½ lines long, scarcely longer than the calyx, its lobes connivent in anthesis. — Santa Lucia Mts. of Monterey and San Luis Obispo Cos. (*E. niveum* Eastw.) Var.

796. *Eriodictyon californicum* Greene; a, fl. branchlet; b, leaf. x ½.

villous, half as long as the slightly villous corolla; corolla somewhat salverform, 4 to 6 lines long. — Mts., 2000 to 6000 ft., Ventura Co. to San Diego Co. Var. *NIVEUM* Brand. Sepals white-silky, not glandular; corolla 2 to 2½ lines long, scarcely longer than the calyx, its lobes connivent in anthesis. — Santa Lucia Mts. of Monterey and San Luis Obispo Cos. (*E. niveum* Eastw.) Var.

TRÁSKIAE Brand. Similar to var. *niveum*; sepals black-glandular; corolla 2½ to 3 lines long. — Santa Inez Mts.; Santa Catalina Isl. (*E. traskiae* Eastw.)

### 11. *TRICÁRDIA* Torr.

Perennial herb, the leaves mostly in a basal rosette. Flowers purplish, rather few in loose spicate racemes. Sepals almost distinct, very dissimilar, the 3 outer large and cordate, becoming much enlarged, scarious and reticulate-veiny in fruit, the 2 inner linear. Corolla broad-campanulate, slightly contracted at the mouth, deciduous, the 10 narrow internal appendages free from the filaments. Stamens unequal, equally inserted on the lower part of the corolla-tube. Ovary 1-celled, glabrous; ovules 4 on each placenta; style 2-cleft. Capsule thin-walled, 1-celled. (Greek tri, three, and cardia, heart, referring to the 3 outer sepals.)

1. *T. watsonii* Torr. Stems ascending or erect, several from a short root, 5 to 11 in. high; leaves oblong-spatulate to oblong-linear, serrate, 1 to 2½ in. long; sepals 2 lines long, becoming ½ to 1 in. long in fruit; corolla purplish, 3 lines long. — Hillslopes or cañons, 1500 to 7000 ft.: Colorado and Mohave deserts; Inyo Co.; e. to southern Utah.

### 12. *HÉSPEROCHIRON* Wats.

Dwarf perennial herbs. Flowers solitary on naked peduncles arising from a leaf-rosette on the ground. Leaves oblong, spatulate or ovate, entire, ciliate, equaling or exceeding the peduncles. Calyx 5-parted, with linear-lanceolate lobes. Corolla purplish or nearly white, campanulate or rotate, deciduous, the stamens inserted on the base of its tube. Filaments subulate, more or less hairy at base. Ovary 1-celled; placentae narrow, projecting into the cavity, borne on narrow plates or half-partitions. Style 2-cleft at apex. (Greek hesperus, western, and Chiron, referring to the Centaur.)

Corolla oblong-campanulate, its lobes shorter than the tube. .... 1. *H. californicus*.  
Corolla saucer-shaped, its lobes longer than the tube. .... 2. *H. pumilus*.

1. *H. californicus* (Benth.) Wats. Leaves many in a basal tuft, narrowed at base to a short petiole, 1 to 1½ in. long; herbage grayish-pubescent; corolla white with a flare of pinkish veins, a little hairy at base. — Mountain valleys and flats, 4000 to 8600 ft.: Sierra Nevada from Tulare Co. to Siskiyou Co.; e. to Utah, n. to Wash.

2. *H. pumilus* (Dougl.) Porter. Leaves few in a basal tuft, oblong or ovate, 1 to 1¾ in. long, the petioles ¼ to ½ as long; herbage greenish, the leaves subglabrous except on the margins; flowers 6 to 8 lines wide. — Moist flats or meadows in the mts.: Sierra Nevada from Fresno Co. to Plumas Co., 6000 to 8000 ft.; Lake Co., 1300 ft.

### 13. *ROMANZÓFFIA* Cham.

Low and delicate perennial herbs with the aspect of some species of *Saxifraga*. Stems somewhat scape-like, loosely racemose. Leaves mostly basal (the cauline alternate), round-cordate, crenately lobed, long-petioled. Flowers white. Calyx 5-parted into nearly distinct sepals. Corolla broadly funnel-form, destitute of appendages, deciduous. Stamens unequal, inserted on the base of the corolla-tube. Style filiform, entire; stigma small. Capsule 2-celled or nearly so, with narrow placentae. Seeds numerous. (Count Romanzoff, promoter of the Russian voyage of Kotzebue; dedicated to him by Chamisso, the German poet and botanist, who accompanied the expedition.)

1. *R. sitchensis* Bong. Stems slender, 4 to 9 in. high, arising from a filiform rootstock bearing tubers; pedicels spreading, much longer than the flowers; calyx-lobes linear or lanceolate, not more than ½ as long as the corolla and exceeded by the capsule. — On moist rocks in shady places near the coast: San Mateo Co. and Mt. Tamalpais to Humboldt Co.; n. to Alas. Rare within our limits.

### BORAGINACEAE. BORAGE FAMILY

Herbs, usually rough with coarse hairs. Leaves simple, commonly entire and alternate. Flowers complete, in one-sided spikes or racemes, coiled spirally (scorpioid) and uncoiling as flowering proceeds. Calyx with com-

monly 5 divisions or teeth. Corolla regular, 5-lobed, with 5 stamens inserted on its tube and alternating with its divisions. Ovary superior, deeply 4-lobed (except in *Heliotropium*), with a simple style inserted between the lobes, in fruit splitting into 4 one-seeded nutlets. Style entire or none, rarely 2-cleft. Nutlets commonly roughened or prickly. Endosperm none, except in *Heliotropium*. Ovary not deeply parted in *Heliotropium*, *Euploca* and *Coldenia*, or merely lobed or laterally grooved. Nutlets often inserted on a short thick prolongation of the receptacle known as the gynobase. The spikes or racemes (here so-called for convenience) are really one-sided scorpioid cymes. *Euploca* has 2 nutlets.

A. Ovary undivided or merely lobed, sometimes 2 to 4-grooved on the sides; style terminal. Style entire, the style or stigmas provided with a glandular ring.

Flowers axillary (or appearing so) and solitary; fruit of 2 nutlets; stigma annular, surmounted by a tuft of short bristles; deserts. . . . .1. *EUPLOCA*.  
Flowers in dense scorpioid racemes; fruit of 4 nutlets; stigma peltate, not tufted (in ours); common. . . . .2. *HELIOTROPIUM*.  
Style 2-cleft, the stigmas capitate; herbs; deserts. . . . .3. *COLDENIA*.

B. Ovary deeply 4-parted; style entire or none (or rarely barely 2-cleft at apex), arising from between the lobes of the ovary.

1. Nutlets armed with barbed prickles.

Nutlets globose or thick; flowers mostly blue, rarely white; plants mostly stout, tall (1 to 3 ft.).

Nutlets spreading, prickly all over; perennials. . . . .4. *CYNOGLOSSUM*.  
Nutlets erect, prickly on the margin and sometimes on the back; perennials or annuals. . . . .5. *LAPPULA*.

Nutlets thin and flat, divergent or spreading in pairs; flowers white, low and slender; annuals. . . . .6. *PECTOCARYA*.

2. Nutlets unarmed or merely tuberculate.

Calyx pubescent, hispidulose or glabrous, not armed with barbed prickles.

Receptacle flat or merely convex; perennials.  
Flowers with tubular or tubular-funnel-form corollas; corolla blue; nutlets wrinkled. . . . .7. *MERTENSIA*.

Flowers with rotate or funnel-form corollas; nutlets smooth and shining.  
Throat of the corolla contracted by prominent crests; racemes mostly without bracts; corolla light-blue. . . . .8. *MYOSOTIS*.

Throat of corolla naked or with low crests; racemes bracteate; corolla greenish-yellow. . . . .9. *LITHOSPERMUM*.

Receptacle more or less elongated or produced upward into a structure (gynobase) to which the nutlets are attached.

Corolla bright or orange yellow, the throat open and naked. . . . .10. *AMINCKIA*.  
Corolla white, or cream-color or pale yellow, the throat with more or less prominent bulbous swellings or crests.

Perennials; calyx persistent; mostly high montane. . . . .11. *OREOCARYA*.  
Annuals (except 2 species each in nos. 13 and 14); mostly low altitudes.

Calyx circumscissile. . . . .12. *GREENEOCHARIS*.  
Calyx not circumscissile (except two species in no. 16).

Nutlets erect, attached from the base to the middle by a groove or scar.

Calyx (and pedicels) usually falling away with the fruit; corolla-throat with crests; leaves commonly alternate. . . . .13. *CRYPTANTHA*.

Calyx (and pedicels) persistent; corolla-throat with only obscure crests; lower leaves opposite. . . . .14. *ALLOCARYA*.

Nutlets oblique or incurved so that the apices are approximate in center, attached above the base to an elevated scar or caruncle.

Caruncle borne on a stipe-like base; lowest leaves opposite. . . . .15. *ECHIDIOCARIA*.

Caruncle commonly borne in a hollow or transverse groove; leaves mostly in a basal rosette. . . . .16. *PLAGIOBOTHRYIS*.

Calyx-lobes armed with barbed prickles, the calyx in fruit modified to form a bur-like envelope for the nutlets; annual. . . . .17. *HARPAGONELLA*.

1. *EUPLOCA* Nutt.

Small annuals. Flowers solitary. Corolla white, the upper part of the tube enlarged and the orifice narrowed, the limb scarcely lobed. Style elongated. Stigma annular, surmounted by a tuft of short bristles. Fruit globosely 2-lobed, each lobe splitting into 2 hemispherical one-seeded nutlets. (Greek *euploca*, well, and *ploca*, a woven thing.)

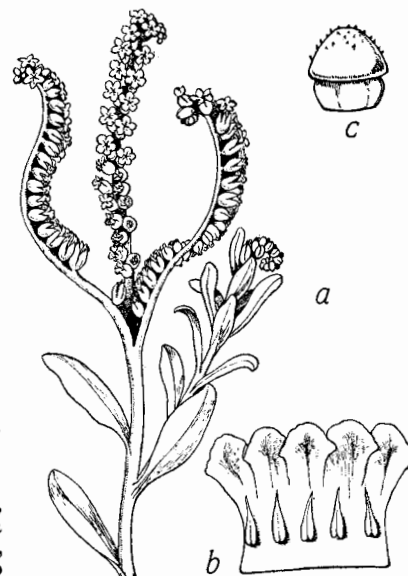
1. *E. albiflora* (Raf.) Jtn. Stem branched, 1 to 3 in. high; herbage, calyx, corolla-tube and midnerve of limb strigose-hispid; leaves ovate to oblong-lanceolate, 5 to 9 lines long, petioled; flowers shortly pediceled, "sweet-

scented"; corolla 5 lines broad.—Desert valleys, 200 to 1800 ft.: Ludlow, e. Mohave Desert; Palo Verde Valley; e. to Neb., s. to Mex. (*E. convolvulacea* Nutt.)

2. *HELIOTROPIUM* L. *HELIOTROPE*

Herbs with alternate mostly entire leaves. Flowers white, in dense one-sided spikes. Calyx-segments lanceolate or linear. Corolla salverform, short, with open throat; sinuses more or less plaited in the bud. Stamens included; anthers acuminate, connivent, nearly sessile. Stigma annular or conic. Ovary not lobed, separating when ripe into 4 one-seeded closed nutlets. (Greek *helios*, sun, and *trope*, a turning, "the flowers beginning to appear at the summer solstice.")

1. *H. curassavicum* L. CHINESE PUSLEY. Fig. 797. Stems branching, ½ to 3 ft. long, prostrate, from a perennial root; herbage glabrous, glaucous, fleshy; leaves obovate to broadly oblanceolate; spikes mostly in pairs; corolla white with the yellow eye changing to purple, 1½ to 2 lines long; stigma turned downward over summit of ovary and thus resembling a skull-cap; style none.—Common along the seashore, in stream beds, and in low moist or alkaline lands throughout Cal. June-Nov. Immigrating locally.



797. *Heliotropium curassavicum* L.; a, fl. branchlet x 1; b, corolla spread open x 5; c, pistil x 10.

3. *COLDENIA* L.

Low prostrate or spreading plants, mostly suffrutescent, hoary-pubescent and often hispid, the small pale flowers sessile and usually clustered in the forks or at the ends of the branches and subtended by a tuft or circle of leaves. Leaves small, petioled, with veins usually conspicuous. Calyx 4 or 5-parted into slender segments. Corolla short-funnel-form or nearly salverform, not more than twice as long as the calyx, the short lobes broad and rounded. Stamens included. Style 2-cleft or -parted. Ovary entire or 4-lobed, 4-celled. Fruit separating at maturity into 4 one-seeded nutlets, or by abortion fewer. (Dr. Cadwallader Colden, Colonial Lieutenant-Governor of New York, a correspondent of Linnaeus.)

Stems dichotomously branched; leaves conspicuously veined, the petioles often equaling or longer than the blade; corolla appendaged within.

Leaves ovate to rotund or rhombic, with 2 or 3 pairs of veins; herbage pubescent and somewhat hispid or hirsute.

Annual; leaf-margins revolute. . . . .1. *C. nuttallii*.  
Perennial; leaf-margins sinuate. . . . .2. *C. brevicalyx*.

