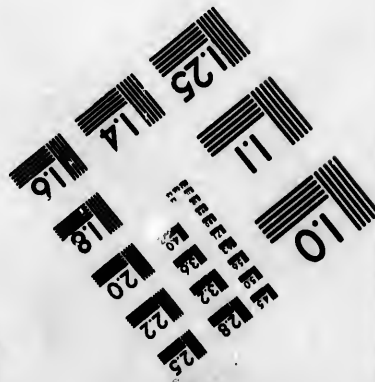
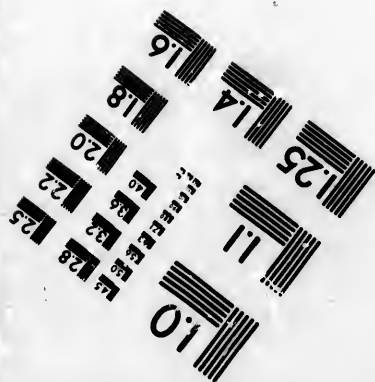
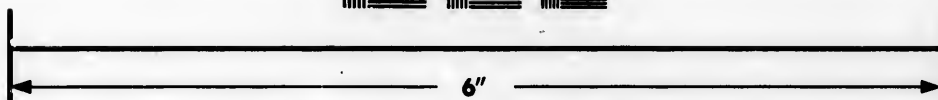
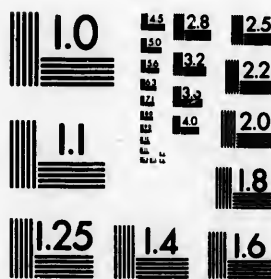


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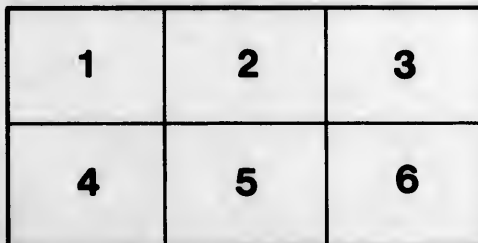
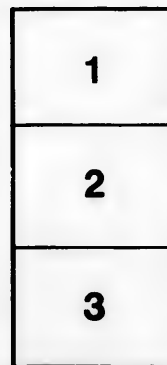
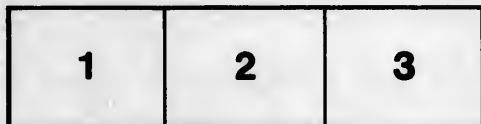
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CONTAINING
BRIEF DESCRIPTIONS OF ALL THE KNOWN INDIGENOUS AND
NATURALIZED PLANTS GROWING WITHOUT CULTIVATION
NORTH OF CALIFORNIA, WEST OF UTAH, AND SOUTH OF
BRITISH COLUMBIA.

BY
THOMAS HOWELL.

VOL. I.

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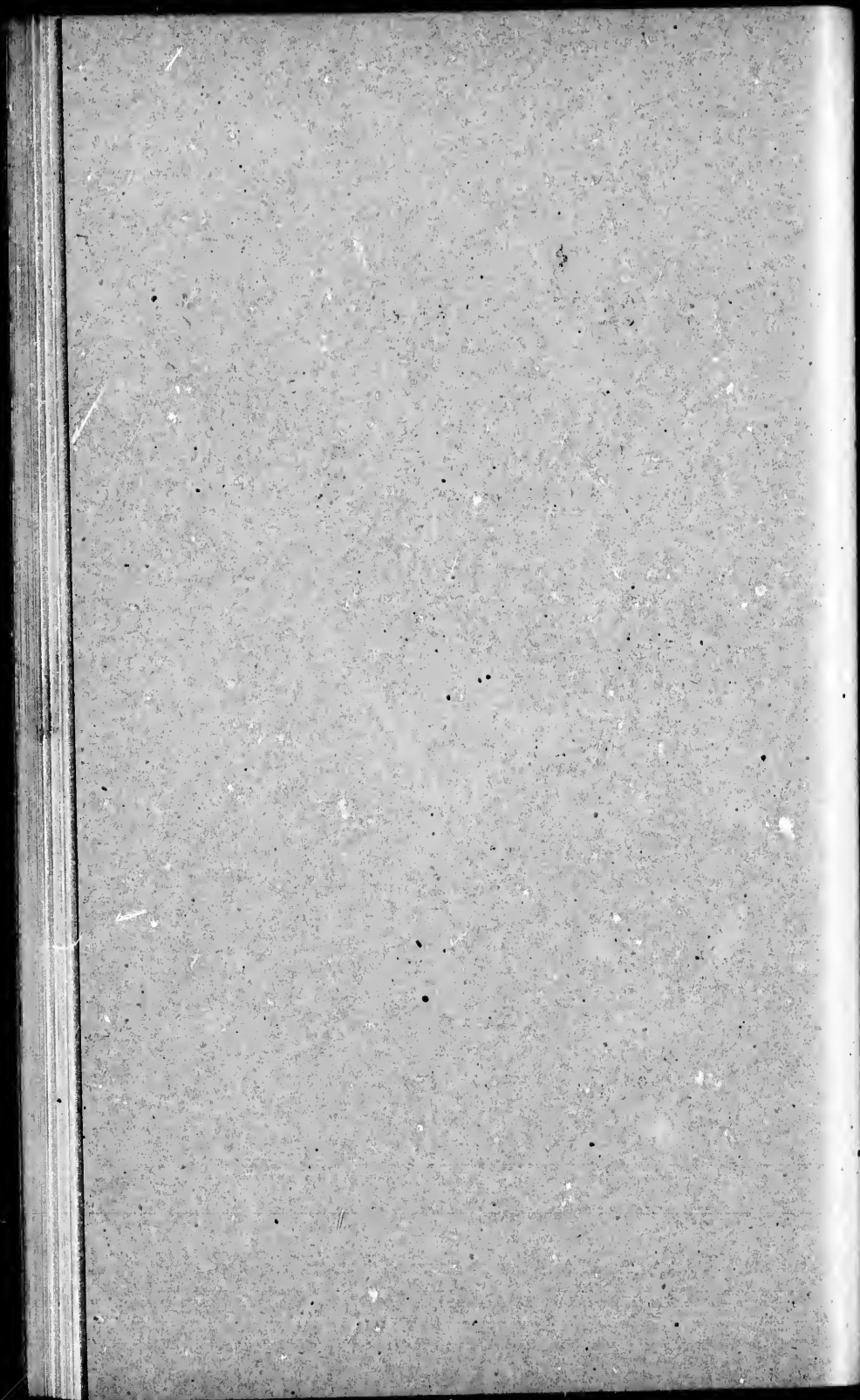
PHANEROGAMÆ.

PABICLE 5, BORAGINACEÆ TO PLANTAGINACEÆ

Price Fifty Cents.

PORTLAND OREGON,
November 20th, 1901.







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II Ovary 4-parted (rarely 2-parted) from above into 1-celled ovuled divisions surrounding the style. Stigma not annular, terminal. Nutlets attached to a central depressed or elevated disk receptacle or axis called the *gynobase*.

TRIBE III Mostly herbs with entire leaves. Flowers chiefly axillary but not in the axils of bracts or leaves or bractless, in scorpioid spikes or racemes.

* Corolla and stamens regular: style entire or sometimes barely cleft at the apex.

+ Ovary 4-parted or 4 lobed: fruit of 4 nutlets or by abortion fewer, subtended or surrounded by the unchanged or merely accrescent calyx.
= Nutlets divergent or divaricate.

Pectocarya Small annuals with minute white flowers: nutlets flat and thin, attached at the inner end underneath to a small depressed gynobase.

Cynoglossum Stout perennial or biennial herbs with blue flowers in bractless racemes: nutlets equally divergent, horizontal or obliquely ascending on a depressed or pyramidal gynobase.

.. Nutlets erect and parallel with the style or sometimes incurved.

= Nutlets attached obliquely by more or less of the ventral face or angle or by the base or prolongation of it to the more or less elevated gynobase, not stipitate and the scar not excavated.

a Nutlets armed with glochidiate prickles, forming burs.

Lappula Annual or perennial herbs: corolla short-salverform or somewhat funnelliform, blue or white; the throat closed with prominent fornicate appendages.

b Nutlets very variable, from nearly smooth to glochidiate.

Eritrichium Nutlets obliquely ascending, with depressed or truncate-complanate back bordered by an acute margin or at length revolute, entire or dentate or spinulose wing.

Allocarya Mostly annuals with opposite leaves and white flowers: pedicels turbinate-thickened and more or less 5-angled, persistent: corolla salverform.

c Nutlets unarmed.

Piptocalyx Small annuals with alternate or scattered leaves and small white flowers on very short persistent pedicels: calyx circumscissile near the middle, the upper part soon falling away: nutlets straight, attached for nearly their whole length to a subulate gynobase.

Eremocarya Hirsute-canescens small annuals with most of the leaves in a radical tuft and small white flowers on persistent pedicels in geminate racemes; the root giving a deep purple stain.

Plagiobothrys Annual herbs with most of the leaves in rosulate radical tufts and small flowers on slender persistent pedicels: nutlets more or less incurved, attached in the middle of the concave ventral face to a globular gynobase.

Oreocarya Stout perennial or biennial herbs with scattered leaves and comparatively large flowers on filiform persistent pedicels: nutlets attached by the inner angle to a slender gynobase.

- 12 *Cryptanthe* Mostly slender annuals with alternate leaves and flowers on slender deciduous pedicels; nutlets attached from the base upward to a pyramidal gynobase.
- 13 *Amsinckia* Coarse annuals with alternate leaves and yellow flowers; nutlets attached below the middle to an oblong pyramidal gynobase.
- 14 *Mertensia* Perennial herbs with alternate leaves and blue or white flowers on slender persistent pedicels: nutlets attached near the base to a convex gynobase, wrinkled when mature and dry.
- 15 *Pneumaria* Maritime fleshy branching herbs with alternate leaves and blue to nearly white flowers: nutlets attached just above the bases to a somewhat elevated gynobase, fleshy, smooth and shining when mature.
= = Nutlets sessile, attached by the very base to a plain gynobase.
- 16 *Myosotis* Annual or perennial herbs with white or blue flowers; bractless racemes: nutlets thin-crustaceous, smooth.
- 17 *Lithospermum* Perennial or annual herbs with white or yellow flowers in bracted racemes: nutlets bony.

Tribe 1 Ehretieæ DC. Prodr. ix, 502. Herbs shrubs or trees. Style once bifid or two-parted. Stigmas more or less capitate. Cotyledons plain.

1 COLDENIA L. Gen. n. 173.

Low herbaceous or suffrutescent plants with entire leaves and numerous small white sessile flowers usually in clusters. Calyx 5-parted, or in the original species 4-parted, the divisions narrow. Corolla short-funnelform or nearly salverform, seldom much spreading, passing the calyx, the lobes rounded, imbricated or sometimes partly convolute in the bud. Stamens included. Style 2-lobed or 2-parted. Stigmas more or less capitate. Ovary entire or laterally 4-lobed, 4-celled. Ovules anatropous, pendulous. Fruit dry, separating at maturity into 4 one-seeded nutlets, or by abortion fewer. Seeds without albumen.

C. Nuttallii Hook. Kew Journ. Bot. iii, 296. Canescently pubescent and sparsely hispid prostrate annual, repeatedly and divergently dichotomous: leaves ovate or rhomboid-rotund, 2-4 lines long, on petioles longer than the blade, with 2 or at most 3 pairs of strong and somewhat curved veins, the margins somewhat revolute: flowers densely clustered in the forks and at the ends of the naked branches: calyx-lobes linear, sparsely hispid, equalling the tube of the pink or white corolla: filaments shorter than the anthers, inserted nearly in the throat of the corolla; the tube which bears 5 short obtuse scales near the base: fruit deeply 4-lobed; thin-walled nutlets rounded and united only at the centre, smooth and shining, oblong-ovate, marked with a linear and raphe-like ventral suture; embryo straight: cotyledons very deeply horseshoe-form, their elongated bases almost enclosing the radical. Arid plains, eastern Washington, California, Utah and Arizona.

Tribe ii. Heliotropieæ Endl. Gen. 646. Leaves entire, rarely denticulate. Inflorescence more or less scorpioid. Style entire, sometimes wanting. Stigma peltate-annular, forming a complete ring, surmounted usually by an entire or 2-lobed hemispherical

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bulate tip or appendage. *Ovules pendulous. Seeds with a straight incurved embryo in sparing or copious albumen.*

2 HELIOTROPIMUM Tourn. L. Gen, n. 179.

Low herbs or shrubs with entire or rarely denticulate leaves and small flowers in scorpioid cymes. Calyx deeply 5-parted, persistent. Corolla salverform or funnelform, plaited and mostly imbricated in the bud. Stamens included: filaments short or none: anthers connivent, sometimes cohering by pointed tips. Style entire, sometimes wanting: stigma peltate-annular, forming complete ring surmounted by an entire or 2-lobed tip or appendage. Ovary 4-celled with a single pendulous ovule in each cell. Fruit dry, 2- or 4-lobed, separating into 2 indurated 2-celled and 2 seeded closed carpels, or more commonly into 4 1-seeded nutlets.

H. Curassavicum L. Sp. 130. Wholly glabrous and more or less succulent: stems diffusely spreading, 6-12 inches long from a perennial root: leaves succulent, obovate to oblanceolate or nearly linear, 1-2 inches long: like mostly in pairs or twice forked, densely flowered, bractless: corolla white with a yellow eye or changing to blue, with a rather ample 5-lobed limb and open throat, the lobes rounded-ovate, rather shorter than the tube: anthers free: style none: stigma umbrella-shaped, broad as the glabrous ovary: fruit 4-lobed, separating at maturity, into 4 1-seeded nutlets. Saline soil, interior of Oregon, and along the coast of most of the warmer parts of the World.

II Ovary 4-parted (rarely 2-parted) from above into 1-celled 4-lobed divisions surrounding the style. Stigma not annular.

Tribe iii, Boragæ DC. Prodr. x, 1. Chiefly herbs with somewhat mucilaginous watery juice and entire leaves. Flowers mostly tubular but not in the axils of leaves or bracts, or bractless in so-called whorls or racemes. Style entire, with a depressed or elevated base from which the nutlets are attached (called the gynobase). Stigma uncinately or depressed-capitate. Ovules amphitropous or almost orthotropous and commonly ascending or erect, or anatropous and commonly pendulous. Nutlets 4, or by abortion fewer, distinct or united into pairs. Seeds without albumen.

* Nutlets attached above the middle, wholly flat and thin, horizontally divergent in pairs or radiate: the margins pectinately and acutely setiferous.

3 PECTOCARYA DC. in Meisn. Gen. 279.

Small annuals with imperfectly opposite leaves and small flowers scattered along the whole length of the stem. Calyx deeply 5-cleft or 5-parted, spreading or reflexed in fruit. Corolla appendages with strong fornicate processes, almost closing the throat. Stamens short, included. Style short: with capitate stigma. Nutlets flat and thin, attached at the inner end underneath to the small depressed gynobase, either winged, lacinate-bordered or pectinately setose around the thin margins; the bristles or prickles simply uncinately at tip.

P. penicillata A. DC. Prodr. x, 120. Strigose-pubescent with minute white hairs; very diffuse or depressed; branches almost filiform, 2-6 inches long; leaves linear or filiform, an inch or less long; calyx-lobes linear, minutely hispid; nutlets geminately divergent, the oblong body surrounded by a merely undulate or pandurate wing that is incurved in age, its rounded apex thickly and the sides rarely or not at all beset with slender uncinately bristles; cotyledons oblong-ovate. Dry plains and hillsides Brit. Columbia to California and western Nevada.

P. setosa Gray Proc. Am. Acad. xii, 81. Hispid as well as minutely strigose-pubescent: stem rather stout, 2-8 inches high, paniculately branched; leaves linear; calyx-lobes linear, armed with stout white straight and divergent bristles; nutlets obovate, equally divergent, bordered by broad thin scarious wing, the faces and margins beset with slender uncinately-tipped bristles; cotyledons broadly obovate. Eastern Washington to southeastern California.

P. pusilla Gray l. c. Strigulose-canescens: stem slender, diffusely branched from the base, 4-8 inches high; lower leaves opposite, linear spatulate, 4-8 lines long, upper ones alternate and reduced to small lanceolate bracts. 1-2 lines long; calyx-lobes lanceolate, longer than the nutlets beset with small uncinately-tipped bristles; nutlets equally divergent, cuneate-obovate, wingless and with a carinate midnerve on the upper face, the acute margins beset with a row of slender uncinately-tipped bristles; cotyledons broadly obovate. Eastern Washington to California.

* * Nutlets thicker, with ventral or introrse-basal attachment.

— Corolla short, with fornicate appendages in the throat. Calyx spreading or reflexed. Nutlets glochidiately armed.

4 CYNOGLOSSUM Tourn. L. Gen. n. 183.

Coarse herbs with broad leaves and rather small flowers in panicles mostly bractless racemes. Calyx 5-parted, persistent in fruit. Corolla short-salverform or funnellform, with conspicuous arching crests at the throat. Stamens and style included. Nutlets 4, turgid, wingless, clothed all over the back with short and stout glochidiate-tipped prickles, equally divergent, horizontal or obliquely ascending on a depressed or pyramidal gynobase, at maturity separating and carrying away an exterior portion of the indurated style from below upward, by which they are for a time suspended.

C. grande Dougl. Hook. Fl. ii, 82. Soft-villous, hardly hirsute below, becoming glabrate in age; stem stout, from a thick perennial root 1-3 feet high; lower leaves ovate or subcordate-oblong and acute or acuminate, the blade 4-8 inches long, on margined petioles of about the same length, the upper smaller, from ovate to lanceolate, abruptly contracted into a short winged petiole; corolla bright blue, its tube slightly exceeding the ovate calyx-lobes and hardly longer than the limb; style slender, thickened toward the base; nutlets ovoid, 4 lines in diameter, very rough-margined and covered with short glochidiate-tipped spines. In open woods Brit. Columbia to California.

C. occidentale Gray Proc. Am. Acad. x, 58. Hirsute-pubescent in age almost hispid; stems rather stout, 10-18 inches high, from a thick perennial root; lower leaves spatulate, tapering gradually into winged petioles; the upper from lanceolate to ovate, sessile or partly clasping

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be of the blue corolla longer than the lanceolate lobes of the calyx and
ice or thrice as long as its own roundish lobes: style wholly filiform:
nutlets almost globular, 4 lines long. In the mountains of southern Ore-
on and northern California.

5 LAPPULA Moench Meth. 416

ECHINOSPERMUM Sw, Lehm.

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Pubescent or hispid herbs with narrow and entire alternate
aves and blue or white flowers in terminal racemes. Calyx 5-
arted, persistent, spreading or reflexed in fruit. Corolla short-
lverform and with conspicuous arching crests in the throat.
laments short. Style short, with minute capitate stigma.
nutlets laterally attached to a more or less elevated gynobase,
med either along a distinct margin or more or less over the
hole back with glochidiate prickles, forming burs.

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L. floribunda Greene Pitt. ii, 182. *Echinosperrnum floribundum* Lehm.
erbage soft-pubescent or the stem soft-hirsute: stems rather strict, 2-5
et high, from a biennial or perennial root: leaves from oblong to linear,
4 inches long, sessile or the lower tapering into margined petioles; rames
numerous, erect or nearly so, densely flowered: pedicels mostly
orter than the fruit, at length reflexed: corolla short-funnelform, blue or
pale, the limb 3-5 lines in diameter: nutlets keeled, papillose-tuberculate
on the back, the margins armed with a single row of flat subulate prickles.
Western Washington to Brit. Columbia Minnesota and Ontario.

attachment.

root. Calyx

L. diffusa Greene Pitt. ii, 182 *Echinosperrnum diffusum* Lehm. Soft-
bescent or at most soft-hirsute: stems erect, 1-3 feet high, from a per-
ennial root: leaves usually lanceolate, the lower ones tapering below to a
margined petiole, the upper sessile and passing into small bracts: racemes
nucled, erect or merely spreading: pedicels longer than the fruit: corolla
m blue to nearly white or pinkish, rotate, its tube shorter than the calyx
and the lobes, the limb 4-6 lines in diameter: dorsal disk of the nutlets
angular-ovate, obscurely carinate, rough-tuberculate, and with a few
ort glochidiate prickles, the marginal prickles flat-subulate, as long as
the width of the disk. Rocky places and base of cliffs, Brit. Columbia to
California and Utah.

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L. hispida Greene l. c. *Echinosperrnum hispidum* Gray. Hispid with
reading papillose-based hairs: stems usually erect, 1-3 feet high, from
perennial root: leaves lanceolate, 3-5 inches long, the lowest long-petioled,
the upper sessile and gradually reduced upward to bracts; racemes lax, 10-
flowered: corolla rotate, greenish white 2-3 lines in diameter: marginal
prickles of the obcompressed nutlets small and narrow, much shorter than
the width of the oval or ovate and either sparsely or copiously glochidiate
dorsal disk, their bases confluent into a thin margin or distinct wing which
sometimes reflexed or cup-shaped; inner face smooth and lucid, with
prickles almost central. Rocky hillsides, eastern Oregon to Idaho.

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In open wood

L. ciliata Greene l. c. *Cynoglossum ciliatum* Dougl. Cinereous with
much appressed pubescence, and bristly-hirsute, especially along the
margins of the linear or lanceolate leaves: stem strict, a foot or more high:
corolla rather large, blue or violet: fruit unknown. Banks of the Spokane
river Washington to Idaho.

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h, from a thick
ly into wings
partly clasping

L. myosotis Moench Meth. 417. Hispid or appressed-pubescent: stem
erect, branching, 1-2 feet high, from an annual root: leaves linear to ob-
long or spatulate, sessile or the lower ones narrowed into petioles, erect or
pendent, obtuse or obtusish at the apex, 9-18 lines long: racemes leafy.

bracted: pedicels very short, stout, not deflexed in fruit: calyx-lobes lanceolate, becoming unequal and spreading: corolla blue, about a line broad; nutlets rough-granulate or tuberculate on the back, the margins with double row of slender and distinct prickles or these irregularly over most of the back. In waste places, Idaho and eastward. Naturalized from Europe.

L. Texana Britton Mem. Torr. Club v, 275. *Echinosperrum Redowskii* var. *cupulatum* Gray. Hispid-hirsute annual: stem 2 inches to 1 foot high, diffusely branching from the base: leaves linear or linear-oblong, mostly obtuse, the lower narrowed into petioles: racemes loosely flowered, leafy-bracted; pedicels stout, a line long, not deflexed in fruit: corolla narrow-funneliform with rounded lobes, about a line broad, but little longer than the linear-lanceolate sepals: nutlets with acuminate ovate papillose tuberculate disk, the marginal prickles broadened and thickened below and usually united into a wing or border which indurates and enlarges forming a cup with the margin more or less incurved, at maturity, sometimes only the tips of the prickles free. Eastern Oregon and Washington, Nevada, Texas, Nebraska and Brit. Columbia.

L. Fremontii. *Echinosperrum Fremontii* Torr. P. R. R. Rep. xii, 1845. *E. Redowskii* var. *occidentale* Watson. Soft-pubescent with white hairs: stem erect, 6-18 inches high, from an annual root, at length diffusely many-branched: leaves linear to spatulate or lanceolate; those of the stem gradually reduced to subulate bracts of the open panicle: pedicels a line long, erect in fruit; sepals linear, longer than the nutlets: corolla inconspicuous but little if at all exceeding the calyx: disk of the nutlets acuminate-ovate beset with sharp white processes; prickles of the margin long and slender, not rarely confluent at their flat bases and more or less cupulate; scarious and narrow, occupying most of the ventral angle. Common throughout the dry interior from Brit. Columbia to California.

6 ERITRICHIMUM Schrad. Diss. Asperif.

Low perennial or annual herbs with petioled radical leaves and small white or blue flowers. Calyx 5-parted or merely 5-lobed, open and but little enlarged in fruit. Corolla with a short tubular and subrotate limb, the fornicate appendages almost closing the throat. Stamens 5, inserted on the tube of the corolla and included in its throat. Ovary 4-lobed: style short. Nutlets obliquely ascending, or depressed and nearly horizontal, with truncate-campanulate back, bordered by an acute winged or at length revolute entire, dentate or spinulose border.

E. Howardi Rydb. *Cynoglossum Howardi* Gray. Silky-canescens and silvery: depressed caespitose: lower leaves linear-spatulate, 6-10 lines long; those of the short flowering stems linear: flowers few in the spatulate bracted cymes: calyx-lobes linear-lanceolate: corolla bright blue, 4-5 lines in diameter: nutlets very smooth, obliquely truncate on the back, wings but the margin of the ovate acutish and flat or slightly depressed dorsally, disk with a sharp edge, and its face either smooth or minutely papillose and pubescent. On the highest parts of the Cascade Mountains of Washington and the Rocky Mountains of Montana.

E. aretioides DC. Prodr. x, 125. Silky-sericeous; with long white hairs: densely caespitose in depressed pulvinate tufts, 1-2 inches high: leaves from lanceolate to ovate, 4-6 lines long, mostly acute: flowers terminating short densely leafy stems, short-pedicelled: lobes of the corolla linear-lanceolate, about a line long, equalling the tube of the corolla: lobes of the corolla bright blue, 2-3 lines in diameter; nutlets with a crest

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wing-like border that is usually cut into slender teeth. lobes. On the chest mountains, eastern Oregon to the Rocky Mountains.

7 ALLOCARYA Greene Pitt. i, 12.

Low, mostly annual, herbs with entire leaves, the lowest always opposite, and rather small flowers in scorpioid racemes. Calyx 5-parted to the base; the segments spreading and somewhat enlarging in fruit. Corolla salverform, with a short tube, yellow throat and white limb. Pedicels turbinate thickened and more or less distinctly 5-angled under the calyx, persistent, more or less indurated in age. Nutlets ovate to lanceolate, crustaceous, opaque or vitreous-shining, smooth or variously tuberculate and rugose-muriculate, or even glochidiate, often carinate on one or both sides, attached by an inframedial or basal concave but sometimes raised and stipitate scar to a low gynobase.

* Small flowered annuals, usually diffuse, with corolla only a line or two broad and but little surpassing the calyx.

A. echinoglochis Greene Pitt. i, 15. *Echinosperrnum Greenei* Gray: triglose-pubescent with whitish hairs: diffusely branched from the base. The branches 4-10 inches long, depressed: leaves linear, the lower 1-2 inches long, obtuse: racemes simple or forked, rather loose, leafy or bracteate at base, and sometimes above: calyx-segments oblong-linear, obtuse, often but not reflexed in fruit, silky-hirsute with fulvous-yellow hairs: corolla about equalling the calyx, its dilated limb about 2 lines broad: nutlets shorter than the calyx, ovate-trigonus, obscurely carinate on the back, acutely so ventrally down to the low ovate scar, minutely tuberculate, pubrous throughout and with small terete barbed prickles interspersed. Wet places, southwestern Oregon and adjacent California.

A. plebia Greene l. c. 16. *Eritrichium Californicum* var. *plebium* Gray. Coarsely and minutely hirsute or glabrate: branches depressed, 6-10 inches long: leaves lax, the larger 2 inches long, linear-oblong: flowers scattered: pedicels shorter than the calyx: segments of the calyx enlarged and open in fruit: nutlets ovate-trigonus, a line long, glabrous, coarsely rugose-angulate, sharply carinate ventrally down to the large ovate scar and usually only along the narrowish apex. Aleutian Islands Alaska, it has been reported from Humboldt Bay California.

A. hispidula Greene l. c. 17. Canescent with short setose-hispid pubescence: diffusely branched from the base, the branches more or less pendulous, 2-6 inches long: racemes single or geminate, naked, or leafy-acted below: pedicels about a line long: segments of the calyx linear, longer than the nutlets, very hispid, erect, not enlarged in fruit: nutlets ovate, opaque, $\frac{3}{4}$ of a line long, carinate on both sides, the back very finely so and beset with minute muriculations, the transverse rugula few and not prominent: scar almost basal, ovate-oblong. In moist meadows, Washington and Oregon to California.

A. Cusickii Greene l. c. 17. Pubescence appressed: diffusely branched from the base, the branches 4-8 inches long: racemes open and leafy-acted: nutlets vitreous-shining, ovate-oblong, carinate ventrally only, the back with crowded depressed rugae and few tuberculations: scar almost basal, narrowly linear and sharp-edged. Union Co. Oregon.

A. bracteata. Appressed-hirsute with minute setose hairs: diffusely branching from the base and depressed, the branches slender, 2-8 inches long: leaves linear, an inch or less long: racemes sparsely flowered and

leafy-bracted: pedicels at length about a line long: calyx-segments linear lanceolate, erect and not enlarged in fruit, longer than the nutlets: corolla 1-2 lines in diameter: nutlets ovate, carinate ventrally down to the ornate nearly basal scar and obscurely so dorsally, dorsal surface transversely rugose with sharp rugæ and obscurely tuberculate. In wet places, Umpqua Valley Oregon.

A. *Californica* Greene l. c. 20. *Eritrichium Californicum* DC. Sparingly appressed-pubescent with setose hairs: stem slender, often diffusely branched, the branches 2-15 inches long, weak and reclining or depressed: leaves linear: racemes rather lax, with a few bracts at the base: pedicels a line or less long, erect: calyx-segments linear, longer than the nutlets spreading but not enlarged in fruit, hirsute with ferruginous hairs when young: corolla 1-2 lines in diameter; the appendages in its throat not conspicuous: nutlets ovate-oblong, slightly carinate ventrally, transversely rugose; the scar roundish-triangular, almost basal. In wet meadows western Oregon and California.

