



Viola Hallii Gray. **Hall's Violet.** One of the most beautiful of western violets. The type specimen of the species was collected on the campus of Willamette University in 1870. Illustration from a drawing by Doctor Helen M. Gilkey. Cut presented by the class of 1914 of Willamette University.

A MANUAL OF THE HIGHER PLANTS OF OREGON

BY

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TO MY WIFE
WHO HAS BEEN THROUGH MANY YEARS
MY UNTIRING ASSISTANT
IN FIELD AND HERBARIUM, AND HAS
HAD A VERY LARGE PART IN THE
WORK OF ITS PREPARATION,
THIS BOOK IS INSCRIBED BY THE AUTHOR

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Annuals	
Corolla 1 cm. long or over	1. <i>N. aretioides</i>
Corolla 6 mm. long or less	2. <i>N. densum</i>
Perennial; stem woody below	3. <i>N. Lobbii</i>

1. *N. aretioides* (H. & A.) Brand. PURPLE NAMA. A harshly hirsute annual, prostrate or nearly so, dichotomously branched from the base, 4-12 cm. across; leaves linear-spatulate or oblanceolate, 1-1.5 cm. long; flowers sessile in the forks and in terminal leafy cymes; calyx-segments hirsute, in fruit subulate and 6-7 mm. long; corolla rose-purple, 12-15 mm. long, the limb 3-5 mm. broad; capsule less than half as long as the calyx, about 10-seeded.—Dry hills, Malheur Co., to Wyom., Ariz. and Calif.

2. *N. densum* Lam. MATTED NAMA. A depressed-spreading, hispid-pubescent annual, forming dense mats 5-20 cm. across, the branches stout, brittle, somewhat dichotomous; leaves very numerous, crowded toward the ends of the branches, oblanceolate, 1-2 cm. long; flowers sessile in the forks and upper axils; calyx-lobes narrowly linear, a little shorter than the corolla; corolla nearly tubular, about 3 mm. long, yellowish, with short blue or purplish lobes; styles united half their length or more.—Arid sandy areas east of the Cascades, to Nev., and Calif.

Var. *parviflorum* (Greenm.) C. L. Hitchc. Leaves less crowded toward the ends of the branches, elliptic-lanceolate to spatulate, up to 4 cm. long; corolla 4-5 mm. long.—Eastern Ore. to Wash., Idaho and Calif.

3. *N. Lobbii* Gray. LOBB'S NAMA. Perennial; herbage white-tomentose; stem creeping or ascending, woody below, 2-6 dm. long; leaves of the glandular vegetative shoots 2-3 cm. long, rather crowded, narrowly oblanceolate or linear, those of the flowering shoots about twice as long, few and not crowded; flowers in sessile or short-peduncled clusters in the upper axils; calyx about 4 mm. long, the segments narrowly linear; corolla purple, narrowly funnelform, 8 mm. long; style and ovary more or less densely pubescent.—Cascade Mts., southwestern Klamath Co., to Calif.

6. ERIODYCTION Benth.

Shrubby aromatic plants with alternate pinnately veined dentate leaves; inflorescence paniculately cymose; corolla rather small, campanulate or funnelform, without appendages; stamens included, the filaments somewhat adherent to the corolla-tube; ovary nearly or quite 2-chambered; styles distinct; capsule small, 4-valved.

1. *E. californicum* (H. & A.) Greene. YERBA SANTA. A glutinous shrub 3-24 dm. high; leaves lance-oblong to oblanceolate or linear-lanceolate, 6-16 cm. long, gradually narrowed to the short petiole, glutinous above, finely and densely white-felted between the veins beneath; flowers in dense, often broad panicles, the branches sparsely hairy; calyx 3-4 mm. long, not enlarging after flowering, cleft nearly to the base, the segments subulate; corolla tubular-funnelform, white or light bluish, 8-12 mm. long, the rounded spreading lobes 3 mm.; stamens and style included; capsule nearly globose, not surpassing the calyx.—Dry open ground, southern Jackson and Josephine Cos. to Calif. (*E. glutinosum* Benth.)

7. HESPEROCHIRON Wats.

Acaulescent perennials with ovate, spatulate, or oblong, entire leaves; scapes slender, 1-flowered, not surpassing the leaves; calyx 5-parted; corolla relatively large, campanulate or rotate; stamens borne on the base of the corolla-tube; ovary 1-chambered; style 2-cleft above; capsule loculicidal.

Leaves essentially glabrous; corolla nearly rotate	1. <i>H. pumilus</i>
Leaves pubescent; corolla campanulate	2. <i>H. californicus</i>

1. *H. pumilus* (Dougl.) Porter. DWARF HESPEROCHIRON. Erect or spreading, 4-12 cm. high; leaves glabrous except the ciliate margins, mostly oblanceolate to obovate or sometimes lanceolate, 2-6 cm. long, on petioles about as long; scapes usually few, seldom longer than the leaves; calyx-lobes ovate, ovate-lanceolate, or oblong, ciliate, unequal, about half as long as the corolla; corolla nearly rotate, 15-22 mm. in diameter, the ovate lobes more than twice as long as the tube, bluish to nearly white with darker veins.—Damp slopes and meadows at moderate altitudes east of the Cascades, to Wash., Idaho, and Calif. (*Capnoorea pumila* Greene).

Var. *ciliatus* (Greene) Brand. Leaves glabrous except the ciliate margins; flowers smaller, under 2 cm. wide.—With the species in our territory.

2. *H. californicus* (Benth.) Wats. CALIFORNIA HESPEROCHIRON. Grayish-pubescent; leaves spreading, broadly lanceolate to ovate, 2-4 cm. long, narrowed to petioles as long or shorter; scapes mostly numerous, equaling or shorter than the leaves; calyx-lobes linear-oblong, obtuse, often unequal, shorter than the corolla-lobes; corolla campanulate, 15-20 mm. long, white or pale bluish with darker veins, the ovate, obtuse lobes about equaling the tube.—Damp flats and meadows east of the Cascades, to Wash., Utah and Calif.

8. ROMANZOFFIA Cham.

Small perennial herbs with mainly basal, long-petioled, crenately lobed orbicular leaves; flowers rather small; sepals nearly distinct; corolla funnelform, white, without appendages; stamens unequal, borne near the base of the corolla; styles completely united; capsule 2-chambered with narrow placentae.

Peduncles much surpassing the orbicular leaves	1. <i>R. sitchensis</i>
Peduncles usually shorter than the reniform leaves	2. <i>R. unalaskensis</i>

1. *R. sitchensis* Bong. CLIFF ROMANZOFFIA. Stem slender, erect or reclining, branched, nearly glabrous or slightly pilose below, minutely glandular above, 6-30 cm. high; leaves long-petioled, glabrous, slightly fleshy, orbicular, 1-2.5 cm. wide, shallowly 5-9-lobed, the cauline few, sometimes with axillary bulblets; racemes loose, the pedicels much elongated in fruit; calyx-lobes lanceolate, 3-4 mm. long; corolla funnelform, white, 5-10 mm. long; capsule equaling or a little surpassing the calyx.—On moist cliffs in the Cascades and westward at moderate to rather high altitudes, to Alaska and Calif.

2. *R. unalaskensis* Cham. ALASKA ROMANZOFFIA. Herbage pilose; stems very short, leafless, or forked and bearing a single leaf; leaves fleshy, reniform, shallowly 9-lobed, 9-12 mm. broad, on petioles 2-6 cm. long; peduncles mostly shorter than the leaves; racemes short and few-flowered, the pedicels about equaling the calyx at flowering time; calyx-lobes oblong-lanceolate; corolla white, funnelform, 4-6 mm. long; capsule equaling to twice as long as the calyx.—Rocky banks and cliffs along the sea, southern Lincoln Co., northward to Unalaska.

95. BORAGINACEAE. BORAGE FAMILY

Herbs or shrubs with alternate simple and mostly entire leaves with no stipules; flowers in scorpioid racemes or spikes, usually regular; calyx deeply 5- or rarely 4-cleft or the sepals nearly distinct; corolla gamopetalous, usually small, the throat with more or less distinct inward protuberances; stamens 5, borne on the corolla-tube; carpels 2, the ovary superior, usually deeply 4-lobed or 4-parted, the stigma simple or 2-lobed; fruit commonly of 4 nutlets attached basally or by the inner face to a central axis or gynobase.

- Ovary not 4-parted, merely lobed or undivided
 Style 2-cleft; a small prostrate annual..... 1. *Coldenia*
 Style entire; a succulent perennial..... 2. *Heliotropium*
 Ovary 4-parted
 Nutlets evenly glochidiate-prickly over the back; corolla blue or purplish..... 3. *Cynoglossum*
 Nutlets not evenly glochidiate-prickly over the back
 Corolla orange or bright yellow; coarse hispid annuals..... 6. *Amsinckia*
 Corolla not orange or bright yellow
 Nutlets radially spreading, thin and flat, the margins hooked-bristly; low slender annuals..... 5. *Pectocarya*
 Nutlets not radially spreading, thin and flat
 Nutlets distinctly glochidiate-bristly, at least on the margins
 Small annuals; corollas very inconspicuous..... 12. *Lappula*
 Rather coarse perennials; corollas conspicuous..... 11. *Hackelia*
 Nutlets not glochidiate-bristly or only minutely so
 Fruiting calyx irregularly cut, not deeply parted, large and flaring..... 7. *Asperugo*
 Fruiting calyx not irregularly cut, deeply parted
 Nutlets attached by a deeply concave or cup-like base; corolla conspicuous, blue or purplish..... 4. *Anchusa*
 Nutlets not attached by a cup-like base
 Nutlets attached at or near the base to a flat or low-convex receptacle
 Corolla rotate or short-salverform..... 13. *Myosotis*
 Corolla tubular-campanulate
 Corolla bright blue, conspicuous..... 14. *Mertensia*
 Corolla pale yellowish or greenish..... 15. *Lithospermum*
 Nutlets attached by their inner angle or subbasally to a convex, conic, or pyramidal receptacle
 Corolla bright blue; low depressed perennials..... 10. *Eritrichium*
 Corolla white
 Nutlets attached by the inner angle along a groove that is commonly forked below; very stiff-bristly plants..... 8. *Cryptantha*
 Nutlets not grooved along the inner angle; more or less keeled, with definite scar; mostly not very stiff-bristly plants..... 9. *Plagiobothrys*

1. *COLDENIA* L.

Prostrate or spreading annuals or perennials; flowers small, sessile in the forks or at the ends of the branches and subtended by a tuft of leaves; calyx 4-5-parted; corolla funnelform or salverform, not more than twice as long as the calyx; style 2-cleft or 2-parted; ovary entire or 4-lobed, in fruit separating into 4 nutlets.

1. *C. Nuttallii* Hook. ANNUAL *COLDENIA*. Stem ascending or nearly prostrate, finely tomentose, .5-2 dm. long, dichotomously branched from near the base, the branches strongly divergent; leaves elliptic to ovate, 4-6 mm. long, densely scabrous-puberulent, the veins above deeply impressed, the slender petioles about equaling the blades; calyx villous and long-bristly, 3-4 mm. long, the lanceolate or linear lobes purplish; corolla purplish, about equaling the calyx; nutlets 1 mm. long, pale and shining.—Dry sandy ground east of the Cascades, to Wash., Ariz. and Calif.

2. *HELIOTROPIUM* L.

Herbs or shrubs usually with petioled leaves; calyx 5-cleft or 5-parted; corolla blue or white, salverform or funnelform, the throat unappendaged; ovary entire or 2-4-sulcate; style entire; fruit 2-4-lobed, separating at maturity into 4 1-seeded nutlets or a pair of 2-seeded nutlets.

1. *H. curassivicum* L. SEASIDE *HELIOTROPE*. A glabrous and glaucous fleshy perennial with stout, branching, decumbent stems 1-4 dm. long; leaves numerous, oblanceolate to obovate, 2-5 cm. long, obtuse, obscurely veined, the lower, or nearly all, narrowed to petioles; flowers in short, dense, geminate to somewhat paniculate, scorpoid spikes; fruiting calyx 3-4 mm. long, the oblong lobes erect; corolla white with yellow center, often turning blue, the tube about equaling the calyx, the limb 6-8 mm. wide; fruit globose, shorter than the calyx, finally splitting into 4-nutlets.—Damp, especially saline ground east of the Cascades to Wash., Calif. and across the continent.

3. *CYNOGLOSSUM* [Tourn.] L.