Leaves mostly obovate with 5 or 6 pairs of veins; perennial (apparently); herbage not hispid or hirsute. . . . .3. *C. palmeri*.

Stems diffusely branched; leaves obscurely veined, the blade longer than the petiole; corolla not appendaged within; perennial. . . . .4. *C. canescens*.

1. *C. nuttallii* Hook. Stem dichotomously branched, prostrate, 4 to 10 in across; herbage grayish-pubescent, and sparsely hirsute or hispid; leaves ovate to rotund, revolute, with 2 or 3 pairs of veins, 2 to 4 lines long, the petioles often longer; flowers densely clustered in the forks and at the ends of the branches, subtended by a circle of leaves; calyx-lobes linear, equaling the corolla-tube; corolla pink or whitish, 1½ lines long, bearing 5 short obtuse scales near the base of the tube; filaments shorter than the anthers, inserted nearly in the throat of the corolla-tube; nutlets oblong-ovate,

polished, the scar linear.—East side Sierra Nevada from Death Valley to Lassen Co.; n. to Wash., e. to Wyo., Utah and Ariz.

2. *C. brevicalyx* Wats. Stems white-barked, dichotomously branched from a woody perennial base, 5 to 10 in. long; herbage grayish-pubescent and somewhat hispid; leaves ovate to rhombic, with sinuate revolute margins, irregularly 2 or 3-nerved, 2 to 4 lines long, hispid toward the margin; calyx 1 line long, the acute lobes shorter than the tube; corolla 2 lines long; filaments slender, somewhat dilated below the insertion; nutlets subglobose.—Colorado Desert. Mar.-Apr.

3. *C. palmeri* Gray. Stems freely branched dichotomously from a suffrutescent base, forming a dense rounded tuft or mat; herbage grayish-pubescent, not hispid or hirsute; leaves obovate, sometimes ovate, strongly plicate, with 5 or 6 pairs of veins, 2 to 4 lines long, the margins thickened-revolute; flowers clustered in the forks and at the ends of the branchlets, subtended by a circle of leaves; calyx-lobes about  $\frac{2}{3}$  as long as corolla-tube; corolla bluish, 2 lines long, with 5 narrowly intruding plates extending from the base of the tube to the base of the filaments or about  $\frac{1}{2}$  the length of the tube; nutlets globular, with an orbicular scar, only 1 or 2 maturing.—Desert sandhills: e. Mohave Desert; Colorado Desert; e. to Ariz. Apr.-May. (C. plicata Cov.)

4. *C. canescens* DC. Stems gnarled, woody and rough-barked, prostrate or procumbent, from a stout perennial base; herbage tomentose and hispid; leaves ovate or oblong, entire, the veins obscure, 3 to 5 lines long, the blade longer than the petiole; flowers 3 lines long, solitary or in small clusters at the axils or forks; fruit depressed-globose; nutlets 4, thick-walled, smooth and rounded on the back, obscurely rugose on the plane sides, pointless.—Colorado Desert; e. to southern Tex. Apr.-May.

#### 4. CYNUGLOSSUM L.

Ours perennial herbs. Flowers blue or pink, in a bractless panicle or raceme on a naked terminal peduncle. Corolla with a ring of conspicuous appendages or crests at the throat. Nutlets large, covered all over with short barbed prickles and thus bur-like. (Greek kuno, dog, and glossa, tongue, on account of the shape and texture of the leaves in some species.)



798. *Cynoglossum grande* Dougl.; a, fl. branchlet x 1; b, nutlet x  $1\frac{1}{2}$ .

Stems glabrous or nearly so; leaves ovate to ovate-oblong or elliptic, rounded or truncate at base, all on long petioles..... 1. *C. grande*.  
Stems with spreading hairs; leaves ovate to oblong-lanceolate, varying to oblong, the upper sessile or partly clasping by a rounded or auriculate base..... 2. *C. occidentale*.

1. *C. grande* Dougl. WESTERN HOUND'S TONGUE. Fig. 798. Stems erect, glabrous, 1 to 3 ft. high; leaves mostly basal or borne on the lower part of the stem, hirsutulose beneath, 3 to 8 in. long, on petioles often as long; calyx-lobes narrowly oblong, obtuse, densely pubescent, 2 to 4 lines long; corolla 4 to 7 lines long, the tube often purple, the lobes elliptic; nutlets depressed.—Wooded cañons, 100 to 4000 ft.: Coast Ranges from the Santa Lucia Mts. to w. Alameda Co.; North Coast Ranges from Marin Co. and the Vaca Mts. to Siskiyou Co., thence se. in the Sierra Nevada foothills to Eldorado Co. and Tuolumne Co., recurring in Tulare Co.; n. to Wash. Feb.-May.

2. *C. occidentale* Gray. Fig. 799. Stems erect, leafy, 1 to several from the root-crown, 1 to  $1\frac{1}{2}$  ft. high; herbage hirsute, the hairs (especially of the stems) spreading or even recurving; leaves 2 to  $7\frac{1}{2}$  in. long, the lower petioled, the upper sessile or clasping; calyx-lobes linear to lanceolate, obtuse, twice longer than the tube; corolla brownish-pink, drying greenish, 4 to  $4\frac{1}{2}$  lines long, the tube longer than the calyx-lobes

and 2 to 3 times as long as the corolla-lobes; nutlets almost globular, 4 lines long.—Moist thickets or woods of mountain slopes and flats, 4000 to 7000 ft.: Sierra Nevada from Tulare Co. to Shasta Co.; Modoc Co. to Trinity and Humboldt Cos. June.

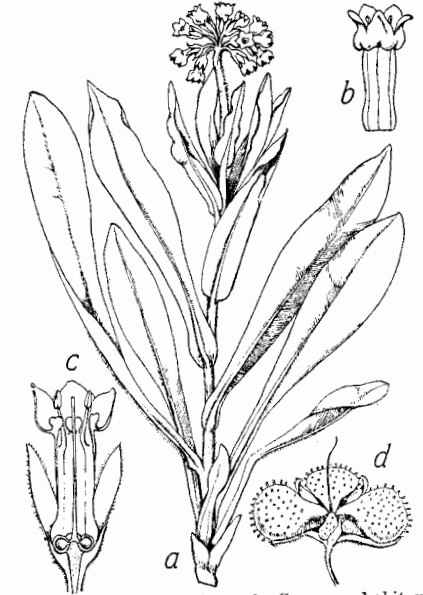
#### 5. LÁPPULA Moench. STICK-SEED

Tall leafy-stemmed herbs; herbage pubescent or hispid. Flowers usually small, blue, white or sometimes pink, disposed in spikes or racemes. Leaves entire, the upper sessile, the lower tapering to a winged petiole. Calyx 5-parted. Corolla rotate or short-funneliform, usually with appendages in the throat. Nutlets bur-like, armed with barbed prickles, these arranged along a distinct margin or over the entire back. (Diminutive of the Latin lappa, a bur.)

Annuals; racemes leafy throughout, the leaves small but still foliaceous; calyx in fruit longer than the pedicels; pedicels in fruit remaining erect; desert areas.  
Dorsal area of nutlets bordered by a row of prickles..... 1. *L. occidentalis*.  
Dorsal area of nutlets with its margin annular-thickened, the ring bearing a few prickles..... 2. *L. texana*.  
Perennials, the stems from a thick root-crown; racemes leafy-bracteate only at base, the bracts above the base minute; calyx in fruit shorter than the pedicels; pedicels in fruit recurving or deflexed.  
Dorsal area of nutlets naked or with very few prickles.  
Corolla white, 6 to 8 lines in diameter; panicle with markedly divergent branches. 3. *L. bella*.  
Corolla blue, 2 to 4 lines in diameter; racemes or panicles rather strict..... 4. *L. floribunda*.  
Dorsal area of nutlets with numerous prickles.  
Corolla white, 3 lines in diameter, the tube not exceeding the calyx..... 5. *L. californica*.  
Corolla blue, the tube  $1\frac{1}{2}$  to 2 times longer than the calyx.  
Limb of corolla 5 to 7 lines broad; pubescence velvety..... 6. *L. velutina*.  
Limb of corolla 3 to 4 lines broad; pubescence somewhat roughish, not velvety..... 7. *L. nervosa*.

1. *L. occidentalis* Greene. Stem strictly erect, commonly branched only above, 8 to 14 in. high; herbage pubescent; leaves linear to oblong-linear or the lower spatulate,  $\frac{1}{2}$  to  $1\frac{1}{4}$  in. long; racemes leafy-bracteate; calyx longer than the pedicels, the narrowly lanceolate segments not recurved in fruit; corolla blue, the tube little exceeding the calyx, the throat with conspicuous crests; nutlets 1 line long, the dorsal area ovate, sharply tuberculate, bordered by a single row of barbed prickles, the prickles more or less confluent at base.—Arid valleys and mountain slopes, 4000 to 7000 ft.: San Bernardino Mts.; Inyo Co.; Lassen and Modoc Cos.; Nev. to Ore., Col. and Tex.

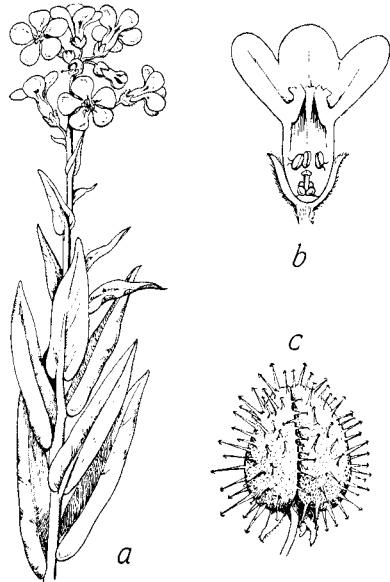
2. *L. texana* Britt. Stem branched from or near the base, the branches ascending, 7 to 11 in. high; leaves 3 to 12 lines long, broadly linear, ovate-lanceolate, obtuse, sessile, the lowest oblanceolate; nutlets finely tuberculate, the dorsal face with the margin strongly annular-thickened, thus making the face saucer-shaped or shallowly cup-shaped; annular thickening bearing a few prickles, especially on upper part.—Desert mesas, 1300 to 4000 ft., e. Mohave Desert: New York Mts.; Needles; e. to Tex.



799. *Cynoglossum occidentale* Gray; a, habit x  $\frac{1}{4}$ ; b, corolla x  $1\frac{1}{2}$ ; c, long. sect. of fl. x 2; d, fr. x 1.

3. *L. bella* Mebr. Stem erect, branched above, 1¾ ft. high; herbage finely appressed-pubescent; cauline leaves oblong-lanceolate to ovate, sessile by a cordate base, 1½ to 3¼ in. long; basal leaves oblanceolate; inflorescence widely racemose-paniculate; pedicels recurved in fruit; calyx-lobes ovate, reflexed in fruit; corolla white, 6 to 8 lines in diameter, the appendages finely pubescent; nutlets 2½ lines high, the broadly ovate back roughened, naked or with a few very minute prickles, bordered by a row of slender prickles, the prickles not confluent at base or rarely so.—Salmon Mts., Trinity Co.

4. *L. floribunda* (Lehm.) Greene. Stem erect, 2 to 3¼ ft. high; herbage somewhat hispid-pubescent; cauline leaves linear-oblong to lanceolate or oblong-lanceolate, narrowed at base, but sessile, 1 to 5 in. long, the basal oblanceolate, drawn down to a petiole; racemes strict, more or less branched or paniculate; pedicels in fruit deflexed, 2 to 4 lines long; calyx-lobes ovate; corolla blue, about 3 lines long, about as broad; nutlets 2 lines long, the elongate-triangular dorsal face merely scabrous, bordered by a row of conspicuously flattened spines, the spines unequal, somewhat united at base into a narrow wing; back of nutlets minutely papillate, naked or with 1, 2 or 3 small bristles, commonly with a median nerve.—Montane, 6000 to 7200 ft.: e. Mendocino Co. to Siskiyou Co.; Sierra Nevada from Tulare Co. to Nevada Co., and n. to Modoc Co.; n. to Ore. and Saskat., e. to Minn. July. Var. *GEISIANA* Jepson n. var. Cauline leaves oblong, those of the inflorescence ovate with cordate-clasping base; calyx-lobes oblong; nutlets 2½ lines high.—Placer Co. (Craggs Slope, Deer Park, Helen D. Geis, type).



800. *Lappula velutina* Piper; a, fl. branchlet x ½; b, long. sect. of fl. x 2; c, fr. x 3.

5. *L. californica* (Gray) Piper. Stems erect, 1½ to 2 ft. high; herbage pubescent; leaves ¾ to 3½ in. long, upper cauline oblong to lanceolate, sessile, the lower cauline and basal oblong, tapering to a long petiole; racemes widely branched; calyx-lobes ovate; corolla white, the tube not or barely exceeding the calyx, the limb 3 to 6 lines broad; nutlets 2½ lines high, the ovate dorsal face beset and also bordered with bristles.—Montane, 5000 to 7300 ft.: Sierra Nevada from Butte Co. to Tehama and Modoc Cos.; also Inyo Co.