* * Larger-flowered annuals, erect or diffuse: limb of the rotate corolla 3-5 lines in diameter: nutlets rugulose.

A. *Chorislana* Greene Pitt. i, 13. Pubescence sparse and appressed except on the calyx: stem 1-2 feet high, freely branching, the branches length recurving: larger leaves 2-4 inches long: racemes elongated, lower and leafy below: pedicels filiform, 4-8 lines long: calyx little accrescent: the campanulate segments about a line long: corolla 3-5 lines broad: nutlets ovate, little more than half of a line long, carinate ventrally only, the keel and scar closely approached but not covered by the lateral angles, the obtuse rugæ of the back running into more or less favose meshes among minute granulations. On Vancouver Island B. C. and at San Francisco Bay California, perhaps at intermediate stations.

A. *hirta* Greene l. c. 161. Setose-hispid throughout with spreading or somewhat deflexed hairs and no appressed pubescence: stem erect and stoutish, 10-16 inches high, simple below with several pairs of connate-sheathing linear leaves, loosely racemose above: racemes in pairs, bractless: pedicels slender, a line long: calyx 2 lines long, not enlarging in fruit: its segments erect in fruit, very hirsute: corolla 3 lines broad: nutlets ovate, dark-colored, scarcely carinate except ventrally, the dorsal face granulate and obscurely rugulose. In wet places, Umpqua Valley Oregon.

A. *Scouleri* Greene l. c. 18. *Eritrichium Scouleri* A. DC. Sparingly appressed-hirsute: stem 6-18 inches high, usually diffusely branching from the base with slender ascending branches and few pairs of connate-clasping linear leaves: flowers in geminate, or sometimes paniculate slender racemes, most of them bractless, very fragrant: pedicels erect or ascending at most a line long: calyx erect and not enlarged in fruit: corolla 3-4 lines broad, the appendages in the throat conspicuous, yellow, puberulent: nutlets ovate, $\frac{1}{2}$ line long, carinate on both sides at the apex and ventrally down to the linear-oblong scar, dorsal surface obviously granulate and distinctly rugulose. Common in wet places, western Oregon and Wash.

A. *Hendersoni* A. Nelson Eryth. vii, 69. Sparsely and rather softly strigose-pubescent throughout: stem simple at the base, sparingly branched above, erect, slender, 8-16 inches high: leaves broadly linear, 2-3 inches long, acutish: racemes naked, at length long and slender, the uppermost geminate with a flower in the fork: pedicels short: calyx-segments linear in fruit about $2\frac{1}{2}$ lines long, strigose-hispid: corolla $2\frac{1}{2}$ -3 lines in diameter, the throat nearly closed by the conspicuous emarginate appendages: nutlets ovate, subacute, 1- $1\frac{1}{2}$ lines long, very closely and finely muriculate with a few small rounded papillæ interspersed, moderately carinate on the ventral side. Eastern Washington and adjacent Idaho.

A. mollis Greene l. c. 160. Leaves linear, 1-2 feet long, 1-2 lines broad, obtuse: corolla 3-4 lines long: calyx-segments linear, spreading at all carinate: nutlets ovate-lanceolate: scar roundish-triangular. California.

Small dichotomous, even to the base: flowers small. The racemes scissile, the corolla membranaceous: the fruit persistent, the style surpassing the ovary: 4 rather distinct.

P. *circumscissile* Greene l. c. 162. Pubescent throughout: stem 1-2 feet high: leaves linear, 1-2 feet long: calyx-segments linear, 1-2 lines long: limb of the corolla 3-5 lines long, not carinate: the fruit persistent, the style and divaricate: the fruit to Brit. C.

Hirsute-canescens: leaves in rosulate: the fruit persistent, the style enlarged in fruit: the corolla carinate, erect: the gynophore smooth or

P. *micrantha* Greene l. c. 163. Pubescent: stem 1-2 feet high: numerous racemose: leaves linear, 1-2 feet long, 1-2 lines broad, and its lobes becoming to long-ovate, acute: the fruit persistent. Dry places.

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** Perennial by creeping and rooting stems: flowers middle-sized.

A. mollis Greene l. c. 20. *Krynitzkia mollis* Gray. Copiously soft-flous, even to the calyx: stems rather stout, spreading or ascending, at length a foot or more long: leaves linear-lingulate, 2-3 inches long by 3-4 lines broad, obtuse: racemes at length elongated, bractless: limb of the corolla 3-4 lines broad: nutlets trigonous-ovate, slightly obcompressed, widely at all carinate on the back, coarsely rugose-areolate, attached by a quarter or a third of their length to an oblong-pyramidal gynobase, the ovate-lanceolate. Borders of alkaline ponds, southeastern Oregon to California.

8 PIPTOCALYX Torrey Bot. Wilkes 414, t. 12.

Small dichotomously branched annuals with narrow leaves and small flowers sessile in the forks or in the axils of leaves or bracts. The root giving a deep purple stain. Calyx early circumscissile, the 5-cleft upper portion falling away, leaving the membranaceous base persistent around the fruit. Pedicels very short, persistent. Corolla with naked and open throat, the tube not surpassing the calyx. Anthers mucronate, included. Fruit 4 rather distinctly margined nutlets.

P. circumscissus Torrey l. c. *Krynitzkia circumscissa* Gray. Hispid-pubescent throughout: stem 1-4 inches high, densely branched from the base: leaves linear or the lowest spatulate, 3-5 lines long, crowded on the upper part of the branches: calyx hispid, its linear lobes foliaceous, about a line long: limb of the white corolla about a line broad: nutlets oblongate, not carinate, smooth or minutely tuberculate, attached for nearly their whole length to the pyramidal-subulate gynobase, the ventral groove narrow and divaricately forked at the base. On dry sandy plains, eastern Oregon to Brit. Columbia, California and Arizona.

9 EREMOCARYA Greene Pitt. i, 58.

Hirsute-canescens small annual herbs with chiefly radical leaves in rosulate tufts and small white flowers with persistent pedicels in dense leafy-bracted geminate racemes: the root giving a deep purple stain. Calyx 5-parted to the base, in fruit campanulate, persistent: the segments nerveless and not bristly-hispid. Limb enlarged in fruit and persistent. Nutlets neither margined nor carinate, erect, attached for their whole length to a slender columnar gynobase by a groove that does not fork nor enlarge at the base, smooth or papillose-scabrous.

E. micrantha Greene l. c. *Krynitzkia micrantha* Gray. Hirsute-pubescent: stem slender, 2-5 inches high, at length diffusely branched, the numerous racemous branches repeatedly dichotomous and copiously leafy-bracted: leaves linear, 2-4 lines long: racemes mostly geminate with a lower in the fork, 4-6 lines long, densely flowered: corolla barely a line long, and its lobes $\frac{1}{3}$ - $\frac{2}{5}$ of a line long, obscurely appendaged in the throat: limb becoming thicker than the gynobase, or even pyramidal; nutlets long-ovate, acute or acuminate, smooth and shining or dull and punctulate. Dry plains, southeastern Oregon to California, Utah and Arizona.

PLAGIOBOTHRYIS Fischer & Meyer Ind. Sem. Hort. Petrop. ii. 49.

Usually rather slender soft-pubescent annuals with most of their leaves in a close radical tuft, and rather small white flowers

on short persistent pedicels in elongating circinate racemes. Calyx 5-cleft or 5-parted, closed or campanulate or even spreading and more or less enlarged in fruit, persistent or irregularly circumscissal near the base. Corolla short, with more or less conspicuous appendages in its throat. Nutlets broadly ovate-triangular, incurved, carinate on both sides toward the apex, the back irregularly transversely rugose, attached by the middle of the concave or seemingly hollowed ventral face to a globular or subglobular conical gynobase, tardily detached, leaving a kind of caruncle at the insertion and corresponding depressed cavities on the gynobase, often only 1 or 2 maturing.

* Nutlets crustaceous or nearly so, usually only 1 or 2 maturing and then horizontally incumbent at maturity on the subglobose or merely convex gynobase: the caruncle short and broad, not stipiform, leaving orbicular depressions on the gynobase.

+ Caruncle annular, merely bordering a deep circular pit.

P. campestris Greene Pitt ii, 282. *P. rufescens* Gray, not *F. & A.* Pubescent with soft white hairs: stem slender, erect, 10-30 inches high, simple up to the 1-3 racemes: radical leaves numerous, 1-2 inches long, oblanceolate, usually withering at flowering time; cauline leaves small, linear-oblong to lanceolate, sessile, with a broad somewhat clasping base: racemes usually 3, the lower one smallest, the others geminate with a flower in the fork, sparsely flowered: calyx of linear-lanceolate nearly 2 lines long, distinct sepals 3 lines long, rusty-hirsute when young: corolla but little longer than the calyx, the limb 2-3 lines broad: nutlets a line long, little incurved, nearly orbicular, abruptly short-beaked, sharply carinate on the back and the sides sharply angled and reticulate-rugose. On dry hillsides, southern Oregon and California.

+ Caruncle forming a wen-shaped or tongue-shaped process that fits into a corresponding cavity in the merely convex gynobase.

** Calyx persistent, not circumscissile near the base: mature nutlets abruptly contracted at base and apex so as to become cruciately 4-lobed, vitreous shining or enameled.

P. tenellus Gray Proc. Am. Acad. xx, 283. Pubescent with rather stiff hairs: stem slender erect or ascending, 6-10 inches high, usually branched from the base: radical leaves numerous, in a dense rosulate tuft, broadly linear to lanceolate, 6-12 lines long; cauline leaves few, lanceolate to narrowly ovate, sessile by a broad somewhat clasping base: racemes usually geminate without a flower in the fork, rather densely flowered: calyx 2 lines long, fulvous-hirsute, cleft to below the middle, the lobes acuminate-triangular: corolla about a line broad: nutlets vitreous-shining, sharply carinate on the back, transversely rugose and sharply tuberculate. Common in open places, Brit. Columbia to California.

P. asper Greene Pitt. iii, 262. "Of the *P. tenellus* group, but larger than the others and rather diffusely branched or many-stemmed from the base: radical leaves numerous, in a dense rosulate tuft, broadly linear to lanceolate, 6-12 lines long; cauline leaves few, lanceolate to narrowly ovate, sessile by a broad somewhat clasping base: racemes usually geminate without a flower in the fork, rather densely flowered: calyx 2 lines long, fulvous-hirsute, cleft to below the middle, the lobes acuminate-triangular: corolla about a line broad: nutlets vitreous-shining, sharply carinate on the back, transversely rugose and sharply tuberculate. Common in open places, Brit. Columbia to California.

"Frequent from northern California to Washington. Easily distinguished at sight by its large size, its many stems, and its stiff harsh pubescence."

"Frequent from northern California to Washington. Easily distinguished at sight by its large size, its many stems, and its stiff harsh pubescence."

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** ** Calyx persistent, not circumscissile near the base: nutlets broadly ovate and not at all cruciform.

P. Shastensis Greene, Gray l. c. 284. Canescently silky-tomentose: stem very slender, 4-10 inches high, not branching from the base, simple to the 1-3 racemes: radical leaves linear to linear-spatulate, 4-8 lines long, appressed-silky above, hispid-ciliate; cauline leaves few linear-lanceolate, smaller: racemes few-flowered; calyx cylindraceous, 4 lines long silky-nate both sides, cleft to near the middle; the lobes lingular and acute, nutlets shining, strongly incurved. carinate on the back, obscurely transversely rugose but not muricate. On a gravelly plain near Grant's Pass region, and Shasta Valley California.

P. colorans Greene Pitt. iii, 262. Canescently tomentose or the leaves and calyces appressed-silky: stem 2-8 inches high, erect, not branching from the base: radical leaves linear, an inch or more long, in a loose rosette tuft; cauline leaves numerous, linear to lanceolate: racemes long and slender, few- to many-flowered often leafy-bracted below: calyx almost globular, 2-3 lines in diameter, cleft to below the middle, the acuminate-angular lobes connivent over the fruit, sparingly hispid: nutlets broadly bicircular, abruptly stout-beaked, strongly carinate on the back, strongly anverse rugose, obscurely muricate on the ridge. On gravel-bars along the creek at Hornbrook California; so near the state line that it may be looked for in adjacent Oregon.

** ** * Calyx at maturity more or less promptly deciduous circumscissile near the base.

P. canescens Benth. Pl. Hartw. 326. Villous-pubescent and somewhat cinereous or canescent especially the calyx, which when young may be fulvous or even somewhat rufescent: stem diffusely branched from the base, 10-12 inches high: leaves linear: calyx 2-3 lines long, in fruit loosely set or sometimes more open and accrescent, rarely disposed to be circumscissile at base: nutlets opaque, not vitreous, slightly carinate on the back, rugose with sparse and somewhat reticulated obtuse wrinkles. Columbia Valley to California.

P. nothofulvus Gray Proc. Am. Acad. xx, 285. Soft-hirsute throughout: stems erect, 1-2 feet high, branching from the base: radical leaves long or lanceolate to linear, 1-2 inches long, numerous in a dense rosette tuft; cauline leaves lanceolate to linear, sometimes 1 or 2 pairs opposite: racemes usually geminate or in threes with a flower in the fork, at length long and slender and loosely-flowered: calyx cleft only to the middle, silky-lustrous, rufescent only when young, soon fulvous or whitish, 1-2 lines long, the acuminate lobes connivent over the nutlets, soon circumscissile, leaving a persistent base which surrounds the lower half of the nutlets: corolla 3 lines broad: nutlets abruptly stout-beaked, carinate on the back, transversely rugose and minutely granulate. Common on open hillsides, British Columbia to California west of the Cascade Mountains.

** Coarse and rough-hispid much branched low annuals with oblong or lanceolate leaves, the upper subtending and equalling or exceeding the flower-clusters: nutlets inserted by a scar above the middle, ventrally carinate only above the round scar, which is attached to the depressed gynobase by a small and soft false caruncle.

P. hispidus Gray l. c. 286. Rough-hispid throughout: stem stout, 3 inches high, profusely branched: lower leaves linear-spatulate; upper leaves oblong, 6 lines long: calyx 5-parted, open in fruit, not circumscissile: nutlets turgid, ovoid, obliquely incumbent, acute at the apex, obscurely carinate on the back, opaque, papillose-granulate, the scar hardly above the middle. Southeastern Oregon to eastern California.

11 OREOCARYA Greene Pitt. i, 57.
KRYNITZKIA § *Pseudokrynitzkia* Gray.

Coarse perennial or biennial herbs with alternate leaves and mostly white flowers on persistent pedicels, in glomerate or paniculate, bracted racemes. Calyx 5-parted to the base, more or less spreading in fruit, not circumscissile nor deciduous. Corolla with prominent folds in the throat, and at base within 10-squamellate or annulate-glandular. Nutlets not carinate on the back, triangular or triquetrous, with acute but not winged lateral angles, attached for most of their length to a commonly subulate gynobase, the scar very slender and usually with transversely dilated base.

* Tube of the corolla not longer than the calyx and little if any longer than its lobes; with a ring of 10 small scales or glands near the base within: anthers oval or oblong: style rather short.

O. glomerata Greene Pitt. i, 58. *Cynoglossum glomeratum* Pursh. *Krynitzkia glomerata* Gray. Grayish-hirsute and hispid: stems erect, 6-20 inches high, from the crown of a biennial or short-lived perennial root: leaves spatulate or linear-spatulate, 1-2 inches long: inflorescence thyrsiform, and usually dense the short and often forked lateral spikes length commonly exceeding the subtending leaves: sepals very setose-hispid, linear, 2-3 lines long: limb of the corolla 3-5 lines in diameter, with crests in the throat truncate: nutlets forming an ovoid fruit, each triangular-ovate, sparsely more or less tuberculate-rugose on the back, with shallow lateral edges, the sulcate ventral angle extending into a broad basal scar. On dry hillsides, eastern Washington to New Mexico, Nebraska and Saskatchewan.

O. sericea Greene l. c. *Krynitzkia sericea* Gray. Canescent with dense silky pubescence and bristly-hirsute: stems stout, simple, 4-8 inches high, from a somewhat woody perennial caudex, leafy: leaves spatulate-oblancheolate, obtuse at the apex, narrowed below to a broad petiole, including the petiole 1-2 inches long: flowers numerous, in a short thyrse: calyx cleft nearly to the base, the linear or lanceolate segments about equaling the tube of the corolla, bristly-hirsute: limb of the corolla 3-5 lines broad, the ovate lobes 2 lines long: nutlets oblong-ovate, obtuse, somewhat rugose-tuberculate on the back. Dry hillsides, eastern Washington to Oregon to Utah and Colorado.

** Tube of the salverform corolla longer than the calyx and twice or thrice the length of the lobes; the ring within at the base of the tube inconspicuous and truncate: crests of the throat large, often elongated: anthers linear-oblong: style long and filiform.

O. leucophæa Greene l. c. *Myosotis leucophæa* Dougl. *Krynitzkia leucophæa* Gray. Silky-strigose and silvery-canescens: stems many or from the lignescens base or root, 6-12 inches high: leaves lanceolate-linear, acute, 2-4 inches long: inflorescence glomerate-spicate hispid with whitish or yellowish hairs and slender bristles: calyx 5-cleft nearly to the base, the linear segments 3-4 lines long: corolla yellow: with tube longer than the calyx: nutlets ovate-triquetrous, very smooth and polished ivory-like, $1\frac{1}{2}$ -2 lines long; gynobase very slender. On sandy plains, Brit. Columbia to California and Utah. East of the Cascade Mountains.

12 CRYPTANTHÆ Lehm. Sem. Hort. Hamburg. 1832.

KRYNITZKIA F. & M. Ind. Sem. Hort. Petrop. vii, 52. 1841.

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leaves and small, mostly white, flowers on very short pedicels in corymbose racemes. Calyx 5-parted or 5-cleft, the segments erect, usually closely embracing the fruit and deciduous, falling with the mature nutlets. Corolla rotate, its tube not surpassing the calyx; usually with 5 scales closing the throat. Stamens included. Style short. Nutlets attached by the ventral angle or groove from the base up at least one third or one half way, or for the whole length to an elevated gynobase, the back convex and not truncate nor transversely rugose.

♂ Fruiting calyx closed over the nutlets and falling with them.

* Sepals lanceolate or linear, traversed by a rigid and stout midrib: nutlets thick-walled, opaque or dull.

1. *Fendleri* Greene Pitt. i, 120. Rough-hispid: stem erect, 10-12 inches high, paniculately branched, rigid: leaves linear, an inch or more long: segments of the mature calyx 2 lines long, linear, hispid with pungent bristles: nutlets usually all four maturing and alike, smooth, ovate-acuminate, hardly a line long, attached for nearly their whole length to the narrow subulate gynobase. Eastern Washington to the Saskatchewan and New Mexico.

** Midrib of the narrow setose-hispid sepals not conspicuously flattened: all thickened: nutlets very smooth and mostly shining, acute or acuminate, with rounded sides and rather thin or brittle pericarp.

† Nutlets conspicuously acuminate, only 1 or very rarely 2 maturing, attached for not more than the lower third to the short and narrow gynobase which it very much surpasses.

2. *faccida* Greene Pitt. i, 115. *Myosotis faccida* Lehm. Cinereous with short appressed pubescence: stem slender, 4-12 inches high, strictly paniculately branched: leaves numerous, linear-spatulate to almost filiform, erect, often appressed: spikes usually in pairs or 3 together, almost terminal, many-flowered: calyx in fruit erect appressed to the peduncle, 2 lines long or more; sepals filiform-linear, thickish below, their bases very broad with deflexed and strong but not pungent bristles: nutlets subterete, lanceolate and rostellate-acuminate, the groove of the attachment enlarged at base but not furcate. Common on the dry interior plains, British Columbia to California.

3. *multicaule*. Densely hirsute with short erect but not appressed white hairs: stems several from the crown of a rather stout root, strictly paniculate, 4-10 inches high, simple up to the short somewhat paniculate inflorescence: lower leaves numerous, linear-spatulate, 1-2 inches long; upper ones almost filiform, erect, 12-18 lines long: spikes short and rather stout, densely hirsute with spreading hairs, an inch or less long, densely-flowered: segments of the calyx acuminate-lanceolate, barely 2 lines long, their bases broad with spreading white hairs: nutlets subterete, rostellate-ovate, light brown, the groove of the attachment not perceptibly enlarged at the base. Along the Des Chutes river at Sherar's Bridge Oregon.

4. *rostellata* Greene Pitt. i, 116. Canescent with a rather sparse appressed pubescence: stem slender, erect, paniculately branched, 4-8 inches high: leaves linear-spatulate to linear-lanceolate, less than an inch long, the lower ones opposite with more or less connate-clasping base, the upper ones smaller and alternate: spikes solitary or geminate, slender, 1-2 inches long: calyx erect but not appressed to the rachis, about 2 lines long: sepals filiform-linear, hispid with short spreading but not reflexed somewhat pungent white bristles: nutlets triangular-ovate, flattish, rostellate-acuminate.

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row alternate

inate, a line long, the groove of the attachment divaricately forked somewhat open at the base. On dry hillsides, southern Oregon and central California.

— — Nutlets usually all 4 maturing and all alike, either flattish or angled ventrally, ovate in outline and acute or short acuminate, attached for half or nearly their whole length to the subulate gynobase, the slender groove not dilated at base into an open areola or scar.

C. leiocarpa Greene l. c. 17. *Krynitzkia leiocarpa* F. & M. Strigose-pubescent; stem 6-18 inches high, diffusely branching; spikes single or sometimes in pairs, often leafy at base, bractless above; leaves spatulate-linear 1-1½ inches long; calyx erect, a line long, densely strigose-hirsute and with some coarser spreading bristles; nutlets flattish, the slender ventral groove continuous to the very base of the nutlet and not at all furcate, attached nearly their whole length to the subulate gynobase. Near the coast, Washington to California.

C. affinis Greene l. c. 119. *K. affinis* Gray Rough-pubescent; stem slender, 6-12 inches high, diffusely branched; leaves spatulate, 1-2 inches long; spikes solitary, or sometimes in pairs, often leafy at base; sepals linear lanceolate much longer than the nutlets, strigose-hirsute with a few stout pungent spreading bristles; nutlets somewhat turgid, the groove simple and continuous to the very base, attached only up to the middle of the slender pyramidal gynobase, the free apical portion a little divergent. Among pines on the edge of forests, eastern Washington to California and Idaho.

C. Torreyana Greene l. c. 118. *K. Torreyana* Gray. Hispid-hirsute; stem rather stout, 9-12 inches high, paniculately branched from the base; leaves linear-oblong, 1-2 inches long; spikes solitary or often in pairs, 1-2 inches long; sepals lanceolate, in fruit attenuate upward, twice as long as the nutlets, setose-hispid with stout spreading bristles; nutlets ovate-acute, attached barely to the middle to the subulate-pyramidal gynobase, the ventral groove divergently forked at base but without an open areola. Oregon to California and Idaho.

* * * Nutlets muriculate or rough-papillose, all 4 alike, sometimes only 1 or 2 maturing, ovate-trigonal, attached from the base to the apex; the ventral groove with or without an areola.

C. barbigeræ Greene l. c. 114. *Eritrichium barbigerum* Gray. Hispid and hirsute; stem 4-12 inches high, freely branching; leaves linear-oblong, an inch or less long; spikes solitary or paniculate; sepals narrowly linear 3-5 lines long thickly beset with long shaggy bristles, loose above; nutlets acuminate-ovate, very rough-muricate, ashy-gray, the open groove at base dilated at base. On dry plains, southeastern Oregon to California and Arizona.

C. ambigua Greene l. c. 113. *K. ambigua* Gray. Rough-hirsute; stem strigose-pubescent also; stem stoutish, 1-2 feet high, paniculately branched; leaves oblong to linear-lanceolate, 6-20 lines long; spikes usually in pairs with a flower in the fork, naked, slender, sparse to rather densely flowered; sepals lanceolate, but little more than a line long, somewhat connivent over the fruit, setose-hispid; nutlets ovate-trigonal, barely convex on the back, minutely papillose-scabrous, the ventral groove closed above but moderately or barely open at the basal portion. On dry stony hillsides, Oregon and Washington to California.

C. muriculata Greene l. c. 113. *K. muriculata* Gray. Hispid-hirsute with spreading hairs; stem stoutish, 6-12 inches high; leaves spatulate or the upper ones linear, about an inch long; spikes often in pairs or collected in a 3-5-radiate paniculate cyme; sepals in fruit 2 lines long, la-

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♂♂ Fruiting calyx persistent, open and discharging the fruit: nutlets all 4 or all but 1 scarious-winged at the margins, attached by the whole length of the ventral groove.

C. pterocarya Greene l. c 120. *K. pterocarya* Gray. Papillose-hirsute: stem slender, rather strictly branching, 6-12 inches high: leaves linear or the lowest spatulate, 6-12 lines long: spikes usually in pairs, sessile: sepals in fruit 2 lines long, ovate, rusty-hirsute and the midrib pubescent-hispid: nutlets oblong-ovate, rough or granulate-tuberculate on the rounded back, attached for nearly the whole length to the filiform-subulate gynobase by a narrow groove which widens gradually to the base. Some of them commonly wingless and rounded at the sides, the others with lateral angles extended into a broad radiately striate wing with serrulate or toothed or even pectinate margins. Dry sandy plains, eastern Washington to California, New Mexico and Arizona.

13 AMSINCKIA Lehm. Del. Sem. Hamb. 1831: 7.

Coarse hispid annuals with alternate oblong-ovate to linear leaves and small yellow flowers in at length loose spikes or racemes without bracts except sometimes to the lowest. Calyx 2-lobed, persistent. Corolla salverform or at the throat somewhat funnelliform, more or less plaited in bud at the sinuses, with the lobes exceeding the calyx and rounded lobes, the throat naked, or with minute hairy tufts opposite the lobes. Filaments short. Style filiform; with capitate 2-lobed stigma. Nutlets ovate-triangular or triquetrous, coriaceous or crustaceous, attached above the middle to an oblong-pyramidal gynobase, the scar ovate or elongate. Cotyledons each 2-parted thus apparently four.

C. intermedia F. & M. Ind Sem. Petrop. 26. Rough-hispid through stem erect, usually 1-2 feet high and sparingly branched above; the lobes even of the calyx white or merely yellowish: leaves linear or the lower ones lanceolate, 1-4 inches long: spikes solitary or in pairs: sepals narrowly lanceolate, obtuse, at length $\frac{1}{2}$ inch long: corolla bright yellow, 4 lines long, its tube equalling the calyx, the limb with very short rounded lobes and no appendages in the throat: nutlets not half as long as the sepals, trigonous, carinate on the back and strongly muricate, attached near the base to the short conical gynobase. Dry plains, British Columbia to California.

C. lycopsoides Lehm. Del. Sem. Hamb. 1831, 7. Rather sparingly pubescent-hispid with pungent bristles: stem rather weak, 1-4 feet high with numerous loose straggling branches: leaves lanceolate to ovate-lanceolate, 1-4 lines long, acute at the apex, hispid-ciliate: spikes usually in pairs, at length 2-4 and sparsely-flowered: sepals linear-lanceolate, at length spreading and 4 times longer than the nutlets, papillose-hispid: corolla almost 2 lines in diameter, somewhat funnelliform, the tube but little longer than the calyx: nutlets oblong-ovate, about a line long, very rough muricate. In rich alluvial lands, western Oregon and Washington to California.

Var. bracteosa Gray Syn. Fl. ii, 188. Smaller-flowered and more decumbent, with most of the flowers subtended by a foliaceous bract. No the Coast, Puget Sound to California.

14 **MERTENSIA** Roth Catal. Bot. 1, 34: 1797.

Perennial herbs with alternate leaves and rather large blue-purple or white flowers in panicles, cymes, or racemes. Calyx 4-parted, herbaceous, the lobes lanceolate or linear, little enlarged in fruit. Corolla tubular-funnelform, crested or unappendaged at the throat, its lobes imbricated in the bud. Stamens inserted in the tube of the corolla, included or scarcely exerted. Filaments flattened or filiform. Anthers oblong or linear, obtuse. Style filiform with entire stigma. Nutlets erect, coriaceous, wrinkled when mature, attached by a small or short scar just above the bases to a flat strongly convex gynobase.

M. oblongifolia Don Syst. iv, 320. Stem slender, 4-8 inches high usually solitary from the short and thick corm-like root: leaves oblong spatulate-lanceolate, obtuse, 6-20 lines long, the lowest ones small, the larger ones in the middle, smooth or the upper face scabrous with minute hairs: flowers rather numerous, in a somewhat close terminal cluster: lobes of the calyx lanceolate little more than a line long, minutely ciliate: corolla funnelform, with a broad purple tube, 6 lines or more long, and ample limb, the throat rather abruptly dilated and open with pubescent crests at base on a line with the stamens: filaments as broad and not longer than anthers: style long and capillary, not exerted: nutlets dull and with obtuse angles. In moist places, Blue Mountains of Oregon to Nevada, Utah and borders of Brit. Columbia.

M. longiflora Greene Pitt. iii, 261. Glabrous except the setulose-scabrous upper face of the leaves: lowest leaves elliptic-lanceolate, on long slender petioles, the upper ones obovate oval or ovate, rounded or even cordate at base and closely sessile, all very obtuse, the largest 2 inches long: floral bracts acutish: flowers in a rather dense strictly terminal and subcorymbose panicle: calyx rather large, cleft to near the base, lobes lanceolate: corolla about an inch long, with long slender tube and short erect narrow-campanulate limb: the almost capillary style nearly equaling the corolla. Eastern Washington. Perhaps only a form of *M. oblongifolia*.