Annual, biennial, or perennial, mostly large herbs; calyx deeply

5-cleft, enlarging in fruit; corolla purple, blue, or white, funnelform or salverform, the tube short, the throat closed by 5 appendages; ovary 4-parted, forming in fruit 4 divergent nutlets, these flat or convex above and clothed with short prickles.

- Biennial; corolla purplish red..... 3. *C. officinale*
 Perennials; corolla deep blue
 Stem glabrous; corolla 1-1.5 cm. broad..... 1. *C. grande*
 Stem hirsute; corolla 4-6 mm. broad..... 2. *C. occidentale*

1. *C. grande* Dougl. GREAT HOUND'S TONGUE. Clustered, 3-8 dm. high, the stems stout and glabrous; leaves glabrous or sparsely strigose-hirsute above, soft-pubescent beneath, the basal numerous and ample, ovate to oblong-ovate or lance-oblong, 1-2 dm. long, mucronate, long-petioled, the cauline few, smaller and short-petioled; panicle loose and long-peduncled; calyx silky-villous, 5-7 mm. long; corolla deep blue, the broad tube twice as long as the calyx, the limb 1-1.5 cm. wide, the lobes broad and rounded, the crests conspicuous; nutlets 5-6 mm. long, glochidiate-spiny.—Open ground mainly west of the Cascades, to Wash. and Calif.

2. *C. occidentale* Gray. WESTERN HOUND'S TONGUE. Stem erect, stout, 3-5 dm. high, hirsute, leafy; leaves oblong to broadly oblanceolate, acute, 8-20 cm. long, the lowest on winged petioles, the rest sessile by a clasping base, rather harshly appressed-pubescent on both surfaces; panicles long-peduncled, small, with few branches, coarsely villous; calyx 5-7 mm. long, the lobes narrowly oblong; corolla deep blue, the tube 4-6 mm. long, the limb about as broad; nutlets 7-9 mm. long, evenly covered with slender glochidiate spines.—Mountain woods, east slope of the Cascades from Jefferson Co. southward, and to Jackson Co. and Calif.

3. *C. officinale* L. HOUND'S TONGUE. A stout, leafy, velvety-tomentose biennial 4-10 dm. high; leaves 8-20 cm. long, the lower oblong to oblanceolate, slender-petioled, the upper lance-oblong, sessile and clasping; racemes numerous, from the upper axils, the pedicels 5-10 mm. long; calyx-lobes in fruit 5-7 mm. long, oblong, obtuse; corolla reddish purple, the broad tube 3-5 mm. long, the broad rounded lobes about as long; fruit broadly pyramidal, 1 cm. wide, the spiny nutlets flattened on their upper faces.—Sparingly established in cultivated and waste ground west of the Cascades and in Wallowa Co. Native of Europe.

4. *ANCHUSA* L.

Hirsute or hispid, mostly rather coarse annual, biennial or perennial herbs; flowers in panicles or scorpioid racemes or congested clusters; corolla blue or purple, trumpet-shaped, the throat nearly closed by scales; nutlets rugose or granulose-roughened, inserted by a broad concave base on the flat receptacle.

1. *A. officinalis* L. COMMON *ANCHUSA*, or *ALKANET*. Biennial; stem stout, branched, erect or decumbent, 5-10 dm. high, harshly hirsute; leaves broadly linear, linear-oblong, or lanceolate, the basal 1-2 dm. long, hirsute like the stem; racemes often geminate, dense, bracted; fruiting calyx about 1 cm. long, rounded at base, the lobes about equaling the tube, corolla deep blue or purplish, the tube about as long as the calyx, the limb 6-10 mm. broad; nutlets dark grayish brown, ridged and tuberculate over the back, 3-4 mm. long.—Native of the Old World; occasionally escaped from cultivation. Established in the valley of the Imnaha R., Wallowa Co.

5. *PECTOCARYA* DC.

Small slender annuals with minute axillary flowers; calyx spreading or reflexed in fruit; corolla white, the throat nearly closed by the 5 crests; nutlets thin and flat, radiately spreading, the margin with a row of hooked bristles.

Nutlets all alike

- Nutlets scarcely or not at all winged.....1. *P. pusilla*
 Nutlets with incurved wings.....2. *P. penicillata*
 Nutlets not all alike, 2 broadly winged, 2 nearly wingless.....3. *P. setosa*

1. *P. pusilla* Gray. LITTLE PECTOCARYA. Thinly strigose; copiously branched from the base, the slender wiry branches erect or ascending, 5-2.5 dm. high; leaves linear to linear-spatulate or oblong, 6-12 mm. long, the lower mainly opposite, the upper short and remote; flowers very small; calyx about 2 mm. long, little enlarged in fruit, covered with appressed hooked bristles; nutlets reflexed, cuneate-obovate, 2-2.5 mm. long, thin, with a low ventral keel, the margins scarcely winged and bearing a row of hooked bristles, the faces with short hairs.—Dry areas east of the Cascades, to Wash., Calif. and South America.

2. *P. penicillata* (H. & A.) A. DC. WINGED PECTOCARYA. Grayish-strigose; copiously branched from the base, the branches spreading or ascending, 5-10 cm. high, very slender, floriferous nearly their whole length; leaves mostly alternate, linear, 6-12 mm. long, reduced above, the hairs pustulate; flowers minute, the calyx in anthesis 1 mm. long; nutlets spreading in pairs, oblong, 1.5 mm. long, the margin with incurved wing bearing a row of hooked bristles; style very short.—Dry ground east of the Cascades, to B. C., Nev. and Calif.

3. *P. setosa* Gray. BRISTLY PECTOCARYA. Bristly-hirsute and with some fine appressed pubescence; stem stout, copiously bushy-branched from the base, 1.5-2.5 dm. high; leaves mostly opposite, linear or oblong; flowers in numerous rather close racemes which become coarse and rigid in fruit; fruiting calyx 4-5 mm. long, the linear spreading lobes with a few coarse bristles; nutlets broadly obovate, 2 mm. long, spreading in pairs, one of each pair broadly winged, the other narrowly winged or wingless, all puberulent on the inner faces and bearing slender hooked bristles.—Dry plains east of the Cascades, to Wash. and Calif.

6. AMSINCKIA Lehm.

Coarse bristly annual herbs; flowers in long spikes; calyx 5-lobed or some of the lobes partly fused; corolla yellow or orange, salverform, not strongly crested in the throat; nutlets bony, somewhat triangular, smooth or rough, attached below the middle to the pyramidal receptacle.

- Nutlets smooth and shining.....1. *A. vernicosa*
 Nutlets not smooth and shining.....2. *A. tesellata*
 Calyx-segments very unequal, often partly coalescent; nutlets coarsely tessellate.....

- Calyx-lobes equal or subequal
 Stem more or less canescent with a fine crisped pubescence as well as bristly, slender and stiffly erect; nutlets broadly ovate.....5. *A. retrorsa*
 Stem with little or no fine crisped pubescence
 Corolla 5 mm. long or less; dorsal keel of nutlets narrow and strongly toothed.....

6. *A. micrantha*
 Corolla 6 mm. long or more; dorsal keel of nutlets less prominent
 Nutlets 2 mm. long; leaves pungent-bristly mainly on the margins; stem weak and nearly prostrate; sea-coast species.....3. *A. spectabilis*
 Nutlets over 2 mm. long; leaves not bristly mainly on the margins; stem usually not prostrate; not sea-coast species
 Stem stout, with elongated spreading branches; spikes not greatly elongating in fruit; corolla-throat with 5 intruded hairy saccations.....4. *A. lycopsoides*
 Stem relatively slender, the branches ascending; spikes much elongated in fruit; corolla-throat without intruded hairy saccations.....7. *A. intermedia*

1. *A. vernicosa* F. & M. VERNAL AMSINCKIA, or FIDDLENECK. Stem 3-5 dm. high, sparingly bristly or glabrous; leaves thickish, glaucous, somewhat bristly on the margins and strongly pustulate above, 5-12 cm. long, broadly lanceolate, the upper somewhat cordate-clasping; spikes 6-12 cm. long; mature calyx 10-18 mm. long, the segments bristly on the back with ciliate margins; corolla bright yellow, 10-12 mm. long; nutlets smooth and shining, mottled, lanceolate, 3-sided, with sharp lateral angles, the ventral groove closed.—Southern Ore. east of the Cascades to Calif.

2. *A. tesellata* Gray. TESELLATE AMSINCKIA, or FIDDLENECK. Copiously bristly-hirsute throughout; stems coarse, mostly branched at least above, 3-10 dm. high; leaves broadly linear or linear-oblong, the upper often narrowly ovate, strongly pustulate; racemes becoming rigid and 1-3 dm. long, scarcely at all bracteate; fruiting calyx 8-17 mm. long, the lobes very unequal, often partly coalescent so as to appear only 3-4, when distinct, linear to lance-oblong; corolla orange, the tube 5-10 mm. long, the limb 2.5-5 mm. broad; nutlets 3-3.5 mm. long, broadly ovate, coarsely and densely warted or tessellate, the back low-convex, not keeled, the narrow scar near the base.—Dry ground east of the Cascades, to Wash., Utah and Calif.

3. *A. spectabilis* F. & M. SEASIDE AMSINCKIA. Herbage somewhat succulent, bright green; stems weak, freely branched, spreading or prostrate, 2-8 dm. long; leaves lanceolate, often acuminate, 4-9 cm. long, sparingly pungent-bristly especially on the margins; mature calyx 3-6 mm. long, stiff-bristly; corolla orange, 6-12 mm. long; nutlets ovate, incurved, about 2 mm. long, finely tuberculate and papillate on the back and with more or less definite ridges, the scar prominent.—Sandy banks and old dunes along the coast, Lincoln Co. to Calif.

4. *A. lycopsoides* Lehm. BUGLOSS AMSINCKIA. Stem erect to procumbent with long spreading branches, rather stout, bristly-hirsute with scant or no fine pubescence at least below, 3-10 dm. long; leaves bristly-hirsute, the hairs spreading or appressed, the lower linear or linear-oblong-lanceolate, 6-15 cm. long, the upper lanceolate or the uppermost narrowly ovate; spikes usually not greatly elongating in fruit, bracteate below; fruiting calyx 6-10 mm. long, the segments narrowly linear-lanceolate, sparsely bristly on the back, the margins densely ciliate with long slender hairs; corolla deep yellow, 7-10 mm. long, the tube well exerted, the throat hairy within; nutlets triangular-ovate, 2.5-3 mm. long, not strongly keeled dorsally, closely muricate, not rugose, the points usually not in definite rows.—Moist open ground mainly west of the Cascade Mts., to Wash. and Calif.

5. *A. retrorsa* Suksd. RIGID AMSINCKIA, or FIDDLENECK. Stem erect, simple below the inflorescence or with a few stiffly ascending branches, 5-10 dm. high, more or less copiously bristly-hirsute and slightly canescent with a fine, somewhat crisped pubescence; leaves pubescent like the stem but the hairs appressed, the lower rather broadly linear, 5-12 cm. long, the uppermost narrowly lanceolate; racemes dense for the genus, not at all bracteate; calyx 7-10 mm. long, the segments linear or linear-lanceolate, obtuse, slightly unequal, all distinct; corolla-tube 4-8 mm. long, the limb 3-5 mm. broad; nutlets dark brown, 2-3 mm. long, broadly ovate, densely and finely tuberculate, with more sparse larger tubercles, these sometimes crowning low transverse ridges toward the apex, or the ridges obsolete.—Moist slopes and fields especially east of the Cascades, to Wash., Idaho and Calif.

6. *A. micrantha* Suksd. SMALL-FLOWERED AMSINCKIA, or FIDDLENECK. Stem slender, freely branched from the base and usually decumbent, 3-6 dm. long, bristly-hirsute with little fine pubescence; leaves broadly linear or oblong, the upper sometimes lanceolate, 4-8 cm. long, thin, bristly, the hairs mostly spreading and strongly pustulate; spikes becoming lax and greatly elongated, with few bracts or none; fruiting calyx 6-8 mm. long, the segments narrowly to broadly lanceolate, thin, bristly, the lower bristles somewhat reflexed; corolla light yellow, 4-5 mm. long, the tube slightly or not at all surpassing the calyx; nutlets triangular, 2.5-3 mm. long, the dorsal keel with a narrow strongly toothed ridge, with similar ridges on either side, the area between the ridges finely and evenly verrucose.—Dry ground mainly east of the Cascade Mts., to B. C. and Idaho.