6. *L. velutina* Piper. Fig. 800. Stems erect, 1 to 2 ft. high; herbage velvety-pubescent; leaves 1 to 3 in. long, the cauline oblong-lanceolate to ovate, the basal oblong-spatulate; racemes simple or branched; calyx-lobes ovate, obtuse; corolla blue or sometimes pink, the tube much exceeding the calyx, the limb 5 to 6 lines broad, the crests conspicuous, ½ as long as the corolla-lobes; nutlets with back thickly beset with prickles.—Montane, 5000 to 8500 ft.: Sierra Nevada from Tulare Co. to Shasta Co. June-July.

7. *L. nervosa* (Kell.) Greene. Stems 1 to 3, erect, 1½ ft. high, glabrous or sparingly hairy; leaves rough-pubescent, ¾ to 3½ in. long, pubescent, ciliate, the cauline oblong to ovate, the basal oblong to oblong-spatulate; racemes somewhat loose or with spreading branches; calyx-lobes ovate; corolla blue, the tube much exceeding the calyx, the limb 2 lines broad, the throat with small crests only ½ as long as lobes; dorsal area of nutlets broadly ovate, covered with prickles.—Montane, 6000 to 7000 ft.: Sierra Nevada from Fresno Co. to Plumas Co. June-July.

## 6. PECTOCARYA DC.

Low slender obscure annuals with strigose pubescence and narrowly linear leaves. Flowers minute, white, on very short pedicels, scattered along the stems or branches. Calyx deeply 5-cleft, spreading or reflexed in fruit. Corolla with a circle of processes or crests which almost close the throat. Stamens included. Nutlets flat, thin, radiately divergent, bordered at apex or all around with a row of bristles hooked at tip. (Greek pectos, combed, and karua, nut, on account of the row of bristles on the nutlet.)

Nutlets not winged, the acute margin bordered all around by bristles; calyx hispidulose... 1. *P. pusilla*.

Nutlets bordered by a wing.

Wing coriaceous, undulate or lacinate; calyx hispidulose.

Wing parted or cleft into subulate teeth ending in a delicate uncinat bristle.... 2. *P. linearis*.

Wing merely undulate or incurved, the apex thickly and the sides rarely beset with slender uncinat bristles..... 3. *P. penicillata*.

Wing thin-scarious, entire or obscurely undulate, the hooked bristles of the body extending beyond its margin; calyx armed with divergent bristles... 4. *P. setosa*.

1. *P. pusilla* Gray. Stem erect, somewhat flexuous, simple or sparingly branched, 3 to 5 in. high; herbage strigulose-canescens; nutlets 4 and equally divergent (or sometimes but 2), 1 line long, cuneate-obovate or somewhat rhomboidal, carinately nerved on the upper face, not winged, the margin bearing a row of slender bristles hooked at the tip.—Shady north slopes in the hills, 500 to 2500 ft.: North Coast Ranges from Napa Co. to Siskiyou Co.; thence se. in the Sierra Nevada to Mariposa Co. Mar.-Apr.

2. *P. linearis* DC. Stem diffusely branched from the base, the branches 2 to 4 in. long; body of nutlets narrowly oblong, 1 to 2 lines long, surrounded by a broad wing laciniately and often irregularly parted or cleft into subulate teeth, the teeth ending in a delicate bristle uncinat at tip; cotyledons oblong.—Valleys and mesas, 500 to 2100 ft.: coastal S. Cal.; Colorado and Mohave deserts; Inyo Co.; e. to Ariz. and Utah. Apr.-May.

3. *P. penicillata* (H. & A.) A. DC. Stem branching at the base, the branches diffuse, 1 to 4 in. long; nutlets divergent in pairs, oblong, 1 line long, surrounded by a wing which is incurved along the middle in age and bears at the rounded apex a series of slender bristles hooked at the tip.—Hillslopes and valleys, 100 to 400 ft., throughout cismontane Cal.; n. to B. C., e. to Nev. Var. *HETEROCARPA* Jtn. Two of the 4 nutlets unmarginated, 2 margined.—Colorado Desert.

4. *P. setosa* Gray. Stem stoutish, freely and diffusely branched, 6 to 9 in. high; herbage hispid as well as minutely strigose-pubescent; calyx-lobes armed with 3 to 6 large divergent bristles; nutlets in pairs, 2 wingless, 2 bordered by a broad thin-scarious wing, the body of the nutlet and commonly also the wing beset with slender uncinat-tipped bristles, the body rarely naked or nearly naked, the wing entire or obscurely undulate.—Desert mesas or their bordering ranges, 2000 to 4500 ft.: San Jacinto Mts.; San Antonio Mts.; Mohave Desert; Lassen Co. Apr.-May. Var. *HOLOPTERA* Jtn. Nutlets all wing-margined.—Mts. on n. side Mohave Desert; also Inyo Co. Var. *APTERA* Jtn. Nutlets all without margins.—E. San Diego Co.

## 7. MERTENSIA Roth. LUNGWORT

Perennial herbs with erect leafy stems terminated by clusters of showy light blue flowers. Herbage glabrous or nearly so. Leaves broad, the lower mostly petioled. Stamens with flattened or filiform filaments inserted on the crested open throat of the corolla. Style filiform; stigma entire. Nutlets attached to the convex receptacle by a small scar just above the base, roughish or wrinkled at maturity. (F. K. Mertens, a German botanist, 1764-1831.)

Calyx-lobes oblong or oblong-linear, mostly obtuse; corolla-tube 2½ to 3 lines long, about as long as the throat and limb, with an obscure or shallow depression on the outside opposite the crests; var. *stomatechoides* of..... 1. *M. ciliata*.

Calyx-lobes lanceolate or linear, mostly acute; corolla-tube 4 to 5½ lines long, 3 to 4 times as long as the throat and limb, with a pair of pockets or rounded pits on the outside opposite the crests..... 2. *M. longiflora*.





801. *Mertensia ciliata* var. *stomatechoides* Jepson; a, fl. branchlet x  $\frac{1}{2}$ ; b, leaf x  $\frac{1}{4}$ ; c, sect. of corolla x  $1\frac{1}{2}$ .

2. *M. longiflora* Greene. Stem erect, simple, leafy,  $\frac{1}{2}$  ft. high; herbage glabrous or nearly so, the upper side of the leaves scabridulous; leaves oblong-ovate or spatulate-obovate, 1 to  $2\frac{1}{4}$  in. long; flowers in a close cluster or subcorymbose panicle; calyx deeply 5-parted or cleft, the lobes lanceolate or linear, mostly acute; corolla bright blue, the tube narrow, 4 to  $5\frac{1}{2}$  lines long, the throat very short, the limb 5-lobed, 1 to  $1\frac{1}{2}$  lines long.—Hillsides, 5000 to 7000 ft.: Modoc Co.; n. to B. C., se. to Ariz. Apr.-May.

#### 8. MYOSÔTIS L. FORGETMENOT

Slender leafy-stemmed perennials with small light blue flowers in loose naked racemose clusters terminating the stem and branchlets. Corolla rotate with prominent crests in the throat. Nutlets small, ovoid, smooth and shining. (Greek mus, mouse, and otos, ear, mouse-ear, to which the leaves of some species are likened.)

1. *M. sylvatica* Hoffm. Stems leafy, somewhat branched above, 1 ft. high, decumbent at base, usually several from a perennial rootstock; herbage hirsute-pubescent, the stem with soft spreading hairs, those of the calyx consisting of bristly hairs with hooked tips; leaves lanceolate or oblong to oblong-spatulate, entire, 1 to 4 in. long, the basal and lower cauline petioled; calyx-lobes lanceolate, equaling or longer than the tube; corolla light blue.—Garden plant from Eur., sparingly naturalized: San Anselmo; Mill Valley; Berkeley; San Francisco. Apr.-July.

*M. PALÛSTRIS* With. Calyx-lobes triangular, shorter than the calyx-tube; pubescence appressed, that of the calyx consisting of straight hairs.—Adv. from Eur.: Quincy.

#### 9. LITHOSPÉRMUM Tourn. PUCCOON

Ours pubescent or hairy perennial herbs, usually with red or violet-colored roots containing coloring matter. Flowers in leafy spikes or in the axils of the upper leaves. Calyx 5-parted. Corolla in ours greenish-yellow, salver-

1. *M. ciliata* (James) G. Don var. *stomatechoides* Jepson n. comb. Fig. 801. Stems several from the root-crown, simple or somewhat branched, leafy, 2 to 5 ft. high; herbage glabrous or nearly so, glaucous; leaves oblong or oblong-spatulate to ovate or lanceolate, entire, 2 to 7 in. long, narrowed to a broad petiole, or the upper cauline ones sessile; flowers in short paniced racemes at the ends of the stem and branchlets, more or less drooping; calyx-lobes oblong to oblong-linear or lanceolate, obtuse or sometimes acute, mostly ciliolate,  $\frac{1}{4}$  to  $\frac{1}{2}$  as long as the corolla; corolla a lively light-blue, with small yellow-tipped crests in the summit of tube, the cylindrical tube  $2\frac{1}{2}$  to 3 lines long, the open-campanulate throat and limb nearly or quite as long; filaments broad, included, inserted on the corolla-tube alternate with the crests; style exerted.—Montane, 5000 to 8500 (or 10,000) ft.: e. Mendocino Co.; Sierra Nevada from Tulare Co. to Nevada Co. and n. to Modoc Co.; e. to Col. (*Mertensia stomatechoides* Kell. *M. sibirica* Bot. Cal.) June-Aug.

form or funnelform, with rounded lobes imbricated in the bud. Filaments short; anthers short, included. Style slender; stigma truncate-capitate or 2-lobed. Nutlets 4 or by abortion fewer, ovate, naked, in ours white, bony and shining, erect, attached to the flat receptacle by the base; scar flat, rather small. (Greek lithos, a stone, and sperma, a seed.)

1. *L. ruderale* Dougl. Stems densely leafy,  $\frac{1}{2}$  to  $1\frac{1}{4}$  ft. high; herbage pubescent; leaves linear-lanceolate to lanceolate, 1 to  $2\frac{3}{4}$  in. long, mostly tapering from base to apex, sessile; flowers crowded in a leafy cluster; corolla campanulate-funnelform, dull greenish-yellow, 4 to 5 lines long, the tube hardly longer than the calyx, silky outside, the open throat naked or nearly so; nutlets broadly ovate, acute, smooth and polished, 2 to  $2\frac{1}{2}$  lines long.—Modoc Co.; n. to B. C., e. to Nev. and ne. to N. Dak. May. Var. *CALIFÓRNICUM* Jepson n. comb. Stems less rigid; upper leaves oblong or ovate-lanceolate; corolla orange-yellow, 5 to 6 lines long, the tube considerable longer than the calyx.—Montane, 3000 to 5000 ft.: Placer Co. to Shasta Co., thence w. to Trinity Co., n. to southern Ore. (*L. californicum* Gray.)

#### 10. AMSÍNCKIA Lehm.

Annuals with rough-hairy herbage, the hairs commonly with pustulate-dilated base, which is often conspicuously hardened or granular. Flowers yellow, in elongated spikes. Calyx-lobes 5, or 4 or 3 through the more or less complete union of two into one. Corolla salverform, the throat somewhat funnelform and with more or less distinct folds, but destitute of crests or processes. Nutlets crustaceous, triquetrous or ovate-triangular, smooth or rough. Cotyledons deeply 2-parted. (Wm. Amsinck of Hamburg, patron of the Botanic Garden in that city.)

Nutlets smooth and polished.

Corolla 5 to 6 lines long; scar of nutlets very obscure, narrowly lineate, nearly basal; mostly deserts. . . . 1. *A. vernicosa*.

Corolla about 6 to  $7\frac{1}{2}$  lines long; scar of nutlets conspicuous, ovate-lanceolate, nearly median; S. F. Bay region. . . . 2. *A. spectabilis*.

Nutlets roughened.

Corolla 2 to  $2\frac{1}{2}$  lines long. . . . 3. *A. parviflora*.

Corolla 4 to 9 lines long.

Nutlets carinate on back, more or less rugulose or muriculate.

Nutlets gray or pale; mostly interior, very common. . . . 4. *A. douglasiana*.

Nutlets black or brown; seaboard. . . . 5. *A. intermedia*.

Nutlets flattened or rounded on the back.

Back of nutlets with low thin or faint rugae, the rugae forming areoles. . . .

6. *A. lycopsoides*.

7. *A. tessellata*.

Back of nutlets tessellate or pavement-like. . . .

1. *A. vernicosa* H. & A. Stem stout, branching above, 7 to 18 in. high, mostly glabrous below; leaves linear-oblong to ovate-lanceolate or lanceolate,  $1\frac{1}{2}$  to 5 in. long, hispid-ciliate and more or less hispid above and below, often glabrate, the pustulate disks frequently producing a tessellate effect; fully developed spikes 5 in. long; calyx-segments strongly hirsute, often partly or wholly confluent so as to appear as 3 or 4, in fruit 5 to 7 lines long; corolla golden yellow, 5 to 6 lines long, the limb narrow; nutlets carinate on the lateral angles with sharp edges, back and lateral faces plane or nearly so, smooth and polished, gray, 2 to 3 lines long, the scar very narrow or hair-like.—Mohave Desert to Inyo Co., 4000 to 4500 ft. Apr.-May.

2. *A. spectabilis* F. & M. Stem erect, rather strictly branched above, about 2 ft. high; herbage rough-hispid; leaves linear-oblongate or -oblong, 1 to  $3\frac{1}{2}$  in. long, the reduced upper ones narrow-ovate or -lanceolate; corolla yellow, 7 to 9 lines long.—Antioch; Judsonville. Too little known.