M. sibirica Don Syst. iv, 320. Glabrous and smooth or nearly pale and glaucous: stems erect 1-3 feet high from a thick branching root: very leafy: leaves oblong to lanceolate and acute, or the lowest ones sometimes obovate and obtuse, hirsute-ciliate, all petioled, 1-4 inches long: racemes short, somewhat panicle: floral bracts like the leaves, 9-10 lines long: lobes of the calyx lanceolate, about 2 lines long, commonly ciliate: corolla blue funnelform, 8-10 lines long, the broad tube nearly twice as long as the calyx shorter than the ample limb, sparingly pubescent within: filaments as broad and much shorter than the anthers: style slightly exerted. Along mountain streams: California to the Arctic regions and the Rocky Mountains.

M. paniculata Don Syst. iv, 318. Roughish-pubescent: stem erect 1-3 feet high, branched above: leaves thin, pinnately veined, the lower ovate, rounded or cordate at base, 2-5 inches long, long-petioled, upper ovate or ovate-lanceolate, acuminate at the apex, narrowed at the base: mostly slender petioles: racemes several-flowered, in loose terminal panicles: flowers purple-blue, 6-8 lines long, on filiform pedicels 4-10 lines long: calyx lobes lanceolate, acute, about 2 lines long: corolla funnelform, crested

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the throat, the tube about twice as long as the calyx, and longer than the limb: filaments flattened, slightly longer than the anthers: style filiform, usually somewhat exserted: nutlets rounded. In damp woods, California Alaska, and Hudson Bay to Michigan, Nebraska and the Rocky Mountains.

M. platyphylla Heller Bull. Torr. Bot. Club xxvi, 548. Stems weak, 6-30 inches high, branched above, the branches slender and spreading: leaves all thin, light green, papillately roughened above; radical leaves usually about a foot long including the petiole, of about 8 inches, which is rough on the margins; blade broadly ovate, 3-4 inches broad, abruptly acuminate, usually cordate at base; lower stem-leaves broadly ovate, abruptly acuminate, in petioles about an inch long; upper ones ovate-lanceolate, gradually acuminate, sessile or nearly so, contracted at base: flowers in loose terminal panicles: pedicels slender, 3-7 lines long, pubescent with short appressed hairs: sepals linear-lanceolate, 3-4 lines long, ciliate: corolla bright blue, or turning blue-color 6-8 lines long, broad funnelform, the tube about 2 lines long, the acutish lobes with broad sinuses at base: anthers oblong: style slightly exserted. In rich moist ground, western Washington and Oregon.

M. nutans. Stems simple, 1-8 from the crown of a thick branching root, 10 inches high, very leafy to the top: leaves oblong to lanceolate or the west sometimes spatulate, the largest ones in the middle of the stem 1-3 inches long, mostly sessile by a broad base or the lowest sometimes petioled, all papillose-granulate above, not at all pubescent: flowers in a dense terminal drooping panicle, sessile or on short pedicels: sepals lanceolate, barely 2 lines long, obscurely ciliate: corolla 6-8 lines long, funnelform, with a broad purple or pinkish tube twice or thrice as long as the calyx: filaments as broad as and fully as long as the anthers: style slender, often slightly exserted. On the north side of high ridges, eastern Oregon and Washington.

15 PNEUMARIA Hill Veg. Syst. vii, 40, t. 36.

Glabrous fleshy perennials with alternate leaves and small blue pinkish or white flowers in loose terminal leafy-bracted racemes. Calyx-lobes somewhat enlarged in fruit. Corolla tubular-campanulate, crested in the throat, 5-lobed, the lobes imbricated in the bud, tightly spreading. Filaments scarcely exserted. Ovary 4-divided; style slender. Nutlets erect, fleshy, attached just above their bases to the somewhat elevated gynobase, smooth and shining, bluish-margined, becoming utricular-like when mature.

P. maritima Hill l. c. 40, t. 37, fig. 3. Very smooth, pale and glaucous, much branched and spreading; leaves fleshy, ovate, obovate, or spatulate-oblong, an inch or two long, upper surface becoming pustulate: flowers small, 3 or 4 lines long, on long and slender pedicels: tube of the blue or bluish corolla hardly as long as the limb and shorter than the ovate-triangular lobes of the calyx, the crests in the throat evident: filaments rather strower and much longer than the anthers: nutlets acute, fleshy-herbaceous, in age becoming utricular, the scar small. Along the Coast, from the Bering Sea to Alaska, and Hudson Bay to New England also Europe.

16 MYOSOTIS. L. Gen. n. 180.

Low annual biennial or perennial herbs with alternate leaves and small blue pink or white flowers in so called spikes or racemes. Calyx 5-parted or 5-cleft. Corolla salverform or rotate, the tube rarely surpassing the calyx, the throat with small and blunt crests at the base of the small and rounded lobes: these convolute in the

bud. Stamens included, inserted on the tube of the corolla, with filiform filaments and obtuse anthers. Style filiform, included. Nutlets smooth, somewhat compressed, thin-crustaceous in texture, attached to the flat gynobase at the very base, the scar minute.

M. PALUSTRIS Lam. Fl. Fr. ii. 283. Appressed-pubescent: stems slender, soon decumbent, rooting at the lower nodes, 6-18 inches long: leaves oblong to lanceolate or oblong-lanceolate, obtuse, narrowed at the base, 1-3 inches long, the lower ones petioled, the others sessile: racemes loosely many-flowered: pedicels longer than the calyx: calyx-lobes triangular, shorter than the tube, spreading in fruit, beset with fine and short appressed hairs, none of them hooked or gland-tipped: corolla blue with yellow throat, 3-4 lines in diameter: nutlets somewhat angled or carinate on the ventral face. In wet places, western Oregon. Escaped from gardens.

M. alpestris Schmidt Fl. Bohem. Cent. iii, Nr. 225. Stems tufted erect, 3-9 inches high, from a perennial root: leaves oblong, linear, or lanceolate: flowers in rather dense racemes: pedicels short, and thick, ascending, seldom longer than the calyx: calyx almost 5-parted, hirsute with erect hairs, mixed near the base with some more spreading and hooked ones, erect in fruit: corolla blue, the flat limb 3-4 lines in diameter: nutlets more or less margined and carinate ventrally at the apex. In the mountains of Oregon to Kotzebue Sound and the northern Rocky Mountains.

M. macrosperma Engelm. Am. Jour. Sci. xvi, 98. Roughish-hirsute or hispid: stem erect, 3-12 inches high from an annual or biennial root, simple or branched: leaves from spatulate-oblong to oblanceolate or oblong, obtuse, 3-12 lines long, the largest ones in the middle: racemes strictly erect: pedicels erect or appressed to the rachis below but spreading above, less than a line long: calyx unequally 5-cleft, the lobes lanceolate, acute, longer than the tube, sometimes the lower ones twice as long as the upper: corolla white, the limb 2-3 lines broad nutlets convex on the back, carinate and margined on the ventral face. In prairies, Brit Columbia to Oregon, Idaho, Texas and Florida.

17 LITHOSPERMUM Tourn. L. Gen. n. 181.

Annual or perennial pubescent or hairy herbs with sessile alternate leaves and small or rather large white, yellow or blue flowers axillary or subaxillary in leafy-bracted spikes. Calyx 5-parted or 5-cleft the lobes or sepals narrow. Corolla salverform or funnelform; its lobes rounded, imbricated in the bud; the throat pubescent or crested. Filaments short, inserted on the tube of the corolla. Style slender: stigma capitate, 2-lobed or sometimes truncate. Ovary of 4 distinct lobes. Nutlets 4 or by abortion fewer, ovate, usually white and smooth, erect, attached by the base to the flat gynobase; the scar flat and rather small.

L. Californicum Gray Proc. Am. Acad. x, 51. Canescently pubescent and papillose-hispid throughout: stems ascending, 4-14 inches long, several from the crown of a thick perennial root, very leafy, simple, or sparingly branched above: leaves bract-like below, gradually enlarged upward, the largest ones in the middle, linear to broadly lanceolate, or the upper ones not rarely ovate, sessile or nearly so 1-3 inches long: peduncles 1-2 lines long: sepals linear, 4-8 lines long: corolla bright yellow, hardly an inch long, narrow-funnelform, its proper tube about equalling the calyx, its ample throat much longer than the very short lobes, pubescent outside, almost destitute of crests, the glandular ring at the base of the tube naked

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anthers oblong, sessile: style 2-lobed at the apex: nutlets white, smooth and polished, the inner face rather conspicuously carinate. On dry rocky hillsides, southwestern Oregon to California.

L. pilosum Nutt. Journ. Phil. Acad. vii, 43. Soft-hirsute and pubescent, pale or canescent stems numerous from the crown of a thick perennial root, 6-18 inches high, mostly simple, very leafy: leaves linear to linear-lanceolate, 2-4 inches long, mostly tapering from near the base to apex, often small and bract-like below: flowers densely crowded in a leafy thyrsus: sepals linear 3-4 lines long, hispid: corolla campanulate-funnel-form, about twice the length of the calyx, silky outside, dull greenish-yellow, the lobes equalling the throat, nearly naked at the throat but obscurely puberulent and thickened under each lobe: style slender: nutlets broadly ovate, acute, smooth and polished. 2-3 lines long white and bony. Common on dry hillsides and plains, Brit. Columbia to California, and Nebraska.

ORDER LXVI CONVOLVULACEÆ Vent. Tabl. ii, 394.

Herbs, or some tropical species shrubs or trees, with generally twining or trailing stems, usually milky juice, alternate leaves without stipules, or leafless, truly axillary regular 5-merous, or rarely 4-merous flowers, except as to the pistil which is almost always 2-carpellary. Calyx mostly of distinct and imbricated sepals, persistent. Corolla either plicate and the pleats convolute or induplicate-valvate or sometimes imbricate in the bud, the limb either lobed or entire. Stamens as many as lobes of the corolla and alternate with them, usually inserted low down on the tube of the corolla; hypogynous disk usually annular and manifest. Ovary 2-celled or rarely 3-celled, with a pair of anatropous ovules in each cell, or spuriously 4- or 6-celled, each cell being more or less divided into a pair of 1-ovuled half-cells by a false partition, or rarely 2- or 4-parted from above around the style. Style single or once or twice divided: stigma terminal or introrse. Fruit capsular or sometimes fleshy. Seeds comparatively large, filled by a crumpled or pleated embryo involving or partly surrounding a little mucilaginous or fleshy albumen, its cotyledons ample and foliaceous, or in *Cuscuta* a spiral embryo without cotyledons.

TRIBE I Plants with ordinary foliage, not parasitic. Ovary entire.

1 Convolvulus Corolla plicate at the sinuses pleats twisted in the bud: style undivided or cleft only at the apex.

TRIBE II Leafless parasitic twining herbs without green color.

Tribe 1 Convolvuleae Choisy in DC. Prodr. ix, 335 Plants with mostly twining or trailing stems, mostly milky juice and ordinary foliage, not parasitic. Ovary entire.

2 Cuscuta Corolla with mostly spreading lobes, between convolute and imbricate in the bud.

1 CONVOLVULUS L. Gen. n. 215.

Herbs with trailing twining or erect stems, broad leaves and

large flowers mostly solitary in the axils of the leaves. Sepals nearly equal or the outer largest, bractless or with a pair of bracts at their base. Corolla campanulate, or short and open funnelform with more or less 5-angulate or obscurely 5-lobed border, deeply plaited down the sinuses in the bud, the plants convolute, commonly straight, sometimes twisted. Stamens inserted on the tube of the corolla, included. Style filiform: stigmas two, subulate or flat, and from narrowly linear to oval. Capsule globose, 2-celled, the cells 2-ovuled and commonly 2-seeded. Embryo with broad and foliaceous cotyledons folded and crumpled in the seed.

* A pair of thin membranaceous-foliaceous bracts close to the calyx, and enveloping or partly enveloping it: stigmas from ovate to oval or oblong: flowers (in ours) solitary.

C. Soldanella L. Sp. 159. Glabrous, fleshy: stems low and mostly short, creeping or trailing: leaves reniform, entire or obscurely angulate, often emarginate, an inch or two wide, long-petioled: bracts roundish, obscurely cordate, not longer than the sepals: corolla pink-purple, 1-3 inches long, short-funnelform: stigmas ovate. Sandy sea-shores, Puget Sound to California. Europe &c.

C. septum L. Sp. 153. Glabrous or more or less pubescent, freely twining: leaves slender-petioled, deltoid-hastate and triangular-sagittate, 2-4 inches long, acute or acuminate; the basal lobes or auricles either entire or angulate-2-3-lobed: peduncles mostly elongated: bracts cordate-ovate or somewhat sagittate, commonly acute: corolla broadly funnelform, 2 inches long, white or tinged with rose-color: stigma from ovate to oblong. Along streams, Brit. Columbia to California and across the Continent.

** Stigmas linear or oblong-linear

C. occidentalis Gray Proc. Am. Acad. xi. 89. Glabrous or minutely pubescent: stems freely twining or prostrate: leaves slender-petioled, from angulate cordate to sagittate or the upper hastate: peduncles elongated, surpassing the leaf: bracts large and covering the calyx or variously smaller and shorter to lanceolate or linear and more or less foliaceous in texture: corolla campanulate-funnelform white or pinkish to cream-color, 12-18 lines long: stigmas linear. Dry hills, Oregon and Washington to California.

C. nyctagineus Greene Pitt. iii, 327. *C. Californicus* of Authors as to the Oregon plant. Stems slender, 2-10 inches long, herbaceous to the ground: leaves roundish-ovate or semicircular in outline, rounded or abruptly acute at the apex, with or without a small hastate lobe on each side near the abruptly contracted and somewhat cuneately tapering base: the blade 1-2 inches long by about as broad, all on slender petioles 4-8 inches long: flowers few, all in the axils of the lowest leaves: peduncles about an inch long: bracts oval, obtuse or almost truncate, barely equalling the obtuse and mucronate sepals: corolla about 2 inches long by 1 1/2 broad, white: stigma oblong-obovate, nearly 2 lines long: fruiting characters not observed. Rather common throughout the Willamette Valley and southward to the border of California.

C. polymorphus Greene Pitt. iii, 331. Herbage pale and puberulent: stems slender, 2-4 feet long, twining, herbaceous to the base: leaves from reniform-hastate to subsagittate, rather prominently and sharply mucronate, the blade 10-18 lines long, short-petioled: peduncles short, 1-flowered: bracts narrowly elliptic, situated a short distance below the calyx and their tips just reaching its base or longer and partly embracing it: sepals very unequal, the outer often broadly oval and truncate and only half the length

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of the narrower inner ones: corolla 12-18 lines broad, yellowish: stigmas oblong. On dry prairies, southern Oregon to California.

* * * Stigma filiform or narrowly linear: no bracts at or near the base of the calyx.

C. ARVENSIS L. Sp. 153. Glabrous or nearly so; stems trailing or decumbent, very slender, 1-2½ feet long, simple or branched: leaves slender-petioled, ovate or oblong, entire, obtusish and mucronulate or acutish at the apex, sagittate or somewhat hastate at the base, 1-2 lines long, the basal lobes spreading, acute: peduncles 1-4-flowered (commonly 2-flowered), shorter than the leaves, 1-3-bracted at the summit, usually with a n- other bract on one of the pedicels: sepals oblong, obtuse, 1½ lines long: corolla pink to white, 8-12 lines broad. In fields and waste places. Naturalized from Europe.

Tribe 2 Cuscutæ B & H. Gen. ii, 881. Leafless parasitic red or yellow twining herbs without foliage or green color. Corolla imbricated in the bud, appendaged below the stamens. Ovary entire.

2 CUSCUTA Tourn. L. Gen. n. 170.

Parasitic herbs, destitute of all green color and of foliage, except scale-like bracts, and small whitish flowers in cymose clusters. Calyx 5- (rarely 4-) parted or cleft. Corolla from campanulate or somewhat urceolate to short-tubular, with the mostly spreading lobes between convolute and imbricate in the bud, not plicate, marcescent persistent, either at the base or summit of the capsule. Stamens inserted in the throat of the corolla above as many scale-like lacerate appendages (these rarely absent). Ovary globular, 2-celled and 4 ovuled. Styles distinct or rarely united, persistent: stigmas globose, or in foreign species filiform. Capsule 1-4-seeded, circumscissile or transversely bursting, or indehiscent. Seeds large, globular, or angled by mutual pressure. Embryo filiform, spirally coiled in firm-fleshy albumen, wholly destitute of cotyledons, but the apex of the plumule often bearing a few alternate scales. Seeds germinating in the ground but not rooting in it, developing into filiform branching stems which twine dextrorsely upon herbs or shrubs and becoming parasitic by means of suckers which penetrate the bark in contact, the base soon dying.

C. arvensis Beyrich Stems pale yellow, slender, low: flowers barely a line long, nearly sessile, in small dense clusters: calyx gamosepalous, with obtuse mostly broad lobes: corolla nearly campanulate, 5-lobed, the lobes acute or acuminate, as long as the tube; its scales large, ovate, as long as or longer than the tube, densely fringed all around with short irregular processes: style shorter than the ovary: stigmas capitate: capsule depressed-globose, indehiscent, the withering corolla and usually the stamens persistent at its base. On various low plants, Brit. Columbia to California and across the Continent.

C. Cephalanthi Engelm. Am. Journ. Sci. xxxiii, 336. Stems coarse and yellow, usually rather high-climbing: flowers a line or less long, on short thick pedicels, often 4-merous: calyx-lobes ovate, obtuse, shorter than the corolla-tube: corolla cylindrical-campanulate, its lobes ovate, obtuse and rounded, spreading, shorter than the tube: scales shorter than the tube, fringed: style slender, as long or longer than the ovary: capsule

depressed-globose, capped with the marcescent corolla. On shrubs and tall herbs, eastern Oregon to the Eastern States.

C. Californica Choisy Cusc. 183. Stems capillary, low: flowers rather small and delicate, in loose cymes: lobes of the calyx acute: corolla gamopetalous, campanulate its lanceolate-subulate lobes as long as the campanulate tube or longer: scales none, or rudimentary: styles slender, longer than the ovary: capsule depressed-globose. On *Eriogonum* etc. southern Oregon to California.

C. salina Engelm. Bot. Cal. 1, 536. Stems slender, low: flowers white delicate, short-pedicelled or clustered: calyx-lobes ovate-lanceolate, acute, as long as the shallow-campanulate tube of the corolla: lobes of the corolla ovate, acute, denticulate: scales fringed, mostly shorter than the tube, sometimes incomplete: filaments about as long as the oval anthers: style equalling or shorter than the ovary: capsule pointed, mostly 1-seeded, surrounded by the marcescent corolla. In saline or brackish marshes along the coast, Brit. Columbia to California.

ORDER LXVII SOLANACEÆ Pers. Syst. i, 214.

Herbs shrubs or even trees with alternate or rarely opposite leaves without stipules, watery juice and perfect regular or nearly regular 4-5-merous flowers in variously modified cymes; the pedicels either not accompanied by bracts, or not in their axils. Calyx inferior, gamosepalous. Corolla rotate, campanulate, funnellform, salverform or tubular, mostly 5-lobed, the lobes induplicate-valvate or plicate in the bud. Stamens as many as lobes of the corolla and alternate with them, inserted on the tube of the corolla: anthers 2-celled, dehiscent at the apex or longitudinally. Ovary entire, normally 2-celled, with the placenta in the axis, many-ovuled, surmounted by an undivided style: stigmas entire or sometimes bilamellar. Ovules anatropous. Fruit a berry or capsule. Seeds numerous, the testa sometimes roughened. Embryo terete, spirally curved or nearly straight, in fleshy albumen, the cotyledons rarely much broader than the radicle.

TRIBE I Corolla mostly short, with the limb plicate or valvate in the bud. Stamens all perfect. Fruit berry-like, at least not dehiscent, sometimes nearly dry.

- 1 **Solanum** Calyx little or not at all enlarged in fruit: anthers longer than their filaments, connivent into a cone, or slightly connate; the cells opening at the apex, or sometimes longitudinally.
- 2 **Physalis** Calyx usually much enlarged in fruit: anthers unconnected and not connivent.

TRIBE II Corolla mostly long with the limb either plicate or imbricate in the bud. Stamens all perfect. Fruit a capsule.

- 3 **Datura** Calyx prismatic or tubular, 5-toothed, in ours at length circumscissile near the base: fruit a 4-valved mostly prickly capsule.

TRIBE III Corolla usually long, with the limb induplicate-imbricate in the bud. Stamens all perfect. Fruit in ours capsular

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- 4 *Nicotiana* Calyx persistent and more or less investing the capsule: fruit a 2-celled spuriously 4-valved capsule.

Tribe I *Solanæ* Endl. Gen. 664. Corolla with the regular limb plicate or valvate in the bud, usually both; that is the sinuses or what answers to them plicate and the edges of the lobes induplicate. Stamens normally 5, all perfect. Fruit berry-like or at least indehiscent, sometimes nearly dry, seeds flattened: embryo curved or coiled, slender; the semiterete cotyledons not broader than the radicle.

1 SOLANUM Tourn. L. Gen. n- 251.

Herbs or shrubs with alternate leaves and white blue purple or yellow flowers in cymes panicles or racemes. Calyx campanulate or rotate, mostly 5-toothed or 5-cleft, not inflated in fruit. Corolla rotate, the limb 5-angled or 5-lobed, the tube very short. Stamens inserted in the throat of the corolla: anthers longer than their filaments connate or connivent into a cone, opening at the apex by a pore or short slit, and sometimes also longitudinally even to the base. Ovary usually 2-celled. Fruit mostly globose, the calyx either persistent at its base or enclosing it.

S. NIGRUM L. Sp. 186 (NIGHTSHADE) Green and almost glabrous or the younger parts pubescent: stem erect, freely branching, 1-2 feet high from an annual root: leaves mostly ovate, petioled, 1-3 inches long, entire, repand or sinuate-toothed, acutish to acuminate at the apex, cuneate to rounded at base: peduncles lateral, umbellately 3-10-flowered, 6-18 lines long: flowers white, on pedicels 3-7 lines long: calyx-lobes oblong, spreading, much shorter than the corolla, 4-10 lines in diameter, the spreading or reflexed lobes acute: filaments more or less hairy inside: anthers oblong, obtuse, loosely connivent: style slightly exserted: berries globose, smooth and glabrous, black when ripe, 4-5 lines in diameter, on nodding pedicels. Waste places and cultivated fields. Widely distributed in nearly all countries as a weed, perhaps indigenous.

S. VILLOSUM Lam. Encycl. Meth. iv, 286. Loosely villous: stem erect, freely branching from the base, 1-2 feet high from an annual root: leaves ovate to broadly lanceolate the blade 1-2 inches long, coarsely sinuate-toothed, narrowed below to a more or less winged slender petiole: peduncles lateral 3-8-flowered, 1-2 inches long: flowers white, on pedicels 3-6 lines long: calyx-lobes triangular-ovate half as long as the corolla enlarging at length and embracing the fruit: corolla 4-5 lines in diameter the merely spreading lobes acute: filaments glabrous to the base: anthers oblong obtuse: berries globular, 3-4 lines in diameter, yellow when ripe. In fields and waste places, southern Oregon and western California. Introduced from southern Europe.

S. triflorum Nutt. Gen. i, 128. Slightly hairy or nearly glabrous: stem branching, 1-3 feet high from an annual root: leaves oblong, 2-4 inches long, pinnatifid, with entire or dentate oblong to lanceolate lobes and broad rounded sinuses: peduncles lateral, 1-3-flowered, 6-12 lines long: calyx-lobes oblong to lanceolate, shorter than the corolla, persistent at the base of the berry: corolla white, 4-5 lines in diameter: anthers oblong, obtuse: berries globose, green and about 5 lines in diameter when mature. In fields, and waste places, Idaho to Ontario, Nebraska and Arizona.

S. umbelliferum Esch. Mem. Acad. Petrop. x, 281. Tomentose-pubescent and cinereous with short many-branched hairs, sometimes glabrate: stems erect or declined, woody below, 1-2 feet long from a perennial

root: flowering branches mostly short and leafy: leaves commonly oblong to obovate, obtuse, rarely ovate and acute, entire, halfinch to 2 inches long, more or less acute or narrowed at base, or the lower and larger ones rounded, on short petioles; flowers in short-peduncled few-several-flowered umbels: calyx-lobes about 2 lines long in flower, ovate, obtuse: corolla 8-10 lines broad, blue to white, angulately 5-lobed, widely rotate: anthers obtuse, the cells opening by a short vertical slit at the apex, which extends downward to the base: berries purple, the base covered by the appressed moderately enlarged calyx. On stony hillsides, southern Oregon to Calif.

S. SISYMBRIFOLIUM Lam. Dunal in DC. Prodr. xiii, 49. Villous-pubescent with simple more or less glandular and viscid hairs, mixed on the leaves with some few-rayed stellate ones; much armed even to the calyx with long subulate straight prickles: stem stout, 2-3 feet high, branching; leaves deeply pinnatifid and the oblong lobes sinuate or even again somewhat pinnatifid: flowers several or numerous, in terminal or soon lateral pedunculate racemes; lobes of the 5-parted calyx lanceolate, becoming ovate-lanceolate and at length loosely and completely or incompletely covering the globose red berry: corolla light blue or white, 1-2 inches broad, 5-lobed: anthers lanceolate. On ballast grounds at Portland Oregon.

2 PHYSALIS L. Gen. n. 250. (GROUND CHERRY)

Annual or perennial herbs with entire or sinuately-toothed leaves and yellow or white flowers on axillary and solitary peduncles. Calyx campanulate, 5-toothed, in fruit enlarged and bladderly-inflated, membranaceous, 5-angled, or prominently 10-ribbed and reticulated, wholly inclosing the pulpy berry, its teeth mostly connivent. Corolla rotate or rotate-campanulate, plicate in the bud, 5-angulate or obscurely 5-lobed. Stamens inserted near the base of the corolla: anthers oblong, longer than their filaments, not connivent, opening by a longitudinal slit. Style slender, somewhat bent; stigma 2-cleft. Seeds numerous, kidney-shaped, flattened, with a thin edge, finely pitted.

P. ixocarpa Brot. Hornem. Hofm. Supp. 26. A little hairy or pubescent when young: stem erect, much branched, 1-2 feet high from an annual root: leaves ovate or oblong, repand or sinuate-toothed or entire, 1-2 inches long or rarely longer, on long and slender petioles: pedicels only 1-3 lines long: calyx-lobes short, broadly triangular, shorter than the tube: corolla bright yellow with purple throat; 6-12 lines broad: fruiting calyx rounded-ovoid, obscurely 10-angled, often purple-veined, at last often filled with the berry which sometimes bursts it. Native of Mexico: escaped from cultivation in eastern Washington.

P. pruinosa L. Sp. 184. Villous or pubescent with simple viscid hairs: stem stout, from an annual root, 1-2 feet high, with at length widely spreading branches, obtusely angled: leaves firm, 2-5 inches long, ovate cordate, generally very oblique at the base and deeply sinuate-toothed with broad and often obtuse teeth: peduncles 1-2 lines long, in fruit about 6 lines long: calyx villous or viscid, the lobes as long as the tube, narrow but not subulate-tipped: corolla 2-5 lines broad, dull yellow with purplish brown eye: anthers yellow or violet: fruiting calyx 12-18 lines long, ovoid cordate at base, reticulated; berry yellow or green. Eastern Washington. Probably introduced from the Southern States.

P. lanceolata Michx. Fl. i, 149. Sparingly hirsute with flat hairs: stems at first erect, later spreading or diffuse, only slightly angled, about 18 inches long from a slender creeping perennial rootstock: leaves broadly oblanceolate or spatulate, tapering into the petiole, acute or obtuse, near

always entire, lobes 5-10 lines long, its lobes triangular about 8 lines broad, indistinctly 10-lobed and eastward t

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always entire, rarely wavy but never sinuately toothed, thickish; peduncles 5-10 lines long, reflexed in fruit; calyx strigose-villous, rarely glabrous, its lobes triangular-lanceolate; corolla dull yellow with a brownish centre, about 8 lines broad; fruiting calyx rounded ovoid, not sunken at the base, indistinctly 10-angled; berry yellow or greenish. On dry prairies, Idaho and eastward to Illinois and the Carolinas.

Tribe 2 Hyoscyamæ Endl. Gen. 664. *Corolla with the limb either plicate or imbricate in the bud. Stamens 5, all perfect. Fruit a 2-celled, or falsely 4-celled capsule. Seeds flattened. Embryo curved: the semiterete cotyledons not broader than the radicle.*

3 DATURA L. Gen. n. 246.

Herbs shrubs or trees with alternate leaves and large white purple or violet flowers solitary in the forks of the stem or branches. Calyx elongated-tubular or prismatic, its apex 5-cleft or spathe-like in our species circumscissile near the base. Corolla funnelform the limb plaited, 5-lobed. Stamens inserted at or below the middle of the corolla-tube, included or but little exerted: filaments filiform. Ovary 2-celled or falsely 4-celled: style filiform: stigma slightly 2-lobed. Capsule 4-valved from the top or bursting irregularly.

D. STRAMONIUM L. Sp. 179. Glabrous or the young parts sparingly pubescent: stem stout, 1-5 feet high from an annual root, freely branching: leaves thin ovate in outline, acute or acuminate at the apex, mostly narrowed at the base, 3-8 inches long, irregularly sinuate-lobed, the lobes acute, on petioles 1-4 inches long: calyx prismatic, less than half the length of the corolla, circumscissile near the base: corolla white 3-4 inches high, the limb $1\frac{1}{2}$ -2 inches broad: capsule erect, thickly armed with short stout prickles, the lowest ones mostly shortest. In fields and waste places, Brit. Columbia to California and across the Continent. Introduced from Asia.