7. *A. intermedia* F. & W. COMMON AMSINCKIA, or FIDDLENECK. Stem erect, rather slender, 3-7 dm. high, bristly-hirsute, sometimes

with sparse fine pubescence; leaves mostly broadly linear, the uppermost lanceolate, not conspicuously clasping, bristly and pustulate on both faces; racemes finally 2-4 dm. long; mature calyx 6-10 mm. long, the linear segments strongly setose and pustulate; corolla light orange, 6-10 mm. long; nutlets 2.5-3 mm. long, ovate, somewhat incurved, broadly carinate down the back, more or less strongly muricate and finely tuberculate dorsally, often with some oblique ridges, the scar broad and prominent.—Dry ground, northern Ore. both sides of the Cascades, to Ariz. and Lower Calif.

7. ASPERUGO L.

A harsh procumbent annual; flowers 1-3 in the upper axils; calyx campanulate, much elongated in fruit; corolla small, blue or white; nutlets ovoid, erect, attached above the middle.

1. *A. procumbens* L. CATCHWEED. Stem slender, ascending or decumbent, few-branched or simple, 2.5-5 dm. high, scabrous or with short recurved bristles; leaves obovate or oblanceolate, 3-6 cm. long, harshly pubescent and ciliate; flowers 1-3 in the axils, on short peduncles that become recurved; calyx in fruit wide-flaring, 8-15 mm. broad, pale and strongly veined; corolla blue, 2-3 mm. long; nutlets obliquely ovoid, about 4 mm. long.—Locally plentiful in fields and along roads in Umatilla and Grant Cos. Introduced from Europe.

8. CRYPTANTHA Lehm.

Annual or perennial herbs with linear or spatulate leaves and usually harsh pubescence; inflorescence of short or elongated scorpioid racemes or spikes; calyx 5-parted nearly or quite to the base, accrescent in fruit; corolla usually white, small, often minute, salverform, the throat partly closed by 5 appendages; nutlets 1-4, smooth or roughened, lanceolate to nearly orbicular, usually erect, without a keel, attached through a commonly forked groove on the inner face to a pyramidal or subulate gynobase.

- A. Stout harshly pubescent perennials with stem simple below the inflorescence—Subgenus *Oreocarya*
- Corolla-tube decidedly longer than the calyx-lobes.....1. *C. leucophaea*
 - Corolla-tube not longer than the calyx-lobes
 - Leaves green, only moderately canescent above; nutlets finely muricate and tuberculate dorsally.....3. *C. humilis*
 - Leaves densely gray-pubescent above
 - Inner surface of nutlets nearly smooth, the margins sharp and prominent, the back with transverse ridges; stems cespitose.....2. *C. andina*
 - Inner surface of nutlets distinctly roughened
 - Nutlets with a triangular open areole; style much exceeding the nutlets.....7. *C. propria*
 - Nutlets without distinct areole
 - Nutlets ovate or lance-ovate, coarsely tuberculate dorsally
 - Basal leaves decidedly spatulate or oblanceolate; nutlets prominently thin-margined.....4. *C. celosioides*
 - Basal leaves narrowly linear-spatulate or linear-oblanceolate; nutlets more narrowly margined.....5. *C. spiculifera*
 - Nutlets lanceolate, less coarsely tuberculate.....6. *C. Sheldonii*
- A. Slender-stemmed annuals, less harshly pubescent—Subgenus *Eucryptantha*
- Nutlets conspicuously wing-margined.....10. *C. pterocarya*
 - Nutlets not wing-margined
 - B. Nutlets smooth or nearly so
 - Fruiting calyx circumsissile; plant depressed and dichotomously branched.....8. *C. circumsissa*
 - Fruiting calyx not regularly circumsissile
 - Spikes with well-developed bracts throughout.....9. *C. micrantha*
 - Spikes with few or no bracts
 - Some of the calyx-bristles hooked or curved; nutlet 1, lanceolate
 - Nutlets compressed, without an open areole at base.....21. *C. flaccida*
 - Nutlets nearly terete, with an open areole.....22. *C. rostellata*
 - Calyx-bristles not hooked or curved
 - Groove of nutlets at one of the angles.....23. *C. affinis*
 - Groove median
 - Prostrate maritime species; lower flowers axillary.....20. *C. leiocarpa*
 - Not prostrate or maritime; few or none of the flowers axillary
 - Nutlets broadly ovate

- Corolla relatively large, the limb over 3 mm. broad; calyx 5-7 mm. long.....13. *C. Hendersoni*
- Corolla inconspicuous, 2 mm. long or less; nutlets shining, usually smooth and mottled.....15. *C. Torreyana*
- Nutlets narrowly ovate or lanceolate
- Margins of the nutlets acute; areole none.....18. *C. Watsoni*
- Margins of the nutlets rounded; areole distinct.....19. *C. Fendleri*
- B. Nutlets roughened
- Spikes with well-developed bracts throughout.....9. *C. micrantha*
- Bracts few or wanting
- Corolla 3 mm. broad or over
- Stem very slender and fragile; calyx under 4 mm. long.....14. *C. fragilis*
- Stem not very slender and fragile; calyx 5-7 mm. long.....13. *C. Hendersoni*
- Corolla 2 mm. broad or less
- Nutlet 1; fruiting calyx very unsymmetrical, bent outward.....11. *C. recurvata*
- Nutlets 4; calyx not conspicuously bent outward
- Nutlets ovate
- Pubescence strigose nearly throughout; nutlets 2 mm. long or more.....16. *C. simulans*
- Pubescence spreading, hirsute; nutlets mostly under 2 mm. long.....17. *C. ambigua*
- Nutlets lanceolate, spinulose.....12. *C. scoparia*

1. *C. leucophaea* (Dougl.) Pays. GRAY OREOCARYA. Stems clustered on a branching woody base, 2-4 dm. high, stout, densely white-strigose below, hirsute above; leaves lanceolate to linear, the lower narrowed to petioles, these dilated at base, the whole 5-9 cm. long, white-strigose, bristly-ciliate toward the base; inflorescence narrow, 7-15 cm. long, leafy below, very bristly-hirsute; pedicels 1-2 mm. long; fruiting calyx 1-1.5 cm. long, white-strigose and bristly, the lobes linear-subulate; corolla 6-8 mm. in diameter, the tube surpassing the calyx; nutlets about 4 mm. long, smooth and shining, ovate, the margins thin and sharp, the groove closed, the areole very small; style much longer than the nutlets.—Dry slopes, northern Ore. east of the Cascades, to Wash. (*Oreocarya leucophaea* Greene).

2. *C. andina* Johnst. SIERRA OREOCARYA. Stems densely cespitose on a stout woody caudex covered with old leaf-bases, 1.5-2 dm. high, finely canescent and sparsely hirsute; basal leaves numerous, on short sterile shoots, narrowly to broadly spatulate, 3-5 cm. long including the petiole, densely appressed-pubescent and sparsely spreading-setose, the cauline similar, mostly shorter; inflorescence congested; calyx densely short-hispid, in fruit 1 cm. long, the lobes linear-lanceolate; corolla 5-6 mm. broad, the tube distinctly longer than the calyx; nutlets lanceolate or narrowly ovate, somewhat acuminate, 4 mm. long, the back slightly convex, sparsely muricate and rugose or nearly smooth, the inner faces nearly smooth, the margins narrowly winged.—Southern Ore. east of the Cascades, to Calif.

3. *C. humilis* (Greene) Pays. LOW OREOCARYA. Stems one to several, clustered on a short woody base, erect, rather stout, 1-3 dm. high, pubescent with fine appressed hairs and sparsely setose with slender spreading bristles; basal leaves 3-7 cm. long including the long petioles, spatulate or oblanceolate, green but more or less canescent with fine pubescence and much longer, slender, weakly pustulate bristles, all appressed except those of the margins and especially of the petioles, the latter conspicuously ciliate; upper cauline leaves few and reduced; inflorescence long and narrow, not strongly leafy; calyx densely bristly, the bristles spreading, slender and weak, the linear segments at maturity 8-12 mm. long; tube of the corolla about equaling the calyx, the limb 7-10 mm. broad; nutlets lance-ovate, 3-4.5 mm. long, finely muricate and tuberculate on the back, the tubercles tending to form ridges, the ventral surface more faintly muricate, the scar open below or nearly closed, without prominent margins.—Dry eastern slope of the Pueblo Mts., Harney Co., to Idaho, Nev. and Calif.

4. *C. celosioides* (Eastw.) Pays. NORTHERN OREOCARYA. Stems one to several from a short woody, branched caudex, 2-4 dm. high, gray-tomentose and with copious spreading bristles; basal leaves broadly spatulate to oblanceolate, canescent with a dense, somewhat appressed

pubescence and mostly with spreading pustulate bristles, especially on the margins, 1-2.5 cm. long, sometimes long-petioled; inflorescence long, the branches numerous and short; calyx villous and densely hispid, in fruit 8-11 mm. long, the lobes linear-lanceolate; tube of the corolla about equaling the calyx, the limb 6-8 mm. broad; nutlets without areole, 3-4 mm. long, ovate, low-convex on the back, rugose and coarsely warted, the margins thin and prominent; style much surpassing the nutlets.—Dry hillsides, northern Ore. east of the Cascades, to Wash. (*Oreocarya celosoides* Eastw.)

5. *C. spiculifera* (Piper) Pays. NARROW-LEAVED OREOCARYA. Stems clustered on a stout woody base, 1.5-3 dm. high, erect, rather slender, densely strigose-pubescent and with numerous spreading hirsute and setose hairs; leaves linear, linear-oblancoate, or linear-spatulate, 3-6 cm. long, pubescent like the stem and strongly ciliate toward the base, the bristles pustulate; inflorescence narrow, the stem often floriferous from well below the middle; calyx very densely appressed-pubescent and spreading-bristly, in fruit 8-10 mm. long, the segments oblong-linear; corolla pale yellowish, the tube equaling the calyx, the limb 5-7 mm. broad; nutlets lanceolate or narrowly ovate, 3-4 mm. long, obtuse or acutish, narrowly margined, dorsally densely and finely muriculate with more or less abundant coarse tubercles, the ventral face less coarsely tuberculate, the scar narrow, more open below; style exceeding the nutlets by about 2 mm.—Dry hills, Baker Co., to Wash. and Idaho.

6. *C. Sheldonii* (Brand) Pays. SHELDON'S OREOCARYA. Stems loosely clustered, 1-3 dm. high, stout, densely spreading-bristly and canescent with finer hairs; leaves pubescent like the stem, the bristles loosely appressed and pustulate, the basal leaves crowded, spatulate or oblanceolate, 2-4 cm. long including the petiole, the cauline narrowing upward; inflorescence rather narrow, often half the total height or more; sepals lance-linear, acute, 3-5 mm. long, becoming twice as long in fruit, densely bristly and canescent; corolla-tube equaling or a little longer than the calyx, the limb 6-10 mm. broad, the fornices yellowish, papillose; nutlets lanceolate, 3-4 mm. long, low-tuberculate on the back and slightly rugose and muricate, the scar extending nearly the whole length; style much longer than the nutlets.—Dry hills, Wallowa Co., to Wash. and Mont.

7. *C. propria* (Nels. & Macbr.) Pays. IDAHO OREOCARYA. Stems several from a stout, woody, branching caudex, densely clothed below with old leaf bases, 12-25 cm. high, finely and closely pubescent below and sparsely bristly, more bristly above; basal leaves numerous, broadly spatulate, rounded or obtuse at apex, 4-7 cm. long including the long slender petiole, the cauline narrower, all finely and densely canescent above, and beneath sparsely strigose and pustulate, the petioles setose-ciliate; inflorescence congested or rather open, the branches slender; calyx densely hispid-hirsute, in fruit about 8 mm. long, the lobes linear; corolla 6-8 mm. broad, the tube a little longer than the calyx; nutlets with a triangular open areole, ovate, 4 mm. long, the margins sharp, the back finely ridged or reticulate and muricate, the inner faces roughened; style much surpassing the nutlets.—Dry hillsides, eastern Malheur Co. to Idaho.

8. *C. circumscissa* (H. & A.) Johnst. MATTED CRYPTANTHA. Stem copiously branched from the base, the branches ascending or more commonly spreading or depressed, forming a circular mat 5-20 cm. in diameter, clothed with abundant stiff bristly hairs; leaves narrowly linear, 5-10 mm. long, bristly like the stem, the hairs spreading; flowers very numerous, essentially axillary, the bracts similar to the ordinary leaves; fruiting calyx 2.5-4 mm. long, very densely bristly, the hairs partly appressed, the narrow lobes erect, the tube circumscissile at maturity; corolla minute; nutlets 1-1.5 mm. long, ovate or ovate-lanceolate, smooth and shining or minutely roughened, convex on the

back, the ventral groove closed and forked at base.—Dry sandy ground east of the Cascades, to Wash., Utah and Calif. (*Piptocalyx circumscissus* Torr.)