3. *A. parviflora* Hel. Stem erect, strictly branched above, 5 to 12 in. high, hispid with spreading hairs and also somewhat strigose; leaves mostly linear, 1 to  $2\frac{1}{2}$  in. long; corolla pale yellow, 2 to  $2\frac{1}{2}$  lines long; nutlets brown, finely papillate or slightly muriculate, faintly rugulose, 1 to  $1\frac{1}{2}$  lines long, the scar large, ovate.—Sierra Nevada, 3000 to 6000 ft., from Mariposa Co. to Plumas Co.

*A. ECHINÁTA* Gray. Erect,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  ft. high, very hispid with white spreading bristles; sepals very narrow, yellow-hispid; corolla light yellow, about twice as long, little dilated at the throat, the limb 2 or 3 lines broad; nutlets muricate with slender points or almost prickly, not rugose.—Sandy

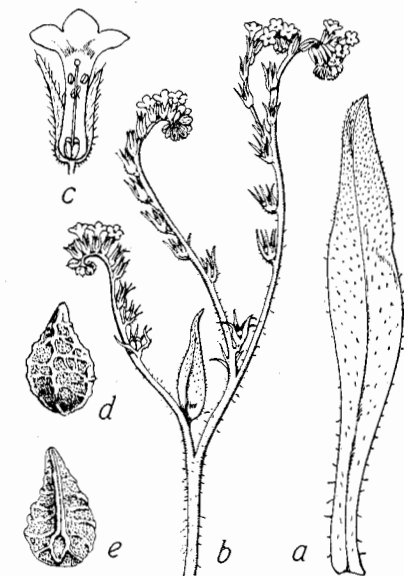
plains, very rare: Camp Mohave and Maricopa, Ariz. To be looked for in e. Mohave Desert.

4. *A. douglasiana* DC. BUCKTHORN WEED. Erect, frequently widely branched,  $1\frac{1}{2}$  to 4 ft. high; stems and branches with scattered white bristles, the foliage densely hispid-bristly with rather shorter bristles; inflorescence hispid and with a short curly pubescence; leaves oblong-lanceolate to linear, thickish, entire, 1 to 9 in. long; racemes more or less crowded at the top of the stem or branches and leafy-bracteate; developed racemes 5 to 10 in. long, peduncled; calyx-segments rusty-hispid, linear-acuminate,  $\frac{1}{2}$  as long as the narrow orange-yellow corollas, in fruit twice as long at least as the nutlets; nutlets incurved, carinate dorsally, scabrous-rugose and granulate, exceeding 1 line in length.—Fields and hillslopes, often forming rank thickets, 20 to 2000 ft.: Great Valley; Coast Ranges; coastal S. Cal. Apr. Also called Fireweed and Zaccato Gorda. (*A. intermedia* Fl. W. Mid. Cal.) Var. *CAMPÉSTRIS* Jepson n. comb. Calyx with appressed pubescence.—Sacramento Valley and n. to Siskiyou Co. (*A. campestris* Greene.) Var. *EASTWOODAE* (Mcbr.) Jtn.

Corolla 8 to 9 lines long, 2 to 3 times as long as the calyx.—Sierra Nevada foothills from Amador Co. to Fresno Co. and s. to Tehachapi Range. (*A. eastwoodae* Mcbr.)

5. *A. intermedia* F. & M. Fig. 802. Stem erect, branching, the branches at length decumbent, 1 to 2 ft. long; herbage of a light yellowish green, setose-hispid; leaves ovate-lanceolate or narrowly oblong, with erose-sinuate or entire margins; racemes rather short, frequently leafy-bracteate; peduncles short or none; calyx sparsely setose-hispid, the lobes lanceolate or ovate-oblong, obtuse, 2 or 3 of the lobes often united; corolla pale yellow, very slender; nutlets brown or blackish, muriculate and rugulose, scarcely more than  $\frac{1}{2}$  line long.—Sandy soil along the seacoast: San Diego Co. to San Francisco, Sonoma and Mendocino Cos. and n. (*A. lycopsoides* Jepson.) Var. *NICOLAI* Jepson n. comb. Racemes leafy-bracteate throughout.—San Nicolas Isl. (*A. sancti-nicolai* Eastw.)

6. *A. lycopsoides* Lehm. Diffuse plant; similar to no. 5; nutlets rounded on the back, not carinate, the thin low rugae forming irregular



802. *Amsinckia intermedia* F. & M.; a, leaf x  $\frac{1}{2}$ ; b, fl. branchlet x  $\frac{1}{2}$ ; c, long; sect. of fl. x 2; d, nutlet, dorsal view x 5; e, nutlet, ventral view x 5.

areoles these minutely granulate.—Along the coast: Mendocino Co.; n. to Wash.

7. *A. tessellata* Gray. Coarsely hispid, 1 to 2 ft. high; leaves linear to oblong-lanceolate, or the upper ovate, 1 to 2 in. long; developed spikes 5 to 6 in. long, loose; calyx of 3 or 4 sepals, 1 narrow and 2 broad, or 3 narrow and 1 broad, rusty-hispid, accrescent in fruit with the broadly-ovate foliaceous segments about twice the length of the nutlets; corolla small, orange-yellow; nutlets broadly ovate, abruptly acute, not carinate but flattish on the back, which is surrounded by a dentate border and filled in with a few short transverse rugae and many wart-like projections fitted closely together, and so resembling a somewhat uneven cobble-stone pavement.—Sandy plains or desert mesas, 100 to 4000 ft.: Colorado and Mohave deserts; San Joaquin Valley; Inyo Co.; e. to Utah. Apr.-May. Var. *LEMMONII* Jepson n. comb. Calyx densely clothed with soft-appressed cinnamon-brown hairs; corolla

6 to 7 lines long, the limb much broader; nutlets tessellate but scarcely rugose.—San Luis Obispo and Monterey Cos. May. (*A. lemmonii* Mcbr.)

#### 11. OREOCARYA Greene

Perennial herbs, the leafy stems more or less tufted on the branched root-crown and terminating in a thyrsoid or spicate leafy-bracteate panicle. Entire plant tomentose or strigose-pubescent, the upper parts usually densely hispid. Leaves mostly basal. Calyx 5-parted to the base or nearly so, the segments lanceolate or ovate-lanceolate. Corolla with prominent crests. Nutlets smooth and polished or roughened and dull, the margins without wings. (Greek oreos, mountain, and karua, nutlet, on account of the habitat.)

Nutlets polished; herbage strigose or strigulose.

Corolla-tube well-exserted ( $1\frac{1}{2}$  to 2 times as long as calyx); inflorescence hirsute; stems  $\frac{1}{2}$  to  $1\frac{1}{4}$  ft. high.....1. *O. confertifolia*.

Corolla-tube not exserted; inflorescence not at all hirsute; stems 3 to 5 in. high; var. abortiva of.....2. *O. suffruticosa*.

Nutlets roughened, dull; herbage hispid, the older leaves white-tomentose, the younger ones greenish-silky.

Nutlets gray, keeled, densely rugose and often finely tuberculate dorsally.....3. *O. echinoides*.

Nutlets brown, narrow-ovate, weakly keeled, sparingly wrinkled.....4. *O. nubigena*.

1. *O. confertifolia* Greene. Stems erect or at base decumbent, leafy,  $\frac{1}{2}$  to  $1\frac{1}{2}$  ft. high, arising from a branched root-crown; herbage strigose-pubescent with silky hairs, above more or less hirsute; leaves mostly in a basal tuft and some on stem, especially lower part, oblanceolate to linear-lanceolate, acute, 1 to 3 in. long; basal leaves more particularly drawn down to a petiole, the petioles white-silky; inflorescence spicate-glomerate, more or less interrupted below; calyx-lobes lanceolate; corolla cream-color or yellow, the tube well-exserted, the crests prominent; nutlets ovate, keeled ventrally, rounded on the back, smooth and polished.—Arid montane slopes or summits, 5000 to 8500 ft.: e. slopes or easterly summits of the Sierra Nevada from Kern Co. to Mono Co.; White Mts.; s. to north slope San Bernardino Mts.; e. to Utah and N. Mex.

2. *O. suffruticosa* Greene var. *abortiva* Mcbr. Stems decumbent or several from the root-crown, diffuse, leafy, branching, 3 to 5 in. long; herbage covered with a fine strigose puberulence, the leaves setose-ciliate toward the base; flowers in a close thyrsoid panicle, leafy-bracteate; leaves linear-ob lanceolate or linear, 2 to 4 in. long, mostly exceeding the panicles; calyx-tube ovate-lanceolate, the tube very short; corolla white, the tube not exserted, the lobes rounded; nutlets 1 to 4, irregularly triangular, polished, mottled on ripening.—Montane, 6000 to 10,200 ft.: northerly flats, San Bernardino Mts.; White Mts.; e. to Nev.

3. *O. echinoides* Mcbr. Stems few, ascending or erect, leafy, 3 to 9 in. high; herbage hispid throughout with long whitish hairs; leaves spatulate, mostly tufted at or near the base,  $\frac{3}{4}$  to  $1\frac{3}{4}$  in. long; inflorescence a spike-like thyrsus, leafy-bracteate below; calyx-lobes ovate-lanceolate, densely hispid; corolla yellow, its tube scarcely exceeding the calyx, the lobes rounded, the crests prominent; nutlets gray, ovate, keeled dorsally, sulcate ventrally, rugose and finely tuberculate.—Desert ranges or arid slopes of ranges bordering the deserts, 4000 to 6000 ft.: San Bernardino Mts.; Providence Mts.; Ivanpah Mts.; Panamint Mts.; Silver Mt., Mono Co.; Squaw Valley, Truckee River; e. to Utah, n. to Can. June.

4. *O. nubigena* Greene. Stems erect, leafy, 3 to 5 in. high, usually several from the branched root-crown; herbage hispid with long yellowish hairs, densely so above; tomentulose throughout; leaves spatulate-obovate, mostly in a basal tuft,  $\frac{3}{4}$  to  $1\frac{3}{4}$  in. long, the basal narrowed to a petiole; inflorescence contracted into a dense cluster or shortly spike-like; calyx-lobes ovate-lanceolate; corolla white with yellow center, the tube little or not at all exserted, the lobes broad and rounded, the throat with prominent crests; nutlets brown, narrow-ovate, sparingly rugose or wrinkled.—Summits of the Sierra Nevada, 4000 to 12,000 ft.: Modoc Co.: Sonora Pass; Clouds Rest; Mt. Whitney; also White Mts. May-July. Well-developed mature fruit is still unknown.

12. **GREENEOCHARIS** Gurke & Harms

Low, diffusely branching annuals, the small white flowers leafy-racemose and leafy-glomerate. Herbage hispid-canescens. Calyx 5-cleft to the middle, the scarious tube circumscissile about midway, the upper part falling, the lower persistent around the small ovate nutlets. (E. L. Greene, writer on western borages, and Greek charis, grace or beauty.)

1. *G. circumscissa* (Torr.) Rydb. Stem slender, diffusely much branched, 1½ to 7 in. high; leaves linear, alternate or some of the lower opposite, 3 to 7 lines long; flowers sessile in the axils of the leaves or crowded in leafy-bracteate clusters at the ends of the branchlets; calyx early circumscissile; corolla 1 line long, the throat naked and open; nutlets ovate, rounded on the back, dull, smooth or punctulate, ½ line long.—Desert mesas or mt. slopes, 4000 to 6500 ft.: Mohave Desert and its bounding mountain ranges; n. along east side Sierra Nevada to Lassen Co.; n. to Wash., e. to Utah. May-June. (Piptocalyx circumscissus Torr.) Var. *DICHOTOMA* Jepson n. comb. Seeds smooth and shining, ½ to ¾ line long.—E. slope Sierra Nevada from Inyo Co. to e. Nevada Co. (Boca); Verdi, w. Nev. July-Aug. (*Krynitzkia dichotoma* Greene.)

13. **CRYPTANTHA** Lehm. NIEVITAS

Annuals, rarely biennials or perennials. Flowers nearly always sessile and scorpioid-spicate. Calyx 5-parted to the base, as long as the corolla-tube; segments more or less hispid or with hooked bristles, in fruit usually closely embracing the nutlets, eventually deciduous. Corolla white, small (½ to 3 lines broad). Nutlets 4, sometimes 3, 2 or 1, smooth, papillate, or muriculate, never rugose; face of nutlet with a ventral groove from the apex to the scar near the base, usually continued beyond the scar as a fork and either open (areolate) or closed. Nutlet attached to the subulate gynobase from the scar halfway or wholly to the apex along the groove. (Greek kruptos, hidden, and anthos, flower, perhaps on account of the minute flowers in some species.)

## A. INFLORESCENCE BRACTEATE.

Floral bracts not exceeding flowers; annuals.

- Lower leaves not exceeding ½ in. .... 1. *C. micrantha*.  
 Lower leaves more than ¾ in. .... 2. *C. costata*.  
 Floral bracts exceeding flowers.  
 Biennial or perennial; nutlets broad, mucronulate. .... 3. *C. racemosa*.  
 Annual; nutlets lanceolate, brown, polished. .... 4. *C. ramosissima*.