Tribe 3 Cestrinæ *Corolla with regular limb induplicate-valvate or induplicate-imbricate in the bud. Stamens all perfect. Fruit either baccate or capsular: seeds little or not at all flattened. Embryo either straight or only slightly curved, the cotyledons usually broader than the radicle.*

4 NICOTIANA Tourn. L. Gen. n. 248.

Annual or perennial herbs with large alternate leaves and rather large white, yellow, greenish or purplish flowers in terminal, often bracted racemes or panicles. Calyx tubular-campanulate or ovoid, 5-cleft, persistent. Corolla funnelform or salverform, plicate and somewhat imbricate in the bud, filaments filiform, mostly included, inserted on the tube of the corolla: anthers ovate or oblong often explanate after dehiscence. Ovary normally 2-celled, with long and thick placenta bearing very numerous ovules and seeds. Style slender: stigma depressed-capitate and often 2-lobed. Fruit a capsule, more or less invested by the calyx, septicidal and also usually loculicidal at summit, the valves or teeth thus becoming twice as many as cells. Seeds very small, with granulate or rugose-foveolate testa. Cotyledons little broader than the radicle. Ours all annuals with white or greenish flowers.

N. attenuata Torr. Watson Bot. King 276, t. 27 fig. 1-2. More or less viscid-pubescent: stem rather slender, 1-3 feet high, usually strict and simple up to the paniculate inflorescence: lower leaves ovate or oblong, 2-4 inches long; the upper from oblong-lanceolate and acuminate-attenuate to linear; all on slender petioles: inflorescence loosely paniculate, naked above: pedicels short: calyx-teeth triangular-lanceolate or subulate, with thin edges, almost equal, much shorter than the tube, not over $1\frac{1}{2}$ lines long and not surpassing the capsule: corolla dull white or greenish, glabrous, slender-salverform, the tube $1\frac{1}{2}$ -2 inches long, the obscurely 5-lobed or angulate limb 4-6 lines in diameter, opening only at night and usually closing before noon, or under sunshine, filaments slender, equally inserted low down on the tube of the corolla: capsule 2-5 lines long, ovate, acute, 2-valved, the valves bifid. Along streams, Brit. Columbia to California and Nevada, east of the Cascade Mountains.

N. Bigelovii Watson Bot. King 276, t. 27 fig. 3-4. Soft-pubescent and more or less viscid: stem stoutish, erect, 1-3 feet high: lower leaves broadly lanceolate, sessile or on short and broad petioles, 5-7 inches long, obtuse or acutish, the upper ones generally reduced upward, lanceolate and more or less attenuate to linear, sessile and with more or less clasping base: inflorescence loose-racemiform, with all the upper flowers bractless: pedicels short and rather stout: calyx-teeth unequal, linear-subulate, about equalling the tube, surpassing the capsule: tube of the corolla 1-2 inches long, narrow, with a gradually expanded throat; the limb 12-18 lines in diameter, 5-lobed, the lobes acute, expanding only at night or in cloudy weather: filaments more or less unequally inserted in the upper part of the tube of the corolla: capsule thin-walled, obtuse, 4-6 lines long, 2-celled, and 4-valved at the apex. Dry grounds, Umpqua Valley Oregon to California and Nevada.

N. quadrivalvis Pursh Sims Bot. Mag. t. 1778. Viscid-pubescent: stem stout, 1-2 feet high, branching from near the base: leaves oblong or the lowermost ovate-lanceolate and the uppermost lanceolate or linear, acute at both ends, sessile or slender-petioled, 4-6 inches long including the petiole: flowers rather few, on short slender pedicels: calyx-teeth linear, about equalling the 4-celled or rarely 3-celled globular capsule: tube of the corolla barely an inch long, the 5-lobed limb $1\frac{1}{2}$ inches in diameter, its lobes ovate and obtusish, veiny: filaments unequally inserted in the upper part of the tube of the corolla. Along streams, Oregon and Washington. Was cultivated by the Indians,

Var. multivalvis Gray Bot. Cal. i, 546. Stouter and with the calyx corolla and stamens 5-8-merous and capsule several-celled, sometimes an inch in diameter. Oregon. Probably an abnormal form from cultivation by the Indians.

ORDER LXVIII SCROPHULARIACEÆ Lindl. Nat. Syst. 288.

RHINANTHACEÆ

Herbs shrubs or trees with alternate or opposite leaves without stipules and perfect mostly complete and irregular flowers. Calyx inferior, persistent 4-5-toothed or 4-5-cleft, or sometimes split on one or both sides, the lobes or segments valvate-imbricate or distinct in the bud. Corolla gamopetalous the limb 2-lipped or nearly regular, wanting in one species of *Synthyris*. Stamens 2, 4, or 5, didynamous or nearly equal, inserted on the corolla and alternate with its lobes: anthers 2-celled, the cells equal or unequal or sometimes confluent one-celled. Pistil

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one, entire or 2-lobed; ovary 2-celled or rarely 1-celled, with the few-many-ovuled placenta in the axis: ovules anatropous or amphitropous. Style simple, with entire, 2-lobed or 2-lamellate stigma. Fruit mostly capsular and septicidally or loculicidally dehiscent. Seeds mostly numerous with small and straight or only slightly curved embryo in fleshy albumen. Cotyledons little if at all broader than the radicle.

I Inflorescence simply centripetal. Corolla hardly if at all bilabiate the two posterior lobes external in the bud.

TRIBE I Corolla rotate, with hardly any tube. Anthers concurrently 1 celled, (Introduced weeds).

VERBASCUM Leaves alternate: Stamens 5, all with anthers

II Leaves mostly opposite, at least the lower ones. Inflorescence when simple centripetal, when compound the peduncles cymosely few-several-flowered. Upper lip or lobes of the corolla external in the bud.

TRIBE II Corolla bilabiate and more or less tubular: the base of the tube gibbous or saccate or spurred on the lower side.

Linaria Corolla with a spur at the base:

Antirrhinum Corolla merely saccate or gibbous at base.

TRIBE III Corolla more or less bilabiate and tubular, not saccate or otherwise produced at base on the lower side. Antheriferous stamens 4 and rudiment of the fifth commonly present.

* Corolla gibbous or saccate on the upper side of the tube: ovules and seeds few or solitary in the cells.

Collinsia Corolla declined, deeply bilabiate.

Tonella Corolla little declined, obscurely bilabiate.

** Corolla-tube not gibbous above: ovules and seeds indefinitely numerous.

+ Sterile filament represented by a scale on the upper side of the throat of the corolla.

Scrophularia Corolla short; the tube ventricose and globular or oblong.

+ + Sterile filament conspicuous and elongated.

Chelone Corolla elongated-tubular: seeds surrounded by a broad membranous wing.

Pentstemon Corolla elongated-tubular: seeds angulate, not winged.

*** Corolla-tube not gibbous: ovules and seeds rather numerous: inflorescence simply spicate.

Chionophila Corolla tubular, with slightly dilated throat: seeds with a loose and arilliform outer coat

TRIBE IV Corolla from bilabiate to almost regular, not saccate or otherwise produced at base. Antheriferous stamens 2 or 4: rudiment of the fifth.



* Calyx prismatic and barely 5-toothed, or rarely campanulate and hardly 5-cleft: corolla more or less bilabiate: stamens four.

- 10 *Diplacus* Shrubby perennials: capsule firm-coriaceous, narrow and closely invested by the calyx, tardily dehiscent down the upper suture.
11 *Eunanus* Low annuals: capsule from almost bony and indehiscent to membranaceous.

12 *Mimulus* Annual or perennial herbs, capsule membranaceous tardily separating from the central placentiferous column.

** Calyx 5-parted or deeply 4-5-lobed: antheriferous stamens only 2, the posterior pair, the anterior pair sterile rudiments or wanting.

13 *Gratiola* Sterile filaments none, or short and entire.

14 *Ilysanthes* Sterile filaments present, slender and forked.

*** Calyx and corolla both 5-lobed and nearly regular: antheriferous stamens 4, nearly equal.

15 *Limosella* Small plants with the flowers on scapes.

III Leaves various. Lower lip or lateral lobes of the corolla external in the bud.

TRIBE V Corolla usually little if at all bilabiate, the lobes all plain, the lateral or one of them external in the bud.

* Stamens 2, distinct, exserted; filaments straight, inserted at or below the sinuses between the two lateral and the posterior lobe of the corolla.

16 *Synthyris* Corolla from oblong to short-campanulate.

17 *Veronica* Corolla from rotate with very short tube to salverform.

** Stamens 4, distinct, not exserted, inserted on the upper side of the tube of the corolla

18 *DIGITALIS* Corolla tubular-funneliform, somewhat irregular.

TRIBE VI Corolla manifestly bilabiate, the upper lip erect and concave or galeate, entire or emarginate, rarely 2-cleft, the lower 3-cleft, exterior in the bud.

* Ovules and usually the seeds numerous.

+ Anther-cells unequal or dissimilar, the outer one affixed by its middle, the other pendulous from its upper end, mostly smaller, sometimes sterile.

19 *Castilleja* Upper lip of the corolla much longer than the very short and 3-toothed lower one.

20 *Orthocarpus* Upper lip of the corolla scarcely longer and usually narrower than the inflated 1-3-saccate lower one.

21 *Adenostegia* Upper lip of the corolla not longer nor much if any narrower than the 3-crenulate or entire lower one.

+ + Anther-cells equal, parallel and alike in all 4 stamens.

22 *Pedicularis* Calyx split anteriorly, not inflated in fruit.

23 *RHINANTHUS* Calyx 4-toothed, inflated in fruit.

** Ovules only two in each cell, one sessile and ascending, the other laterally attached.

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4 *Melampyrum* Annual branching herbs with opposite leaves.

SERIES I PSEUDOSOLANÆ B. & H. Gen. ii, 915. Leaves all alternate. Inflorescence centripetal. Corolla hardly if at all bilabiate; the two posterior lobes external in the bud. All five stamens sometimes present and perfect.

Tribe 1 *Verbasceæ* Benth. in DC. Prodr. x, 188. Corolla rotate with hardly any tube. Anthers by confluence one-celled.

1 VERBASCUM L. Sp. 177. 1753.

Biennial, or rarely perennial, mostly tall and erect herbs with alternate leaves and rather large flowers in terminal spikes, racemes or panicles. Calyx deeply 5-cleft or 5-parted. Corolla rotate, 5-lobed, the lobes a little unequal, the upper exterior at least in the bud. Stamens 5, inserted on the base of the corolla, unequal, all antheriferous: cells of the anthers confluent into one. Ovules numerous. Style dilated and flattened at the summit. Capsule globose to oblong, septicidally 2-valved, many-seeded, the valves usually 2-cleft at the apex. Seeds not winged.

V. THAPUS L. Sp. 177. (GREAT MULLIEN). Densely woolly throughout with branched hairs: stem stout, erect, simple or with a few erect branches, 2-10 feet high: leaves thick, oblong acute, narrowed at the base, dentate or denticulate, 4-12 inches long, the radical ones on margined petioles, the cauline sessile with decurrent base causing the stem to appear ring angled: flowers yellow, 8-12 lines broad, sessile, very numerous in dense terminal spikes: stamens unequal, the 3 upper shorter with white-hairy filaments and short anthers, the 2 lower glabrous or nearly so, with larger anthers: capsule 3-4 lines high slightly longer than the calyx, many-seeded. Roadsides and waste places, throughout North America. Introduced from Europe.

V. BLATTARIA L. Sp. 178 (MOTH MULLIEN). Glabrous or sparingly glandular-pubescent: stem strictly erect, simple, slender, terete, 2-6 feet high: leaves oblong or ovate to lanceolate, dentate, lacinate or pinnatifid, acute or acuminate, the lower and radical ones sessile or somewhat petiolate 4-12 inches long, seldom present at flowering time, the upper ones $\frac{1}{2}$ -2 inches long sessile by a truncate or cordate-clasping base: flowers in long loose racemes: pedicels spreading 8-12 lines long, bracted at the base: corolla yellow or white with brownish marks on the back, 10-12 lines broad: filaments all pilose with violet hairs: capsule depressed globose 3 lines in diameter, longer than the calyx. In fields and waste places throughout the United States and Canada. Naturalized from Europe.

II ANTIRRHINIDÆ Benth. in DC. Prodr. x, 188. Leaves mostly opposite, at least the lower ones. Inflorescence when simple centripetal, when compound the peduncle cymosely few to several-flowered. Upper lip or lobes of the corolla external in the bud, with a few and irregular exceptions. Fertile stamens very seldom more than four.

Tribe 2 *Antirrhinæ* Bhav. Monog. Antirrh. 1833. Inflorescence simple and racemous, or the flowers solitary and axillary. Corolla bilabiate and more or less tubular: the base of the tube gibbous or saccate or spurred on the lower side, and the lower lip often with

a palate at the throat. Capsule opening by irregular perforations lacerate chinks not by normal valves.

2 LINARIA Tourn. Juss. Gen. 120 (TOAD-FLAX.)

Herbs, or some exotic species shrubby, with alternate, or the lower and those of sterile shoots opposite, leaves and yellow white or blue or purple flowers in terminal racemes or spikes. Calyx 5-parted, the segments imbricated in the bud. Corolla bilabiate, the upper lip erect, 2-lobed, outside of the lower one in the bud the tube spurred at the base, or the spur rarely wanting; lower lip spreading, 3-lobed, its base produced into a palate often nearly closing the throat. Stamens 4 didynamous, not exerted. Capsule ovoid or globose, opening by one or more mostly 3-toothed pores or slits below the summit. Seeds numerous. Ours are perennials by short rootstocks.

L. VULGARIS Mill, Gard. Dict. ed. 8, No. 1. Pale green and slightly glaucous: stems slender erect, very leafy, 1-3 feet high from short perennial rootstock, glabrous or sparingly glandular-pubescent above: leaves linear, sessile, entire, acute at both ends, mostly alternate 6-18 lines long; flowers densely racemose, light yellow, 12-16 lines long, the spur of the erect corolla somewhat darker; the palate orange-colored: pedicels 2-4 lines long nearly erect: calyx-segments oblong, acutish, about $1\frac{1}{2}$ lines long: spur subulate nearly as long as the body of the corolla; middle lobe of the lower lip shorter than the other 2: capsule ovoid: seeds rugose, winged. In various places. Introduced from Europe.

L. CANADENSIS Dumont Bot. Cult. ii. 96. Glabrous: flowering stems erect or ascending very slender simple or branched 4-30 inches high; sterile shoots spreading or procumbent, very leafy: leaves linear-oblong, 15 lines long, $\frac{1}{2}$ -1 line wide, entire, sessile; those of the sterile shoots opposite: flowers blue, 3-4 lines long, in long slender racemes: pedicels 2-3 lines long, erect, in fruit appressed to the rachis, minutely bracted at the base; calyx-segments lanceolate, acute or acuminate, about as long as the capsule: spur of the corolla filiform, curved, as long as the tube or longer: palate a white convex 2-ridged projection: capsule opening by 2 apertures, each becoming 3-toothed: seeds angled, wingless. On rocky banks from Oregon to California and across the continent.

3 ANTIRRHINUM Tourn. L. Sp. 612.

Annual or perennial herbs with all or all but the lower leaves alternate, and rather large flowers in terminal racemes or solitary in the axils of the upper leaves or bracts. Calyx 5-parted, the segments imbricated in the bud. Corolla irregular, gibbous, saccate, but not spurred at the base, 2-lipped, the upper lip erect, 2-lobed; the lower spreading, 3-lobed, its base produced into a palate nearly or quite closing the throat. Stamens 4, didynamous, included; filaments filiform, or dilated at the summit. Style filiform. Capsule ovoid or globose, opening by chinks or pores below the summit. Seeds numerous, not winged.

A. leptaleum Gray Proc. Am. Acad. vii. 373. Viscid-villous: stems erect 1-2 feet high from an annual root simple or branched: leaves linear-lanceolate to linear, 6-18 lines long, entire, the lower ones on slender petioles, the uppermost ones smaller and sessile: flowers on short pedicels

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the axils of all but the lowest: calyx-lobes subulate, 1-2 lines long: corolla 4-6 lines long, dull purplish, the lips nearly as long as the tube, the prominent palate nearly closing the throat: filaments dilated at their apex: style rather shorter than the capsule, thickened below, bent forward, included and persistent: capsule about equalling the calyx, somewhat oblique, the cells opening by 1 or 2 holes: seeds rugose-pitted. On bare hillsides, New Creek Mountains Oregon to the Sierra Nevadas in California.

4. *Kingii* Watson Bot. King 215 t. 21. Nearly glabrous throughout puberulent or even woolly at base: stem slender, 6-18 inches high, from annual root, simple or branched, often bearing prehensile branchlets above: leaves from oblong to lanceolate or linear, attenuate to a short petiole, 6-12 lines long, alternate or the lower ones often opposite: pedicels 1-3 lines long: calyx-segments unequal, the posterior one oblong, obtuse, nearly enclosing the corolla, the rest oblong, acute, a half shorter: corolla dull white, 3-4 lines long the upper lip 2-lobed: capsule globose, 1-2 lines in diameter, somewhat oblique, terminated by the short straight and very slender style: seeds deeply reticulated. Eastern Oregon to Nevada and Utah.

Tribe 3 *Chelonæ* Benth, in DC. Prodr. x. 188. Herbs with at least the lower leaves opposite and normally compound inflorescence. Corolla more or less bilabiate and tubular, not saccate or otherwise produced at base anteriorly. Antheriferous stamens 4, and rudimentary of the fifth commonly present. Capsule dehiscent by valves.

4 COLLINSIA Nutt. Journ. Acad. Phil. i, 190 t. 9. 1817.

Low annual herbs with opposite or verticillate, leaves and blue pink or variegated flowers verticillate or solitary on ebracteate simple pedicels in the axils of the upper leaves. Calyx campanulate, 5-cleft. Corolla irregular, gibbous or saccate on the upper side: the tube short and the limb deeply bilabiate: the upper lip 5-cleft, the lobes erect or recurved; lower lip larger, 3-lobed the lateral lobes spreading or drooping, the middle one conduplicate into a keel-like sack and enclosing the 4, declined stamens and the inferior style. Filaments filiform, the lower pair inserted higher than the corolla than the others, the fifth represented by a gland at the base of the corolla on the upper side. Anthers round-reniform 2 cells confluent into one at the apex. Ovules few in the ovary. Capsule ovate or globose, at first septicial; the valves 2-celled in the middle. Seeds amphitropous and peltate, concave laterally.

Peduncles deflexed in fruit: seeds terete or nearly so, not margined.

4. *grandiflora* Dougl. Lindl. Bot. Reg. t. 1107. Glabrate or minutely pubescent: stem rather weak, 6-12 inches long sparingly branched from the base: lower leaves orbicular to obovate or oblong, on slender petioles, blade 4-6 lines long, often coarsely toothed; upper ones spatulate or ovate to lanceolate or linear, 10-18 lines long, sessile or short-petioled, marginally and obscurely dentate, usually 3 or 4 in a whorl: peduncles slender, in fruit an inch or more long and reflexed, usually only 2 or 4, often one and opposite a branch: calyx-lobes lanceolate-subulate, about two lines long, longer than the campanulate tube, very acute: corolla about 6 lines long, strongly declined, the throat a little longer than the lobes, each nearly white, as broad as long; upper lip light blue, middle lobe of

the lower lip purple, the others dark blue: gland very small, slightly stipitate: seeds not wing-margined. On gravelly banks and open places along the Columbia and Willamette rivers in Oregon and Washington.

C. parviflora Dougl. Lindl. Bot. Reg. t. 1802. Glabrous or minutely puberulent: stem slender and weak 2-20 inches long, branching from near the base; the branches weak and straggling: leaves oblong to lanceolate, 6-12 lines long the lower ones opposite and rather long petioled; the upper ones in whorls of 3-5 and sessile or nearly so, all entire or sparsely toothed: peduncles solitary, or above 3-5 in the whorls, 6-18 lines long reflexed in fruit: calyx-lobes triangular-subulate, very acute, a line or more long: corolla blue and white, 3-4 lines long, the throat about as long as the lips, not very strongly saccate: gland small, capitate, short-stipitate: capsule globose, a little shorter than the calyx: seeds thickish, not margined. Common in moist places, Brit. Columbia to California, Arizona and Michigan.

C. Torreyi Gray Proc. Am. Acad. vii, 378. Viscid-glandular: stem slender, 2-4 inches high, divergently branched: leaves thickish, the lower ones orbicular to oblong, the blade 4-6 lines long, on petioles as long as the blade: upper ones oblong to linear, 8-12 lines long, short-petioled; the uppermost ones reduced to subulate bracts: flowers numerous, on slender peduncles 6-8 lines long: calyx about 2 lines long, cleft to the middle, the lobes broadly subulate and acute: corolla blue and white; the lips as long as the tube and strongly saccate throat: peduncles reflexed in fruit: capsule ovoid, about equalling the calyx: seeds oblong, nearly terete. In open places in the higher parts of the Siskiyou and Sierra Nevada Mountains.

* * Peduncles erect in fruit: seeds meniscoidal, acute-margined.

C. multiflora. Scurfy-puberulent: stem erect, with rather numerous ascending or spreading branches, 6-12 inches high: lower leaves obovate to spatulate, petioled; those of the middle of the stem and branches linear-oblong, sessile, 12-18 lines long; the uppermost ones reduced to small linear-lanceolate or almost filiform bracts: flowers only in the upper axilla, very numerous, in dense whorls: peduncles filiform, 4-10 lines long, erect in fruit: calyx-lobes triangular subulate, very acute, about 2 lines long, nearly thrice as long as the campanulate tube: corolla about 6 lines long, the throat saccate at base, light blue; the lips blue and white. In damp places, Willamette Valley, Oregon.

C. pusilla. *C. grandiflora* var. *pusilla* Gray. Stem 2-6 inches high, sparingly branched below: lower leaves orbicular to obovate or spatulate, petioled, entire or coarsely toothed; upper ones oblong, 6-12 lines long, sessile: flowers numerous, in the upper axilla only; peduncles 4-6 lines long, calyx-lobes acuminate-triangular, longer than the tube: corolla 3-4 lines long, blue and violet, the throat saccate and as broad as long. In open places, Brit. Columbia to California, west of the Cascade Mountains.

C. sparsiflora F. & M. Ind. Sem. Petrop. ii, 33, 1835. Glabrous throughout: stem slender, simple or sparingly branched from the base, 4-10 inches high: lower leaves orbicular to oblong, petioled; upper ones oblong to lanceolate, sessile, 4-8 lines long, all opposite and more or less toothed or entire: peduncles usually solitary, in the axils of the upper leaves, 6-12 lines long, erect in fruit: calyx-lobes linear, acute, slightly unequal, longer than the capsule: corolla 4-6 lines long, violet, the saccate throat very oblique but not transverse; lower lip but little if any longer than the upper: filaments hirsute below: gland sessile, elongated-subulate: seeds acute-margined or narrowly winged. In moist or wet rocky places, Oregon to California.

C. glandulosa. Glandular-puberulent above; somewhat cinereous below: stem stoutish, erect, sparingly branched above, 6-10 inches high: lowest pair of leaves spatulate, 6-8 lines long, short-petioled; upper ones

linear or narrow, entire, only the lower ones usually solitary: calyx-lobes triangular, obtuse: capsule obovoid, in wet places abundant.

C. Rattani A. very minute, stem erect, 6-18 inches high, the blade 4-6 lines long, sessile by the base: pedicels a line or more long: calyx-lobes broadly triangular, 3-4 lines long, or two long: capsule only 2 lines long, meniscoidal, slightly winged. California.

C. linearis A. high, paniculate stem, the inflorescence densely branched: calyx-lobes 4-6 lines long, cleft to the middle: corolla much deeper than the tube: white lips longer than the tube: gland filiform-subulate, in dry open places.

5 TO. Small annual plant, filiform axillary, persistent. Corolla less unequal than the tube: enclosing the throat anteriorly. Inflorescence: corolla-tube. Gland globose, septate, the ventral face anteriorly.

T. collinsii A. nearly glabrous stem, 12 inches long, deeply 3-5-lobed: the others short and entire, many-lobed divisions shorter than the tube: equal length, larger than the corolla: deeper sinuses: the calyx. Common.

T. floribunda A. stem stout and erect, mostly simple: leaflets lanceolate, elongated racemously.

linear or narrower, 1-2 inches long, coarsely toothed or subpinnatifid to entire, only the uppermost in whorls of 3-4; peduncles 6-8 lines long, erect, usually solitary; calyx about 3 lines long, cleft to the middle; the lobes triangular, obtusish; corolla 4-5 lines long, violet; the lips about 2 lines long; capsule ovoid, hardly as long as the calyx; seeds narrowly winged. In wet places about Cold Camp, eastern Oregon.

C. Rattani Gray Proc. Am. Acad. xx, 50. Somewhat cinereous with a very minute pubescence below, glandular above; stem slender, strictly erect, 6-18 inches high, sparingly branched above; lower leaves spatulate, the blade 4-6 lines long, slender-petioled; upper ones linear to almost filiform, sessile by a broad base, entire, opposite or in whorls of 3-6, 1-2 inches long; pedicels about 6 lines long, erect, solitary or 3-6 in the upper whorls; calyx-lobes broadly lanceolate rather obtuse, about as long as the tube; corolla 3-4 lines long, violet and white, but little declined; the lips only a line or two long, the upper one with a double callosity; gland subulate; ovules only 2 in each cell; capsule globular, equalling the calyx; seeds hemispherical, slightly wing-margined. On dry open hillsides, Washington to California.

C. linearis Gray l. c. Minutely puberulent; stem slender, 6-12 inches high, paniculately branched above; leaves all linear, 1-3 inches long, those of the inflorescence reduced to filiform bracts; all entire or the lowest ones obscurely dentate; pedicels slender, erect, 4-6 lines long; calyx less than 3 lines long, cleft to below the middle, the lobes triangular-lanceolate, acute; corolla much declined, gibbous-saccate, 6-8 lines long, the light blue and white lips longer than the tube and throat; upper lip with a 2-lobed callus; gland filiform-subulate; ovules 3 in each cell; seeds very slightly margined. In dry open places, southern Oregon to California.

5 TONELLA Nutt. Gray Proc. Am. Acad. vii, 378. Small annual herbs with opposite leaves and small flowers on filiform axillary naked peduncles. Calyx campanulate, 5-lobed, persistent. Corolla little declined, obscurely bilabiate, the 5 more or less unequal lobes somewhat rotately spreading, the lower not enclosing the soon ascending stamens: the tube slightly gibbous posteriorly. Filaments filiform the lower pair inserted on the corolla-tube. Ovules and seeds 1 or 2 in each cell. Capsule subglobose, septicidally dehiscent. Seeds ovate, convex on the back; the ventral face concave.

T. collinsioides Nutt. Mss. *T. tenella* Benth. in DC. Prodr. x, 293. Nearly glabrous; stem weak and filiform, diffusely branched from the base, 6-12 inches long; lower leaves round or reniform in outline more or less deeply 3-5-lobed or trifoliolate, on slender petioles longer than the blade, the others short-petioled or sessile, ovate to lanceolate, coarsely toothed to entire, many of them 3-parted or else quite divided into oblong or lanceolate divisions or leaflets; the uppermost in whorls of three, simple and shorter than the long filiform pedicels; corolla blue, a line long, its 5 lobes of equal length, the lower one transversely oval or roundish very much larger than the oblong lateral and upper ones and separated from them by deeper sinuses; ovules solitary in the cells; capsule globose, longer than the calyx. Common in shady places, Brit. Columbia to California.

T. floribunda Gray Proc. Am. Acad. vii, 378. Glabrous throughout; stem stout erect, 3-20 inches high, paniculately branched; lower leaves ovate mostly simple, on slender petioles; most of the cauline 3-5-foliolate, the leaflets lanceolate to linear, 1-2 inches long; whorls numerous, in loose elongated racemes each of 3-10 flowers; calyx 2 lines long its subulate

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lobes longer than the tube, acute, minutely serrulate: corolla rotate, 3-4 lines broad, much exceeding the calyx, blue and white, the three lobes of the lower lip obovate and nearly alike, smaller than those of the 2-cleft upper lip: ovules and seeds 3 or 4 in each cell. In copses, eastern Washington to Idaho and Oregon.

6 SCROPHULARIA Tourn. L. Sp. 619.

Coarse perennial herbs, some exctic species shrubby, with mostly opposite leaves and small purple, greenish or yellow flowers in terminal paniced cymes. Calyx 5-parted or 5-cleft, the lobes mostly obtuse, imbricated in the bud. Corolla irregular, the tube globose to oblong, not gibbous nor spurred at the base; the limb 5-lobed, four of them erect, the fifth or anterior one shortest and reflexed or spreading: the upper pair largest and external in the bud. Anthers 5, four of them antheriferous and declined, mostly included: cells of the anthers confluent at the apex into one; the fifth stamen reduced to a scale on the upper side of the corolla-tube. Style filiform, with capitate or truncate stigma. Capsule ovoid septically dehiscent. Seeds numerous, rugose, not winged.