9. *C. micrantha* (Torr.) Greene. SMALL-FLOWERED CRYPTANTHA. Stem slender, bushy-branched from the base, 3-15 cm. high, strigose; root dye-staining; leaves linear-oblong, 5-15 mm. long, many of the upper opposite, the pubescence somewhat spreading; racemes very numerous, short and dense, leafy-bracted throughout; corolla 1-1.5 mm. long, the limb very small; nutlets lanceolate, acuminate, 1.5 mm. long, smooth or muriculate, half to three-fourths as long as the calyx; style much exceeding the nutlets.—Dry sandy ground, southeastern Ore. to Utah, Texas and Lower Calif.

10. *C. pterocarya* (Torr.) Greene. WINGED CRYPTANTHA. Stem rather slender and freely branched from the base, the branches ascending, 1.5-5 dm. high, short-hirsute, scarcely bristly and with some appressed hairs; leaves linear, 1-3.5 cm. long, pubescent like the stem and strongly pustulate; spikes numerous, geminate or ternate, rather short, the flowers biseriate; fruiting calyx 3-4 mm. long, broadly rounded at base, densely appressed-villous and with a few bristles, the lanceolate lobes nearly erect, often promptly deciduous with the fruit at maturity; corolla inconspicuous; nutlets broadly lanceolate, 3-3.5 mm. long, coarsely papillate over the back, three of them with broad, white, pectinate to entire wings, the fourth wingless, the ventral groove often closed only to the middle, bifurcate toward the base.—Dry ground east of the Cascades, to Wash., Calif. and Texas.

11. *C. recurvata* Cov. RECURVED CRYPTANTHA. Stem slender, freely branched from the base, 1-3 dm. high, strigose or some of the hairs spreading; leaves narrowly oblong to linear or linear-spatulate, 1-2.5 cm. long, strongly pustulate above, the pubescence hispid and appressed; spikes solitary or geminate, elongated, very slender; calyx 3-4 mm. long, very unsymmetrical, long-bristly especially below, the nearly filiform lobes strongly connivent except the spreading and conspicuously recurved tips; corolla inconspicuous; nutlets solitary, 1.5-2 mm. long, lance-ovate, dull brown, minutely granulose, persistent, the groove closed at base.—Dry ground, southern Ore. east of the Cascades, to Calif.

12. *C. scoparia* Nels. DESERT CRYPTANTHA. Stem rather coarse, 1.5-4 dm. high, freely branched, the branches long and stiffly ascending, short-strigose and canescent and with a few bristly hairs; leaves linear, strigose and sparsely bristly, strongly pustulate; racemes solitary, geminate, or sometimes ternate, becoming 4-12 cm. long; fruiting calyx 4-6 mm. long, narrow, the linear lobes erect or with slightly spreading tips, short appressed-pubescent, the prominent midribs armed with a few, long, straight, stiff bristles; corolla inconspicuous; nutlets narrowly lanceolate, 1.75-2 mm. long, spinulose-muricate, the ventral groove closed above, dilated below to form a small areole.—Dry ground, Harney and Malheur Cos., to Idaho.

13. *C. Hendersoni* (Nels.) Piper. LARGE-FLOWERED CRYPTANTHA. Stem erect, 2-4 dm. high, usually branched from near the base, the branches elongated; hirsute with spreading bristly hairs and with a finer appressed pubescence; leaves linear or oblong, 2-4 cm. long, pubescent like the stem and pustulate; racemes mostly geminate or ternate, often becoming long and loose, the flowers distinctly pedicelled or subsessile; calyx slightly unsymmetrical in fruit, 3.5-7 mm. long, the linear lobes connivent, often with spreading tips, appressed-villous on the margins, the midribs spreading-bristly; corolla 4-6 mm. broad; nutlets about 2 mm. long, ovate, often broadly so, smooth to coarsely papillate and granulose, the margins obtuse, the ventral groove closed and bifurcate at base, the style equaling or slightly surpassing the nutlets.—Dry open ground from the Pacific coast eastward, to Wash., Idaho and Calif.

14. *C. fragilis* Peck. BRITTLE CRYPTANTHA. A slender annual 3-4 dm. high, the stem sparsely branched throughout its length, the branches long and spreading, pale, brittle, sparingly hirsute with slender spreading hairs; leaves crowded below, linear, 2-4 cm. long, thin, hirsute, the hairs often pustulate at base; spikes geminate, rarely ternate or solitary, long-peduncled, at first dense, later elongating, the flowers sessile and conspicuously biseriate; calyx with the fruit falling promptly at maturity; mature calyx 3-3.5 mm. long, the lanceolate lobes somewhat obtuse, appressed-hispid medially on the back, the apices connivent; corolla-tube longer than the calyx, the limb 3-5 mm. wide, the glandular crests and throat yellow; nutlets 1-2, broadly ovate, 2 mm. long, conspicuously carinate ventrally, the furrow forked toward the base without open areole, the back convex with rounded margins, the surface sinuately muricate and sparsely spinulose; gynobase about half as long as the nutlets; style a little shorter than the nutlets.—Dry ground, northern Josephine and Curry Cos.

15. *C. Torreyana* (Gray) Greene. TORREY'S CRYPTANTHA. Stem 1-4 dm. high, abundantly to sparingly branched, nearly erect to spreading, hirsute and with a fine appressed pubescence; leaves linear to oblong, less coarsely pubescent than the stem, pustulate; spikes numerous, mostly geminate, usually rather short; fruiting calyx 4-6 mm. long, slightly unsymmetrical, the linear-lanceolate lobes erect or connivent with spreading tips, densely pubescent with villous margins and bristly midribs, or the hairs all bristly and partly spreading; corolla very small; nutlets ovate, smooth and shining, usually mottled, 1.5-2.5 mm. long, the ventral groove closed, bifurcate below, the margins rounded.—Dry ground, especially east of the Cascades, to Wash., Mont. and Calif.

16. *C. simulans* Greene. PINE WOODS CRYPTANTHA. Stem slender with few erect branches, 1.5-4 dm. high, pale, strigose, without bristly hairs; leaves oblanceolate or linear-spatulate, strictly ascending, 1.5-3 cm. long, rather densely appressed-pubescent and pustulate; spikes mostly geminate or ternate, slender, often short; fruiting calyx 4-7 mm. long, ovoid, the narrowly lanceolate lobes somewhat connivent, densely appressed-pubescent on the margins, weakly bristly along the midribs, the short hairs toward the tips strongly spreading; corolla very small; nutlets broadly ovate, 2-2.5 mm. long, sparsely warted and densely muriculate, the ventral groove closed and broadly bifurcate below.—Pine woods mainly east of the Cascades, to Wash., Idaho and Calif.

17. *C. ambigua* (Gray) Greene. OBSCURE CRYPTANTHA. Bristly-hirsute and with a fine appressed pubescence; stem freely branched from the base, 1-3 dm. high; leaves narrowly to broadly linear, 1-4 cm. long; spikes numerous and rather short or the earliest finally much elongated, often forked above; calyx in fruit 4-7 mm. long, unsymmetrical, the linear lobes erect or connivent with somewhat spreading tips, villous and with strongly bristly midribs; corolla very small; nutlets 4, ovate, somewhat acuminate, 1.5-2 mm. long, coarsely to obscurely warted, the margins rounded, the ventral groove nearly closed and strongly bifurcate at base.—Dry ground east of the Cascades, to Wash., Wyom. and Calif.

18. *C. Watsoni* (Gray) Greene. WATSON'S CRYPTANTHA. Stem slender, pale, freely branched, the branches ascending, 1-3 dm. high, short-hirsute, without appressed hairs; leaves oblong to linear or linear-oblanceolate, ascending, pubescent like the stem, not strongly pustulate; racemes solitary or geminate, mostly short; fruiting calyx nearly symmetrical, spreading, promptly deciduous at maturity, 2-3.5 mm. long, the lobes nearly erect, lanceolate, copiously appressed-pubescent and with a few bristles along the weakly-developed midribs; corolla very small; nutlets lanceolate, 1.5-2 mm. long, smooth and shining, nearly flat dorsally, sharp-margined, the ventral groove closed, bifurcate

at the very base.—Dry ground east of the Cascades, to Wash., Mont. and Colo.

19. *C. Fendleri* (Gray) Greene. FENDLER'S CRYPTANTHA. Stem 1-4 dm. high, usually with a definite main axis but sometimes bushy-branched, pubescent with appressed hairs and abundantly bristly-hirsute; leaves linear-oblanceolate, 2-4 cm. long, hispid with more or less appressed pustulate hairs; spikes mostly geminate or ternate, in fruit up to 1 dm. long, rather stout; fruiting calyx slightly unsymmetrical at base, 4-6 cm. long, the segments hispid with long bristles and appressed-villous on the margins, narrowly linear, connivent with spreading tips; corolla very small; nutlets 4, smooth and shining, little flattened, lanceolate, with rounded triangular areole at base; style one-fourth longer than the nutlets or less.—Dry plains, Harney Co., to Alta. and Ariz.

20. *C. leiocarpa* (F. & M.) Greene. SEASIDE CRYPTANTHA. Canescent, sometimes silvery with a copious, closely appressed, coarse pubescence; stem branched from the base, spreading or prostrate, coarse, 8-20 cm. long; leaves linear to oblong or oblanceolate, numerous, 1-3 cm. long, often strongly pustulate; flowers in numerous, small, axillary, bracteate glomerules which become somewhat elongated; fruiting calyx 2-3.5 mm. long in fruit, densely appressed-pubescent and with coarse spreading bristles, nutlets 1-2, small, 1.5-2 mm. long, lance-ovate or -obovate, smooth and shining, the ventral groove quite closed and without basal bifurcation.—Dry ground east of the Cascades, to Sask., Nev. and Calif.

21. *C. flaccida* (Dougl.) Greene. WEAK-STEMMED CRYPTANTHA. Finely appressed-pubescent; stem slender, simple or more commonly freely branched from the base, 2-5 dm. high; leaves narrowly linear or linear-spatulate, 1.5-3 cm. long; spikes becoming very long and loose; fruiting calyx very unsymmetrical, 2.5-5 mm. long, closely appressed, hispid-hirsute with spreading, curved or hooked hairs, those toward the base reflexed, the linear lobes connivent but with spreading tips; corolla small or minute; nutlet usually solitary, lanceolate, acuminate, not flattened, rounded at base, 2-2.5 mm. long, smooth and shining, the ventral groove closed and almost without basal bifurcation.—Dry ground, southern Willamette Valley to Calif. and east of the Cascades to Wash. and Idaho.

22. *C. rostellata* Greene. RED-STEMMED CRYPTANTHA. Very similar to *C. flaccida*; mostly coarser and lower, 1-2 dm. high; several pairs of lower leaves usually opposite; spikes stiff, 2-4 cm. long; nutlets distinctly dorso-ventrally flattened, somewhat truncate at base, the ventral groove open below forming a distinct areole, the style reaching above the middle of the nutlets.—Dry hills east of the Cascades, to Wash. and Calif.

23. *C. affinis* (Gray) Greene. SLENDER CRYPTANTHA. Pubescent throughout with loosely appressed, slightly harsh hairs; stems erect, slender, freely branched, 1-3.5 dm. high; leaves broadly linear, oblong, or oblanceolate, few, 1.5-2.5 cm. long, the lowest 1-2 pair often opposite; spikes somewhat paniculate, the flowers not secund; calyx 2-4 mm. long, the lanceolate lobes nearly erect in fruit, appressed-pubescent and with a few spreading bristles on the midribs; corolla very small; nutlets 1.5-2.5 mm. long, lanceolate, dark brown and mottled, smooth and shining, the ventral groove near one margin, not open below.—Dry woods and plains, east slope of the Cascades, to Wash., Idaho and Calif.

9. PLAGIOBOTHRYS Fisch. & Mey.

Annual or perennial low freely branching herbs with linear or oblong leaves all alternate or the lower opposite; flowers in commonly elongated scorpioid racemes; calyx-lobes mostly connivent in fruit; corolla salver-

form, white, small, often minute; nutlets lanceolate to ovate or somewhat cruciform, erect or incurved, not grooved along the inner angle, smooth or roughened, attached medially to subbasally or basally to a low convex gynobase.