## B. INFLORESCENCE NOT BRACTEATE; ANNUALS.

## 1. Nutlet surface roughened.

- Fruiting calyx, including pedicel, seldom more than 2 lines long.  
 Calyx in fruit recurved. .... 5. *C. recurvata*.  
 Calyx in fruit not recurved.  
 Plants profusely branched, thickly covered with bristles or short stiff hairs; nutlets minutely white-papillate upon purplish-gray or brown.  
 Desert plants; calyx 1 line long.  
 Nutlets without margins. .... 6. *C. angustifolia*.  
 Nutlets with whitish margins. .... 7. *C. holoptera*.  
 Cismontane plants; calyx ½ line long. .... 8. *C. micromeres*.  
 Plants scarcely branched, hispid to hirsute; nutlets conspicuously papillate or mucronate, white to brown or brown-flecked, never purplish.  
 Nutlets wingless.  
 Calyx-segments with both bristles and hairs.  
 Papillae on nutlets straight.  
 Nutlets ovate, acute. .... 9. *C. muriculata*.  
 Nutlets ovate, acuminate. .... 10. *C. ambigua*.  
 Papillae on nutlets dentate to curvidentate; nutlets lanceolate. .... 11. *C. intermedia*.  
 Calyx-segments with soft hairs but no bristles. .... 12. *C. utahensis*.  
 Nutlets winged; calyx-segments with soft hairs but no bristles. .... 13. *C. pterocarya*.  
 Fruiting calyx, including pedicel, three lines long or more; calyx-segments densely covered with long soft hairs.  
 Lower leaves about 1 line wide; calyx-segments silky-villous. .... 14. *C. crinita*.  
 Lower leaves 2 to 3 lines wide; calyx-segments hirsute. .... 15. *C. barbipera*.

## 2. Nutlet surface smooth.

Nutlets ovate-lanceolate.  
 Stems strigose; plants of interior foothills and mountains.

- Spreading montane plants, 2 to 4 in. high. .... 16. *C. glomeriflora*.  
 Erect foothill plants, 5 to 18 in. high. .... 17. *C. flaccida*.  
 Stems with spreading pubescence; coast or coast ranges. .... 18. *C. leiocarpa*.  
 Nutlets ovate-acute.  
 Plants stout; calyces with stiff bristles, fruiting calyx-lobes elongated. .... 19. *C. torreyana*.  
 Plants slender; calyces with softer bristles, fruiting calyx-lobes scarcely if at all elongated. .... 20. *C. affinis*.

1. *C. micrantha* (Torr.) Jtn. Stems slender, leafy, 2 to 5 in. high, diffusely much-branched from the base; root carrying purple stain; herbage grayish with somewhat appressed hispid hairs; leaves linear, 2 lines long; flowers in the axils of the leaves or crowded in leafy clusters at the ends of the branchlets; calyx-lobes oblong, obtuse; corolla 1 line long, the throat obscurely appendaged; nutlets ovate, acuminate, purplish-gray, polished, one or more commonly mucronulate.—Desert or arid valleys and mountain slopes, 1000 to 6000 ft.: Mohave and Colorado deserts and their bordering ranges s. and w.; San Bernardino Valley. Apr.-June. (*Eremocarya micrantha* Greene.) Var. *LEPIDA* Jtn. Stems less slender and only sparsely hispid; corolla larger with the appendages in the throat less obscure.—Montane, 4500 to 6800 ft.: San Bernardino and San Jacinto mountains to mts. of e. San Diego Co. June-Aug. (*Eremocarya lepidica* Greene.)

2. *C. costata* Bdg. Stem profusely branched throughout, 3 to 6 in. high; stems and leaves gray with appressed hispid hairs, these interspersed with more sparse spreading longer and stiffer hairs; leaves lanceolate, the lower leaves ¾ to 1 in. long; flowers minute, in dense leafy-bracteate spikes, the bracts and sepals closely beset with long rigid white or yellowish bristles with softer shorter hairs between; sepals lanceolate, 1 to 1½ lines long, in fruit twice as long; nutlets ovate, ½ line long, minutely roughened but shining, rounded on the back, with sharp edges, the ventral groove dilated from above the middle downward.—Desert valleys, 200 to 1000 ft.: Colorado Desert; n. to Death Valley region.

3. *C. racemosa* (Wats.) Greene. Stem profusely branched throughout, ½ to 1 or 2 ft. high, the ultimate branchlets almost filiform, the main stem and larger branches woody; herbage hispid with spreading bristles or the stem mostly strigose-hispid; leaves linear, ½ to 1 in. long; inflorescence loosely racemose-paniculate, the lowest flowers often on spreading pedicels, the upper nearly sessile; calyx in fruit usually about 1 line long, the segments lanceolate, bristly-hispid; corolla limb 1 line in diameter; nutlets ovate-lanceolate, unequal (the 3 smaller becoming free from the gynobase earlier, the fourth sometimes abortive), ½ line long, gray, mucronulate, the brown endocarp showing through the white coat, the margins whitish, sharp, the ventral groove open and gradually widening at base.—Deserts: Inyo Co.; Mohave and Colorado deserts; s. to L. Cal., e. to Ariz.

4. *C. ramosissima* (Gray) Greene. Stem usually stout with many ascending branches, 5 to 11 in. high; herbage rufescent, hispid, often, also, with more appressed finer hairs; leaves linear, somewhat thickened, ½ to 1 in. long; spikes elongate in age, rather densely flowered, more or less leafy-bracteate; calyx-segments linear, 1 line long with stiff bristles of about the same length among softer hairs; corolla minute; nutlets smooth, usually solitary, lanceolate, ½ to ¾ line long, pale brownish-green with translucent pericarp, abruptly acute-margined; groove closed in perfect nutlets.—Deserts and desert mts., Inyo Co. to Colorado Desert; s. to L. Cal.

5. *C. recurvata* Cov. Stem slender, more or less branched from below, 2 or 3 to 8 in. high; herbage appressed-hispid, or the leaves with somewhat spreading hairs; leaves linear-oblongate, ¼ to ¾ in. long; spikes in 2s or 3s. naked, becoming loose; calyx in fruit recurved, 1 to 1½ lines long, hispid-bristly with stiff divergent hairs; corolla minute, scarcely exerted; nutlet single, not 1 line long, ovate-lanceolate, muriculate, rounded on the angles, slightly incurved at apex, adherent to columnar gynobase for half the length of the closed ventral groove.—Mts. of Inyo Co.: White Mts.; Panamint Mts.

6. *C. angustifolia* (Torr.) Greene. Stem diffusely branched from base, 3 to 9 in. high; herbage densely hispid with white hairs which are commonly



pustulate at base; leaves narrowly linear, 3 to 8 lines long; flowers in dense spikes; sepals narrowly linear, 1 to 1½ lines long, densely covered with stout rigid often yellowish bristles nearly as long; corolla minute, exserted; nutlets ovate-lanceolate, about ½ line long (or 1 or 2 shorter, these sometimes abortive), minutely white-papillate upon purplish-gray, the ventral groove widened toward the base.—Colorado and Mohave deserts, n. to Inyo Co.; e. to Ariz. Mar.-May.

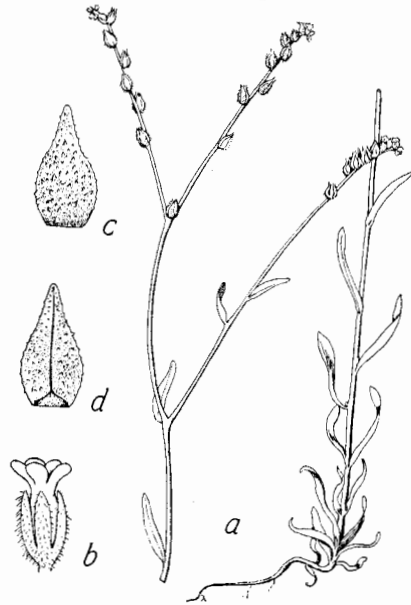
7. *C. holóptera* (Gray) Mebr. Stem paniculately branched, 1 ft. high; or in depauperate specimens less than 3 in.; herbage gray with spreading (or on the stems appressed) hispid hairs; leaves lanceolate, ½ to 1½ in. long, thickly white-dotted with the white pustules at the bases of the hairs; spikes naked or bracteate only at base, paniculate, finally elongate; calyx segments lanceolate, ¾ (in fruit 1½) lines long, armed with bristles nearly as long, the midrib prominent at base; corolla minute; nutlets ovate, ¾ line long, wing-margined, white-papillate upon a purplish-gray ground, the ventral groove open from the middle downward.—Colorado and Mohave deserts; n. to Inyo Co.; e. to Ariz. Mar.-Apr.

8. *C. micrómeres* (Gray) Greene. Stem slender, rather widely branched above the base, 4 to 9 in. high; herbage rough-hirsute almost throughout, the hairs not white; leaves oblong to linear, ¼ to 1 in. long; spikes mostly terminal or subterminal, ebracteate, not dense, 2 to 4 in. long; calyx ½ line long; nutlets ovate, acute, ½ line long, minutely papillate, ventral groove opening at base.—Foothills: South Coast Ranges from Contra Costa Co. to Monterey Co. and s. to San Diego Co.; Amador Co.

9. *C. muriculáta* (A.D.C.) Greene. Stem robust, branching, ½ to 1¼ ft. high; herbage rough-hirsute or hispid; leaves linear, ½ to 1 in. long; spikes well-developed, rather dense, mostly in 2s and 3s at the end of the branches; calyx 1½ lines long; corolla 2 to 3 lines broad; nutlets 1 line long, muriculate-papillose, and somewhat rugose on the back; ventral groove and its basal bifurcation mostly closed; lateral angles acutish, distinct.—Montane, 2000 to 8000 ft.: Coast Ranges from Sonoma Co. s.; Santa Inez Mts.; Sierra Nevada from Mariposa Co. southward; San Gabriel Mts. Var. *VITRÉA* Jepson n. comb. Profusely branched and vigorous, very floriferous; flowers much smaller; nutlets broader. — S. Sierra Nevada in Fresno Co. (*C. vitrea* Eastw.)

10. *C. ambigua* (Gray) Greene. Fig. 803. Stem much branched from the base, ½ to ¾ ft. high; herbage rough-hirsute throughout; leaves linear, 1 to 1½ in. long; spikes 1 to 2¾ in. long, commonly very loose below, ternate or geminate, often pedunculate; calyx-segments linear, 1 to 1½ (or in fruit 2½) lines long, more densely hispid-bristly towards the base; corolla 2½ to 3 lines broad; nutlets gray, 4 or 3, narrowly ovate, papillate but not pointed or prickly, the lateral angle obtuse and the groove more or less closed, with the basal bifurcation open-areolate (or sometimes closed). — Mountain slopes, 1500 to 6000 ft.: inner North Coast Ranges from Lake Co. to Siskiyou Co., thence s. in the Sierra Nevada to Tulare Co.

11. *C. intermédia* Greene. Stem more or less diffusely branched



803. *Cryptantha ambigua* Greene; a, habit x ½; b, fl. x 4; c, nutlet, dorsal view x 8; d, nutlet, ventral view x 8.

from base, ½ to 1 ft. high; herbage hispid with appressed and spreading hairs; leaves lanceolate or linear, ½ to 1 in. long; spikes naked, in 2s or 3s, finally much elongated so that the flowers are remote; calyx-segments linear, scarcely 1 line long, in fruit often 2 to 3 or 4 lines long, hispid and armed with bristles 1 to 1½ lines long; corolla 2 lines broad; nutlets ovate, acuminate, roughened with unusually sharp-pointed papillae, the ventral groove open and widening at base.—Hills and valleys, 1000 to 4000 ft.: coastal S. Cal.; Colorado and Mohave deserts; Tehachapi Mts.; Inyo Co. Var. *DUMETORUM* Jepson n. comb. Diffuse flexuous branches ½ to 1 ft. high; leaves lanceolate, ½ to 1 in. long, densely studded with the conspicuous white pustules at the base of the hairs; spikes single, in 2s or 3s, finally elongating so that the flowers are distant.—Mohave Desert and bordering ranges. (*Krynitzkia dumetorum* Greene.)

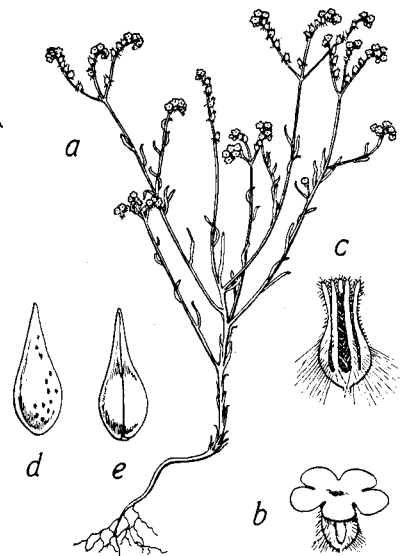
12. *C. utahénsis* Greene. Stem branched from base, ½ to 1 ft. high; herbage strigose-hispid; leaves linear, ¼ to ¾ in. long; spikes in 2s or 3s, very short; calyx 1 line long, rather densely silky-pubescent, not at all bristly; corolla 1½ lines broad; nutlets (often solitary and adhering closely to gynobase) ovate-acuminate, sharp on the edges, 1¼ lines long, papillate and somewhat nerved dorsally, the ventral groove gradually widening toward base.—Desert valleys, 2000 to 4000 ft.: cent. and e. Mohave Desert; Inyo Co.; e. to Utah. May.