S. Californica Cham. Linn. ii, 585. Minutely puberulent and the inflorescence glandular: stems stout, 2-4 feet high simple: leaves oblong ovate with truncate or cordate base and acute or acuminate apex, or the upper narrowly deltoid, coarsely doubly serrate, or sometimes lacinate-incised, 2-4 inches long, the lower ones smaller and sometimes with a pair of detached lobelets near the summit of the petiole: thyrsus very loose and often few-flowered, mainly naked: pedicels slender, 8-20 lines long: calyx cleft nearly to the base, the ovate lobes 1-2 lines long, corolla greenish-purple, its ovoid tube 3-4 lines long, the limb short: rudiment of the fifth stamen spatulate or cuneiform either roundish or acutish at base: capsule ovoid 3-4 lines in diameter. Moist grounds. Siskiyou Mountains of Oregon to California and Nevada

S. occidentalis Bicknell Bull. Torr. Bot Club xxiii, 315. *S. nodosa* var. *occidentalis* Rydb. More or less soft-pubescent and glandular: stems stout, 3-5 feet high: leaves ovate or slightly cordate at base, acute or acuminate, 2-8 inches long, doubly and sharply serrate or incised, often with fascicles of smaller leaves in their axils: thyrsus with short branches: flowers numerous: calyx-segments rounded-elliptical, obtuse, slightly margined: sterile filament very broad, reniform, stipitate. In alluvial soil Oregon and Washington to Dakota.

S. Marylandica L. Sp. 619?. Glabrous below, somewhat glandular puberulent above: stems slender, erect, 3-10 feet high, usually with widely spreading branches: leaves membranaceous, slender-petioled, ovate or ovate-lanceolate, acuminate at the apex, sharply serrate, narrowed truncate or subcordate at base, 3-12 inches long: flowers greenish-purple, 3-4 lines long, very numerous in the nearly leafless thyrsus: pedicels slender ascending, 4-12 lines long: calyx-lobes broadly ovate, obtuse, about the length of the tube: corolla green and dull outside, brownish-purple and shining within, little contracted at the throat, the 2 lateral lobes slightly spreading; the upper lip erect, its lobes short and rounded: sterile filament dull purple: capsule subglobose with a slender tip. In woods and thickets Oregon and Washington to the Eastern States.

7 CHELONE L. Sp. 611. (1753.)

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purple flowers in dense terminal and axillary spikes or thyrsoid panicles. Calyx 5-parted, bracted at the base, the segments ovate or lanceolate. Corolla irregular, the tube elongated, enlarged above, the limb bilabiate: upper lip concave, emarginate or entire, exterior in the bud: lower lip spreading, 3-lobed. Stamens 5, included, 4 of them antheriferous, didynamous, the fifth sterile and smaller: filaments slender: anthers cordate, woolly. Style filiform: stigma small, capitate. Capsule ovoid, septicidally dehiscent. Seeds numerous, compressed, winged.

C. nemorosa Dougl. Lindl Bot. Reg. t. 1211. Glabrous except the inflorescence which is glandular-pubescent: stems 1-4 feet high, usually simple: leaves ovate to lanceolate, 2-4 inches long, irregularly serrate, acute or acuminate, often subcordate, on very short petioles: flowers pedicelled, in a loose terminal panicle: bracts and sepals pubescent, lanceolate, acuminate, the latter 3-4 lines long: no bractlets under the calyx: corolla violet-purple, 12-16 lines long, with wide open mouth, very short 2-cleft and not at all fornicate upper lip and 3-lobed spreading lower one, the lobes broad and rounded, the ample throat glabrous: antheriferous filaments glabrous, the sterile one slender-subulate and bearded on the upper side near the apex: anthers densely woolly: capsule ovoid, half inch long or more. On rocky banks along mountain streams, Brit. Columbia to California.

8 PENTSTEMON Soland. in Ait. Hort. Kew. iii, 511. (1789.)

Perennial herbs with opposite leaves and purple, blue white, red or yellow flowers in terminal thyrses panicles or racemes. Calyx 5-parted, the segments imbricated. Corolla irregular, with ample throat, not gibbous anteriorly, and bilabiate limb: the upper lip 2-lobed; the lower one 3-lobed. Stamens 5, not exserted, 4 of them antheriferous and didynamous, the other sterile and as long as or shorter than the others. Anther-cells either united or confluent at the apex. Style filiform, with small entire stigma. Seeds numerous, angled but not winged.

§ 1 EUPENTSTEMON Gray Proc. Am. Acad. vi, 57. Anther-cells soon divaricate or divergent, united and often confluent at the apex, dehiscent for nearly or quite their whole length.

* Low and suffruticose with coriaceous leaves: anthers densely woolly with long soft hairs, at length peltately explanate.

P. Lewisii Benth. in DC. Prodr. x, 321. (1846.) *P. Menziesii* Gray part, *Gerardia fruticosa* Pursh. Fl. 423 (1814.) Glabrous or more or less cinereous: a tufted shrub 1-2 feet high with lateral leafy branches, the central ones bearing peduncled racemes: leaves thick, ovate or obovate to long, 6-12 lines long, serrate, the lower short-petioled: inflorescence racemes; the peduncles almost all 1-flowered: sepals lanceolate, often acuminate: corolla lilac-purple, an inch or more long, tubular-funnelform and moderately bilabiate: stamens rather deeply included: sterile filament long and glabrous. Arid mountain tops, eastern Washington to Brit. Columbia and Montana.

P. Menziesii Hook. Fl. ii, 98. Glabrous or more or less pubescent: low densely matted prostrate shrub with lateral leafy branches, part of which bear erect flowering shoots 2-6 inches high: leaves thick, 3-10 lines

long, obovate, more or less dentate, most of them petioled: flowering stems 1-6 inches long, bearing several pairs of orbicular or oblong leaf-like bracts: pedicels slender: sepals lanceolate, acute, about 4 lines long: corolla purple, tubular-funnelform, an inch or more long, moderately bilabiate; the lower lip bearded within: stamens included: sterile filament densely bearded. On rocks and volcanic sands, Erit. Columbia to California.

P. Davidsonii Greene Pitt. ii, 241 A low semiherbaceous undershrub, the proper stems horizontal and rooting at the joints, usually intricately branched: flowering, and ascending sterile stems 1-3 inches long, very leafy: leaves fleshy, from oblong or obovate to orbicular, entire, 3-4 lines long, short-petioled, glabrous both sides; peduncles leafy-bracted, glandular-hairy, 1-4-flowered: sepals ovate to lanceolate, often acuminate, 3-4 lines long: corolla an inch long, lilac-purple, ventricose from the tip of the sepals, the lobes rather short and not very unequal; the lower lip woolly within: sterile filament less than half as long as the others, strongly bearded at and near the apex. On the highest peaks of the Cascade and Sierra Nevada Mountains.

P. Lyallii Gray Syn. Fl. Supp. 440. Puberulent or nearly glabrous up to the racemiform inflorescence: flowering stems 2 feet high, herbaceous (the base unknown): leaves elongated-linear or linear-lanceolate, 3-4 inches long, 2-4 lines wide, sparingly serrulate: sepals linear-lanceolate and attenuate-acuminate: corolla purple, inch and a half long: sterile filament glabrous. On cliffs of Lake Pend d'Oreille Idaho to Montana and Brit. Columbia.

P. rupicola. *P. Newberryi* var. *rupicola* Piper Bull. Torr. Club. xxix, 397. A much branched densely caespitose decumbent shrub, 3-4 inches high: pilose-puberulent below, the inflorescence glandular-viscid: leaves ovate or orbicular, more or less dentate, glaucous with a persistent bloom thick, not turning black in drying, 3-5 lines long: flowers 3-6, in a rather close corymb: sepals ovate, acute, ciliate-glandular, about 3 lines long: corolla about inch and a half long, bright rose-crimson, naked in the throat, decidedly ventricose, somewhat bilabiate, the lobes oblong, obtuse: sterile filament short and glabrous. Dry cliffs, Mount Rainier Washington.

P. Douglasii Hook. Fl. ii, 98. Stems woody and much branched at base, 4-8 inches long, leaves ovate-lanceolate or ovate-oblong, 6-18 lines long, entire: inflorescence glandular-pubescent, racemose, the pedicels almost all 1-flowered, usually 1-2-bracteolate: sepals ovate-lanceolate, attenuate-acuminate: corolla lilac-purple with pink base, an inch or more long: tubular-funnelform and moderately bilabiate: sterile filament short and slender. On rocks, interior of Oregon and Washington.

P. Scouleri Dougl. Lindl. Bot. Reg. t. 1377. Stems woody and much branched at base, 6-12 inches long: leaves lanceolate to linear-lanceolate, acute, 1-3 inches long, sparingly and acutely serrulate: inflorescence viscid-pubescent, racemose, the pedicels almost always all 1-flowered: sepals ovate-lanceolate or narrower, attenuate-acuminate, corolla one and a half inches long, violet-purple, tubular-funnelform and moderately bilabiate: sterile filament short and slender. On rocks and mountain tops, interior of Oregon and Washington.

P. Cardwellii. Glabrous throughout or the inflorescence minutely puberulent: stems woody at base, declined or ascending, 6-10 inches long, leaves thick, not shining, lanceolate to ovate, 6-12 lines long, incisely serrate, all narrowed at base: peduncles mostly 1-flowered and 2-bracteolate: sepals narrow-lanceolate, 4-5 lines long, longer than the tube of the corolla: obtuse: corolla purple, 1-1½ inches long, tubular-funnelform, with short tube, ample throat and moderately bilabiate limb; the throat woolly with white hairs on the lower side; upper lip of 2 rounded lobes, the lower of 3 oblong

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P. Adamsianus. Glabrous except the inflorescence: stems shrubby and much branched at base, 4-10 inches high, the numerous short branches densely leafy: leaves thick, dark green, very smooth and shining, oblong or lanceolate to obovate, 6-18 lines long, entire or sparsely and sharply serrate above the middle, attenuate below to a short and broad petiole, or those of the flowering stems sessile: inflorescence racemose, glandular with small stipitate glands: peduncles mostly 1-flowered, 2-6 lines long: sepals broadly ovate, acuminate, about 2 lines long: corolla less than an inch long, dark purple, tubular-funnelform, with broad tube longer than the calyx, ample throat nearly as broad as long, and strongly bilabiate limb, the lower lip woolly at base: sterile filament shorter than the others, bearded on the upper side nearly its whole length. On dry ridges of Mount Adams Washington.

P. Barrettae Gray Syn. Fl. Supp. 440. Glabrous throughout and very glaucous: stems stout and shrubby, about a foot high densely branched below: leaves ovate to oblong or lanceolate, 1-3 inches long very thick and leathery flowering branches or peduncles short, leafy up to the inflorescence: peduncles short, often 2-flowered: sepals oblong, more or less abruptly acuminate, 2 lines long, scarious-coriaceous: corolla lilac-purple, 1½ inches long, tubular-funnelform, with broad tube longer than the calyx, comparatively narrow throat and strongly bilabiate limb, woolly on the lower side within: sterile filament as long as the others, not bearded. On a bare rocky ridge above Hood River Oregon.

** Herbs with simple stems and closely sessile mostly very glabrous entire cauline leaves: inflorescence never glandular-pubescent or viscid: flowers showy: corolla blue or violet, ventricose-ampliate above: the lobes of the moderately or slightly bilabiate roundish and equally spreading: anthers with the diverging or divaricate and distinct cells dehiscent from the base nearly or quite to but not confluent through the apex, not petalately explanate after dehiscent, either glabrous, pilose or long-pilose.

P. glaber Pursh Fl. 728. Glabrous and glaucous or glaucescent: stem stout, 1-2 feet high: leaves obovate to spatulate, narrowed below into petioles, including the petiole 2-4 inches long; upper ones lanceolate to oblong or linear: thyrsus narrow, more or less secund, densely many-flowered, peduncles and pedicels short, commonly very short: sepals from bicircular-ovate and merely acute to ovate-lanceolate or strongly acuminate on a broad base, commonly with erose edges; corolla 1-1½ inches long, bright blue to violet-purple, rather abruptly expanded above the calyx: others from glabrous to sparsely hirsute, the cells dehiscent to or very near the apex: sterile filament shorter than the others and more or less bearded. On dry ridges, eastern Washington to California, S. Dakota and Arizona.

** Herbs, sometimes suffrutescent at base, with simple stems and mostly sessile cauline leaves: anthers glabrous, dehiscent from base to apex and through the junction of the 2 cells, open after dehiscent commonly completely 1-celled.

P. Dayanus. Glabrous below, pubescent above: stems rather slender, 18 inches high: lower leaves obovate to lanceolate or linear, laciniately lobed or entire, narrowed below to slender petioles as long or longer than the blades, including the petioles 2-4 inches long; cauline linear-lanceolate linear, gradually reduced upward to small bracts, all but the lowermost sessile and more or less clasping by a broad base, lanceolate or broader,

mostly entire: thyrsus interrupted, leafy below, the clusters several-flowered: peduncles and pedicels short: sepals lanceolate, gradually acuminate, very acute, about 3 lines long, conspicuously ciliate: corolla blue or purple, 8-10 lines long, funnelform, with a broad tube longer than the calyx, the abruptly enlarged throat, the lower lip bearded at base: sterile filament as long as the others, bearded with yellowish hairs. Hillsides and plains, Muddy Station, John Day Valley Oregon.

P. acuminatus Dougl. Lindl. Bot. Reg. t. 1285. Glabrous and more or less glaucous: stems stout, 6-20 inches high: leaves coriaceous, somewhat cartilaginous-margined, entire; radical and lowest cauline obovate or oblong, petioled; middle cauline lanceolate, 2-3 inches long; those subtending the flowers long-acuminate from a broadly ovate cordate-clasping base: thyrsus strict, leafy below, the clusters several-flowered: peduncles and pedicels mostly very short: sepals ovate and acute to lanceolate and acuminate, 3-5 lines long: corolla lilac or violet, 8-10 lines long, funnelform, the throat very gradually enlarged from the broad tube: sterile filament usually bearded at the enlarged apex: capsule firm-coriaceous, acute, longer than the calyx. Sandy plains, Brit. Columbia to eastern Oregon, Nevada, Nebraska and the Saskatchewan.

P. miser Gray Syn. Fl. Supp. 441. Pruinoso-pubescent and the inflorescence glandular-viscid but not villous: stems 10-18 inches high: radical leaves spatulate or obovate; cauline lanceolate, an inch or less long: sepals lanceolate, merely acute: corolla violet or bluish, only half inch long, rather tubular than funnelform, the throat little dilated: spreading lobes short; base of the lower lip moderately villous; sterile filament with dilated and curved tip hardly projecting from the throat densely yellow-bearded down one side. Along the Malheur river eastern Oregon.

P. prinosus Dougl. Lindl. Bot. Reg. t. 1280. Pruinoso-pubescent stems about a foot high: leaves from ovate to oblong, glaucescent, an inch or two long; the radical and lowest cauline and also uppermost cauline commonly entire; the others acutely and rigidly dentate or denticulate: thyrsus virgate, interrupted: peduncles and pedicels short, these and the lanceolate attenuate-acuminate sepals viscidly villous: lower lip of the deep blue corolla slightly hairy within. Interior of Oregon and Washington. Little known.

P. ovatus Dougl. Hook. Bot. Mag. t. 2903, puberulent or pubescent stems stout, 2-4 feet high: leaves ovate, the radical and lowest cauline slender-petioled, the others sessile, all with more or less cordate base and coarsely toothed, the blade 2-4 inches long, bright green: thyrsus paniculate, the lower peduncles often longer than the clusters: pedicels short: glandular: sepals ovate to lanceolate, acute or acuminate, about 2 lines long, more or less glandular: corolla bright blue, 8-10 lines long, tubular-funnelform, minutely hairy outside, moderately bilabiate, the lower lobes bearded at the base: sterile filament as long as the others and bearded at the apex: capsule ovoid, acuminate, longer than the calyx. On the banks of the Willamette river near Portland Oregon to Brit. Columbia and Idaho.

P. Whitteii Piper Bot. Gaz. xxi 490. puberulent below and glandular pubescent above: stems several from a lignescens base 8-12 inches high: radical leaves glabrous or sparingly puberulent, narrowly spatulate-lanceolate, acute, saliently dentate with large obtuse teeth, or rarely entire, nearly so, 2-4 inches long: cauline about 4 pairs, ovate-lanceolate, acute, entire or sparingly dentate, clasping at base: thyrsus virgate, interrupted: peduncles and pedicels short: sepals broadly lanceolate, acute, 3-4 lines long: corolla bright blue, bilabiate 7-10 lines long, glandular-pubescent on the side, the lobes puberulent within, throat sparsely bearded: sterile filament bearded on one side nearly its whole length with yellow hairs. On rocky soil, near Wenatche, eastern Washington.

P. attenuatus Dougl. Bot. Reg. t. 1285. Stems 10-18 inches high; the summit narrowly oblong, the lobes as long or longer than the calyx: corolla funnelform, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla bright blue, bilabiate 7-10 lines long, glandular-pubescent on the side, the lobes puberulent within, throat sparsely bearded: sterile filament bearded on one side nearly its whole length with yellow hairs. On rocky soil, near Wenatche, eastern Washington.

P. confertus Dougl. Bot. Reg. t. 1285. Stems 10-18 inches high: leaves narrow-ovate, the middle cauline lanceolate, the others ovate, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla very narrow, bilabiate 7-10 lines long, glandular-pubescent within: sterile filament as long as the others: capsule acuminate. Oregon to Brit. Columbia.

Var. globosus Dougl. Bot. Reg. t. 1285. Stems 10-18 inches high: leaves narrow-ovate, the middle cauline lanceolate, the others ovate, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla very narrow, bilabiate 7-10 lines long, glandular-pubescent within: sterile filament as long as the others: capsule acuminate. Oregon to Brit. Columbia.

P. procerus Dougl. Bot. Reg. t. 1285. Stems 10-18 inches high: leaves narrow-ovate, the middle cauline lanceolate, the others ovate, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla very narrow, bilabiate 7-10 lines long, glandular-pubescent within: sterile filament as long as the others: capsule acuminate. Oregon to Brit. Columbia.

P. pulchellus Dougl. Bot. Reg. t. 1285. Stems 10-18 inches high: leaves narrow-ovate, the middle cauline lanceolate, the others ovate, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla very narrow, bilabiate 7-10 lines long, glandular-pubescent within: sterile filament as long as the others: capsule acuminate. Oregon to Brit. Columbia.

P. paniculatus Dougl. Bot. Reg. t. 1285. Stems 10-18 inches high: leaves narrow-ovate, the middle cauline lanceolate, the others ovate, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla very narrow, bilabiate 7-10 lines long, glandular-pubescent within: sterile filament as long as the others: capsule acuminate. Oregon to Brit. Columbia.

P. humilis Nutt. Bot. Beechey. p. 107. Stems 10-18 inches high: leaves narrow-ovate, the middle cauline lanceolate, the others ovate, interrupted: peduncles and pedicels very short: sepals lanceolate, acute, 3-4 lines long: corolla very narrow, bilabiate 7-10 lines long, glandular-pubescent within: sterile filament as long as the others: capsule acuminate. Oregon to Brit. Columbia.

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P. attenuatus Dougl. Lindl. Bot. Reg. t. 1295. Stems straggling, 1-2 feet high; the summit and inflorescence pubescent and viscid: lower leaves narrowly oblong or ovate to lanceolate, the blade 6-18 lines long; on petioles as long or longer; the upper linear to ovate-lanceolate, sessile: thyrsus spiciform, interrupted, the peduncles and pedicels short: sepals ovate or oblong-lanceolate, acute or acuminate, 2-3 lines long, narrowly scarious-margined: corolla narrowly funnelform, 8-11 lines long, blue, ochroleucous: sterile filament bearded at the apex. Interior of Oregon to Idaho.

P. confertus Dougl. Lindl. Bot. Reg. t. 1260. Glabrous throughout: the inflorescence sometimes pubescent or puberulent: stems slender, 20 inches high: lower leaves narrow-lanceolate, attenuate below to narrow petioles, including the petiole 1-2 inches long, mostly entire; the middle cauline largest, lanceolate, sessile by a broad base: thyrsus spiciform, interrupted, of 2-5 verticillastriform dense many-flowered clusters: pedicels very short: sepals from oblong-lanceolate to broadly ovate, acute or acuminate, with broad scarious margins commonly erose or lacerate: corolla very narrow, 4-6 lines long, yellow, lower lip conspicuously bearded within: sterile filament shorter than the others, dilated at the summit: panicle acuminate-ovoid, longer than the calyx. Prairies of eastern Oregon to Brit. Columbia and the Rocky Mountains.

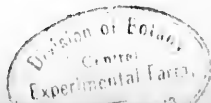
Var. globosus Piper Bull. Torr. Club xxvii, 397. Inflorescence a dense head-like panicle of many short-pedicelled flowers, rarely with a second verticillate cluster below: corolla intense blue, nearly an inch long. Allowa Mountains, eastern Oregon.

P. procerus Dougl. ex Graham in Edinb. Phil. Jour. 1829. *P. confertus* var. *caeruleo-purpureus* Gray. Glabrous throughout: stems slender, 2-12 inches high: leaves lanceolate, the lower ones petioled, 1-2 inches long, those of the middle of the stem largest, all usually entire: flowers in about 2 dense verticillate clusters: sepals oblong or spatulate, with broad scarious erose margins, abruptly acuminate or 3-toothed at the apex, about 6 lines long: corolla bright blue and violet, about 8 lines long, tubular-funnelform, the lower lip bearded within: sterile filament as long as the others and bearded at the apex. On high mountains and plains, Brit. Columbia to California and the Rocky Mountains.

P. pulchellus Greene Pitt. iii, 310. Green and glabrous throughout: flowering stems slender, from a much branched woody base with numerous short sterile branches, 2-6 inches high: leaves coriaceous, entire, the lower ones from ovate to oblanceolate, 6-12 lines long including the slender petiole; those of the stem 2-3 pairs, oblong or lanceolate-oblong, sessile: thyrsus short and interrupted: flowers numerous, on very short pedicels: sepals obovate, abruptly acute, with scarious more or less erose margins: corolla bright blue to purple, about 6 lines long, with narrow throat and abruptly spreading limb, the throat sparsely hairy inside. On alpine summits of the Cascade and Blue Mountains of Oregon and Washington.

P. paniculatus. Glabrous throughout: stems stout, very numerous, bushy below, forming loose bushy clumps, 1-2 feet high: leaves linear-lanceolate, entire or sparsely dentate, all nearly alike, 1-2 inches long, 3-4 lines wide, only the uppermost ones sessile: flowers very numerous, in open thyrsoid leafy panicles: pedicels short: sepals ovate or oblong to lanceolate, acute or acuminate, with narrow scarious margins, 3-4 lines long: corolla ochroleucous, 5-6 lines long, tubular, the limb scarcely spreading, puberulent outside, the lower lip bearded within: sterile filament longer than the others, bearded at the apex. On the high ridge between Klickitat Valley and the Columbia river, opposite The Dalles Oregon.

P. humilis Nutt. Gray Proc. Am. Acad. vi, 69. Minutely puberulent



below, the inflorescence more or less viscid-pubescent: stems numerous from the woody base, 3-10 inches high: very leafy: leaves about an inch long, the lower ones spatulate or oblanceolate, short-petioled, somewhat glaucescent, the upper ones oblong or linear-oblong, sessile and somewhat clasping, all entire or sometimes somewhat serrulate: thyrsus strict and virgate, 2-4 inches long: peduncles short 1-5-flowered: sepals, ovate or lanceolate and acuminate lax, about 3 lines long: corolla deep blue or partly white, 6-8 lines long, tubular-funnelform, bilabiate, the lower lip somewhat hairy within: sterile filament bearded with yellow hairs: On Dry ridges, eastern Oregon to Nevada and the Rocky Mountains.

P. stenosepalus. *P. glaucus* var. *stenosepalus* Gray. Glabrous or more or less rough-pubescent below, the inflorescence villous-pubescent and viscid: stems $\frac{1}{2}$ to 2 feet high: lower leaves ovate or oblanceolate to linear spatulate, mostly dentate, including the petiole 1-4 inches long: upper ones lanceolate with broad clasping base: thyrsus small and glomerate: sepals attenuate-lanceolate, 3-4 lines long: corolla dull whitish to lurid purple or blue, 10-12 lines long, campanulate-ventricose above the very short proper tube, the mouth widely spreading, the broad lower lip sparsely bearded within: sterile filament bearded near the apex. Plains of eastern Oregon to Nevada and the Rocky Mountains.

P. Rattan Gray Syn. Fl. Supp. 441. Glabrous: stems 1-3 feet high: leaves membranaceous, broadly lanceolate, 3-8 inches long finely dentate, radical and lowest cauline attenuate at base into margined petioles, the others half clasping by subcordate base: inflorescence glandular-pubescent, cymes from the lower axils long-peduncled, upper short-peduncled or sessile: pedicels short or hardly any: sepals oblong-lanceolate, acuminate, soft-membranaceous, loose, 4 lines long: corolla pale purple, an inch long, funnelform, with short tube and campanulate throat, distinctly bilabiate, lower lip villous-bearded within: sterile filament at length exserted, bearded at the apex. In open forest, Siskiyou mountains of Oregon and California: also reported from Idaho.

Var. minor Gray l. c. slender, with oblong leaves only an inch or two long, obscurely denticulate: thyrsus simple: flowers one-half smaller: sepals attenuate: corolla 6-7 lines long. With the type.

P. deustus Dougl. Lindl. Bot. Reg. t. 1318. Completely glabrous, the calyx at most glandular: stems slender, 1-2 feet high, numerous from a woody base, strict: leaves thickish, from ovate to oblong-linear or lanceolate, 1-2 inches long, regularly and rigidly dentate or acutely serrate or some of them entire; the upper cauline closely sessile: thyrsus virgate or more paniculate, mostly many-flowered: pedicels short: sepals from ovate to lanceolate or subulate, nearly marginless, acute, 2-3 lines long: corolla ochroleucous or dull white, sometimes partly blue, minutely pubescent, 4-8 lines long, either narrowly or rather broadly funnelform, the short lobes widely spreading: sterile filament glabrous, or rarely exserted and sparsely bearded. On gravelly banks in the dry interior region, Brit. Columbia to California, Nevada and Montana.

P. Gardneri Hook. Fl. ii, 99. Cinereous-puberulent: stems rigid, 2-10 inches high, tufted on the stout shrubby base: leaves linear or the lower more or less spatulate, 6-12 lines long, all usually sessile, the upper ones mostly alternate: thyrsus short: peduncles short and mostly alternate, usually 1-flowered: sepals oblong-ovate to lanceolate, acute or acuminate, 3-4 lines long: corolla 6-10 lines long, dark blue or purple, narrow funnelform, sterile filament bearded on one side. On high rocky ridges eastern Washington and Oregon to Nevada.

Var. hians Piper Bull. Torr. Club xxvii, 396. Sepals larger: corolla larger and more spreading. Northwestern Washington.

P. Oregonulent and the branched wood lowest ones linear opposite: thyrsus sepals oblong-linear little funnelform spreading: sterile filament southeastern O

P. laticifol inches high: lower, when dry margins revolute and scattered of slender pedicels 6 lines long, the bearded on the

§ 2 **SACCA** perennials, so the apex, and down both sides: saccate: some

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P. diffusus perulent: stems ovate to oblong- sometimes lacinate and leaf acuminate, soon violet, funnelform glabrous: sterile filament of the Ca

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P. Oreganus. *P. Gairdneri* var. *Oreganus* Gray. Cinereous-puberulent and the inflorescence glandular: stems numerous from a much branched woody base, very slender, 4-8 inches high: leaves linear cuneate, the lower ones linear-spatulate, about an inch long by a line or less wide, all opposite: thyrsus very narrow and loose: the peduncles mostly 1-flowered: sepals oblong-lanceolate, acute, about 2 lines long: corolla tubular or but little funnellform, 8-10 lines long, obscurely bilabiate and the lips but little spreading: sterile filament bearded on the upper side. On dry ridges, southeastern Oregon.

P. laticifolius H. & A. Bot. Beech. 376. Glabrous: stems tufted, 2-5 inches high: lignescens caudex not rising above the soil: leaves very slender, when dry filiform, the larger a fourth of a line wide, and with the margins revolute, an inch or less long, much crowded in subradical tufts and scattered on the filiform flowering stems: flowers few, loosely racemose, slender-pedicelled: sepals ovate-lanceolate: corolla tubular-funnelform, 6 lines long, the small purple limb obscurely bilabiate: sterile filament bearded on the upper side. Interior of Oregon to Wyoming.

§ 2 **SACCANTHERA** Benth. Bot. Mag. t. 3391. Herbaceous perennials, some woolly at base, mostly with ample and showy flowers. Anthers sagittate or horseshoe-shaped: the cells confluent at the apex, and there dehiscent by a continuous cleft, which extends down both sides only to the middle: the base remaining closed and saccate: sometimes hirsute never lanate.

P. glandulosus Lindl. Bot. Reg. t. 1262. Soft-pubescent and viscid: stems rather stout 2-3 feet high: leaves broad and thinnish, the lower ones from ovate to oblong, 6-8 inches long, dentate: upper ones from ovate-lanceolate and acuminate, to cordate-clasping, usually denticulate: thyrsus contracted and interrupted, leafy below: cymes short-pedunculate, few-several flowered: sepals attenuate-lanceolate, lax, 6-8 lines long: corolla 1-1½ inches long, with funnellform inflated throat and broad spreading lips: sterile filament glabrous. On moist prairies eastern Oregon to Washington and Idaho.