- A. Lower leaves as well as the upper alternate; nutlets strongly incurved—Subgenus *Euplagiobothrys*
 Bristly-hirsute; stem leafy; flowers in short close racemes or spikes
 Nutlets strongly rugose or papillate.....5. *P. Harknessii*
 Nutlets granulose, sometimes low-rugose.....6. *P. hispidus*
 Less harshly hirsute; leaves mainly in a basal rosette; inflorescence elongated
 Mature calyx not definitely circumscissile, the lobes erect; nutlets usually 4
 Nutlets thick-cruciform, with broad transverse ridges
 Stem freely branched at base; fruiting calyx about twice as wide as long.....1. *P. tenellus*
 Stem with fewer and stouter branches; fruiting calyx nearly as long as wide.....2. *P. shastensis*
 Nutlets interruptedly low-rugose or granulate, narrowly keeled dorsally above the middle.....3. *P. fulvus*
 Mature calyx finally circumscissile, the lobes connivent; nutlets usually 1-2.....4. *P. nothofulvus*
- A. Lower leaves opposite; nutlets little or not at all incurved—Subgenus *Allocarya*
 Soft-villous perennial.....7. *P. mollis*
 Annuals
 Scar large and deep, a fourth to a half as long as the nutlet
 Nutlets 2.5-3 mm. long, at least two-thirds as broad as long.....8. *P. Greenei*
 Nutlets 2 mm. long, half as broad as long.....9. *P. glyptocarpus*
 Scar smaller, flat or a little concave
 Nutlets attached basally or nearly so; calyx-lobes strongly ribbed, the ribs continued below the lobes
 Plant prostrate; calyx-lobes connivent.....10. *P. leptocladus*
 Plant erect or ascending; calyx-lobes spreading.....11. *P. stipitatus*
 Nutlets attached by the inner face or partly so
 Racemes mostly in pairs; corolla 4-12 mm. broad; plant usually erect
 Pubescence fine and soft, mostly strigose; corolla 4-8 mm. broad.....13. *P. figuratus*
 Pubescence coarse and stiff, not at all strigose; corolla 8-14 mm. broad.....12. *P. hirtus*
 Racemes not in pairs, usually with bracts below
 Pubescence of stem at least in part spreading; nutlets 2 mm. long or more, with transverse dorsal ridges above the middle.....14. *P. salsus*
 Pubescence of stem appressed
 B. Scar of nutlets in an areole broader than long, or areole none; nutlets often unsymmetrical
 Ventral keel in a longitudinal groove; nutlets 1-2, plano-convex.....15. *P. lamprocarpus*
 Ventral keel not in a groove; nutlets usually 4
 Plant erect; corolla 2-3 mm. broad.....16. *P. granulatus*
 Plant usually spreading; corolla 1-2 mm. broad
 Scar ovate or triangular, with prominent spreading margins; nutlets rather dull.....17. *P. cognatus*
 Scar of 3 of the nutlets long and narrow, the high thin margins not spreading; nutlets shining.....18. *P. Cusickii*
 B. Scar of nutlets in an areole mostly longer than broad
 Ventral keel not in a groove
 Scar not lateral, obliquely placed.....19. *P. bracteatus*
 Scar distinctly lateral, not oblique; nutlets narrowly ovate, minutely hispid.....20. *P. hispidulus*
 Ventral keel in a broad groove
 Nutlets sparsely reticulate and finely granulate, with thin pericarp.....21. *P. reticulatus*
 Nutlets tuberculate as well as granulate, the pericarp thick and firm.....22. *P. dispar*

1. *P. tenellus* (Nutt.) Gray. SLENDER PLAGIOBOTHRYS. Stem freely branched from the base or sometimes nearly simple, slender and erect, finely soft-villous, 8-20 cm. high; leaves of the basal rosette lance-oblong, obtuse, villous, 1-2.5 cm. long, the cauline scattered and much smaller; spikes becoming long and loosely flowered; calyx densely rufous-pubescent with spreading hairs, about 3 mm. high, in fruit nearly twice as broad, with erect lobes; corolla about 2 mm. broad; nutlets very small, less than 1 mm. long, thick-cruciform, sharply ridged dorsally and on the margins, the latter papillate.—Sandy ground mainly west of the Cascades, to Wash. and Calif.

2. *P. shastensis* Greene. SHASTA PLAGIOBOTHRYS. Copiously villous-hirsute, slender, branched from the base or simple, 1-2 dm. high; leaves mostly in a basal rosette, those of the stem scattered, lanceolate to oblanceolate, acutish, 8-20 mm. long; racemes mostly geminate with a

few axillary, becoming elongated, the pedicels 1-2 mm. long; calyx very hirsute, ferruginous when young, 4-6 mm. long and about as broad, the lanceolate lobes connivent but somewhat spreading at maturity, the base broadly rounded; corolla about 1.5 mm. broad; nutlets 1.5-2 mm. long, thick-cruciform with a broad, transverse ventral groove, the prominent scar below the middle, coarsely warted over the back and with a few broken transverse ridges and low-keeled toward the apex.—Southern Ore. both sides of the Cascades, to Calif.

3. *P. fulvus* (H. & A.) Johnst. var. *campestris* (Greene) Johnst. FULVOUS PLAGIOBOTHRYS. Stem rather slender, 3-7 dm. high, branched from near the base with few long ascending branches, loosely hirsute, with some fine pubescence; leaves mostly in a basal rosette, broadly linear or linear-oblongate, 3-7 cm. long, hirsute, the upper scattered and reduced; racemes very long and becoming sparsely flowered, solitary or geminate, fulvous-hirsute when young, the pedicels 1-3 mm. long; calyx about 5 mm. long, the lanceolate lobes erect in fruit; corolla 3-4 mm. broad; nutlets 2.5-3 mm. long, triangular-ovate, short-acuminate, dark colored, only faintly rugose, thin-keeled dorsally above the middle, the scar annular.—Dry ground, southern Ore. west of the Cascades, to Calif.

4. *P. nothofulvus* Gray. RUSTY PLAGIOBOTHRYS. Stem slender or rather coarse, usually branched from the base, the branches simple below, 1.5-4 dm. high, villous; leaves mostly in a basal rosette, linear-lanceolate to oblong or narrowly ovate, acute or obtuse, very villous-hirsute, 3-10 cm. long, the cauline scattered and commonly much smaller; racemes mostly geminate or ternate; calyx densely appressed-pubescent and very ferruginous when young, 3-4 mm. long, cleft about half way, the lobes at first erect, later connivent, the tube finally circumscissile; corolla 4-9 mm. broad; nutlets 1.5-2 mm. long, abruptly contracted above to a beak-like summit, the lower part as broad as long or broader, depressed, narrowly keeled dorsally, transversely rugose as well as verrucose, the scar nearly central in the ventral depression.—Dry open ground especially west of the Cascades, to Wash. and Calif.

5. *P. Harknessii* (Greene) Nels. & Macbr. HARKNESS' PLAGIOBOTHRYS. A coarse, very hispid-bristly annual, freely branched from the base, the branches ascending, .5-2 dm. high; leaves lance-oblong, becoming strongly pustulate, numerous, little reduced upward, 2-4 cm. long; flowers in small axillary and terminal racemes or glomerules, sometimes with leafy bracts, the short pedicels spreading or reflexed in fruit; fruiting calyx 5-6 mm. long, truncate at base, the lanceolate lobes bristly on the back, villous on the margins, somewhat connivent in fruit; corolla white with yellowish center, 5-6 mm. broad; nutlets 2-2.5 mm. long, broadly ovate, acuminate, incurved, coarsely rugulose with high sharp ridges, attached above the base, the narrow scar prominent.—Dry sandy ground about Malheur Lake, to Nev.

6. *P. hispidus* Gray. BRISTLY PLAGIOBOTHRYS. Stem 7-20 cm. high, freely branched from the base, the branches spreading, bristly-hirsute and finely puberulent; leaves broadly linear to oblong or the uppermost narrowly ovate, 1-3 cm. long, little reduced upward, bristly-hirsute with pustulate hairs and without puberulence; flowers in axillary glomerules, subsessile; calyx 2.5-3 mm. long, the oblong lobes spreading in fruit; corolla-limb 2 mm. wide, the tube nearly as long; nutlets 1.5 mm. long, appearing turgid, dark and dull, unevenly granulose and rugose, a conspicuous white callosity on either side of the central scar.—Arid regions east of the Cascades from central Ore. to Nev. and Calif.

7. *P. mollis* (Gray) Johnst. DOWNY ALLOCARYA. Perennial by slender rootstocks; stems simple to freely branched, erect or decumbent, 1-3.5 dm. long, coarse, densely spreading-villous; leaves numerous, broadly linear, 3-7 cm. long, the pubescence like that of the stem but

harsher and appressed; flowers mostly in axillary racemes which become elongated, the pedicels 1-2 mm. long; calyx finally 5-6 mm. long, villous, the linear lobes somewhat spreading; corolla white without yellow center, 6-9 mm. broad; style much surpassing the fruit; nutlets 1.2-2 mm. long, ovate, reticulate, shining, the scar basal.—Moist alkaline meadows east of the Cascades, to Calif. (*Allocarya mollis* Greene).

8. *P. Greenei* (Gray) Johnst. GREENE'S ALLOCARYA. Stem simple or branched from near the base, the branches ascending or spreading, 1-2.5 dm. long, appressed-pubescent with fine hairs; leaves linear, 2.5-5 cm. long, often nearly glabrous above, the hairs below appressed and somewhat pustulate, racemes long and loosely flowered, more or less bracteate, the pedicels 1-2 mm. long; calyx in fruit 3-4 mm. long, rounded or nearly truncate at base, the pubescence fulvous, dense and closely appressed; corolla-tube about equaling the calyx, the limb 3-4 mm. broad; nutlets 2.5-3 mm. long, broadly ovate, acuminate, the dorsal keel well developed the whole length, closely and evenly tuberculate over the back and bearing a number of long glochidiate and minutely barbed bristles, the large scar just inside the base, strongly excavated.—Moist ground, southern Ore. west of the Cascades, to Calif. (*Allocarya Greenei* Greene).

9. *P. glyptocarpus* (Piper) Johnst. SCULPTURED ALLOCARYA. Stem 1-2.5 dm. high, branched from the base, the branches ascending or spreading, strigose; leaves linear, 3-5 cm. long, pustulate-strigose and coarsely ciliate near the base; racemes very long and loose, the pedicels 1 mm. long; calyx-lobes about 4 mm. long in fruit, spreading and hirsute, the tube in fruit turbinate and very strongly ribbed; corolla 4-5 mm. wide, the tube hardly equaling the calyx; nutlets ovate, somewhat acuminate, 2 mm. long, keeled the whole length dorsally and very prominently rugose and verrucose, with granulation between the ridges, the ovate scar on the inner face above the base.—Moist ground, Rogue River Valley, to Calif. (*Allocarya glyptocarpa* Piper).

10. *P. leptocladus* (Greene) Johnst. SMOOTH-STEMMED ALLOCARYA. Stem freely branched from the base, the branches prostrate, stout, 1-2 dm. long, strigose; leaves linear or linear-spatulate or the uppermost lanceolate, the basal 4-8 cm. long, the upper much shorter, nearly glabrous above, sparsely appressed-bristly beneath; racemes becoming greatly elongated, leafy-bracted below, one-sided, the pedicels very short; fruiting calyx 4-8 mm. long, turbinate at base with prominent stout ribs continued downward, the lobes lanceolate or linear, connivent, sparsely strigose; corolla inconspicuous, 1-2 mm. broad; nutlets 1.5-2.5 mm. long, lanceolate, keeled dorsally above the middle, transversely rugulose and usually granulose or minutely hispid between the ridges, the scar basal; style not reaching the middle of the nutlets.—Muddy shores, Sherman Co., to Utah and Lower Calif.

11. *P. stipitatus* (Greene) Johnst. STALKED ALLOCARYA. Stem branched from the base, erect or spreading, 8-16 cm. high, strigose; leaves linear, ciliate, otherwise glabrous, 2-10 cm. long; racemes very long, stiff, often one-sided; pedicels short and stout; calyx strigose, the tube obpyramidal, the straight, linear, spreading lobes 5-8 mm. long, strongly ribbed; corolla 5-12 mm. broad; nutlets lanceolate or narrowly ovate, 2-2.5 mm. long, much compressed above and sharp-edged dorsally and ventrally, the back flattened below, obscurely rugulose and minutely tuberculate, the small scar basal and usually more or less stipitate.—Low flats, Rogue R. Valley to Calif. (*Allocarya stipitata* Greene).