13. *C. ptérocárya* Greene. Stem slender and loosely branched or diffusely much branched from base, 6 to 9 in. high; herbage hispid with appressed or spreading hairs; leaves linear, ½ to 1 in. long; spikes short, at first glomerate, in 2s or 3s; calyx in fruit 2 lines long, the segments with a few stiff bristles, linear at first, in fruit becoming ovate, the midrib prominent; corolla not 1 line broad; nutlets ovate, papillate on the back, the edges produced into broad scarious somewhat crenate wings (or 1 nutlet wingless), the ventral groove open or closed, with open forks at base.—Colorado and Mohave deserts; e. side Sierra Nevada from Inyo Co. to Lassen Co.; n. to Wash., e. to Tex. Apr.-June. Var. *PURPUSII* Jepson n. var. Inflorescence denser; calyces smaller; nutlets with narrow wing (one wingless).—Argus Mts. (*Purpus* 5433, type).

14. *C. crinita* Greene. Stem rather strictly branched from near base, 7 to 12 in. high; herbage hirsute; the pustulate bases of the hairs giving them a salty appearance; leaves linear, ½ to 1 in. long; spikes elongate, very dense, on very slender peduncles, the shaggy-hirsute covering of the calyces almost concealing the individual flowers; calyx-segments linear, obtuse, in fruit 2½ to 3 lines long; corolla 1½ to 2 lines broad; nutlet solitary, sharply acuminate, with granular brittle pericarp, 1½ lines long, the ventral groove open at the base.—Creek bottoms, 500 ft., Shasta Co. Apr.-May.

15. *C. barbigerá* Greene. Stem freely branched from base, ¾ to 1 ft. high; herbage hispid and hirsute; leaves oblong-linear, ½ to 1½ in. long; spikes solitary or paniculate, becoming elongated, the flowers at length remote and less secund; calyx-lobes linear-attenuate, in fruit 3 to 4 lines long, armed with numerous bristles 1½ to 2 lines long and also white-villous; corolla 2 to 3 lines broad; nutlets mostly 1, ovate, acuminate, 1 line long, the grayish-brown surface thickly studded with white papillae, the ventral groove open, dilated at base; gynobase subulate with the infertile ovary-lobes persistent.—Santa Barbara Co.; Colorado and Mohave deserts; Inyo Co.; e. to Utah and Ariz. Apr.-May. Var. *INOPS* (T. Bdg.) Mebr. Branches slender, terete, divaricate to flexuous.—Colorado and Mohave deserts, n. to Inyo Co. Apr. (*Krynitzkia barbigerá* var. *inops* Bdg.)

16. *C. glómeriflora* Greene. Stem diffusely branching from base, 2 to 4 in. high; herbage hispid; leaves linear-oblong, ¼ to ½ in. long; flowers in glomerules of 2 or 3 at the ends of the branches and in the axils of even the lowest leaves; calyx-segments linear, ½ line long, armed with bristles as long; corolla very minute; nutlets smooth and shining, ovate, acute, the ventral groove open only at base.—Montane 6000 to 10,300 ft.: Sierra Nevada from Nevada Co. to Tulare Co.; White Mts. July.



804. *Cryptantha flaccida* Greene; a, habit x  $\frac{1}{4}$ ; b, fl. x 4; c, fr. calyx x 4; d, nutlet, dorsal view x 8; e, nutlet, ventral view x 8.

17. *C. flaccida* (Dougl.) Greene. Fig. 804. Stem strictly and rigidly erect, with few ascending branches at the top,  $\frac{3}{4}$  to  $1\frac{1}{4}$  ft. high; leaves linear; spikes 2 to 4 in. long, at length not crowded; corolla nearly or quite 1 line broad; fruiting calyx  $1\frac{1}{2}$  lines long, appressed to the rachis, its narrowly linear segments thickish at base, connivent above, nearly twice as long as the nutlet, hispid and bearing toward the base a deflexed tuft of bristles; nutlet 1, ovate, rostellate-acuminate at apex, smooth and shining, the groove enlarged below but not forked.—Gravelly hillslopes or valleys, 500 to 4000 ft.: throughout cismontane Cal. Apr.-June.

18. *C. lilocarpa* (F. & M.) Greene. Stem commonly branched from the base, with many erect or ascending branches, 5 to 18 in. long; branches mostly simple below, branching above, and bearing many spikes which are often more or less congested; herbage hirsute or hispid with spreading hairs; leaves linear,  $\frac{1}{2}$  to 1 or  $1\frac{3}{4}$  in. long; spikes leafy-bracted, rarely bractless, the terminal longer and interrupted, the lateral short and glomerate; calyx-lobes short-linear, hispid-bristly, 1 line long; nutlets usually 4, rarely 1, narrowly ovate, acute,  $\frac{2}{3}$  line long, the ventral groove not forked, or scarcely so.—Sandy lands near the coast: Humboldt Co. to Monterey Co. May-June. Bristles often pustulate-dilated at base. Nutlets mottled transversely on the ventral side and longitudinally on the back. (*C. hispidiissima* Greene.)

19. *C. torreyana* (Gray) Greene. Stem erect, usually stout, branched from the middle and sometimes from the base; herbage markedly hispid; leaves linear,  $1\frac{1}{2}$  to  $2\frac{1}{4}$  in. long; spikes commonly elongated, loose below, frequently geminate; calyx-segments very bristly, elongating in fruit; nutlets ovate, acute, the groove forked at base, the fork sometimes minute.—Hillslopes, 1500 to 5000 ft.: Mt. Hamilton Range; North Coast Ranges; Sierra Nevada from Tehama Co. to Kern Co. Apr.-June. Var. *incana* Jepson n. comb. Whole plant gray with dense spreading hispid hairs and (on the stems) finer strigose hairs; calyx elongating less in fruit.—Nine-Mile Creek, Tulare Co. (*C. incana* Greene.)

20. *C. affinis* Greene. Stem slender, branching,  $\frac{1}{2}$  to 1 ft. high; herbage hispid with rather short hairs; leaves oblong to oblanceolate,  $\frac{1}{2}$  to  $1\frac{1}{4}$  in. long, those of the main stem often opposite; spikes simple or in pairs, leafy at base, interrupted; flowers minute; calyx-segments narrowly linear, 1 to  $1\frac{1}{2}$  lines long, not elongating in fruit, rather sparsely armed with stiffish bristles; nutlets ovate, acute or acuminate, rounded on the back, smooth and shining, mottled,  $\frac{3}{4}$  line long, attached only up to the middle to the gynobase, the ventral groove closed to base.—Montane, 4000 to 7500 ft.: San Bernardino Mts.; Sierra Nevada from Tulare Co. to Shasta Co.; North Coast Ranges from Lake Co. to Siskiyou Co.; n. to Wash. and Ida. June-July.

#### 14. ALLOCARYA Greene

Low herbs of wet ground, mostly branching from the base. Leaves linear or narrow, entire, the lowest always opposite. Pedicels persistent. Calyx 5-parted to the base, indurated and somewhat accrescent in fruit. Corolla white with yellow throat, salverform, with short tube; processes or crests

in the throat none or weakly developed. Nutlets ovate or lanceolate-ovate, smooth, rugose, tuberculate or even with barbed or prickly points, often carinate on one or both sides. Scar of the nutlet basal or above the base, concave or sometimes raised and stipe-like. (Greek *allos*, diverse, and *karua*, nut, the plants separated from *Cryptantha* on account of the different fruits.)

#### A. PERENNIALS; HERBAGE WITH A DENSE COVER OF LONG SOFT HAIRS.

Nutlets gray, rugose, the lateral angles carinate.....1. *A. mollis*.  
Nutlets brown, reticulate, without lateral carina.....2. *A. vestita*.

#### B. ANNUALS.

##### 1. Scar basal or very nearly so, not excavate or at least not deeply so.

Nutlets drawn to a lanceolate point above the middle.  
Scar exactly basal; calyx strongly accrescent.....3. *A. glabra*.  
Stems fistulous-enlarged; nutlets strongly 3-carinate dorsally.....4. *A. stipitata*.  
Stems not fistulous; nutlets lightly 3-carinate dorsally.....5. *A. ambigens*.  
Scar not exactly basal; calyx not accrescent or not markedly so.  
Northern Sierra Nevada.....6. *A. cooperi*.  
Mohave Desert.....7. *A. cooperi*.  
Nutlets ovate or ovoid; scar extending a little way up one side from the base (except in no. 12).

Keel on ventral side of nutlets lying in a groove.  
Nutlets whitish or light-colored, perfectly smooth and shining.....7. *A. lithocarya*.  
Nutlets roughened, drab or brownish.....8. *A. chorisiana*.  
Keel on ventral side not lying in a groove or not obviously so.  
Nutlets not bristly.

Rugae not sharp or dentate.  
Ventral rugae or tuberculations distinct from carina or essentially so.  
Scar linear; nutlets transversely and closely rugulose.....9. *A. sculpta*.  
Scar ovate.

Surface of nutlets more or less reticulate, not tuberculate or scarcely so.....10. *A. minuta*.  
Surface of nutlets densely tuberculate.....11. *A. diffusa*.

Ventral rugae or tubercles more or less distinctly merged with carina.....12. *A. californica*.

Rugae sharp or dentate or muriculate.  
Scar linear; nutlets of a granitic cast.....13. *A. stricta*.  
Scar ovate; nutlets brown.....14. *A. trachycarpa*.

Nutlets microscopically bristly.  
Scar linear; bristles stout.....15. *A. hispida*.  
Scar ovate; bristles very slender.....16. *A. humistrata*.

2. Scar distinctly suprabasal, deeply excavate, large, usually half as large as the nutlet; nutlets with bristles or barbed prickles.

Nutlets not rugulose dorsally.  
Bristles scattered over the whole back of the nutlet.  
Bristles very unequal, not barbed.....17. *A. spiculifera*.  
Bristles subequal, barbed.....18. *A. greenii*.  
Bristles only on the dorsal ridge and marginal angles.....19. *A. austinae*.  
Nutlets more or less rugulose-areolate, the rugae bearing bristles.  
Rugae high; areoles tuberculate.....20. *A. acanthocarpa*.  
Rugae low; areoles smooth.....21. *A. scripta*.

1. *A. mollis* (Gray) Greene. Stems 1 to several from the base, spreading or ascending, 2 to 5 in. high; herbage densely clothed with long straight and rather soft hairs even to the calyx; leaves linear-lingulate, obtuse,  $1\frac{1}{2}$  to  $3\frac{1}{4}$  in. long; racemes dense, or at length looser, bractless; corolla  $2\frac{1}{2}$  to 3 lines broad; nutlets ovate, irregularly rugose or rugose-foveolate, more or less carinate on the back and at the lateral angles, the scar shortly ovate-lanceolate.—Moist alkaline flats and borders of ponds: Sierra Co. to Modoc Co.; n. to eastern Ore.

2. *A. vestita* Greene. Rank plant with ascending stems 1 to  $1\frac{1}{2}$  ft. high; herbage conspicuously pilose throughout even to the calyx; spikes 3 to 6 in. long, bractless; flowers about 2 lines broad; fruit not scattered; nutlets brown, nearly 1 line long, regularly reticulate on the back, carinate from the apex to below the middle (the carina there vanishing in the meshes of the reticulation) or not carinate, strongly ridged ventrally down to the roundish scar, which is bounded toward the base by a horseshoe-shaped ridge; epidermal cells microscopically muriculate.—Valley floors: Sonoma Co.; Tulare Co. An unusually localized distribution. (*A. mollis* var. *vestita* Jepson.)

3. *A. glabra* (Gray) Mcbr. Branched from the base, or strictly erect and simple, 5 to 6 in. high; rachis of the spikes fistulous-enlarged, the flowers

rather dense, but strictly unilateral in 2 rather marked rows; calyx-segments spatulate or ovate, very strongly callous-thickened toward the base, the sinus next the axis much deeper than the others, some of the outer sepals united nearly to the summit in some cases; nutlets finely tuberculate, carinate dorsally and with rather sharp lateral angles.—Salt marshes, e. side San Francisco Bay and s. to Santa Clara Co. (*A. salina* Jepson.)

4. *A. stipitata* Greene. Branches many from the base, mostly simple, slender, somewhat spreading, commonly 9 to 12 in. long; herbage sparsely setulose; leaves linear-oblongate, 1 to 3 in. long, or the basal obovate or oblong, attenuate into a long petiole; pedicels turbinate-thickened beneath the flower; corolla 2 to 3 lines broad, white with yellow eye or the eye changing to white; sepals at length brownish and often spreading, strongly accrescent, becoming 3 to 4 lines long; nutlets obscurely constricted at base, somewhat flattened on the back, rugose and more or less finely tuberculate, strongly carinate ventrally, the dorsal carina obsolete just above the middle.—Plains, very common: inner Coast Range valleys; Great Valley; Sierra Nevada foothills. Apr.-May. Var. *MICRANTHA* Mcbr. Corolla 1 to 2 lines broad.—With the species.

5. *A. ámbigens* Piper. Four to 6 in. high; herbage nearly glabrous except on the younger parts; calyx only slightly accrescent; corolla  $1\frac{1}{2}$  to 2 lines broad; nutlets as in *A. stipitata* except that the scar is basally oblique.—Plumas Co.