P. venustus Dougl. Lindl. Bot. Reg. t. 1309. Very glabrous: stems rather strict and simple, 1-2 feet high, leafy: leaves thickish in texture, oblong-lanceolate or the upper ovate-lanceolate, closely and subulately serrate, about 2 inches long: thyrsus naked, mostly narrow: peduncles 2-3-flowered: sepals ovate, acute or acuminate, only a line or 2 long, much shorter than the narrow proper tube of the corolla: upper part of the fertile filaments and of the sterile one (as also usually anthers and lobes of the corolla within), sparingly pilose. Eastern Oregon to Idaho.

P. diffusus Dougl. Lindl. Bot. Reg. t. 1132. Glabrous or merely puberulent: stems numerous, diffuse, 10-18 inches high: leaves thin, from ovate to oblong-lanceolate or the upper subcordate, sharply and unequally, sometimes laciniately, serrate, 1-4 inches long: thyrsus commonly interrupted and leafy: pedicels mostly shorter than the ovate or lanceolate and acuminate, sometimes laciniate-toothed sepals: corolla 8-12 lines long, violet, funnellform, the lips widely spreading: anthers and inside of corolla glabrous: sterile filament more or less hairy above. On wooded rocky banks of the Cascade Mountains in Oregon to Brit. Columbia:

P. Richardsoni Dougl. Lindl. Bot. Reg. t. 1121. Glabrous throughout: stems very diffuse or decumbent, 6-18 inches long, simple or paniculately branched above: leaves from ovate to narrowly lanceolate in outline, and from entire or incisely toothed to laciniate-pinnatifid, 1-3 inches long, often alternate: thyrsus loosely paniced, the peduncles 2-flowered: sepals ovate to ovate-lanceolate, acute, about 2 lines long: corolla bright red to

purple, an inch long, funnelliform, with rather long tube and ample throat: stamens and inside of corolla glabrous, the sterile filament sometimes bearded at the apex: capsule ovoid, about twice as long as the calyx. On cliffs and rocky banks, Oregon and Washington.

P. triphyllus Dougl. Lindl. Bot. Reg. t. 1245. Stems slender about a foot high, usually simple: cauline leaves lanceolate or linear, an inch or more long, rigid, from denticulate to irregularly pinnatifid-laciniate: the upper sometimes ternately verticillate, sometimes alternate: thyrsus narrow, loosely paniculate: sepals lanceolate, acuminate: corolla comparatively small and narrow, 6-9 lines long: sterile filament densely bearded at the apex. Rocky banks, Oregon to Brit. Columbia.

P. gracilentus Gray Pac. R. Rep. vi, 83. Glabrous: stems slender, from a lignescens base, a foot or more high, rather few-leaved, naked above, terminating in loose and rather simple paniculate thyrsus: leaves glabrous and green, entire, lanceolate or the upper linear and the lower sometimes oblong, all narrowed at base: peduncles viscid-puberulent, 2-5-flowered, the lower elongated: pedicels short: corolla blue or violet, half-inch long, slender-funnelform, moderately bilabiate, its lobes only 2 lines long, moderately spreading: sterile filament slightly bearded. Mountains of southern Oregon and adjacent California.

P. Rezii Regel Act. Hort. Petrop, ii, 326. Smooth below, the inflorescence more or less pubescent and glandular: stems 10-18 inches high from a woody base: leaves all lanceolate or linear, or the lower oblanceolate, entire, 1-3 inches long: thyrsus either narrow, or more diffuse and paniculate with divergent branches: sepals ovate to lanceolate, about 2 lines long: corolla blue, 8-10 lines long, funnelliform, with rather long tube and campanulate throat, sterile filament glabrous. On gravelly banks of streams, southern Oregon and northern California.

P. cusickii Gray Proc. Am. Acad. xvi, 106. Pale and very minutely pruinose-puberulent: stems a foot or less high, many from a barely lignescens caudex, strict, equally leafy up to the racemiform loose thyrsus: leaves very narrowly linear, an inch or two long by a line or more wide, or some of the lower broader and spatulate: peduncles 1-2-flowered: sepals ovate, acuminate, glabrous, not glandular: corolla barely 9 lines long, bright blue with purple tube, a moderately enlarged throat and short lobes: sterile filament spatulate-dilated at the very tip: very glabrous. On the slopes of Eagle Creek Mountains, northeastern Oregon.

P. Kingii Watson Bot. King 223 Pruinose or glandular-pubescent, at least below, stems numerous from a shrubby base, ascending, 4-8 inches high: leaves oblanceolate, mostly acute, entire, sessile with a narrowed base, the lowermost somewhat spatulate and short-petioled, 1-2 inches long by 2-4 lines wide: thyrsus secund, short and rather leafy at base: peduncles 1-4-flowered: sepals ovate or oblong-lanceolate, more or less acuminate: corolla 8 lines long, purple, dilated upward, somewhat bilabiate: sterile filament flattened toward the apex, glabrous. In the mountains of eastern Oregon to Nevada.

P. azureus Benth. Pl. Hartw. 327. Glabrous and glaucous, rarely pruinose-puberulent: stems erect or ascending from a woody base, 1-3 feet high: leaves from narrowly- to ovate-lanceolate or even broader, the upper ones wider at base, the lowest more or less petioled, 1-2 inches long: thyrsus virgate, loose, usually elongated: sepals ovate or oblong, scarious-margined, with or without a conspicuous acumination, about 2 lines long: corolla 1-1½ inches long, azure-blue verging or changing to violet, the base sometimes red. Disk, broadly funnelliform, the expanded limb sometimes an inch in diameter:

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sterile filament glabrous. In open places in the Siskiyou Mountains of Oregon and California.

P. heterophyllus Lindl. Bot. Reg. t. 1890. Glabrous or pruinose-puberulent, scarcely glaucous: stems 1-2 feet high from a woody base, slender, often diffusely branched: leaves lanceolate or linear or only the lowest oblong-lanceolate, mostly narrowed at base, 1-4 inches long: corolla an inch or sometimes more long, with narrow tube rose-purple or pink, sometimes changing to violet, sterile filament glabrous. On rocky tops of the Siskiyou Mountains in Oregon to Nevada.

9 CHIONOPHILA Benth. in DC. Prodr. x, 351.

Dwarf perennial herbs with thickish opposite leaves and tubular flowers in simple spikes or racemes. Calyx funnelform, thin-membranaceous, becoming scarious, merely and obtusely 5-lobed. Corolla tubular, with slightly dilated throat and bilabiate limb: upper lip erect and slightly concave, barely 2-lobed, the sides somewhat recurved: lower with convex densely bearded base forming a palate, and 3-lobed, the short lobes, recurving. Antheriferous stamens 4, didynamous: anther-cells divaricate and confluent. Sterile filament small and short or even minute, naked. Style filiform: stigma minute entire. Capsule oblong enclosed in the marcescent calyx and corolla, loculicidally 2-valved the valves soon 2-parted: placental dissepiment flat. Seeds rather large, with a very loose and arilliform cellular-reticulated outer coat.

C. Tweedyi Henderson Bull. Torr. Club xxvii, 352. Dwarf perennial: glabrous or nearly so: leaves thickish, entire, mostly in a radical tuft spatulate or lanceolate, tapering below into a scarious-margined base: those of the 1-3 inches high flowering stems 1 or 2 pairs, or sometimes alternate, linear: flowers in a few-flowered raceme: calyx short and deeply lobed: corolla saccate at base dorsally, the lower lip strongly papillate. In the Mountains of Idaho and adjacent Washington.

Tribe 4 Gratiolæ Benth. in DC. Prodr. x, 189. Leaves opposite or verticillate only the upper ones alternate. Inflorescence simple and centripetal: the peduncles solitary in the axils of bracts or leaves and ebracteolate. Corolla from bilabiate to almost regular, not saccate or otherwise produced at base. Antheriferous stamens 2 or 4 no rudiments of the fifth.

10 DIPLACUS Nutt. in Taylor's Ann. Nat. Hist. i, 137.

Shrubs with opposite leaves and large yellow red or orange axillary flowers on solitary peduncles. Calyx tubular, 5-angled or 5-toothed, persistent. Corolla tubular, bilabiate, the upper lip 2-lobed, the lower 3-lobed, the lobes emarginate or variously toothed or cleft. Fertile stamens 4. Style slender with bilamellate stigma. Capsule linear-oblong, closely invested by the calyx and wholly inclosed in it; firm-coriaceous, with a woody tubercular enlargement at the apex, incompletely dehiscent, opening by the upper suture only, from the base to near the apex, the valves spreading into a boat-shaped open pod. Placentæ distinct, borne on the middle of the valves. Seeds small, very numerous.

D. glutinosus Nutt. in Hook. Bot. Mag. t. 3655. Shrub 2-6 feet high, nearly glabrous but the young parts glutinous: leaves from narrowly oblong to linear, entire or more or less denticulate, 1-4 inches long, at length with revolute margins, glabrous above, pubescent beneath with branched hairs: flowers $1\frac{1}{2}$ -2 inches long, short-peduncled: calyx an inch long, 5-toothed, the teeth somewhat unequal, the upper tooth largest: corolla buff-colored, obscurely bilabiate, the spreading lobes laciniately toothed or notched. Along streams near the coast, from the south line of Oregon southward.

11 EUNANUS Benth. in DC. Prodr. x, 374.

Dwarf annual herbs with opposite leaves and large or small flowers on solitary peduncles in the axils of the upper leaves. Calyx tubular, 5-angled, 5-toothed, persistent. Corolla funnel-form, with included or rarely long-exserted tube, or sometimes nearly salverform: the limb usually 5-lobed, strongly bilabiate or nearly regular. Stamens 4, didynamous. Style filiform: stigma bilamellar with the lobes unequally or equally petaloid-dilated, or more or less peltate-funnel-form by the union of the 2 lamellæ at their edges. Capsule cartilaginous, coriaceous, chartaceous, or even membranaceous, gibbous at base, obtuse and shorter than the calyx or acute and surpassing it. Placentæ borne on the middle of the valves, not united in the axis. Seeds numerous, often muriculate.

E. Douglasii Benth. in DC. Prodr. x, 374. *Mimulus Douglasii* Gray. Glandular- or viscid-pubescent: stems 6-18 lines high: leaves ovate or oblong, obscurely dentate, 3-nerved at base and contracted into a petiole, including the petiole 3-10 lines long, the upper pair connate-clasping: calyx tubular, 6 lines long, the teeth obtuse: corolla red and purple, nearly $1\frac{1}{2}$ inches long, with very long filiform tube and funnel-form throat, the lower lip very short, the upper large and 3-lobed: capsule linear or linear-oblong, terete, 4-sulcate, gibbous or somewhat inflexed at the very base: seeds small, apiculate at both ends. On dry gravelly banks, Umpqua Valley Oregon to California.

E. Bigelovii Gray Pac. R. Rep. iv, 122. *Mimulus Bigelovii* Gray. Viscid and more or less glandular-villous: stem 1-8 inches high, paniculately branched: leaves oblong or the upper ovate and acute, 5-10 lines long, contracted at base but scarcely petioled, entire or with a few coarse teeth: calyx 4-5 lines long, hardly at all oblique, the teeth very acutely subulate from a broad base, 2 lines long or less, the tube broadly campanulate: corolla crimson, 8-10 lines long, with cylindrical throat and broad rotate limb, the narrow tube little if any longer than the calyx: capsule oblong-lanceolate, acute or acutish, little exceeding the calyx, the valves membranaceous: seeds oblong-linear, minutely and irregularly reticulated. On dry plains, southeastern Oregon to California and Utah.

E. Cusickii Greene Pitt. 1, 56. *Mimulus Bigelovii* var. *ovatus* Gray. Stem 8-12 inches high, simple, or branched from the base: leaves broadly ovate, very acute, entire, sessile, an inch or more long and nearly as broad: calyx-teeth very unequal, triangular-subulate, the very acute tips somewhat recurved: corolla red-purple, with slender tube and quite regularly lobed rotate limb 6-10 lines in diameter. On moist banks, southeastern Oregon.

E. Tolmiei Benth. l. c. *Mimulus nanus* H. & A. Glandular or viscid:

stem stoutish, oblong or ovate base; the lower teeth broadly bilabiate; corolla rose-purple 4-6 lines broad; calyx; the valves vada and Calif.

E. Brewer with spreading or much branched slender, equal corolla red, with than the calyx dehiscent by the placentæ united of the Cascade

Annual or showy yellow (the axils of the leaves to small ribbed, 5-toothed; its tube cylindrical: its limb broader lower one spreading inserted on the sometimes corolla, the lobes passing the corolla from the center

M. cardinalis cent, viscid above or the lowest 1-2 inches long, several oblong-prismatic scarlet and the lip erect with cylindrical: stem and loose coat, western Oregon

M. Lewisii stems numerous oblong-ovate to 1-2 inches long: petals, 8-10 lines long: 2-3 lines long: broad throat and the lower lip dehiscent: stigma longitudinally California and

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stem stoutish, $\frac{1}{2}$ - $\frac{3}{4}$ inches high, simple, or branched from the base: leaves oblong or ovate to lanceolate, entire or obscurely toothed, contracted at base; the lower ones petioled; including the petiole 4-12 lines long: calyx-teeth broadly lanceolate, acute, a line long, about $\frac{1}{4}$ as long as the tube; corolla rose-purple with yellow and dark purple in the throat; the limb 4-6 lines broad, obviously bilabiate: capsule acuminate, surpassing the calyx; the valves chartaceous. On bare hills, eastern Washington to Nevada and California.

E. Breweri Greene Bull. Calif. Acad. No. 3, 101. Viscid-pubescent with spreading gland-tipped hairs: stem slender, 1-10 inches high, simple or much branched: leaves linear, entire, an inch long, sessile: peduncles slender, equalling the calyx: teeth of the calyx short-triangular, equal: corolla red, with short tube and spreading limb, 4-5 lines long, little longer than the calyx: capsule acute, not longer than the calyx, chartaceous, dehiscent by the upper suture, the lower parting at the apex only: the placentæ united below. In moist places, Brit. Columbia to California, east of the Cascade Mountains.

12 MIMULUS L. Sp. 634. 1753.

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Annual or perennial herbs with opposite leaves and mostly showy yellow blue or pink flowers on solitary peduncles from the axils of the upper leaves, or racemose by the reduction of the leaves to small bracts. Calyx tubular, persistent, 5-angled or 5-ribbed, 5-toothed, the upper tooth usually largest. Corolla irregular, its tube cylindrical with a pair of ridges on the lower side within: its limb bilabiate; the upper lip erect or reflexed, 2-lobed, the lower one spreading and 3-lobed. Stamens 4, didynamous, inserted on the corolla-tube: anthers globose, the cells divergent or sometimes confluent at the apex. Style filiform: stigma bilamellar, the lobes equal, ovate or orbicular. Capsule obtuse, not surpassing the calyx, the valves membranaceous, tardily separating from the central columnar united placentæ.

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M. cardinalis Dougl. Lindl. Hort. Trans. ii, 70. t. 3. Villous-pubescent, viscid above: root perennial: stems stout, 2-4 feet high: leaves ovate or the lowest ovate-lanceolate; the upper connate; all erose-dentate, 2-4 inches long, several-nerved from the base: peduncles 3-4 inches long: calyx oblong-prismatic, an inch or more long, its short teeth nearly equal: corolla scarlet and yellow, 1-2 inches long, with very oblique limb, the upper lip erect with the lobes turned backward, the lower reflexed, the throat cylindrical: stamens exerted: capsule oblong, sessile: seeds with a dull and loose coat, longitudinally wrinkled. In springy places along streams, western Oregon to California and Arizona.

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M. Lewisii Pursh Fl. 427 t. 20. Pubescent and more or less viscid: stems numerous from a perennial root, 1-2 feet high, simple: leaves from oblong-ovate to lanceolate, denticulate, mostly acute or acuminate, 1-3 inches long: peduncles longer than the leaves: calyx prismatic-campanulate, 8-10 lines long, its triangular teeth short-acuminate and very acute, 2-3 lines long: corolla rose-red or purplish, about $1\frac{1}{2}$ inches long, with broad throat and bilabiate limb, lobes of the upper lip obcordate, flat, of the lower lip obovate and sparingly bearded in the throat: stamens not exerted: stigmas oblong: capsule oblong: seeds with a dull and loose coat, longitudinally wrinkled. Along mountain streams, Brit. Columbia to California and Montana.

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M. dentatus Nutt. in Herb. Hook. Pubescent with stout pilose hairs:

alar or viscid:

stems slender, 6-12 inches long, usually decumbent or ascending: leaves ovate, acute or acuminate, coarsely serrate-toothed, 1-3 inches long, short-petioled: peduncles about equalling the leaves: calyx-teeth triangular-subulate, half the length of the tube, nearly equal: corolla golden yellow, an inch or more long, the ample throat purple-dotted and strongly bearded to the base in two lines inside, the bilabiate limb an inch broad, its lobes entire and ciliate: seeds ovate, acute, scrobiculate, reddish-brown. Along streams in the Coast Mountains, Oregon to California.

M. hirsutus. Herbage dark green, glabrous below, the inflorescence hirsute, stems stoutish, 1-2 feet high very numerous and caespitose: root perennial by short basal stolons: leaves oblong or oval, obtuse, denticulate, 1-3 inches long, the lower ones short-petioled and often laciniately lobed or lyrate: peduncles stout, often more than an inch long: calyx campanulate in flower, the teeth unequal, the upper one largest, the tube becoming inflated in fruit, often purple-dotted or almost red, the 2 lower teeth incurving and closing the orifice: corolla bright yellow, an inch long, funneliform; lobes of the upper lip oblong, narrowed at the apex, recurved; the middle lobe of the lower lip 5-6 lines broad, as broad or broader than long, emarginate; the throat spotted with dark red on the lower side, the pubescent lines reaching its base: stamens not exerted: stigmas fan-shaped, erose-dentate and apiculate: capsule oblong, short stipitate. On wet rocks in the Tualatin and Willamette rivers Oregon: beginning to flower about the first of July.

M. grandiflorus. Herbage pale green and glabrous up to the inflorescence which is sparsely hairy: stems often stout, 1-4 feet high, usually solitary or 2-4 together: root perennial by basal stolons: leaves oblong to ovate, most of them petioled, 1-5 inches long, coarsely toothed and denticulate, the lower ones sublyrate: peduncles 1-1½ inches long: calyx campanulate, about 8 lines long, its triangular acute teeth unequal, 2-3 lines long, the tube slightly inflated in fruit and more or less spotted with red, the 2 lower teeth incurved and closing the orifice: corolla often nearly 2 inches long, bright yellow, lobes of the upper lip oblong, rounded at the apex, erect and slightly recurved, lateral lobes of the lower lip almost square, the middle one broadly cuneate, as long or longer than broad, emarginate; the throat spotted with dark red or brown, the pubescent lines extending to its base: stamens not exerted; stigmas fan-shaped, erose-dentate and apiculate: capsule oblong, stipitate. Growing in wet places along streams, western Oregon and Washington: beginning to flower early in May.

M. Langsdorffii Sims.? Herbage light green, often marked with dark brown: glabrous or the inflorescence minutely pubescent: stems terete, 6-20 inches high, usually paniculately branched, erect or the base often horizontal and rooting for a few inches, thus perennial: leaves orbicular or ovate, the blade 6-20 lines long, dentate or denticulate, usually sublyrate, purple beneath, all petioled: floral bracts 2-6 lines long, connate-clasping: pedicels slender, about an inch long: calyx campanulate, in flower about 4 lines long, often mottled with dark purple, at length much inflated, the 4 lower teeth incurved and closing the orifice: corolla yellow, 10-12 lines long funneliform; lobes of the upper lip erect, oblong, 4-6 lines long: the middle lobe of the lower lip broadly cordate, pendulous: the throat usually spotted with dark red, the pubescent lines running to the base: capsule oblong, 3-4 lines long, on a stipe about a line long: seeds oblong. In wet places, California to Alaska and the Rocky Mountains: flowering from early spring until August.

M. Scouleri Hook. Fl. ii, 100. Glabrous throughout: stems erect, from a stoloniferous base, 1-2 feet high: leaves oblong-lanceolate, 1-2 inches long, obtuse or acutish, evenly callous-dentate, the lower tapering into petioles: peduncles 1-2 inches long, much longer than the bracts:

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inflorescence: root denticulate, minutely lobed, campanulate becoming lower teeth long, funicular, recurved, broader than lower side, the stigmas faucipitate. On

the inflorescence: usually lobes oblong to and denticulate, campanulate 3 lines long, the 2 early 2 inches the apex, erect square, the marginate; the extending to dentate and long streams. May.

ed with dark stems terete, the base often orbicular or sublyrate, late-clasping: flower about inflated, the w, 10-12 lines long: the throat usually base: capsule long. In wet flowering from

stems erect, lanceolate, 1-2 lower tapering on the bracts

calyx campanulate, in flower about 4 lines long, the short broadly-triangular teeth subequal; the tube at length becoming inflated and the 4 lower teeth incurved over the orifice: corolla bright yellow, an inch or more long, strongly bilabiate, the upper lip erect, its oblong lobes reflexed; the lower one ample; the pubescent lines deep yellow: capsule obovate, short-stipitate: seeds obovoid, smooth, dark brown. On the banks of the Columbia river: at Tongue Point near Astoria Oregon.

M. nasutus Greene Bull. Calif. Acad. No. 3, 112. Usually nearly glabrous: stems rather stout, 6-24 inches long, branching and flowering from the base, distinctly quadrangular and winged: root annual, or perennial by stolons: leaves mostly subradical, ovate to reniform-cordate, coarsely toothed or lobed, purple beneath, the lower on broad petioles, an inch long, the floral reduced to short bracts: peduncles short, or long and filiform, ascending or spreading: calyx tubular to campanulate, in fruit much inflated, the teeth acute, very unequal, the upper one 3 times as long as the others, the lower pair in fruit bent upward lying at right angles across and closely enfolding the other 3: corolla yellow, 4-8 lines long, little surpassing the calyx: capsule oval, obcompressed, almost sessile: seeds minute, oblong. On wet shady banks, Oregon to California.

M. microphyllus Benth. in DC. Prodr. x, 371. Pubescent, or in the smaller forms glabrous: stems terete, slender, usually simple, 2-12 inches high, racemose above, or in depauperate states with a single terminal flower: leaves few, ovate to orbicular, often cordate at base sometimes serrate, denticulate or coarsely toothed, purple beneath: peduncles slender: calyx 2-3 lines long, often dotted with purple, oblique at the orifice, the teeth obscure or prominent: corolla 3-9 lines long. In moist places, Washington to California and the Rocky Mountains.

M. alsinoides Dougl. Benth. in DC. Prodr. x, 371. Glabrous or more or less puberulent and musky-scented: stem slender, at length diffuse and branching from the base, 3-12 inches long, terete: root annual: leaves broadly ovate or subcordate to oblong, the lower 3-12 lines long, coarsely toothed, all petioled: peduncles filiform, 1-2 inches long: calyx tubular, 2-3 lines long, not inflated in fruit, the orifice oblique; the teeth small and subequal: corolla 4-6 lines long, strongly bilabiate, yellow with a bright crimson spot in the centre of the lower lip: capsule oblong, acuminate, filling the calyx: seeds oblong, light-colored. On wet rocks, western Oregon to Brit. Columbia: flowering in very early Spring.

M. breviflorus Piper Bull. Torr. Club xxviii, 45. A glabrous to puberulent annual: stem 1-10 inches high, erect simple or freely branching from the base: leaves ovate to lanceolate, entire or sparingly toothed, 3-5-erved from the base, 6-12 lines long, sessile by a broad base, or tapering to a short petiole: peduncles slender, about equaling the leaves in flower, in fruit becoming much longer: calyx oval, in fruit 3-4 lines long, its teeth nearly equal, short-triangular, acute: corolla pale yellow, tubular, 2-3 lines long; the lobes short and rounded: stigma scarcely exceeding the calyx: capsule ovoid, acutish. On moist banks, eastern Washington and Oregon.

M. pulsifera Gray Proc. Am. Acad. xi, 98. From obscurely to distinctly viscidulous-puberulent: stem erect, 4-10 inches high, loosely branching from the base: leaves broadly ovate to lanceolate-oblong, sparsely denticulate to entire, 6-10 lines long, the lower ones on short margined petioles: peduncles about equaling or at length longer than the leaves: calyx cylindraceous-campanulate, in fruit about 4 lines long, with short triangular acute or acuminate equal teeth: corolla light yellow, 5-6 lines long: style longer than the calyx: capsule oblong, acute, nearly as long as the calyx. On bars along streams, Washington to California.

M. pezuncularis Dougl. Benth. Scroph. Ind. 49. A small erect vis-

cid-puberulent or pubescent annual: stem slender, 6-18 inches high: leaves ovate to lanceolate, the blade 4-6 lines long, usually acute, abruptly contracted into rather broad petioles, purple beneath and prominently 3-5 veined from the base: peduncles slender, 1-2 inches long, erect or ascending: calyx tubular-campanulate, about 4 lines long, truncate at the apex, the short acute teeth equal: corolla yellow, 5-10 lines long, the pubescent lines extending to the base of the throat: capsule oblanceolate, very short-stipitate, obcompressed: seeds globular. In moist shady places, eastern Oregon and Washington.

M. Suksdorfii Gray Syn. Fl. Supp. 450. A small annual 1-3 inches high; whole herbage often reddish-hued; obscurely puberulent-viscidulous: leaves oblong-lanceolate to linear, 3-6 lines long, thickish, entire, narrowed below but scarcely petioled: peduncles filiform, usually shorter than the leaves: calyx tubular-campanulate, in fruit 3-4 lines long, truncate at the apex, the short and broad teeth all equal: corolla yellow or reddish, about 3 lines long, little exerted from the calyx the limb less than 2 lines wide all 5 lobes obcordate-emarginate; throat beardless or nearly so. Bare places on mountains, eastern Washington to California and Utah.

M. rubellus Gray Bot. Mex. Bound. 116. Small annual 1-6 inches high: very minutely and rather sparingly glandular-puberulent but not viscid: leaves narrowly oblong, entire or with a few prominent teeth, narrowed at base but sessile, 6-10 lines long: peduncles very slender, exceeding the leaves: calyx cylindraceous, the teeth oblong, obtuse, ciliate, equal: corolla rose-color to yellow, 3-4 lines long, the unequal lobes scarcely spreading. In moist places, eastern Washington to California, Colorado and New Mexico.

M. floribundus Dougl. Lindl. Bot. Reg. t. 1225. Villous with spreading white hairs and viscid: stem rather slender, 2-20 inches long, at first erect, but soon decumbent and diffusely spreading, flowering from the lowest axils: root annual: leaves ovate, or the lower subcordate, the blade 6-12 lines long rather coarsely toothed, all petioled: peduncles spreading about an inch long, exceeding the leaves: calyx campanulate, about 3 lines long, the short triangular acute teeth nearly equal; corolla about 6 lines long, light yellow, funnelform: capsule globose-ovoid, obtuse, sessile: seeds almost globular, light-colored. On wet banks and shady places: Washington to California and the Rocky Mountains.

M. moschatus Dougl. Lindl. Bot. Reg. t. 1118. Conspicuously villous and viscid throughout: stems slender, weak and declined or ascending: leaves broadly lanceolate, 6-18 inches long: leaves broadly ovate 1-2 inches long, all petioled: sparingly dentate: peduncles slender, an inch long, shorter than the leaves: calyx tubular, 6 lines long, the subulate teeth subequal, half as long as the tube: corolla yellow, the narrow throat about $\frac{1}{2}$ longer than the calyx the lobes nearly equal and rotately spreading; the throat striate and spotted with maroon, the pubescent lines not extended to the base: stamens not exerted: capsule lanceolate, acute: seeds globular. In springy places: Brit. Columbia to Oregon and the Rocky Mountains.

M. primuloides Benth. Scroph. Ind. 29. Stems $\frac{1}{2}$ -3 inches high: glabrous or pilose-pubescent with white hairs: perennial by stolons: leaves ovate to broadly lanceolate, entire or more or less dentate, narrowed below but sessile, 6-12 lines long, glabrous both sides: peduncles filiform, 2 inches long, erect, usually only one to each stem: calyx tubular-campanulate, 3-4 lines long, the broad acute teeth all equal: corolla yellow, about 8 lines long, funnelform; lobes of the almost regular limb deeply emarginate or obcordate. In mountain marshes, eastern Washington to California.

M. pilosellus Greene Eryth. iv. 22. Very small and depressed: stem 2-6 lines high: perennial by stolons: leaves obovate to oblong, 2-6 lines

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long, entire or sparingly toothed toward the apex, glabrous below, pilose above with long white jointed hairs: peduncles filiform, erect, 1-2 inches long, usually only one to each plant: calyx tubular-campanulate, about 3 lines long, its triangular acute teeth nearly equal: corolla golden yellow, 3-4 lines long, its nearly equal lobes barely emarginate. In mountain marshes, southern Oregon to California.

al 1-3 inches viscidulous: hairs, narrowed rather than the uncinate at the reddish, about 2 lines wide, very so. Bare Utah.

M. pilosus Watson Bot. King 225. *Herpestis pilosa* Benth. Pilose-pubescent throughout with soft white hairs: stem terete, 3-12 inches high, paniculately branched from the base: root annual: leaves lanceolate or narrowly oblong, sessile, entire, 1-3 inches long: peduncles slender, 1-2 inches long: calyx campanulate, 5-cleft, the tube not prismatic nor angled, almost nerveless, becoming enlarged in fruit, the 5 lobes almost subulate, very acute, somewhat unequal: corolla bright yellow, 3-4 lines long, rather obscurely bilabiate, usually with a pair of brown spots on the lower lip: capsule oblong-ovate, acute. On sandy bars along streams, Washington to California and the Rocky Mountains.