Var. *micranthus* (Piper) Johnst. Corolla small, about 2.5 mm. broad.—Western Harney Co. to Calif.

12. *P. hirtus* (Greene) Johnst. ROUGH ALLOCARYA. Stem rather stout, mostly simple below, erect or reclining, 3-7 dm. high, spreading-

pubescent with hispid hairs above, mostly glabrous below; leaves linear, 3-5 of the lower pairs opposite, these usually glabrous or sparsely ciliate toward the base, 1-2.5 dm. long, the upper gradually reduced upward, pubescent with coarse, somewhat appressed but not strigose, pustulate hairs; racemes mostly geminate, very ferruginous, the pedicels very short; calyx in fruit 5-6 mm. long, very hirsute, the lobes somewhat spreading; corolla 8-14 mm. broad; nutlets ovate, about 2 mm. long, finely warted and rugose, the dorsal ridges tending to be transverse or reticulate, the dorsal keel well defined, the scar rather large and nearly basal.—Boggy ground in the Umpqua Valley (near Drain); very local.

13. *P. figuratus* (Piper) Johnst. FRAGRANT ALLOCARYA. Plant slender to moderately stout, erect, 1.5-4.5 dm. high, the stem simple to freely branched below the inflorescence, densely to rather sparsely strigose; leaves mostly narrowly linear, 6-15 mm. long, appressed-pubescent like the stem, or spreading-ciliate toward the base; some or all of the racemes geminate or occasionally partly ternate, often with flowers in the forks, the pedicels .5-2 mm. long; calyx densely somewhat spreading-villous, strongly or only slightly ferruginous, 3-5 mm. long, the lobes linear-lanceolate and little enlarged in fruit; corolla-tube shorter than the calyx, the limb 4-8 mm. wide; nutlets ovate, 1.5 mm. long or less, transversely rugose and coarsely warted, the dorsal keel often well defined, the scar small and just above the base.—Damp open ground west of the Cascades, to Vancouver Is., Wash. and Calif. (*Allocarya Scouleri* Greene).

14. *P. salsus* (Brandeg.) Johnst. DESERT ALLOCARYA. Stem branched from near the base, erect or somewhat spreading, 8-16 cm. high, glabrate or sparsely weak-bristly; leaves linear or narrowly oblong, 3-6 cm. long, bristly-ciliate and the faces sometimes sparingly bristly; racemes sparsely flowered, leafy-bracted, the flowers subsessile; calyx long-bristly, 4-5 mm. long, the lobes oblong or lanceolate, erect or somewhat spreading in fruit, often acute, the base obpyramidal and strongly ridged; corolla 4-5 mm. broad; nutlets lanceolate, 2-2.5 mm. long, low-rugulose dorsally on the upper half and granulose; scar basal.—Dry ground, southern Malheur and Harney Cos., to Nev. (*Allocarya Cusickii jucunda* Nels. & Macbr.)

15. *P. lamprocarpus* (Piper) Johnst. SHINY-FRUITED ALLOCARYA. Stem simple erect, slender, 1-3 dm. high, strigose; leaves linear, 1-2 cm. long, glabrous above, hispid beneath; racemes one-sided, bracted below, the pedicels very short; fruiting calyx somewhat thickened at base, the segments narrowly lanceolate, erect or ascending, 2 mm. long; corolla very small; nutlet 1 or 2, broadly ovate, 1.5 mm. long, incurved, shining, without minute roughening but dorsally with broad low transverse ridges and irregular prominences, the ventral keel strongly developed, the lower portion in a deep groove.—Grants Pass, Josephine Co.; not otherwise known.

16. *P. granulatus* (Piper) Johnst. OREGON ALLOCARYA. Stem branched from the base, erect to widely spreading, 1-3 dm. high; leaves linear, 2-5 cm. long, strigose or the hairs toward the base somewhat spreading; inflorescence long and loose, occasionally geminate, the tips rusty, some of the lower flowers short-pedicellate; fruiting calyx usually with some spreading bristles, the tube somewhat obpyramidal, the linear lobes moderately spreading or erect, 2-3 mm. long; corolla-tube shorter than the calyx-lobes, the limb 2.5-3 mm. wide; nutlets about 1.5 mm. long, granulate, sharply tuberculate, with a few mostly transverse ridges above, the small scar subbasal, ovate, slightly stipitate.—Damp ground, Willamette Valley to southern Wash. (*Allocarya granulata* Piper).

17. *P. cognatus* (Greene) Johnst. ALLIED ALLOCARYA. Stem slender, usually branched from the base, erect to widely spreading or even

prostrate, strigose, 8-20 cm. high; leaves linear, 2-6 cm. long, strigose, or the hairs somewhat spreading; inflorescence long and loose, more or less bracteate, the pedicels usually distinguishable; calyx uniformly appressed-setose, the tube becoming somewhat obpyramidal, the linear or lanceolate, obtuse or acutish lobes 2-4 mm. long, ascending; corolla 1-2 mm. broad; nutlets 1.5-2.5 mm. long, ovate or oblong-ovate, dull, finely granulose, slightly unsymmetrical, marked with somewhat reticulating ridges and coarsely verrucose, the broad scar subbasal, ovate, that of the axial nutlet longest, all surrounded by a prominent ridge enclosing an areole.—Moist ground east of the Cascades, to Wash., the Rocky Mts. and Calif. (*Allocarya cognata* Greene).

18. *P. Cusickii* (Greene) Johnst. CUSICK'S ALLOCARYA. Stem erect to nearly prostrate, branched from the base, 1-2.5 dm. high, strigose; leaves linear, 2-5 cm. long, the pubescence rather short, stiff and largely spreading; inflorescence long and loose, more or less leafy-bracted, the pedicels 1 mm. long or less; fruiting calyx appressed-setose, somewhat asymmetrical, the tube obpyramidal, indurated, the lobes linear and obtuse, 3-4 mm. long, moderately spreading; tube of the corolla a little shorter than the calyx, the limb 1-2 mm. wide; nutlets lance-ovate, 1.5-2 mm. long, shining, not granulose, marked dorsally with low coarse warts and broken ridges, keeled toward the summit, the axial nutlet with a broad triangular-ovate scar, the others with small deep scars.—Damp ground east of the Cascades, to Wash., Idaho and Calif. (*Allocarya Cusickii* Greene).

19. *P. bracteatus* (How.) Johnst. BRACKETED ALLOCARYA. Stem freely branched from the base, flaccid, widely spreading or prostrate, 1-4 dm. long, sparsely strigose; leaves linear, 2.5-5 cm. long, sparsely strigose and somewhat bristly-ciliate; racemes very long and loose in fruit, sparingly leafy-bracted below, often with pedicels 1-3 mm. long; fruiting calyx uniformly appressed-setose, the tube more or less obpyramidal, the linear lobes spreading, 2.5-4 mm. long; corolla 1-3 mm. broad; nutlets 1.5-2 mm. long, oblong-ovate, rugose both dorsally and ventrally with broken reticulating ridges and finely muriculate, the broad scar oblique, nearly basal, the areole longer than broad.—Damp ground, Umpqua Valley, to Calif. (*Allocarya bracteata* How.)

20. *P. hispidulus* (Greene) Johnst. HARSH ALLOCARYA. Stem branched from the base, spreading or prostrate, 8-35 cm. high, strigose; leaves narrowly oblong or linear, 2-4 cm. long, strigose or the hairs partly spreading; racemes slender and in fruit becoming long and loose, the lower flowers often in the axils of ordinary leaves, the pedicels 1 mm. long or less; calyx densely setose, the hairs little spreading, the tube only slightly indurated, not obpyramidal, the lobes 2-3 mm. long, somewhat spreading; corolla under 2 mm. broad; nutlets 1.5-2 mm. long, ovate or lanceolate, rugose and warted and finely hispidulous, the scar lance-linear to ovate, lateral, concave, subbasal.—Damp ground throughout Ore., to Wash., Wyo. and Calif. (*Allocarya hispidula* Greene).

21. *P. reticulatus* (Piper) Johnst. NETTED ALLOCARYA. Stem weak and slender, flexuose, spreading or prostrate, branched from the base, 1-2 dm. long, softly appressed-pubescent; leaves linear, 2-5 cm. long, thin, strigose; racemes lax, with a few leafy bracts below; pedicels about 1 mm. long; calyx-lobes in fruit about 2 mm. long, appressed-hairy, the tube not conspicuously turbinate or nerved; nutlets ovate, 1.5 mm. long, low rugose-reticulate and densely granulate, with thin pericarp, the ventral keel prominent, in a broad groove, the lanceolate scar ventral.—Moist ground, Coos and Curry Cos., to Calif. (*Allocarya reticulata* Piper).

22. *P. dispar* (Piper) Johnst. LONG-BRANCHED ALLOCARYA. Widely spreading or prostrate, branched from the base, the branches 1.5-5 dm. long, strigose; leaves broadly linear, 2-5 cm. long, strigose or some

of the marginal hairs spreading; inflorescence becoming very long and loose, leafy-bracted below, the lower pedicels usually elongated, sometimes up to 5 mm. long; calyx not indurated below, the hairs appressed, the linear lobes in fruit spreading, 3-4 mm. long; corolla about 2 mm. broad; nutlets ovate, 1.5 mm. long, with thick pericarp, dorsally marked with low reticulating ridges, warted and minutely granulose, keeled dorsally down to the middle or farther, the ventral keel in a broad depression, the lanceolate scar distinctly ventral.—Southwestern Ore. to Calif.

10. ERITRICHIMUM Schrad.

Low depressed perennials with abundant small crowded leaves; flowers in small racemes; calyx-lobes ascending; corolla blue, funnelform, with short tube; nutlets obliquely attached to the conic gynobase, smooth, the apex obliquely truncate and distinctly margined.

1. *E. elongatum* (Rydb.) Wight. PALE ALPINE FORGET-ME-NOT. Densely caespitose, forming cushion-like mats 4-10 cm. in diameter, more or less densely long white-pilose; leaves of sterile shoots oblong, mostly obtuse, 3-8 mm. long, those of the flowering stems linear; flowering stems 2.5-7 cm. high, simple, few-flowered; calyx 3-4 mm. long, the lobes linear; corolla bright blue, 5-6 mm. wide, the crests in the throat puberulent; nutlets smooth, 2 mm. long.—High peaks of the Wallowa Mts., to Mont. and N. Mex.

11. HACKELIA Opiz.

Biennial or perennial usually rather tall herbs with linear or oblong leaves; inflorescence paniculate, the pedicels becoming recurved or deflexed; calyx 5-parted, spreading or reflexed in fruit; corolla small or medium sized, blue, white, or pinkish, the throat prominently crested; style shorter than the nutlets; gynobase pyramidal, broader than high; nutlets attached by a broad triangular or ovate areole, armed with glochidiate prickles.

- Corolla white or yellowish
Marginal bristles of the nutlets not strongly confluent at base; corolla 10-15 mm. broad
Backs of the nutlets with bristles nearly as long as those of the margins.....1. *H. californica*
Backs of the nutlets with bristles much shorter than those of the margin.....2. *H. diffusa*
Marginal bristles strongly confluent at base, forming an inrolled wing; corolla 4-5 mm. broad.....7. *H. hispida*
Corolla blue
Corolla 2-6 mm. broad
Backs of the nutlets without bristles, more or less keeled down the middle.....6. *H. floribunda*
Backs of the nutlets with short bristles, not keeled down the middle.....5. *H. jessicae*
Corolla 10-15 mm. broad
Leaves villous; marginal bristles of the nutlets not equaling the maximum width of the latter.....4. *H. setosa*
Leaves not villous; marginal bristles equaling the maximum width of the nutlets
Pubescence of the stem rather harsh and spreading at least below.....2. *H. diffusa*
Pubescence of the stem not harsh, mostly closely appressed.....3. *H. Cusickii*

1. *H. californica* (Piper) Johnst. CALIFORNIA STICKWEED. Stems stoutish, 4-9 dm. high, softly short-pubescent; lowest leaves oblong or oblong-lanceolate, obtuse or acutish, narrowed to petioles, the whole 8-15 cm. long, pubescent like the stem, the upper sessile and partly clasping, often lance-ovate; flowers scattered, few to a peduncle; calyx 2-4 mm. long, the lobes oblong or narrowly ovate, obtuse; corolla white, 10-15 mm. in diameter, the crests prominent, puberulent; nutlets broadly ovate, 7-9 mm. long, bearing 20-30 long bristles, the marginal not conspicuously longer and only moderately flattened, the faces with some smaller bristles and sharply mucronate, the scar large, broadly ovate.—Mountains of southern Ore. east of the Cascades to Calif.