6. *A. cóoperi* (Gray) Greene. Diffusely branched from the root, 4 to 8 in. high; leaves linear, somewhat succulent,  $\frac{1}{2}$  to 1 in. long, the basal 1 to  $2\frac{1}{2}$  in.; calyces densely white-hispid; nutlet ovate-triangular, obcompressed, abruptly contracted above the middle, ventrally reticulate-rugulose, dorsally transversely rugulose, the scar shortly sub-linear.—Mohave Desert; n. to Inyo Co.

7. *A. lithocárya* (Gray) Greene. Stems 7 to 10 in. high; leaves linear, 1 to  $1\frac{1}{2}$  in. long; racemes becoming loose and more or less leafy-bracted; nutlets smooth and vitreous-shining, whitish or somewhat mottled, lightly carinate dorsally, the ventral keel hidden by lateral folds for nearly its entire length; scar narrowly linear, likewise hidden by the folds.—Lake and Mendocino Cos.

8. *A. chòrisiàna* (Cham.) Greene. Diffuse (or at first erect) with reclining branches 7 to 16 in. long, strigose throughout and very leafy below; basal leaves linear-elongated, 2 to 4 in. long; racemes elongated, at length very loose, leafy below; fruiting pedicels 3 to 6 lines long, seldom only 1 line long; calyx little accrescent, about 1 line long, the segments at length spreading; corolla 3 to 4 lines wide; nutlets ovate,  $\frac{1}{2}$  line long or a trifle more. dark brown, carinate ventrally only, or also dorsally toward the apex, more or less rugulose or minutely tuberculate; ventral carina set in a groove; scar linear.—Low ground towards the coast, sw. Solano Co. to Monterey Co. Apr.-June. Var. *MYRIANTHA* Jepson n. comb. Pedicels nearly all shorter than the calyx; corolla 1 to  $1\frac{1}{2}$  (or  $2\frac{1}{2}$ ) lines broad; nutlets brownish, rugulose, minutely tuberculate, carinate half-way down the back.—Monterey coast from Monterey to San Simeon. (*A. myriantha* Greene.) Var. *HICKMANNII* Jepson n. comb. Like var. *myriantha* but obscurely tuberculate, scarcely rugulose.—Southern Monterey Co. (*A. hickmannii* Greene.) Var. *UNDULATA* Jepson n. comb. Nutlets closely rugulose, not tuberculate.—Santa Barbara. (*A. undulata* Piper.)

9. *A. scálpita* Piper. Stems loosely branched, 5 to 8 in. high; nutlets keeled dorsally only near the apex, closely transverse-rugulose; scar ovate.—Humboldt Co.

10. *A. minúta* Piper. Stems erect, 6 to 10 in. high; nutlets closely reticulate with fine ridges, keeled dorsally near the apex, the surface not tuberculate or scarcely so, scar ovate; epidermal cells microscopically muriculate.—Mendocino and Humboldt Cos. Var. *RETICULATA* Jepsor n. comb. Nutlet reticulate, the areoles large, smooth; no dorsal keel.—Humboldt Co. (*A. reticulata* Piper.)

11. *A. diffúsa* Greene. Branches several from the base, decumbent or spreading, 5 to 8 in. long; corolla 1 to  $1\frac{1}{2}$  lines broad; nutlet transversely rugulose-reticulate on back and finely tuberculate; scar ovate; epidermal cells microscopically muriculate.—Valleys about San Francisco Bay.

12. *A. califòrnica* (F. & M.) Greene. Similar in habit to *A. stipitata*; flowers 1 to  $1\frac{1}{2}$  lines broad; nutlets ovate, carinate ventrally and a little past the apex dorsally, usually grayish, closely rugulose dorsally; scar not raised, nearly basal, ovate or sometimes linear (even on same plant).—Throughout montane Cal., but most common in the North Coast Ranges and n. Sierra foothills.

13. *A. strícta* Greene. Stem slender, strictly erect, commonly branching freely from the base, 6 to 15 in. high; stems and leaves glabrous or nearly so; spikes very dense; corolla 2 lines broad; nutlet keeled to the middle and transversely rugulose dorsally, the rugae sharp, the interspaces very narrow but more or less tuberculate; scar linear.—Upper Napa Valley.

14. *A. tràchycárpá* (Gray) Greene. More or less diffuse or decumbent; racemes leafy throughout or nearly so; calyx-segments spreading; corolla small, 1 to  $1\frac{1}{2}$  lines broad; nutlets broadly ovate, transversely and sharply rugose and papillate or muricate, carinate ventrally and dorsally; dorsal rugosities commonly simple, and keel mostly dentate-interrupted; scar deltoid-obicular, nearly basal.—Sacramento and San Joaquin valleys and w. to Sonoma and Monterey Cos.

15. *A. hispídula* Greene. Spreading, 2 to 6 in. high; herbage hirsutulose; nutlet finely tuberculate, rugulose-reticulate, microscopically bristly on the ridges, carinate ventrally; scar linear, not excavated; bristles more or less barbed at tip.—Montane, 5000 to 8000 ft.: Sierra Nevada; San Bernardino Mts. Var. *PENICILLATA* Jepson n. comb. Nutlets with the barbed bristles tufted, especially on the tubercles; scar excavated.—Sierra Nevada, 5000 to 8700 ft. (*A. penicillata* Greene.)

16. *A. humistráta* Greene. Branches stoutish, mostly prostrate, 6 to 12 in. long; pedicels short and stout, commonly deflexed; calyx markedly accrescent, in fruit 4 to 6 lines long; nutlets muriculate and sharply rugulose, bearing minute penicillate bristles; scar roundish, exactly basal.—San Diego and n. to the San Joaquin Valley. Var. *SIMILIS* Jepson n. var. Scar ovate, oblique at the base.—E. Contra Costa Co. (Antioch, K. Brandegee, type).

17. *A. spiculífera* Piper. Branches spreading, 4 to 8 in. long; nutlet covered with short spines which arise from the dorsal keel and from low reticulations, some of the spines barbed at tip; scar deltoid, bordered by a flange-like margin.—Tulare Co. plains.

18. *A. greénei* (Gray) Greene. Diffusely branched from the base, the straggling branches 5 to 15 in. long; herbage strigulose-pubescent; leaves linear-oblongate; racemes simple, leafy or bracteate below, the flowers scattered; nutlets broadly ovate, 1 line long, carinate, densely and minutely tuberculate and well armed with slender barbed prickles; prickles  $\frac{1}{4}$  to  $\frac{1}{2}$  line long, quite distinct at base.—Grassy clay hills or adobe plains, northern Sierra foothills from Calaveras Co. to Siskiyou Co.; n. to Ore. Var. *HYSTRICULA* Jepson n. comb. Bristles very short (about  $\frac{1}{4}$  the length of the nutlet), densely barbed throughout, disposed in rows, either crowded or interrupted, but so arranged as to make the surface somewhat areolate; areoles covered with fine tubercles.—Low plains, Solano Co. (*A. hystriacula* Piper.)

19. *A. austinae* Greene. Erect, 6 to 9 in. high; herbage almost glabrous; leaves linear,  $1\frac{1}{2}$  to 3 in. long; surface of nutlet densely tuberculate, the dorsal keel and lateral angles armed with stout bristles; bristles barbed from midway up.—N. Sierra Nevada foothills and bordering plains from Amador Co. to Shasta Co. Var. *CRISTATA* Jepson n. comb. Surface of nutlet not tuberculate.—Calaveras Co. (*A. cristata* Piper.)

20. *A. acánthocárpá* Piper. Branches several from the base, simple, 4 to 6 in. high; corolla  $\frac{3}{4}$  line wide; keel and ridges of the lateral reticulations armed with bristles; interspaces tuberculate.—San Joaquin Valley in Kern Co. Var. *ECHINÁCEA* Jepson n. comb. Reticulations of the nutlet small; bristles of the nutlet very numerous.—Great Valley and South Coast Ranges

to San Diego Co. (*A. echinacea* Piper.) Var. *OLIGOCHAËTA* Jepson n. comb. Bristles very few.—E. Contra Costa Co. (*A. oligochaeta* Piper.)

21. *A. scripta* Greene. Branches prostrate, 6 to 10 in. long; back of the nutlets smooth and brown, except as marked by sharp white-reticulated ridges, these irregularly beset with tufts of spreading bristles.—Sacramento Valley.

### 15. *ECHÍDIOCARYA* Gray

Annual herbs with the lower leaves opposite. Flowers in racemes. Nutlets strongly incurved, dorsally rugose; scar elevated on a conspicuous slender projection or stipe. Ventral keel prominent, continuous downward and joined to the base of the stipe. (Greek echidion, a diminutive viper, and carua, nutlet, the stipe suggestive of the head and neck of a snake.)

1. *E. californica* Gray. Stems several or numerous from the base, diffuse or prostrate, mostly slender, often very leafy, 5 to 14 in. long, flowering for  $\frac{2}{3}$  or more of their length; herbage hispid or hirsute; leaves linear; racemes spike-like, mostly bractless, in age remotely flowered; calyx cleft nearly to the base; corolla  $1\frac{1}{2}$  to 3 lines wide; nutlets usually 4, ovate,  $\frac{3}{4}$  line long, the median dorsal ridge well-marked towards apex, the ridges of the lateral angles not conspicuous and blending with the transverse ridges of the back which connect to form polygonal areas.—Mesas, 100 to 1500 ft., coastal S. Cal. from the Santa Inez Mts. to San Diego Co. Var. *URSINA* Jepson n. comb. Stems stout, short, depressed; nutlets about 1 line long, the dorsal ridges few.—Summit valleys, San Bernardino Mts. (*Plagiobothrys ursinus* Gray.)

### 16. *PLAGIOBÓTHRYS* F. & M. POP-CORN FLOWER

Rather slender annuals. Herbage soft-pubescent, the hairs often rusty when young, especially on the calyx. Leaves alternate, mostly in a basal rosette. Flowers in spike-like, elongated, loose and sometimes leafy racemes or sometimes glomerate. Pedicels very short or almost none, filiform, persistent. Corolla short, white, with crests or processes at the mouth of the throat. Nutlets ovate, carinate on both sides towards the apex and often also laterally margined, on the back rugose or roughened; insertion above the base or median, the scar raised and rounded and leaving a corresponding depression on the receptacle or gynobase. (Greek plagios, on the side, and bothrus, pit or excavation, the first known species having a hollow scar.)

Caruncle rounded or circular in outline; nutlets ovate or cruciform.

Flowers in an elongated raceme; caruncle firm or cartilaginous, borne at or a little below the middle of the nutlet in a transverse groove and thus lying below the ventral keel; basal rosette of leaves conspicuous; mature nutlets 1 to 4. Calyx-lobes erect or spreading, not circumscissile; mature nutlets usually 4.

Nutlets with the back marked off by transverse lineate grooves into broad flattish ridges.

Plants conspicuously purplish; nutlets ovate, constricted only at apex, the base rounded, dark-colored.....1. *P. torreyi*.

Plants not purplish or rarely so; nutlets strongly constricted at apex and at base, and thus cruciform, vitreous-shining or glassy.

Calyx about twice as wide as long; racemes not bracteate or only at base; stems many from base, slender...2. *P. tenellus*.

Calyx nearly as broad as long; racemes bracteate; stems few, stout.....3. *P. shastensis*.

Nutlets with transverse dorsal ridges very thin and sharp, the ridges rather widely separated, so that, with the 3 keels, there are enclosed depressed rectangular areas with granulate surface.

Caruncle conspicuous, ring-like or annular; calyx cleft to the base; corolla-tube exceeding the calyx; var. *campestris* of.....

4. *P. fulvus*.

Caruncle solid; calyx cleft  $\frac{2}{3}$  to base; corolla-tube not exerted from calyx.....5. *P. canescens*.

Calyx-lobes connivent over fruit, in age circumscissile; mature nutlets 1 or 2.

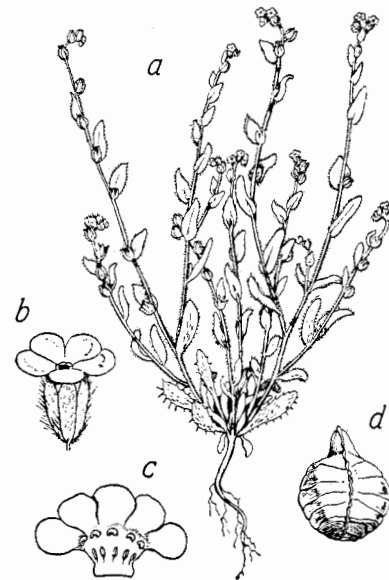
Flowers in forked racemes, not bracteate or only at base; stems mostly erect, rather tall (10 to 30 in. high); nutlets, in lateral outline, compressed.....6. *P. nothofulvus*.

Flowers in a long simple bracteate raceme; stems low (5 to 8 in. high), usually ascending, branched mainly below the middle; nutlets, in lateral outline, strongly arched.....7. *P. arizonicus*.

Flowers in a close cluster or glomerule; e. side Sierra Nevada.....8. *P. hispidus*. Caruncle elongated, extending along the median ventral keel; nutlets trigonous; deserts on e. side Sierra Nevada.