13 GRATIOLA L. Sp. 17. (1753.)

al 1-6 inches pubescent but not dent teeth, narrower, exceeding, ciliate, lobes scarcely

Erect or diffuse herbs with opposite entire or dentate leaves, and yellow or whitish flowers solitary in the axils of the upper leaves. Calyx 5-parted, the segments narrow, slightly unequal. Corolla irregular, with cylindric tube and more or less bilabiate limb: upper lip entire, emarginate on the left; lower one 3-lobed. Antheriferous stamens 2, the posterior pair, the anterior pair represented by rudiments or wanting: filaments filiform: anther-cells distinct, transverse and separated by a broad connective, or parallel and contiguous. Style filiform, with dilated slightly 2-lobed stigma. Capsule loculicidally and septicidally dehiscent, ovoid or globose, 4-valved. Seeds numerous, longitudinally and transversely striate.

as with spreading long, at first arising from the base, the blades spreading, about 3 lines long, about 6 lines wide, sessile, in shady places

G. Virginiana L. Sp. 17. Puberulent and somewhat glandular, or below glabrous: stem erect, at length widely branching from the base, 3-10 inches high, from an annual root: leaves commonly glabrous, oblong or oblong-lanceolate, sessile, narrowed at both ends, denticulate, 1-2 inches long: peduncles slender, glandular, shorter than or equalling the leaves, bracteolate under the calyx; bractlets as long as the calyx or longer: sepals lanceolate, acute, about 3 lines long: corolla 4-5 lines long, with yellowish tube barely twice the length of the calyx, and whitish lobes: the 2 upper emarginate: sterile filaments minute or none: anther-cells transverse, separated by a broad connective: capsule ovate, about equalling the calyx. In wet or muddy places, California to Brit. Columbia and across the Continent.

uously villous and ascending petioled: spatulate than the leaves, as long as the tube in the calyx the and spotted: stamens none: springy places

G. ebracteata Benth. DC. Prodr. x. 595. Nearly glabrous and obscurely glandular: stem stout, 1-6 inches high, branching and flowering from the base: leaves lanceolate, entire or sometimes sparingly and sharply denticulate, sessile by a rather broad base: peduncles slender, as long as or shorter than the leaves, ebracteate: sepals foliaceous, lanceolate, at length 4-6 lines long, equalling the yellowish corolla: capsule globose, somewhat 4-angled, much shorter than the calyx. On the margin of pools, California to Brit. Columbia.

14 ILYSANTHES Raf. Ann. Nat. 14. (1820.)

expressed: stem long, 2-6 lines

Glabrous annual or biennial herbs with opposite sessile leaves and small purplish flowers solitary in the axils of the upper leaves. Calyx 5-parted, the segments linear, not subtended by bractlets.

Corolla irregular, the tube somewhat expanded above, the limb bilabiate: upper lip 2-cleft; the lower larger and 3-lobed, spreading. Fertile stamens 2, included, their anther-cells divergent; sterile filaments 2, two-lobed, one of the lobes capitate-glandular, the other glabrous and shorter. Capsule oblong or ovoid, septically dehiscent. Seeds numerous, wrinkled.

I. gratioloides Benth. DC. Prodr. x, 419. Stem slender usually erect at length diffusely branched, 3-8 inches high: leaves ovate, ovate-oblong or the lowest obovate, sessile or slightly clasping at base, remotely denticulate or entire, thickish, 3-7-nerved, 6-12 lines long; the uppermost ones commonly much smaller: peduncles slender, 2-3 times as long as the subtending leaves: sepals linear-lanceolate, about 2 lines long, acute: corolla violet to purple, about 3 lines long: capsule narrowly ovoid-oblong, 2-3 lines long, longer than the calyx: seeds a line long, reddish, usually truncate at the ends. In wet or muddy places, California to Brit. Columbia and across the Continent.

15 LIMOSELLA L. Sp. 631. (1753.)

Low stemless glabrous succulent annual (or perennial by stolons) herbs with rosulate leaves and small flowers on scape-like one-flowered peduncles. Calyx campanulate, 5-lobed. Corolla nearly regular, open-campanulate, with a short, tube and 5-cleft limb. Stamens 4, inserted on the tube of the corolla, scarcely exerted: filaments short; anthers confluent one-celled. Style short: stigma capitate. Ovary two-celled at the base, one-celled above. Capsule two-celled only at the base; the large central placenta many-seeded. Seeds ovoid, rugulose.

L. aquatica L. Sp. 631. Stoloniferous stems slender, 1-3 inches long, leaves lanceolate to oblong or spatulate, the blade 4-6 lines long, on filiform petioles 3-4 times as long: peduncles shorter than the leaves, arising with the petioles from the base of the plant, or from nodes of the stolons: calyx-lobes ovate, acute or acutish, about the length of the tube: corolla white or pink, about a line broad, scarcely longer than the calyx: stamens high up on the corolla-tube: filaments slightly longer than the anthers: capsule globose or oblong-globose, obtuse, 1½ lines high, longer than the calyx. On muddy banks and in brooks, Washington to California and across the Continent: Europe, Asia and S. America.

SERIES III RHINANTHIDÆ Benth. in DC. Prodr. x, 189. Leaves various. Inflorescence simply centripetal. Lower lip or lateral lobes of the corolla external in the bud. Stamens very rarely more than four.

Tribe 5 Digitaleæ Benth. l. c. Herbs or shrubs, none parasitic. Corolla little if at all bilabiate; the lobes all plain: the lateral or one of them external in the bud. Anther-cells contiguous at the apex and often confluent.

16 SYNTHYRIS Benth. in DC. Prodr. x, 545.

Perennial herbs with simple stems, mainly radical leaves and rather small purple blue or pink flowers in terminal spikes or racemes. Calyx 4-parted: the segments oblong. Corolla from oblong to short campanulate, 4-cleft, more or less irregular, rarely

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§ 1 Acaulescent with naked scapes. Ovules and seeds only a pair in each cell, on a short partition. Capsule divaricately two-lobed, the cells transversely oblong. Seeds with thickened margins incurved at maturity.

S. rotundifolia Gray Syn. Fl ii, 285. Rootstock short and creeping, bearing a tuft of cordate-orbicular long-petioled persistent leaves and simple scapes: leaf-blades 1-2 inches in diameter, doubly crenate or crenate-incised, slightly pubescent, especially on the veins beneath: petioles and scapes pubescent with brownish hairs: scapes 4-6 inches high, about equalling the leaves, naked except the ovate-lanceolate floral bracts: flowers few, in a terminal raceme: pedicels slender, 4-6 lines long, each subtended by a small bract: calyx-lobes ovate, acute, ciliate, 3 lines long: corolla blue or purple, about 4 lines long. In open woods on rocky soil, western Washington to California: flowering very early, often in January.

§ 2 Ovules and usually seeds several or numerous in each cell. Capsule merely emarginate. Seeds plain, or meniscoidal, thin-edged.

S. reniformis Benth. l. c. Rootstock short and branching: herbage glabrous: radical leaves persistent, orbicular-reniform, crenately incised and the small lobes sharply toothed, 1-3 inches in diameter, on stout petioles 3-6 inches long: flowering stems 6-10 inches high, bearing several small bract-like fan-shaped alternate, or the lowest opposite, leaves and numerous flowers in a dense terminal raceme: pedicels slender, shorter than the subtending cuneate or lanceolate bracts: calyx-lobes lanceolate, about 2 lines long: corolla blue changing to purple, 3-4 lines in diameter: capsule truncate, emarginate. On rocky banks of the Columbia river and in the mountains of eastern Oregon and Washington: flowering in early spring.

S. major Heller. *S. reniformis* var. *major* Hook. Glabrous: leaves persistent, orbicular-reniform, 1-4 inches in diameter, somewhat coriaceous, with multilobulate margins, on petioles 2-4 inches long: flowering stems longer than the leaves, bearing several fan-shaped bract-like leaves below, and a dense spike-like terminal raceme of purple flowers: pedicels slender, shorter than the subtending bracts: calyx-lobes lanceolate, about 2 lines long: corolla purple, 3-4 lines broad: capsule strongly emarginate. Fertile northerly slope of high mountains, Idaho.

S. pinnatifida Watson Bot. King. 227, t. 22. Somewhat villous: radical leaves long-petioled, broadly ovate in outline, pinnately divided, the lowest of the 3 or 4 pairs of lobes nearly distinct, the upper confluent, all laciniately pinnatifid and the segments laciniately toothed: flowering stems 3-8 inches high, usually exceeding the leaves, naked below: raceme 1-2 inches long, densely flowered above: pedicels shorter than the subtending ovate or oblong toothed or entire bracts: calyx-lobes oblong, mostly obtuse: corolla whitish, nearly twice longer than the calyx, the lower lip deeply 3-lobed, the upper one entire: capsule elliptical, turgid. On rocky ridges in the high mountains, Idaho to Utah.

S. rubra Benth. l. c. 425. Lanate with soft white wool: herbage more or less reddish-hued: leafy: radical leaves orbicular or ovate to oblong or lanceolate, crenulate, narrowed, truncate or cordate at base, the blade 1-2 inches long, on petioles as long or longer; cauline ovate to lanceolate, 6-12 lines long, sessile or nearly so: pedicels only 1-2 lines long: calyx-lobes ovate-lanceolate or oblong: corolla none: stamens inserted on the outside of the hypogynous disk: capsule turgid, emarginate, slightly longer than the calyx. On high open ridges, eastern Oregon to Brit. Columbia and Nebraska.

17 VERONICA L. Sp. 9. (1753.)

Annual or perennial herbs (some exotic species shrubs or trees) with mostly opposite, rarely verticillate or alternate, leaves and usually small blue, pink or white flowers in terminal or axillary racemes or spikes, or rarely solitary. Calyx mostly 4-parted, sometimes 5-parted, the segments oblong or ovate. Corolla rotate, its tube very short, the limb deeply and more or less unequal-ly 4-lobed, rarely 5-lobed, the lower lobe commonly smallest. Stamens 2, divergent, inserted on either side at the base of the upper lobe of the corolla: anthers obtuse, their cells confluent at the apex. Ovary two-celled: style slender; stigma capitate: ovules few or many in each cell. Capsule more or less compressed, sometimes very flat, emarginate, obcordate or two-lobed, loculicidally dehiscent. Seeds smooth or rough, flat, plano-convex or excavated on the inner face.

* Perennial by stolons, or creeping base: racemes in the axils of opposite leaves.

V. Americana Schwein. Benth. in DC. Prodr. x, 468. Glabrous throughout: stems decumbent, usually branched, rooting at the lower nodes, 6-30 inches long: leaves oblong to ovate or broadly lanceolate, 1-3 inches long, sharply serrate, truncate, rounded or subcordate at base, all distinctly petioled: racemes peduncled, loose, elongated, 2-6 inches long: bractlets linear, 2-6 lines long: pedicels slender, 6 lines or more long: sepals oblong, about a line long: corolla blue or nearly white, usually striped with purple, about 2 lines broad: capsule nearly orbicular, compressed but not very flat, emarginate, 1½ lines high: seeds flat. Common in moist or wet places, Alaska to California and across the Continent.

V. scutellata L. Sp. 12. Glabrous or very sparingly hairy: stems slender, ascending from a stoloniferous base, 1-2 feet long: leaves sessile, linear or linear-lanceolate, acute, remotely denticulate, 2-3 inches long: flowers scattered on filiform elongated and widely spreading pedicels: corolla blue or purple, 2-3 lines broad: capsule broader than high, very flat, deeply emarginate at the summit, slightly so at base: seeds flat. In ponds and wet places, Brit. Columbia to California and across the Continent.

** Low perennials with ascending or erect flowering stems terminated by a single raceme: cauline leaves above passing into bracts: seeds numerous, much compressed or meniscoidal.

V. cusickii Gray Syn. Fl. ii, 288. Glabrous: stems 3-6 inches high, erect, simple, from creeping rootstocks: leaves ovate to oblong, sessile or nearly so, entire, 6-10 lines long, the pairs crowded up to the naked peduncle of the 3-9-flowered raceme: pedicels slender, often as long as the flower and longer than the oblong-linear bracts: sepals lanceolate, about 2 lines long: corolla blue or violet, 4-5 lines in diameter, with ample

rounded lobes long as the calyx of the Blue Mo

V. Allenti bescent above sessile, thickly glandular: bracts: calyx-lobes the apex covered with glandular hairs: purplish throat: ovate or ovate-oblong: exserted: ovaries exserted: fruit

V. Worms authors' not of 3-12 inches high than the internodes rounded, truncate, spiciform or shorter than the ovary, its limb violet, its limb style: capsule regions, Alaska

V. serpyllifolia and branching leaves all opposite, ovate, 3-10 lines long at the ends of the calyx, usually blue with dark veins and style 1 line high, equal to the calyx: California and across

*** Low more or less shorter than

V. peregrina erect, 2-6 inches high: 4-12 lines long: sessile, from oblong bract-like and corolla whitish: not exserted: shorter than the calyx: moist or wet places

V. arvensis erect, a lower leaves ovate, 2-6 lines long: ovate or lanceolate: corolla blue or purple: capsule broad: and pastures, naturalized from

rounded lobes: filaments filiform, exserted: style filiform, three times as long as the calyx: capsule elliptical, merely emarginate. Alpine regions of the Blue Mountains of Oregon.

V. Alleni Greenman Bot. Gaz. xxv, 263. Nearly glabrous below, pubescent above: stems 3-4 inches high: lower leaves much reduced, upper sessile, thickish, oblong or oblong-ovate, 5-7 lines long, obtuse: inflorescence glandular-pubescent: pedicels 1-3 lines long, often exceeding the bracts: calyx-lobes unequal, oblong or oblong-ovate, obtuse or rounded at the apex covered on the outer surface and along the margins with long glandular hairs: corolla 3-4 lines in diameter, white or with a slightly purplish throat, the upper lobe subrhombic, emarginate, the lateral ones ovate or ovate-rhombic, somewhat larger than the lower one: stamens exserted: ovary closely covered above with short glandular hairs: style exserted: fruit not seen. Along Paradise river, Mount Rainier Wash.

V. Wormskoldii Røem. & Sch. Syst. i, 101. *V. alpina* of American authors' not of L. Hirsute-pubescent or glabrate: stems slender, simple, 3-12 inches high, from slender creeping rootstocks: leaves mostly shorter than the internodes, ovate to oblong, obscurely crenulate, 6-12 lines long, rounded, truncate or subcordate at base, sessile or nearly so: racemes spiciform or subspicate, dense, or interrupted below: pedicels erect, shorter than the calyx, much shorter than the lanceolate bracts: corolla violet, its limb 2-3 lines in diameter, surpassing the stamens and style: capsule elliptical-obovate, emarginate. In wet places in alpine regions, Alaska to California and across the Continent.

V. serpyllifolia L. Sp. 12. Pubescent or glabrous: stems creeping and branching at base, the branches at length ascending, 2-10 inches long: leaves all opposite and petioled, or the upper ones sessile, oblong to oval or ovate, 3-10 lines long, crenulate to entire: flowers in short spicate racemes at the ends of the stems or branches: pedicels equalling or longer than the calyx, usually shorter than the lanceolate or oblong bracts: corolla pale blue with darker stripes, to almost white, about 2 lines in diameter: stamens and style exserted: capsule broader than high, obcordate, about a line high, equalling the calyx: seeds flat. In wet places Alaska to California and across the Continent: also in Europe, Asia and South America.

*** Low annuals: flowers in the axils of ordinary or of the upper more or less reduced and commonly alternate leaves: corolla mostly shorter than the leaves.

V. peregrina L. Sp. 14. Glabrous, or glandular-puberulent: stem erect, 2-6 inches high, usually branched from the base: leaves thickish, 4-12 lines long, the lower petioled and oblong or oval, dentate; the others sessile, from oblong to linear-spatulate, mostly attenuate; uppermost more bract-like and entire: pedicels a line long, much shorter than the bracts: corolla whitish, about a line in diameter, shorter than the calyx: stamens not exserted: capsule nearly orbicular, obcordate usually a little shorter than the calyx, 1-1½ lines high, many-seeded: seeds flat. Common in moist or wet places Brit. Columbia to California and across the Continent.

V. arvensis L. Sp. 13. Pubescent annual: stem slender, at first simple and erect, at length much branched and diffuse, 2-10 inches long: lower leaves ovate or oval, opposite, obtuse at both ends, crenate or crenulate, 2-6 lines long, the lowest petioled; upper leaves sessile, alternate, ovate or lanceolate, acute or acutish, commonly entire: pedicels very short: corolla blue or white, about a line in diameter, shorter than the calyx: capsule broadly ovate, obcordate, a line high. Common in waste places and pastures, Brit. Columbia to California and across the Continent: naturalized from Europe.

DIGITALIS L. Sp. 621. (1753)

Tall biennial or perennial herbs with alternate leaves and large showy red, white or purple flowers in long terminal usually one-sided racemes. Calyx 5-parted, the segments imbricated. Corolla declined, somewhat irregular, the tube contracted above the ovary, then rather abruptly expanded, longer than the 4- or 5-lobed slightly bilabiate limb: upper lip broadly emarginate or 2-cleft; lower one 3-lobed, the middle lobe largest, the lateral ones exterior in the bud. Stamens 4, didynamous, ascending, mostly included; anthers approximate in pairs. Style slender, with 2-lobed stigma. Capsule ovoid, septically dehiscent. Seeds numerous, rugose.

D. PURPUREA L. Sp. 621. Pubescent: stems stout, 1-5 feet high: radical and lower cauline leaves ovate or ovate-lanceolate, 3-10 inches long, slender-petioled, acute at the apex, narrowed at base, dentate: upper leaves similar but smaller, sessile: racemes a foot long or more, dense, one-sided: flowers various-colored, drooping: upper lobe of the calyx narrower than the 4 other foliaceous ones: corolla $1\frac{1}{2}$ -2 inches long, spotted within. Common in rich alluvial soil, especially along the coast, western Oregon to Brit. Columbia: Naturalized from Europe.

Tribe vi Euphrasieæ Benth. in DC. Prodr. x, 189. Corolla manifestly bilabiate: the upper lip erect and concave or galeate, entire or emarginate, rarely 2-cleft; the lower 3-lobed, mostly spreading, external in the bud. Stamens 4 and didynamous or rarely 2, ascending under the upper lip: anther-cells distinct, sometimes one abortive or wanting. Style mostly filiform, with entire or 2-lobed stigma. Capsule loculicidally dehiscent.

§ Anther-cells unequal or dissimilar, the outer one affixed by its middle, the other pendulous from its upper end, mostly smaller, sometimes sterile or deficient. Seeds with a loose reticulated coat.

19 CASTILLEIA Mutis. L. f. Supp. 47. (1781)

Herbs with alternate leaves and red, yellow, purple or white flowers in dense terminal leafy-bracted spikes, the bracts often brightly colored and much larger than the flowers. Calyx tubular, laterally flattened, more or less cleft before or behind, or both the lobes entire 2-cleft. Corolla tubular, very irregular, its tube not longer than the calyx, its limb bilabiate; upper lip (galea) arched, elongated, concave or keeled, laterally compressed, entire, enclosing the didynamous stamens: lower lip short, often very small, 3-toothed, 3-carinate or somewhat saccate below the short teeth.

* Annuals with fibrous roots: at least the upper part of the bracts and sometimes the calyx petaloid.

C. minor Gray Bot. Cal. i, 573. Villous-pubescent: stem slender, strict, simple or with 1 or 2 erect branches, 1-2½ feet high: leaves linear-lanceolate and entire, sessile, acuminate, 2-3 inches long: bracts similar to the leaves but smaller, red or red-tipped, very narrow, equal or longer than the short-petalled flowers: calyx green, cleft on both sides to about the middle, the lobes lanceolate, acute, entire or 2-toothed

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corolla yellow, 6-10 lines long, its upper lip much longer than the small lower one: capsule oblong, acute, 6-8 lines long. In moist soil, eastern Oregon to Nevada, New Mexico and Nebraska.

* * Perennials.

+ Calyx deeper cleft before than behind, tubular-cylindrical mostly colored red, as are a part of the bracts: corolla large, an inch or two long, well exerted from the lower side of the spathaceous calyx and at length somewhat arcuate or falcate exposing the protuberant and very short callous lower lip, its galea about equalling the tube.

C. linearifolia Benth. in DC. Prodr. x, 259. Glabrous below, the inflorescence somewhat pubescent or villous: stems strict, 2-5 feet high: leaves linear, entire or some of the upper sparingly lacinate, and the uppermost and bracts 3-parted, 3-nerved: calyx narrowly cylindrical, over an inch long, mostly red or crimson, sometimes pale, the anterior fissure very much deeper than the posterior: the long upper lip acutely 4-toothed or 2-cleft and the lobes 2-toothed: corolla $1\frac{1}{2}$ -2 inches long; its narrow falcate and much exerted galea as long as the tube. In the mountains of eastern Oregon to California, Colorado and Arizona.

+ + Floral leaves or bracts more or less dilated and colored: calyx about equally cleft before and behind.

C. oreopola Greenman Bot. Gaz. xxv, 264. Glabrous or nearly so below, soft-pubescent above: stems erect, 6-12 inches high, somewhat furrowed by the inconspicuous decurrence of the leaves: leaves sessile, oblong-lanceolate, 1-2 inches long by 3-5 lines wide, with 1 or 2 pairs of divaricately spreading linear lobes, glabrous or the upper ones pubescent with long soft spreading hairs; the lower ones much reduced, usually entire: bracts 3-cleft to the middle, their lobes as well as the calyx deep rose-purple, (sometimes crimson or white): calyx 6 lines long, about equally cleft to the middle, the lobes oblong-linear, obtusish: corolla an inch long, the narrow exerted galea green on the back: lower lip included, rather deeply and subequally 3-lobed: capsule glabrous, about 6 lines long. On the snowy peaks of the Cascade Mountains of Oregon and Washington.

Var. *subintegra* Fernald Eryth. vi, 45. Stems much clustered: upper leaves mostly entire. Common in mountain bogs, eastern Oregon and Washington.

C. rupicola Piper. Fernald l, c. Herbage often dark purple, pubescent-hirsute to villous, especially above: stems tufted, usually numerous, from a multicapital caudex, 4-8 inches high: leaves lanceolate in outline, deeply cleft into 3-7 linear rather obtuse lobes, or the lowest rarely entire, all sparsely short hirsute, $\frac{1}{2}$ -2 inches long: bracts similar to the leaves, but with rather broader lobes, more or less scarlet-tinged: flowers 5-15, in a short raceme, deep scarlet, the lower with short pedicels: calyx 9-12 lines long, the tube shorter than the equal 2-lobed to entire lobes: corolla 15-18 lines long, the straight or curved galea much longer than the calyx; the minute saccately 3-lobed lower lip included: anthers white, exerted: capsule oblong, 6 lines long: seeds numerous, deeply favose-pitted. On cliffs, Paradise valley Mount Rainier Washington.

C. angustifolia (Nutt.) Don Syst. iv, 616. *C. parviflora* Gray in part, not Bong. Pubescence of two kinds, the shorter fine and appressed, the longer, pilose hispid: stems more or less clustered, from a woody caudex, simple, or sparingly branched above, 4-12 inches high: lower leaves linear, entire or subentire; the upper cleft to near or below the middle into 3-5 linear or linear-lanceolate long-attenuate lobes, the lateral ones rather strongly divaricate: bracts similar to the leaves, rather broader and more deeply cleft into linear obtuse segments, strongly pilose toward the base, the scarlet or rarely yellowish tips velutinous and sometimes glandular:

calyx 7-8 lines long, with lanceolate or lance-ovate segments: corolla 1-1½ inches long, the slightly exerted galea hardly as long as the tube and much longer than the short 3-lobed lower lip. Brit. Columbia to California and the Rocky Mountains.

Var. *Whitellii* Piper Bull. Torr. Bot. Club xxvii, 399. Stems clustered on a woody caudex, erect, 8-12 inches high: leaves all entire, lanceolate, 1-3 inches long: bracts broader than the leaves, the uppermost 3-lobed: otherwise like the type. Wenatchee Washington.

C. hispida Benth. in Hook. Fl. ii, 105. *C. parviflora* Gray in part not Bong. Pilose, especially above, with long hairs, becoming less so with age: stems stout, 16-20 inches high, simple or sparingly branched: leaves 2-4 inches long, rather rigid, the lower ones attenuate-lanceolate, entire; upper ones becoming oblong or even obovate, cleft above the middle into 3 lobes the middle-lobe lanceolate, the lateral ones shorter and narrower, ascending or slightly spreading: bracts rather broader and shorter than the upper leaves, with softer pubescence, mostly 5-cleft, the tips variously shaded with yellow and red: calyx 1¼-1½ inches long, the reddish or yellowish segments acute to obtuse: corolla 1½-2 inches long, the galea a little more than half the length of the tube, and much exceeding the short lower lip with its unequal ovate-oblong involute lobes. On rocky hillsides. Washington to California and the Rocky Mountains.

C. Bradburii Don Syst. iv, 616. *C. parviflora* Gray in part, not Bong. Pilose or glabrate: stems 8-16 inches high, simple or often loosely branched: leaves 1-3 inches long, lanceolate or oblong-lanceolate, the upper sometimes obovate, subcuneate at base, nearly all cleft above the middle into 3 or 5 lobes, the middle one oblong or oblong-lanceolate, obtuse; the lateral ones linear-lanceolate, short mostly ascending: calyx 12-18 lines long, red- or nearly yellow-tipped, about equalling the bracts: corolla 14-24 lines long, the galea hardly as long as the tube. Brit. Columbia to California and the Rocky Mountains.

C. Applegatei Fernald Eryth. vi, 48. Stems few from an elongated perennial root, decumbent at base, densely glandular and with long spreading hairs: leaves lanceolate or obovate-lanceolate, 1-2 inches long, the lowest entire, the others 3- or 5-cleft, mostly to below the middle, into lanceolate or linear ascending lobes, all densely covered with glands and with some spreading soft hairs, especially on the margins: racemes dense, becoming 4-5 inches long: bracts similar in outline to the leaves, scarlet: calyx scarlet, 8-10 lines long, the linear segments acutish: the upper ¼ of the slender green-backed galea exerted; the greenish lower lip about a line long, deeply cleft into 3 subequal linear incurved lobes: capsule glabrous, oblong, short-beaked. On Mount Scott, Klamath Co. Oregon.

C. plutorum Fernald l. c. 50. Stems slender, erect, 12-16 inches high, glandular, and pubescent with short scarcely spreading hairs: leaves oblong-linear, 1-2 inches long, minutely pilose and glandular, entire or nearly so: lower bracts like the leaves, the upper becoming cleft into 3 or 5 linear roseate or bright red segments: inflorescence narrow, the bracts and flowers at first much appressed and ascending: calyx 8-9 lines long, with attenuate-lanceolate acute segments: corolla about 1½ lines long, the narrow galea about as long as the tube; lower lip less than a line long, the narrowly deltoid lateral lobes twice as long as the middle one. In pine woods, Swan Lake Valley Klamath Co. Oregon.

C. pruinosa Fernald l. c. Whole plant cinereous with fine often stellate pubescence: stems simple or slightly branched above, slender, 8-16 inches high: leaves 12-18 lines long, the lowest linear, entire, the upper lanceolate or oblong-lanceolate, subentire or slightly and irregularly lobed: bracts 3-lobed above the middle, scarlet above, exceeding the calyx, spread-

ing at maturity before and behind: segments: corolla lip very short, one. On rocky

C. Elmeri solitary or in small crowded, ascending oblong-lanceolate obovate-oblong lowest green, a little deeper than the tube; the lobes about ¼

C. Covillei well as villous subvertical root into linear more than the leaves the flowers: deeper cleft, be acute lobes: corolla tube twice the deeply infolded and subconvoluted

C. miniata the inflorescence simple and striate obovate-lanceolate lanceolate to ovate short and dense inch long, the galea lower lip protuberant teeth. In

C. Suksdorfii throughout: stems long rootstocks: leaves narrow commonly lacinate broadly cuneate lobes often agglutinating squalling the lower an inch lower lip exceeding the Mountains of C

C. lutea throughout: stems cuneate the upper ones narrow and acute lobes narrower more unequally rounded, the lower long, equally dilated and long or a little long Potlatch river

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C. Elmeri Fernald l. c. Viscid-pilose throughout: stems simple, solitary or in small clusters, 8-12 inches high: leaves 1-2 inches long, rather crowded, ascending, the lowest linear-acuminate, the upper lanceolate or oblong-lanceolate, the broader ones indistinctly 3-nerved: bracts oblong or obovate-oblong, entire or slightly lobed at the tip, 12-15 lines long, the lowest green, the uppermost crimson or rose-purple, calyx 8-10 lines long, a little deeper cleft before than behind, the lobes entire or cleft into lacinate segments: corolla 12-15 lines long, the green-backed galea half as long as the tube; the lower lip included or slightly exerted, with 3 incurved lobes about ¼ as long as the galea. On Wenatchee Mountain, Washington.

C. Covilleana Henderson Bull. Torr. Club xxvii, 353. Glandular as well as villous throughout with long crisp hairs: stems numerous from a subvertical rootstock about 8 inches high: leaves narrow, 3-parted above into linear more or less circinate lobes, 12-18 lines long: bracts broader than the leaves, 3-parted and the central segment 2-3-cleft, about equalling the flowers: calyx equalling or slightly surpassed by the corolla, much deeper cleft behind than before, the divisions shortly cleft into lanceolate acute lobes: corolla slightly villous, conspicuously glandular above, with tube twice the length of the lower lip which is somewhat saccate with 3 deeply infolded narrow plicae slightly longer than the 3 erect bright-colored subconvoluted lobes. Among rocks, Soldier Mountain, Idaho.