2. *H. diffusa* (Lehm.) Johnst. SPREADING STICKWEED. Stems erect or ascending, rather slender, 3-6 dm. high, crisp-villous below and somewhat scabrous, more appressed-pubescent above; leaves thin, pub-

escent on both faces, 5-10 cm. long, lanceolate or narrowly lance-oblong, the basal long-petioled, often obtuse, the upper cauline sessile and acute; panicles long and loose, the branches leafy-bracted, the pedicels 4-12 mm. long; calyx 3-4 mm. long, the broadly linear lobes obtuse or acute; corolla white, the tube shorter than the calyx, the limb 10-15 mm. broad, the crests in the throat very prominent, 2-lobed and puberulent; nutlets 5-7 mm. long, the flat marginal spines not confluent and nearly equaling the width of the body, the faces with rather numerous short bristles.—Dry areas east of the Cascades, to B. C., the Rocky Mts. and Calif. (*Lappula diffusa* Greene).

Var. *coerulescens* (Rydb.) Johnst. Corolla bright blue; otherwise like the species.—Range that of the species. (*Lappula coerulescens* Rydb.)

3. *H. Cusickii* (Piper) Johnst. CUSICK'S TICKWEED. Stems slender, erect, arising from a branching base with several short sterile shoots, canescent with mainly closely appressed hairs, not scabrous; leaves thin, pubescent on both faces, the hairs appressed or on the margins and petioles spreading, the basal narrowly to broadly oblanceolate, gradually tapering to slender petioles, the whole 7-12 cm. long, the cauline leaves much smaller and sessile; inflorescence long and loose, often leafy; calyx-lobes linear, obtuse, 3-4 mm. long; corolla bright blue, the limb 10-15 mm. wide, the broad lobes narrowed at base; nutlets about 5 mm. long, the flat spreading bristles about equaling the width of the body, the back finely muricate and with a few small bristles.—Dry slopes, Gilliam to Lake and Malheur Cos.

4. *H. setosa* (Piper) Johnst. BRISTLY TICKWEED. Stem rather slender, 3-6 dm. high, villous-hirsute below, the hairs above more appressed; leaves broadly linear or linear-oblong, 4-10 cm. long, rather long-villous; inflorescence 1-2 dm. long, leafy below, the branches ascending; calyx-lobes oblong-lanceolate, 3-4 mm. long; corolla bright blue, the limb 10-15 mm. broad; nutlets 4-5 mm. long, rounded at base, the marginal bristles strongly flattened, shorter than the width of the nutlet, densely muricate and sparsely short-bristly on the back.—Mountains of southwestern Ore. to Calif.

5. *H. Jessicae* (McGreg.) Brand. JESSICA'S TICKWEED. Stems few from a stout caudex, 3-6 dm. high, somewhat angled, sparsely crisped-hairy; basal leaves numerous, ample, broadly oblanceolate, obtusish, 1-2.5 dm. long including the flat petioles, softly appressed-pubescent, the petioles villous-ciliate, the uppermost cauline leaves subcordate-clasping at base; inflorescence large and open; calyx lobes narrowly oblong-ovate, 3 mm. long, canescent; corolla blue, the tube longer than the calyx, the limb 3-6 mm. broad; nutlets 4-5 mm. long, broadly ovate, the wide flat marginal spines somewhat branched, nearly equaling the greatest width of the body, the back rugulose and with a few short stout spines.—Dry woods, east slope of the Cascade Mts. to Wash., the Rocky Mts. and Calif.

6. *H. floribunda* (Lehm.) Johnst. MANY-FLOWERED TICKWEED. Stems erect, stout, 5-10 dm. high, short-villous and somewhat scabrous; leaves varying from oblong to oblanceolate, linear-oblong or linear, 6-12 cm. long, the lower on usually slender petioles; inflorescence ample, the racemes many-flowered; calyx cleft about two-thirds its length, the lobes oblong and obtuse; corolla bright blue with yellow throat, the limb 5-6 mm. broad; nutlets broadly ovate, 3-5 mm. long, the flat marginal prickles longer than the maximum width, the back densely and finely muricate, not bristly, with a more or less prominent median keel.—Open woods and thickets, Wallowa Mts., to Wash. and the Rocky Mts. (*Lappula floribunda* Greene).

7. *H. hispida* (Gray) Johnst. ROUGH TICKWEED. Stem simple to freely branched, 3-5 dm. high, sparsely short-hirsute; leaves linear-lanceolate or oblong, 4-8 cm. long, the upper usually broader and somewhat clasping, the pubescence short, harsh and pustulate; branches

of the inflorescence elongated and stiffly ascending; calyx-lobes oblong, about 2 mm. long; corolla greenish white or pale yellow, broadly campanulate, 4-5 mm. broad, the short lobes recurved; nutlets 5-6 mm. long, rounded at base, the flat marginal bristles confluent below, forming a conspicuous wing, inrolled dorsally, the back finely muricate and sparsely short-bristly.—Dry slopes, northern Ore. east of the Cascades, to Wash.

12. LAPPULA [Rivin.] Moench.

Annual herbs with linear or oblong leaves; inflorescence mostly elongated and leafy-bracted, the pedicels erect in fruit; corolla salverform, blue or white, in our species very small; style surpassing the mature nutlets; gynobase subulate; nutlets with narrow attachment along the median ventral keel, the back with glochidiate prickles about the margin.

Marginal spines of the nutlets in 2 rows.....1. *L. echinata*
Marginal spines of the nutlets in 1 row.....2. *L. Redowskii*

1. *L. echinata* Gilib. BRISTLY-FRUITED TICKWEED. Stem erect, simple to freely branched, 1.5-6 dm. high, harshly appressed-pubescent and canescent; leaves linear or the lowest oblanceolate, closely ascending, 2.5-5 cm. long, pubescent like the stem, passing above into the lanceolate bracts of the raceme, pedicels 1-3 mm. long; calyx-lobes broadly linear, appressed-bristly, in fruit spreading, 2.5-3 mm. long; corolla bright blue, the limb 3-4 mm. broad, the tube surpassing the calyx; nutlets 3.5-4 mm. long, sharply muricate dorsally, with 2 marginal rows of long slender bristles not confluent at base.—Occasional in waste and cultivated ground east of the Cascade Mts. Native of Europe.

2. *L. Redowskii* (Hornem.) Greene. WESTERN TICKWEED. Stem 2-4 dm. high, branched from the base or only above with ascending branches, more or less densely villous or with some fine appressed hairs; leaves linear or oblanceolate or the upper lanceolate, 1.5-4 cm. long, villous and slightly harsh; racemes long and loose, leafy-bracted, the pedicels 1-3 mm. long; fruiting calyx 2-3 mm. long, cleft nearly to the base, the lobes lanceolate; corolla white or blue, the tube equaling or shorter than the calyx, the limb 2-3 mm. wide; nutlets 3-4 mm. long, the back nearly flat, more or less muricate, often with a well marked row of points down the middle, the marginal spines in 1 row, moderately flattened or terete, not fused below, the ventral surface very convex and strongly muricate.—Dry plains east of the Cascades, to B. C., S. Dak., Tex. and Calif. and in the Old World. (*L. occidentalis* Rydb.)

Var. *desertorum* (Greene) Johnst. Nutlets with a well marked cup-like elevation of the dorsal margin, formed by the confluence of the lower portion of the marginal spines.—With the species. (*L. cupulata* Rydb.)

13. MYOSOTIS L.

Annual, biennial, or perennial herbs, usually soft-pubescent; flowers in long usually bractless, 1-sided racemes; calyx-lobes spreading or erect and little enlarging in fruit; corolla blue, pink, or white, rotate or salverform, the throat crested; nutlets glabrous or pubescent, smooth, attached by the base to the receptacle, the scar small and flat.

Perennial; hairs of calyx straight; corolla 4-8 mm. broad.....1. *M. laxa*
Annuals; calyx with hooked hairs; corolla less than 3 mm. broad.....2. *M. versicolor*
Fruiting pedicels spreading; corolla yellow, turning blue.....3. *M. macrosperma*
Fruiting pedicels erect; corolla white.....

1. *M. laxa* Lehm. SMALLER FORGET-ME-NOT. Perennial; stem slender to rather stout, erect or decumbent, often branched, sparsely pubescent or glabrous below, strigose above, 2-6 dm. high; leaves narrowly oblong or linear or the lower oblanceolate, 3-7 cm. long, appressed-

pubescent, sometimes glabrous beneath; racemes long and lax, 1-3.5 dm. long, the pedicels spreading in fruit, very slender, 3-8 mm. long; fruiting calyx campanulate, 3-5 mm. long, cleft half its length; corolla bright blue with yellow center, 3-8 mm. wide; nutlets broadly ovate, dark brown and shining, 1.5 mm. long.—Swampy ground, widely distributed, to B. C., Calif. and the eastern states.

2. *M. versicolor* (Pers.) Reich. YELLOW-AND-BLUE SCORPION-GRASS. A slender, freely branched, hirsute annual 1-3 dm. high; leaves linear to lanceolate or the lower oblanceolate, 1-2.5 cm. long, the basal often rosulate; racemes long and loosely flowered, the rachis slender and erect, the pedicels spreading, 2-4 mm. long; fruiting calyx 4-5 mm. long, cleft over half-way, the tube pubescent with spreading hooked hairs; corolla about 2 mm. broad, at first yellow, then turning blue; nutlets ovate, 1.5 mm. long.—Abundantly established in open ground in the Willamette and Umpqua valleys. Native of Europe.

3. *M. macrosperma* Engelm. WHITE SCORPION-GRASS. Erect, annual, the stem simple or branched, 1-3 dm. high, coarsely pubescent; leaves narrowly oblong or the lower oblanceolate, hirsute, 2-3.5 cm. long; racemes erect, the peduncles pubescent with incurved hairs, the pedicels becoming 2-4 mm. long, erect, bent outward at summit; fruiting calyx 5-7 mm. long, pubescent with spreading minutely hooked hairs, cleft half-way or more, the lobes lanceolate, the two lower one-fourth longer than the other three, or all sometimes about equal; corolla white, 2 mm. broad, nutlets oblong-ovate, 1.5 mm. long, grayish brown.—Moist ground, widely distributed, to the southern U. S.

14. MERTENSIA Roth.

Perennial herbs usually with soft foliage and rather large leaves; calyx relatively small, scarcely enlarging in fruit; corolla large for the family, tubular-funnelform or trumpet-shaped, blue, purple, or white, shallowly lobed, crested or naked in the throat; nutlets erect, wrinkled at maturity, attached above the base to the more or less convex receptacle.

- Limb of corolla not sharply differentiated from the tube; stem from a globose tuber..... 1. *M. bella*
 Limb of corolla sharply differentiated from the tube; stem not from a globose tuber
 Corolla-tube 2.5-6 times as long as the limb; root somewhat tuber-like..... 7. *M. longiflora*
 Corolla-tube relatively shorter; root not tuber-like
 Limb of corolla decidedly longer than the tube
 Calyx-lobes obtuse; species of the Willamette and Umpqua valleys and westward..... 3. *M. platyphylla*
 Calyx-lobes acute; species of the Cascade Mts. and eastward..... 2. *M. paniculata*
 Limb of corolla little or not at all longer than the tube
 Limb of corolla fully equaling the tube; calyx-lobes obtuse, usually under 3 mm. long..... 4. *M. ciliata*
 Limb of corolla decidedly shorter than the tube; calyx-lobes usually longer and acute
 Calyx 3-4 mm. long, corolla 10-15 mm. 6. *M. oblongifolia*
 Calyx 5-9 mm. long, corolla 15-20 mm. 5. *M. umbratilis*

1. *M. bella* Piper. OREGON LUNGWORT. Stem solitary from a globose tuber, 2-5.5 dm. high, very slender, glabrous to sparsely short-villous, simple to the inflorescence; leaves very thin, elliptic to ovate or the uppermost lanceolate, 2.5-5 cm. long, the upper acute, the lower obtuse or rounded at apex, glabrous beneath, minutely scabrous above, the lower long-petioled; flowers in 2-4 small racemes from the upper axils, on long, very slender peduncles, the terminal flowers of the raceme somewhat umbellate, the pedicels strigose, 6-12 mm. long; calyx strigose, 3-4 mm. long, the lance-linear lobes acute; corolla bright blue, 5-7 mm. long, the tube half as long as the calyx, dilating to the broad campanulate throat and limb, the lobes short and broad; style half as long as the corolla.—Moist slopes at middle altitudes in the Cascades of Lane Co. and in the mountains of southeastern Josephine Co.