Nutlets irregularly rugose; corolla 2 to  $3\frac{1}{2}$  lines broad; flowers in a congested cluster or glomerule; var. *harknessii* of.....9. *P. kingii*. Nutlets regularly tessellate; corolla  $\frac{1}{2}$  to 1 line broad.....10. *P. jonesii*.

1. *P. torreyi* Gray. Fig. 805. Stems several to many from the base, erect or decumbent, commonly simple, 2 to 6 in. long, commonly rather densely leafy throughout; roots purple; herbage very dark green, conspicuously hispid; leaves oblong to oblong-ovate or linear, sessile, 5 to 10 lines long; racemes leafy-bracteate throughout, somewhat loose; calyx cleft nearly to base; corolla 1 to  $1\frac{1}{2}$  lines broad; nutlets commonly 4, ovate, dull or gray, somewhat constricted at apex, rounded at base,  $\frac{3}{4}$  to 1 line long, the dorsal ridge weak, produced around apex into the narrow and very prominent ventral keel; lateral angles well-defined, the back with transverse lineate grooves, thus separating the dorsal area into low ridges; caruncle small, sunken in the transverse groove.—Montane, 4000 to 8000 ft.: Sierra Nevada from Nevada Co. to Tulare Co. Var. *DIFFUSUS* Jtn. Stems diffusely spreading, more leafy; bracts larger; flowers more numerous.—Sierra Nevada.



805. *Plagiobothrys torreyi* Gray; a, habit x  $\frac{1}{2}$ ; b, fl. x 4; c, corolla spread open x 3; d, nutlet x 8.

2. *P. tenellus* Gray. Stems 1 to several from the base, commonly erect, simple or branching above, 3 to 7 (or 12) in. high; herbage pubescent or often hirsute with spreading hairs; leaves of the basal tuft oblong, acute or obtuse,  $\frac{1}{2}$  to 1 in. long; cauline leaves few, ovate or ovate-oblong, 2 to 6 lines long; spikes 1 to 3 in. long, comparatively few-flowered; calyx deeply cleft, at first rusty-yellowish, at length pale, sometimes imperfectly circumscissile; nutlets minute ( $\frac{1}{4}$  line long), shining and enamel-like on the back, papillate-scabrous on the lateral angles and often also on the rugae; rugae transverse, straight, smooth and low, separated by very fine lines.—Hill slopes, 100 to 2000 (or 3000) ft.: Coast Ranges; Sierra Nevada foothills; coastal S. Cal. May.

3. *P. shastensis* Greene. Stems erect, stoutish, one or few from the base, simple or branching above, 5 to 12 in. high; herbage thinly hirsute; leaves linear; racemes loose; calyx 2 to  $2\frac{3}{4}$  lines broad, scarcely longer, cleft to the middle; corolla  $1\frac{1}{4}$  lines broad; nutlets glassy, transversely lineate-grooved with broad flat ridges between the grooves.—Hillslopes and valleys, 500 to 2500 ft.: e. San Joaquin Co. to Butte Co.; Lake Co. to Siskiyou Co.; n. to southern Ore.

4. *P. fulvus* (H. & A.) Jtn. var. *campestris* (Greene) Jtn. Stems 1 or several from the base, erect or simple or branching only above, 1 to 2 ft. high; herbage hispid-hirsute; roots, petioles and midribs of leaves purple-dyed; herbage hirsute; leaves linear or lanceolate,  $\frac{1}{2}$  to  $3\frac{1}{4}$  in. long; racemes very loose and leafless; calyx-segments nearly distinct, lanceolate, connivent over the nutlets, more or less reddish even in age, 2 to 3 lines long in fruit; corolla 1 to 2 lines broad; nutlets usually 4,  $1\frac{1}{2}$  lines long, nearly 1 line wide in the middle, abruptly beaked, the transverse rugae more or less interrupted and often dot-like or granulate; median and lateral ridges prominent; caruncle raised and ring-like, bordering a deep circular excavation.—Plains and foothills, 100 to 1500 ft.: Sacramento Valley and its bordering foothills; s. to Mariposa, Santa Clara and San Luis Obispo Cos. Apr.-May. (*P. rufescens* var. *campestris* Jepson.)

5. *P. canescens* Benth. Stem divided at or near the base into long and straggling branches, rarely erect, the branches nearly or quite simple,  $\frac{1}{2}$  to 2 ft. long, loosely flower-bearing and leafy nearly throughout, or quite leafless above and spicate; herbage pale, hirsute; leaves oblong to linear, lanceolate or oblanceolate,  $\frac{3}{4}$  to  $2\frac{1}{2}$  in. long; calyx cleft to below the middle, the segments broadly lanceolate, in fruit circular-depressed, 2 to 3 lines long, the tips of the segments connivent over the nutlets; pedicels short, stubby, persistent, the calyx in age deciduous; nutlets commonly 4, incurved-connivent, rugose-reticulate, light gray, 1 line long, the areola smooth, longer transversely, and the lateral angles very distinct.—Low open hills and rolling plains, 100 to 1500 ft.: Sacramento and San Joaquin valleys and their bordering foothills; s. to San Diego Co. Apr. Var. *APERTUS* Greene. Calyx-segments stellately spreading; caruncle green, a small hollow like a pin point on the upper part of it.—Alameda and Santa Clara Cos. to San Diego Co.; also Great Valley. Var. *CATALINENSIS* Jepson n. comb. Herbage purple-stained; nutlets commonly 2.—Santa Catalina Isl. (*P. arizonicus* var. *catalinensis* Gray.)

6. *P. nothofolius* Gray. Stems slender, 1 to several from the base, erect or suberect, simple or forked only above, 1 to  $2\frac{1}{2}$  ft. high; roots, petioles and midribs of leaves purple-dyed; herbage silky-villous, the hairs very reddish when young, especially on the calyx and sometimes on the leaves; raceme forked once, twice or more, the inflorescence then paniculate, leafless or bracted only at base; leaves 1 to  $3\frac{1}{2}$  in. long, oblong-ovate or lanceolate, those of the basal tuft oblong-ovate or oblanceolate; calyx cleft to the middle,  $1\frac{1}{2}$  lines long, in fruit circumscissile below the middle, the upper part falling away and leaving the persistent base as a shallow cup about the nutlets; corolla 2 to 4 lines broad; nutlets 3 (sometimes 4, 1 or 2), ovate, narrowed to a stout apical beak, flat dorsally, dull; transverse ridges joining the median dorsal keel with the lateral keels complete (and thus making rectangular areoles) or incomplete; caruncle situated in the shallow transverse groove.—Foothills and valleys, 100 to 3100 ft.: Sierra Nevada foothills (common); Coast Ranges (frequent but usually not on the immediate coast); Great Valley (infrequent); s. to San Diego Co.; n. to Wash. Mar-May.

7. *P. arizonicus* (Gray) Greene. Stems several from the base, usually simple, erect or ascending, 8 to 15 in. high; herbage hispid with spreading hairs; leaves linear-lanceolate to linear; roots, midribs and margins of leaves purple, or occasionally the whole plant purplish; racemes elongated, remotely flowered, mostly naked above; calyx cleft nearly half-way to base, the oblong lobes connivent over the fruit, the lower portion at length circumscissile near base; corolla 1 to  $1\frac{1}{4}$  lines broad; nutlets 2 (sometimes 1, 3 or 4), ovate, light colored, abruptly narrowed to a stout beak,  $\frac{3}{4}$  to  $1\frac{1}{4}$  lines long; dorsal keel narrow, sharp; transverse ridges parallel, setting off rectangular areoles; caruncle seated in a transverse groove and thus sunken below the crest of the ventral keel.—Mts. on w. side Colorado Desert; w. side Mohave Desert; mts. on w. side upper San Joaquin Valley; Inyo Co.; e. to N. Mex. and southern Utah.

8. *P. hispidus* Gray. Stem erect, much-branched, 6 in. high; herbage roughly hispid; leaves linear-spatulate, the upper oblong; flowers in close clusters or glomerules; nutlets ovoid, acute, obscurely carinate on back, not rugose or muricate, but papillate-granulate; caruncle small, soft or fragile.—East side Sierra Nevada from Mono Co. to Lassen Co., thence nw. to Siskiyou Co.; w. Nev. to cent. Ore.

9. *P. kingii* (Wats.) Gray var. *harknessii* Jepson n. comb. Stem erect, branched, 4 to 8 in. high; herbage coarsely hirsute with spreading hairs; basal leaves spatulate, 1 to 2 in. long, the upper oblong or lanceolate about  $\frac{1}{2}$  in. long; flowers glomerate or becoming somewhat racemosely elongated; corolla 3 to 4 lines broad; nutlets interruptedly rugose or papillate.—E. side Sierra Nevada: Inyo Co.; Mono Lake; n. to eastern Ore. (*Sonnea harknessii* Greene.)

10. *P. jonesii* Gray. Stems few or several from the base, divergently branching, 5 to 8 in. high; herbage with spreading bristly hairs and also

finely pubescent with short mostly deflexed hairs; bristles mostly arising from a siliceous base or disk; leaves narrowly lanceolate,  $\frac{1}{2}$  to 1 in. long, or the basal linear-oblanceolate, 1 to  $1\frac{1}{4}$  in. long; calyx-segments linear, long-bristly, as well as with a shorter pubescence; corolla  $\frac{1}{2}$  to 1 line broad; nutlets  $1\frac{1}{2}$  lines long, strongly ridged dorsally and also with ridges at the lateral angles, the surface densely covered with flattened papillae, that is, tessellate; ventral keel well developed, merged below with the low narrow caruncle.—Desert valleys and cañons, 500 to 4000 ft.: Hanaupah Cañon, Panamint Mts.; Needles.

#### 17. *HARPAGONÉLLA* Gray

Small annual. Flowers minute, white, somewhat racemosely disposed at the ends of the branches. Calyx-lobes rather closely beset with soft hooked spines, in fruit very unequal, 3 nearly distinct, the other 2 more united and forming a bur-like envelope enclosing the 1 or 2 nutlets which are basally attached. (Diminutive of Latin *harpago*, a grappling-hook.)

1. *H. palmieri* Gray. Stem diffusely branched from the base, the branches 3 to 8 in. long; herbage thinly strigose-hirsute; leaves narrowly linear or very narrowly lanceolate,  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long; flowers 1 line long, on short pedicels which in fruit become strongly recurved and rigid; nutlets 1 or 2, smooth.—Dry slopes and mesas, 200 to 1500 ft., coastal S. Cal.: Santa Catalina Isl.; Murietta, w. Riverside Co.; El Cajon; San Diego; e. to Ariz.

*Lycópsis* L. Coarse setose-hispid annuals with small flowers and leafy bracts. Corolla with unequal lobes, the tube curved at the middle, the throat closed with hispid scales. Nutlets ovoid, coarsely reticulate-rugose; scar large, oval, excavated or perforate, bordered by a thickened cartilaginous ring. *L. ARVENSIS* L. Small Bugloss. Stems 1 to 2 ft. high, the spreading bristly hairs at length pustulate at base; leaves lanceolate, undulate-margined; flowers more or less racemose; corolla blue or at first purple, the tube not longer than the calyx, the lobes barely 1 line long.—Native of Eur.; adv. at Upland, San Bernardino Valley.

*Sýmphytum* L. Coarse perennial herbs with entire leaves. Flowers in forked scorpioid racemes. Corolla in ours purple, tubular, shallowly 5-lobed, its throat with 5 prominent lanceolate crests alternating with and as long as the stamens. Stamens included; style exerted. Nutlets 4, inserted by their bases. *S. ASPERRIMUM* Donn. Rough Comfrey. Stems 2 to 3 ft. high; herbage scabrous-hairy; leaves ovate- to oblong-lanceolate, acuminate, 4 to 7 in. long; flowers 7 lines long.—Native of Eur.: adv. at Arcata.

#### VERBENACEAE. VERBENA FAMILY

Ours herbs with opposite or whorled simple leaves. Flowers complete. Calyx persistent. Corolla in ours with a tube, the 4 or 5-lobed limb almost regular or manifestly 2-lipped. Stamens 4, in 2 pairs. Ovary superior, undivided, 2 to 4-celled, separating at maturity into as many 1-celled 1-seeded achene-like nutlets; style single, entire; stigmas 2 or 1. Nutlets usually rounded and often reticulate on back, the face with a commissural scar or area of coherence. Endosperm scanty or none.

Calyx 5-toothed; nutlets 4; diffuse or erect herbs ..... 1. VERBENA.  
Calyx 2-cleft; nutlets 2; creeping herbs ..... 2. LIPPIA.

#### 1. VERBENA L. VERVAIN

Erect or diffuse herbs. Flowers in terminal dense bracteate spikes. Calyx narrow, tubular, plicately 5-angled, 5-toothed. Corolla salverform, the limb 5-lobed, obscurely or slightly 2-lipped. Anthers ovate. Stigmas mostly 2-lobed, the anterior lobe larger and stigmatic, the posterior smooth and sterile. Fruit mostly enclosed by the calyx, finally separating into 4 nutlets. (Latin name of a sacred plant.)

Flowers in spikes; corolla  $1\frac{1}{2}$  to 2 lines long, its limb about 1 line broad; corolla-lobes not orbiculate.

Bracts shorter than the flowers.

Spikes filiform, the flowers or fruit scattered.

Annual; leaves 1 to 2-pinnately cleft or incised ..... 1. *V. officinalis*.