2. *M. paniculata* (Ait.) G. Don var. *borealis* (Macbr.) Wms. TALL LUNGWORT. Stems arising singly or few together, 2-8 dm. high, mostly

glabrous; leaves glabrous or often sparsely strigose above or short-hairy beneath, the basal lance-oblong to ovate, acute or acuminate, 1-2 dm. long, on petioles as long or longer, the cauline similar, short-petioled or sessile, the uppermost reduced; inflorescence becoming elongated and open, the pedicels 5-25 mm. long, with appressed or spreading hairs; calyx 4-5 mm. long, pubescent or glabrous, the lobes lanceolate and acute; corolla 1-1.5 cm. long, the tube shorter than the limb and often pubescent within; filaments shorter than the anthers; style included or slightly exserted.—Moist woods and meadows and along streams at moderate to rather high altitudes, west slope of the Cascade Mts., to B. C., Idaho and Mont.

3. *M. platyphylla* Hel. var. *subcordata* (Greene) Wms. WESTERN LUNGWORT. Stem stout to rather slender, 5-10 dm. high, arising singly or in small clusters, nearly glabrous; leaves numerous, ovate or elliptic, acute or short-acuminate, the lowest often subcordate, glabrous or minutely scabrous above, sparsely rather short-pubescent beneath, thin, paler beneath, 5-10 cm. long, mostly on winged petioles, the lowest equaling the blades; inflorescence finally loose, the pedicels up to 4 cm. long, more or less strigose; calyx 3-4 mm. long, cleft nearly to the base, the segments triangular-lanceolate to oblong, acute or obtuse, pubescent over the back or glabrous except the ciliate margins; corolla 8-12 mm. long, the tube shorter than the narrowly campanulate throat and limb, the lobes very short; filaments shorter than the anthers, broadest near the summit; style nearly or quite included.—Moist shade, west of the Cascade Mts., Willamette Valley and Coast Mts., to Wash. (*M. subcordata* Greene).

4. *M. ciliata* (James) Don. BROAD-LEAVED LUNGWORT. Stems clustered, rather stout, glabrous, branched, leafy, 3-6 dm. high; leaves glabrous except the sometimes scabrous-ciliate margins, minutely pustulate, all ovate to ovate-oblong or elliptic, those of the sterile shoots 8-15 cm. long, on petioles about as long, the cauline simple, not greatly reduced upward, sessile and clasping, acute or somewhat acuminate; panicles loose and nodding, the slender pedicels often minutely pustulate; calyx-lobes much longer than the tube, oblong, obtuse, about 2 mm. long, glabrous except the minutely scabrous-ciliate margins; corolla 10-12 mm. long, the limb little longer than the tube, lobed about one-third its length; stamens borne at the summit of the corolla-tube, the filaments about as long and broad as the anthers.—Moist slopes, eastern Grant Co., to Wyom. and Nev.

5. *M. umbratilis* Greenm. SHADE LUNGWORT. Stems from elongated rootstocks, glabrate and somewhat glaucous, 3-8 dm. high; leaves oblong-lanceolate or narrowly ovate, acute or obtuse, those of the sterile shoots long-petioled, 8-12 cm. long, the cauline short-petioled or the upper sessile, 5-10 cm. long, all glabrous or minutely pustulate above, glabrous beneath, minutely hispid-ciliate; branches of the panicle glabrous; calyx 5-9 mm. long, glabrous except the ciliate margins of the lanceolate, acute or obtuse lobes; corolla 15-20 mm. long, the moderately expanded limb half to two-thirds as long as the tube, the latter glabrous within, the throat externally with very small indentations marking the crests.—Shaded slopes, Blue Mts., to Wash.

6. *M. oblongifolia* (Nutt.) Don var. *nevadensis*. Wms. LEAFY LUNGWORT. Stems usually clustered on a stout branching caudex covered with old leaf-bases, 2-4 dm. high, glabrous; leaves thickish, glabrous, the margins sometimes more or less ciliate, the basal and those of the sterile shoots broadly lanceolate to ovate or elliptic, 8-10 cm. long, often on very long petioles, the lower cauline lance-oblong to obovate, the upper lanceolate to ovate, acute; flowers numerous, in a dense to rather open, leafy panicle, the pedicels glabrous; calyx 3-4 mm. long, deeply cleft, the triangular-lanceolate lobes acute, obscurely scabrous to strongly ciliate, otherwise nearly glabrous; corolla 10-15

mm. long, the campanulate limb more than half as long as the tube; filaments longer and broader than the anthers; style usually exerted. —Moist slopes in the mountains, Harney Co. to Wash., the Rocky Mts. and Calif. (*M. nutans* How.)

Var. *amoena* (Nels.) Johnst. Leaves softly and sometimes copiously pubescent on both sides or only above; stem sometimes pubescent; inflorescence, including the calyx, more or less pubescent; corolla-tube hairy within.—Moist slopes east of the Cascades, to Wash., Mont. and Calif.

7. *M. longiflora* Greene. LONG-FLOWERED LUNGWORT. Stems solitary or few from a branching tuberous base, 1-2 dm. high, glabrous; leaves glabrous beneath, short-strigose or merely harshly papillose above, the margins scabrous, the basal leaves undeveloped, the lower cauline obovate, the middle oblong to obovate, the upper ovate to lanceolate and acute; panicles rather dense, the pedicels 2-6 mm. long, glabrous or somewhat strigose; calyx 5-6 mm. long, the broadly lanceolate to linear lobes acute, glabrous except the scabrous-serrulate or minutely ciliate margins; corolla 1.5-2 cm. long, the tube 2.5-3 times as long as the shallow-lobed limb; style nearly equaling to a little surpassing the corolla.—Middle altitudes in the Blue Mts., to Wash., Idaho and Mont.

15. LITHOSPERMUM L.

Annual or perennial, mostly harshly pubescent herbs; flowers in leafy spikes or racemes; corolla white, yellow, or blue, funnelform or salverform, naked, pubescent, or crested in the throat; style slender or filiform; nutlets white, smooth and shining, or brown and wrinkled, attached by their bases to the nearly flat receptacle.

Pedicels 1-3 mm. long; corolla-tube broad, the throat scarcely dilated.....1. *L. ruderaie*
Pedicels 4-7 mm. long; corolla-tube slender, the throat funnelform.....2. *L. californicum*

1. *L. ruderaie* Dougl. WESTERN GROMWELL. Stems rather stout, erect or decumbent, 2-5 dm. high, simple or much branched above, hirsute and somewhat hispid to densely soft-villous; leaves very numerous, more crowded above, the upper often reflexed and curved upward, linear-lanceolate to rather broadly lanceolate, 3-8 cm. long, obtuse or acutish, softly or rather harshly pubescent on both surfaces, the margins scabrous; flowers in the axils of the upper leaves, the very stout pedicels 1-3 mm. long; calyx in fruit 7-10 mm. long, the lobes subulate; corolla 9-12 mm. long, pale yellow, the broad tube scarcely dilated into the throat, the lobes about 3 mm. long; nutlets 5-6 mm. long, broadly ovoid or sometimes broader than long.—Dry plains and open woods east of the Cascades, to B. C., Mont. and Calif.

2. *L. californicum* Gray. CALIFORNIA GROMWELL. Stem erect, 1-2.5 dm. high, branched above or simple, densely hispid to nearly glabrous; leaves numerous and uniformly distributed on the stem, linear to lanceolate or oblong, mostly obtuse, 2.5-5 cm. long, very hispid-strigose on both faces; flowers axillary on the upper part of the stem or branches, the stout spreading or recurved pedicels 4-7 mm. long; fruiting calyx 7-10 mm. long, the lobes linear; corolla light yellow, 12-18 mm. long, the slender tube dilated into the distinct funnelform throat, the lobes 2-3 mm. long; nutlets ovoid, 5-6 mm. long, often keeled the full length, smooth and shining.—Dry slopes, southern Josephine and Jackson Cos. to Calif.

96. VERBENACEAE. VERBENA FAMILY

Herbs or shrubs with opposite leaves; inflorescence diverse, in our species spicate; flowers irregular or nearly regular, perfect; calyx 2-5-lobed, free from the ovary; corolla 4-5-lobed, sometimes bilabiate; stamens borne on the corolla-tube, usually 4 and didynamous; ovary

2-4-chambered, in fruit splitting into as many 1-seeded nutlets, or sometimes berry-like.

1. VERBENA [Tourn.] L.

Mostly perennial herbs with opposite leaves; flowers spicate or corymbose; calyx unequally 5-lobed; corolla salverform or funnelform, regular or slightly irregular, 5-lobed; stamens 4; ovary 4-chambered with 1 ovule to each chamber; style short, 2-lobed, only one of the lobes stigmatic; mature fruit splitting into 4 nutlets.

Stem erect; spikes dense; corolla 3 mm. long.....1. *V. hastata*
Stem usually not erect.....2. *V. prostrata*
Corolla 5-7 mm. long, longer than the bracts.....3. *N. bracteosa*
Corolla about 4 mm. long, shorter than the bracts.....

1. *V. hastata* L. BLUE VERBENA. Harshly short-pubescent, erect, 5-12 dm. high; leaves broadly oblong-lanceolate, 7-15 cm. long, serrate to coarsely dentate; spikes cymosely clustered at the summit, erect, slender, closely flowered; corolla purplish blue, 3 mm. long; nutlets under 2 mm. long, nearly equaling the calyx.—Moist open ground from the Willamette Valley to Wash. and Calif., and eastward across the continent.

2. *V. prostrata* R. Br. WESTERN VERBENA. Villous-hirsute; stems 4-12 dm. high, erect, spreading, or decumbent; leaves ovate, irregularly toothed and incised, often 3-cleft below, 4-8 cm. long, on winged petioles; inflorescence broad and open, the spikes long and rather loosely flowered; corolla 5-7 mm. long, bright blue; nutlets 1.5 mm. long, much shorter than the hirsute calyx.—Dry open ground from the Umpqua Valley to Calif.

3. *V. bracteosa* Michx. BRACKETED VERBENA. Loosely hirsute; stem prostrate or spreading, occasionally erect, freely branched, 2-8 dm. long; leaves oblong to oblanceolate or ovate in outline, coarsely toothed or deeply incised, numerous, 2-5 cm. long; spikes numerous, the linear-subulate or lanceolate, hispid-hirsute bracts much surpassing the small light blue flowers.—Moist ground east of the Cascades, to Wash., Calif. and the Atlantic coast.

97. LABIATAE. MINT FAMILY

Herbs or sometimes shrubby, usually aromatic, with square stem and opposite leaves; flowers usually in axillary clusters or terminal spikes, perfect and more or less irregular; calyx regular and 5-lobed or bilabiate, free from the ovary; corolla usually bilabiate; stamens 4 and didynamous or only 2, borne on the corolla-tube; ovary deeply 4-lobed, the style 1, 2-cleft at apex; fruit splitting into 4 1-seeded nutlets.

Nutlets distinctly united.....1. *Teucrium*
Calyx and corolla very irregular.....2. *Trichostema*
Calyx and corolla nearly regular.....
Nutlets nearly or quite separate.....
Calyx distinctly bilabiate.....3. *Scutellaria*
Calyx with a saccate protuberance above.....
Calyx without a saccate protuberance.....
Calyx depressed, the throat closed in fruit; flowers in dense purple spikes.....9. *Prunella*
Calyx not depressed, the throat open.....
Functional stamens 4.....
Flowers in axillary clusters; corolla-tube curved; leaves large and coarsely dentate.....17. *Melissa*
Flowers in a terminal inflorescence; corolla-tube straight; leaves very small and entire.....19. *Thymus*
Functional stamens 2.....
Anthers 2-chambered, the connective not elongated; small annuals.....18. *Pogogyne*
Anthers 1-chambered, the connective greatly elongated, often with a sterile anther-chamber; large annuals or perennials.....13. *Salvia*
Calyx not distinctly bilabiate.....
Corolla nearly regular.....
Functional stamens 4.....20. *Mentha*