C. miniata Dougl. Hook. Fl. ii, 106. Glabrous or nearly so except the inflorescence: stems numerous and tufted on a short rootstock, mostly simple and strict, 1-2 feet high: leaves lanceolate or linear, or the upper ovate-lanceolate, acute, entire or rarely laciniately 3-cleft: bracts from lanceolate to oval, mostly bright red, rarely whitish, seldom lobed: spikes short and dense: calyx-lobes lanceolate, acutely 2-cleft: corolla over an inch long, the galea exerted, linear, longer than the tube, the very short lower lip protuberant and callous, as deep as long, with short ovate involute teeth. In damp soil, Alaska to California and the Rocky Mountains.

C. Suksdorfii Gray Proc. Am. Acad. xxii, 311. Sparsely villous throughout: stems slender, 1-2 feet high, from slender underground creeping rootstocks, simple, or sometimes with a few branches above, lower leaves narrowly lanceolate, attenuate, entire, 1-3 inches long, upper ones commonly laciniately 3-lobed, the lateral lobes linear and erect: bracts broadly cuneate in outline, about an inch long, deeply 3-lobed, the lobes often again cleft or toothed, bright red: spikes short: calyx about equalling the bracts, its oblong, lobes acutely cleft at the apex: corolla over an inch long, the galea exerted, longer than the tube, the very short lower lip exerted, 3-lobed. In wet or marshy places in the Cascade Mountains of Oregon and Washington.

C. lutea Heller Bull. Torr. Club xxv, 268. Lanate-pubescent throughout: stems clustered, 10-16 inches high: lower leaves narrow lanceolate, the upper ones mostly 3-lobed, the lobes all lanceolate but the lateral ones narrow and acuminate, the middle one usually again 3-lobed with its lateral lobes narrower: bracts pale yellow, or their tips somewhat purple-tinged, more unequally lobed or toothed than the leaves, their middle lobes broad and rounded, the others narrowly lanceolate: calyx oblong, about 18 lines long, equally cleft before and behind to the middle, the lobes obtuse, slightly dilated and notched at the apex: corolla barely exerted, the galea as long or a little shorter than the tube. Grassy hillsides, mouth of the Potlatch river Idaho.



C. lutescens Rydb. *C. pallida* var. *lutescens* Greenman Bot. Gaz. xxv, 265. Stems several from a somewhat woody persistent base, 12-20 inches high, more or less pubescent, usually branched above: lower leaves linear to oblong-lanceolate, entire, upper ones somewhat broader, 2-3-lobed, all somewhat scabrous, especially on the upper surface: bracts oblong, about an inch long, laciniately cut into 3-5 lobes, the lateral ones linear to subulate, the middle one broad and rounded at the summit, green or yellowish with whitish tips: spikes dense and many-flowered: calyx 8-10 lines long, pubescent, its oblong lobes deeply 2-toothed: corolla but little longer than the calyx, the galea about $\frac{1}{2}$ as long as the tube, 3-4 times as long as the lower lip. On prairies, eastern Washington.

C. camporum. *C. pallida* var. *camporum* Greenman l. c. Stems usually several, rising from a perennial base; 6-12 inches high, more or less covered with a spreading pilose pubescence: leaves narrowly oblong-lanceolate, the lower mostly entire, the upper irregularly laciniately 3-7-lobed with narrow ascending lobes, pubescent both sides: inflorescence greenish-yellow or tinged with red, at length becoming much elongated: calyx 6-13 lines long, the lobes again shortly 2-lobed and obtuse or even rounded at the summit: lower lip $\frac{1}{2}$ - $\frac{2}{3}$ as long as the galea. On prairies eastern Washington.

C. pallescens Greenman l. c. *Orthocarpus pallescens* Gray. Cinereous-puberulent: stems 6-12 inches high, usually several from a woody perennial base, simple or sparingly branched above: leaves 3-parted into linear lobes, or the lower entire: bracts similar to the leaves, with dilated base or the upper with shorter obscurely whitish or yellowish lobes: calyx deeply 2-cleft, its broad lobes merely 2-cleft at the summit: corolla over 6 lines long, galea broadish, obtuse, the lower lip nearly half as long as the galea, obscurely saccate. Eastern Oregon and Washington to the Rocky Mountains.

C. pilosa Rydb. *Orthocarpus pilosus* Watson. From soft villous to hirsute-pubescent: stems tufted at the crown of a somewhat woody rootstock, 2-10 inches high: leaves 2-3 inches long, lanceolate, 3-nerved, divaricately 3-lobed, the middle lobe broadest, dilated and rounded at the apex, the lateral ones linear: bracts shorter and broader than the leaves, usually 5-lobed, the lateral lobes linear, the middle one broad, rounded at the summit, all tipped with pale yellow: calyx about an inch long, the oblong lobes about as long as the tube, emarginate to deeply 2-lobed, the lobes rounded: corolla barely surpassing the calyx, the straight and broad galea about half as long as the tube; the lower lip 3-lobed, obscurely saccate, more than half as long as the galea. On high dry plains, eastern Oregon to Nevada and Brit. Columbia.

C. Cusickii Greenman l. c. 267. Stems several from a procumbent base, 16-18 inches high, simple or branched above, covered with a short spreading cinereous pubescence: lower leaves linear to linear lanceolate, acute, 1-2 inches long, upper ones somewhat larger, usually laciniately lobed with 1 or 2 pairs of slender spreading lobes: bracts oblong, obtuse or rounded at the summit, usually entire strongly ciliate toward the base, distinctly 3-nerved and rather strongly reticulate-veined, 10-14 lines long, racemes rather dense, 2-5 inches long: calyx 10-12 lines long, pubescent outside equally cleft before and behind, its lobes linear-oblong, bidentate or shallowly 2-lobed at the apex: corolla 12-16 lines long, the galea scarcely twice as long as the 3-lobed lower lip: capsule oblong, about 6 lines long, glabrous. In Sumpter valley, eastern Oregon.

C. levisecta Greenman l. c. Stems many from a perennial base, 6-10 inches high, usually simple, covered with a more or less spreading unequal pilose pubescence: leaves oblong-lanceolate, 1-2 inches long, 3-5-nerved, pubescent both sides, often bearing long pilose hairs on the veins beneath.

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the lower somewhat narrower and sometimes entire, the upper laciniately cut into narrow lobes: bracts yellow, an inch or more long, oblong, subdigitately lobed at the summit: calyx 8-10 lines long, pubescent outside, the oblong lobes again rather deeply 2-lobed, obtuse or rounded at the summit: corolla an inch or more long, the galea 4-6 lines long, 2 or 3 times longer than the shortly and obtusely 3-lobed lower lip. On dry plains, western Washington.

C. rustica Piper Bull. Torr. Bot. Club xxvii, 398. Minutely white-pubescent throughout and somewhat glandular above: stems erect, simple or more commonly with some erect branches: leaves narrowly lanceolate, rather few, mostly entire: bracts 3-5-cleft, only the lower longer than the flowers, greenish: spike dense, 1-4 inches long: calyx 6 lines long, short-villous, equally cleft before and behind, the segments slightly shorter than the tube, each divided to the middle into similar triangular acuminate teeth: corolla greenish-yellow, about 8 lines long, the obtuse galea more than half as long as the tube: lower lip one-fourth as long as the galea, saccately 3-lobed, the free portions acute. Rocks of the Wallowa river, eastern Oregon.

C. rubida Piper l. c. Pubescent with short white crisp hairs and also minutely glandular: stems numerous, simple, decumbent, 1-6 inches long, from a stout woody caudex: leaves linear or lanceolate, entire or more commonly 3-cleft, 6-12 lines long: bracts 3-7-cleft, mostly tinged with dull purple: spikes short and dense: calyx more or less villous, 6 lines long, equally cleft before and behind, the lobes half as long as the tube, each again deeply cleft so that the 4 triangular acuminate teeth are subequal: corolla 8 lines long, the blunt galea only one third as long as the tube, slightly longer than the saccately 3-lobed lower lip, the free portions of which are oblong and obtuse. Subalpine on the Wallowa Mountains, northeastern Oregon.

29 ORTHOCARPUS Nutt. Gen. ii, 56. (1818.)

Annual herbs with alternate leaves and yellow, white or purple flowers in bracted spikes, the bracts often bright-colored. Calyx tubular or tubular-campanulate, 4-cleft. Corolla very irregular, the tube slender, the limb bilabiate; upper lip little if any longer than the 3-lobed 1-3-saccate lower one. Stamens 4, didynamous, ascending under the upper lip. Anther-cells dissimilar, the outer one affixed by its middle, the other pendulous from its upper end, commonly small, sometimes wanting. Style filiform, with entire stigma. Capsule oblong, loculicidally dehiscent, many-seeded. Seeds reticulated.

§ 1 CASTILLEIODES Gray Bot. Cal. ii, 575. Corolla with the lower lip simply or somewhat triply saccate and with conspicuous mostly erect lobes, the upper lip either broadish or narrow. Anthers all 2-celled. Seeds with a very loose and arilliform cellular-favose coat.

* Upper lip narrow and nearly straight, lanceolate-triangular or broadly subulate, naked: lower lip moderately ventricose and somewhat plicate-trisaccate for its whole length, the teeth or lobes conspicuous, erect: filaments glabrous: capsule oblong or oval.

O. attenuatus Gray Pacif. R. Rep. iv, 121. Minutely hirsute-pubescent: stem slender, erect, 6-18 inches high, simple, or branched from the base: leaves linear and attenuate, often with a pair of filiform lobes, 3-ner-

ved from the base, 2-3 inches long: bracts broader than the leaves, 4-6 lines long, with 1 or 2 pairs of filiform white-tipped lobes: spikes virgate, elongated: calyx longer than the bracts, with 4 filiform white-tipped teeth about as long as the tube: corolla white, exceeding the calyx, narrow throughout, the narrow lobes of the purple-spotted lower lip nearly equaling the upper one: capsule oblong, about 3 lines long: seeds white. In moist open places, Puget Sound to California west of the Cascade Mts.

O. castilleoides Benth. Scroph. Ind. 13. Minutely pubescent or glabrate below: stem 5-12 inches high, simple or at length diffuse and corymbosely branched: leaves from lanceolate to oblong, usually laciniately lobed, the upper ones and bracts cuneate-dilated and incisely cleft, herbaceous, or the obtuse tips whitish or yellowish: spikes dense, short and thick: calyx 8-10 lines long, the 4 oblong lobes as long as the tube, the obtuse tips whitish: corolla nearly an inch long, dull white, or purplish-tipped, upper lip narrow and straight, the lower ventricose-dilated: capsule oblong, 5-6 lines long, obtuse or emarginate: seeds oblong or longer, dark brown. In salt-marshes along the coast, Puget Sound to California.

* † Upper lip attenuate upward, densely bearded on the back, uncinately or incurved at the obtuse tip, rather longer and very much narrower than the open-saccate lower lip: filaments pubescent.

O. purpurascens Benth. l. c. Hirsute throughout: stem erect, rather stout, at length much branched from the base, 6-12 inches high: leaves with lanceolate base or body and laciniately 1-2-pinnately linear or filiform lobes, or the upper palmately cleft, 1-2 inches long: bracts about an inch long, crimson to purple, somewhat dilated, laciniately cleft into linear obtuse lobes: calyx 8-10 lines long, the 4 linear lobes nearly as long as the tube: corolla crimson to purple, about an inch long, narrow, the ventricose-dilated lower lip shorter than the narrow upper one: stigma large, depressed-capitate: capsule ovate, acute, 5-6 lines long: seeds orbicular to ovate white, somewhat winged. Along the coast southern Oregon to California.

§ 2 **EUORTHOCAPIA** Corolla with simply saccate lower lip inconspicuously or obsoletely 3-lobed, and moderately smaller ovate-triangular galea with small usually somewhat uncinately inflexed tip or mucro. Anthers all 2-celled. Stigma small, entire. Seed-coat very loose, costate-reticulated.

* Bracts conspicuously different from the leaves, much dilated, entire, or with narrow lateral lobes, more or less colored, imbricated in the dense spike: corolla mostly rose-color.

O. cuspidatus Greene Pitt. iv, 101. Minutely pubescent and the leaves more or less ciliate: stem slender and usually simple, 6-20 inches high: leaves 2-3 inches long, linear-lanceolate, entire or laciniately cleft into 3 linear or almost filiform lobes: bracts purple, chartaceous, ovate lanceolate to oval, 6-8 lines long by 4-5 broad, with or without a pair of short subhastate lobes at base, rounded and cuspidate, or abruptly short acuminate at the apex, ciliate at base: spikes dense, 2-4 inches long: calyx 4-6 lines long, sparingly bristly, the 4 subulate very acute teeth about as long as the tube: corolla about an inch long, tubular-funneliform, the narrow, at length strongly curved, galea pubescent on the back, much longer than the inflated 3-toothed lower lip and two thirds as long as the tube: capsule ovate, obtuse. On high ridges of the Siskiyou Mountains and foothills near Ashland Oregon.

O. tenuifolius Benth. Scroph. Ind. 12. Pubescent and more or less hispid: stem rather slender, 4-10 inches high, paniculately branched: leaves simple: leaves linear-attenuate, 3- or 5-lobed, with filiform lobes, 6-8 lines long: bracts oblong, 6-8 lines long, rounded and minutely or not

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§ 3 **TRIPHY**
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all cuspidate at the apex, ciliate below and with 1 or 2 pairs of subulate divaricate lobes, chartaceous and more or less colored with red or purple: calyx sparsely hispid, 4-6 lines long, its attenuate-subulate lobes almost as long as the tube: corolla narrow, 6-8 lines long, puberulent, purplish, the tube little surpassing the calyx, the inflexed tip of the galea minute: anther-cells oblong, sparsely pubescent. Dry ground, eastern Washington to California, Montana and Brit. Columbia.

O. imbricatus Torr. in Herb. Watson Bot. King 458. Stem slender, erect, simple or sparingly branched, 2-10 inches high, minutely pubescent: leaves 1-2 inches long, linear to lanceolate, attenuate, the upper ones broadest and sessile by a broad base, all entire: bracts chartaceous, dull red, oval to oblong, rounded at both ends, usually with a pair of small subulate teeth near the base, otherwise entire, glabrous, 4-5 lines long: calyx 2 lines long, 2-lobed to below the middle, the lobes acutely 2-toothed, ciliate: corolla purplish, 4-8 lines long, nearly glabrous, the uncinately-tipped galea a little longer than the slightly dilated 3-plicate lower lip: capsule obovoid, 2 lines long: seeds obovoid, black. On grassy plains of the Cascade Mountains of Oregon.

* * Bracts herbaceous, little if at all colored, less or little different from the leaves, all 3-cleft and with acute lobes.

O. bracteosus Benth. l. c. Hirsute-pubescent: stem strict, simple or branched above, 6-18 inches high: leaves linear-lanceolate, 1-2 inches long, all 3-lobed to near the base with narrow lanceolate or filiform attenuate lobes: bracts of the thickish and dense spike cuneate-dilated, shorter than the flowers, 3-lobed, the divergent lobes broadly lanceolate, acute: calyx pubescent, about 3 lines long, the 4 filiform teeth about as long as the tube: corolla narrow funnelform, rose-purple, 6-8 lines long, the short galea but little longer than the much dilated 3-saccate lower lip: capsule ovoid, 2-3 lines long: seeds oblong, dark-colored. On dry plains, Brit. Columbia to California,

O. luteus Nutt. Gen. ii, 57. Pubescent and hirsute, sometimes viscid: stem strict, 8-12 inches high, simple, or branched above: leaves erect ascending, linear or lanceolate, entire or sometimes 3-cleft, long-acuminate, 12-18 lines long: bracts of the dense spike lanceolate, broader and shorter than the leaves, entire or 3-cleft, acute, green, mostly longer than the flowers: calyx-teeth acute, shorter than the tube: corolla yellow, 5-6 lines long, pubescent outside, its galea ovate, obtuse, about as long as the saccate 3-toothed lower lip: capsule about as long as the calyx-tube. On dry plains, eastern Washington and Brit. Columbia to California and Ariz.

O. Tolmiei H. & A. Bot. Beech. 379. Pubescent: stem 8-15 inches high, loosely branching: leaves linear or linear-lanceolate, 1-2 inches long, entire or rarely incised: bracts divaricately 3-cleft, the segments acuminate: spikes short, rather dense: calyx 2-3 lines long, the tube twice as long as the ovate-lanceolate teeth: corolla 4-6 lines long, bright yellow, glabrous, the galea uncinately, little exceeding the narrowly saccate 3-plicate lower lip, slightly hairy on the margins, the teeth very short: capsule 2 lines long, retuse, compressed: seeds 4-6, oblong. In the mountains of southern Idaho to the Wahsatch Mountains of Utah.

§ 3 *TRIPHYSARIA* Benth. Corolla with conspicuous trisaccate lower lip, very much longer than the slender straight galea, its teeth minute or small: tube filiform or slender: stigma capitate, sometimes 2-lobed.

* Lower lip of the corolla saccately three-lobed from the end: anthers one-celled: seed-coat close, conformed to the nucleus, apiculate at one or both ends.

O. pusillus Benth. Scroph. Ind. 12. Whole plant reddish-brown, hirsute with short hairs; stem slender, 1-4 inches high, diffusely branching and flowering from the base: leaves lanceolate, an inch or more long, once or twice pinnatifid with filiform lobes: bracts shorter than the leaves, broadly cuneate in outline, 3-5-parted into filiform divisions: calyx pubescent, the 4 filiform lobes about as long as the tube: corolla purplish, shorter than the bracts, 2-3 lines long, the tube not surpassing the calyx, the lower lip moderately 3-lobed, beardless: capsule globose, two lines long: seeds minute, dark-colored. In low open places, Brit. Columbia to California.

O. erianthus Benth. Scroph. Ind. 12. Minutely pubescent to nearly glabrous: stem 6 inches to a foot high, fastigiately or paniculately much branched: leaves two to three inches long, pinnately parted above the entire base into setaceous or filiform divisions: bracts but little longer than the calyx, with lanceolate body and filiform lobes: calyx 5-6 lines long, the lanceolate teeth about one third as long as the tube: corolla nearly an inch long, yellow, lower lip of three globular-inflated sacs, not more than one fourth as long as the filiform pubescent tube, the two folds separating the sacs without villous-bearded, galea subulate, brownish-purple, but little exceeding the lower lip. Low ground near the coast, southern Oregon and California.

** Anthers two-celled: seed-coat loose and arilliform, coarsely reticulated

O. lithospermoides Benth. l. c. Copiously hirsute above, pubescent below: stem 6-18 inches high, strict, simple, or with some erect branches very leafy: leaves lanceolate or somewhat linear, 2-5-cleft, or the lowermost simple: bracts of the dense many-flowered spike cuneate-dilated and 3-5-cleft about equalling the flowers: calyx two lines long, the short subulate teeth about as long as the tube: corolla about an inch long, cream-color, or often turning pale rose-color: sacs of the lower lip three lines deep, the teeth sharp and inconspicuous: capsule ovate. In open places, southern Oregon and California.

O. lacernus Benth. Pl. Hartw. 329. Rather soft hirsute and above decid: stem strict, simple, or branched above, 6-14 inches high: leaves pinnately and bracts palmately 3-7-cleft or parted, with linear attenuate lobes: corolla yellow, 6-8 lines long: galea straight, subulate, glabrous or merely puberulous: lower lip ample, the sacs nearly as deep as long, shorter than the galea. On dry ground, eastern Oregon to California.

O. hispidus Benth. Scroph. Ind. 12. Soft-hirsute: stem slender, strict and erect, 4-12 inches high, simple, or with a few erect branches near the top: leaves lanceolate, 6-18 lines long, deeply 3-lobed, with linear attenuate lanceolate lobes: bracts similar to the leaves but smaller: spikes very dense 2-3 inches long: calyx about 4 lines long, pubescent, the subulate teeth shorter than the tube: corolla white, 6-8 lines long, the lower lip with moderately ample sacs longer than deep, surpassed by the subulate galea: capsule ovoid, obtuse, longer than the tube of the calyx: seeds obovoid, dark green. In damp open places, western Oregon to California.

21 ADENOSTEGIA Benth. in Lindl. Nat. Syst. ed. 2, 445.

CORDYLANTHUS Nutt.

Branching annual herbs with narrow alternate leaves and inconspicuous flowers in leafy-bracted fascicles or spikes at the ends of the branches. Calyx spathe-like, diphyllous, or by the absence of the anterior division monophyllous. Corolla tubular, slightly dilated upward, bilabiate, the lips short, rarely unequal in length.

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A. ramosa Greene Pitt. ii, 180. *Cordylanthus ramosus* Nutt. Canescent with a minute scabrous pubescence: stem erect, 6-10 inches high, branching: leaves pinnately 3-5-parted with filiform segments; the floral ones with 5-7 equal filiform lobes, scarcely dilated at the apex: bracts entire or 2-3-lobed: flowers capitate: calyx leaves 5-7 lines long, ovate or oblong, obtuse, 4-6-nerved, the upper one emarginate: corolla yellow, 6-8 lines long: stamens 4; filaments more or less villous; anthers 2-celled: capsule 4-5 lines long, linear-oblong, 20-seeded. Eastern Oregon to Nevada and Wyoming.

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A. capitata Greene l. c. *Cordylanthus capitatus* Nutt. Pilose-pubescent: stem erect, 6-20 inches high, branched above: lower leaves and those of the branches linear, one to two inches long, mostly entire, upper ones three-lobed, the lobes linear or filiform: floral leaves three-cleft or subpinnatifid: flowers in small capitate fascicles, sessile, usually with a single obtuse bract: calyx two-leaved, the lower leaf three to five-nerved, the upper two-nerved and two-toothed at the apex: corolla six to eight lines long, purplish, but little exceeding the calyx: stamens two; filaments flattened, almost glabrous: anthers one-celled: capsule oblong, eight-seeded: seeds minutely favose. In open woods, eastern Washington to Nevada and Idaho.

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A. viscida. Minutely pilose and copiously viscid-glandular: stem erect, one to three feet high, divaricately much branched: leaves linear-lanceolate, one to three inches long, mostly entire. Those subtending the branches with a pair of linear lobes near the base; floral leaves deeply three-lobed, the lobes linear-spatulate, not callous-tipped: flowers in small fascicles or solitary: calyx two-leaved, nearly an inch long, the lower leaf linear-oblong, obtuse, five-nerved, the upper linear-lanceolate, acuminate, faintly five-nerved: corolla purplish, barely equalling the calyx: antheriferous stamens two, with villous filaments and two-celled anthers: sterile filaments conspicuous: fruit not seen. On dry slopes, eastern base of the Coast Mountains near Waldo, southern Oregon.

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22 PEDICULARIS L. Sp. 603.

ed. 2, 445.

Herbs with alternate or opposite leaves and yellow, purple, red or white flowers in terminal spikes or racemes. Calyx tubular, cleft on the lower side or sometimes also on the upper side, or 2-5-toothed. Corolla strongly bilabiate, the tube cylindrical; the galea laterally compressed, concave or conduplicate, sometimes beaked; lower lip erect or ascending, 3-lobed, the lobes spreading or reflexed, the middle one smallest. Stamens 4, didynamous, ascending within the upper lip of the corolla: anthers transverse, approximate in pairs, their cells equal, parallel, obtuse or rarely, mucronate at base. Capsule compressed, oblique or curved, beaked, many-seeded loculicidally dehiscent. Seeds reticulated pitted, striate or ribbed.

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P. Menziesii Benth. in DC. Prodr. x, 563. Nearly glabrous: stems

about ten inches high, simple: leaves deeply pinnatifid or pinnately parted into oblong incisely toothed divisions: lower whorls of the spike rather distant: calyx inflated-globose its teeth short, ciliate, somewhat crested: tube of the corolla exceeding the calyx: galea straightish, slightly if at all beaked, shorter than the depending lower lip. Northwest Coast *Menzies*.

* * Leaves alternate or sometimes opposite.

P. Grœnlandica Retz Fl. Scand. ed. 2, 145. Glabrous perennial: stems simple, erect, twelve to eighteen inches high: leaves alternate, lanceolate in outline, acute or acuminate, pinnately parted or the lower pinnately divided into lanceolate acute crenulate or incised segments, the lower slender-petioled, the upper sessile, two to six inches long: spikes one to six inches long, very dense: calyx five toothed, nearly as long as the tube of the corolla, the teeth short, acutish: corolla red or purple, the galea produced into a filiform beak 6-8 lines long, which is decumbent upon the lower lip and upwardly recurved beyond it: capsule obliquely ovate, about three lines long. In mountain marshes, Alaska to California and across the Continent.

P. contorta Benth. in Hook. Fl. ii, 108. Glabrous perennial: stems eight to twelve inches high, simple, erect: leaves mostly radical and petioled, two to three inches long, pinnately parted into linear entire or incisely serrate alternate lobes, the upper similar but smaller and sessile: spikes cylindrical, two to four inches long, many-flowered: calyx four to five lines long, cleft to below the middle into two triangular acute lobes which are sharply two-toothed at the apex: corolla yellow or whitish, the galea produced into a slender elongated-subulate circinate incurved beak equalling or longer than the broad lower lip: capsule six lines long, exceeding the calyx, ovoid, obliquely acute: seeds oblong, callus apiculate at both ends. In open meadows in the Cascade Mountains to Idaho.

P. racemosa Dougl. Hook, Fl. ii, 108. Glabrous perennial: stems rather slender, one to two feet high, simple, or sometimes branched, leafy to the top: leaves all cauline, one to two inches long, lanceolate, undivided, finely serrulate or incisely crenate and the crenations finely crenulate, the teeth mostly white-tipped, all petioled: flowers rather few, in a short leafy raceme: calyx somewhat oblique, deeper cleft before than behind, the lobes abruptly acuminate, three lines long: corolla dull white or yellowish, six to eight lines long, the galea produced into a slender elongated-subulate circinate incurved beak nearly as long as the broad lower lip, hamate-deflexed. Subalpine regions, Brit. Columbia to California and the Rocky Mountains.

P. Howellii Gray Proc. Am. Acad. xx, 107. Glabrous perennial: stem stout, six to eighteen inches high, naked, or with some small scales below, above densely leafy up to the short and dense cylindrical spike: leaves all cauline, one to two inches long, oblong, some simple and undulate-serrate or entire on margined petioles, others pinnately three to seven-parted or upper lobes more confluent: bracts foliaceous, ovate, mostly acuminate, more or less lanate-ciliate, shorter than the flowers: calyx campanulate, sparsely villous, five-toothed, the teeth ovate, nearly entire, the posterior and lateral more connate: corolla white or yellowish, with exerted tube and a rather long much incurved somewhat rose-colored galea much longer than and surrounding the short obscurely three-lobed lower lip. On damp shady slopes, top of the Siskiyou Mountains near Waldo Oregon.

P. ornithorhyncha Benth. in Hook. l. c. Smooth perennial: stems scapiform, or sometimes bearing a pair of leaves, 6-8 inches high, simple: leaves pinnately parted and the oblong or lanceolate divisions incisely pinnatifid, the lobes small, dentate: spikes interrupted: calyx ovate-inflated,

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the teeth nearly entire: corolla about half-inch long, galea falcate, with a narrow beak longer than its width, lower lip much smaller. Mount Rainier, Washington.

P. parviflora J. E. Smith in Rees' Cyclop. 1814. Glabrous: stems about a foot high, branching, from a biennial or perhaps perennial root: leaves all pinnate'ly parted; the small segments oblong, incisely crenate: calyx two-cleft, its lobes incisely cristate: corolla narrow, 6 lines long, purplish, its lips much shorter than the tube; galea not at all beaked, nearly straight, the anterior face curvilinear and slender-bidentate at the lower part of the apex, and a pair of minute additional denticulations at the throat. Alpine or subalpine, Oregon to Alaska and Hudson Bay.

P. bracteosa Benth. l. c. Glabrous perennial: stem stout, 1-3 feet high, erect and simple, leafy only near the middle: leaves linear to ovate in outline, the radical few, petioled, pinnate. the oblong leaflets $\frac{1}{2}$ -1 inch long and pinnately parted, the segments incisely dentate, the teeth often tipped with white; cauline broader in outline, 2-4 inches long, pinnate or pinnately parted, the segments narrowly lanceolate, 1-2 inches long, coarsely serrate: bracts ovate, acuminate, shorter than the flowers: spikes cylindrical, in flower very dense: calyx sparsely pilose, 9 lines long, its teeth subulate from a broad base: corolla about an inch long, ochroleucous, the tube about equalling the calyx; galea much longer and larger than the lower lip, its cucullate summit slightly produced at the entire edentulate orifice, but not beaked. In open forests of high mountains, eastern Oregon to Brit. Columbia and the Saskatchewan.

P. densiflora Benth. Hook. Fl. ii, 110. Pubescent or glabrate perennial: stem stout, 6-20 inches high, leafy, simple: leaves ample, 4-12 inches long, of oblong outline, bipinnatifid, or pinnately parted and the lobes lacinate-dentate, the irregular salient teeth cuspidate-tipped: lower bracts leaf-like, uppermost almost entire and equalling or shorter than the flowers: spikes at first very dense, oblong, 2-5 inches long, in age looser and sometimes a foot long: calyx campanulate, about 6 lines long by 4-5 broad, 5-toothed, the triangular acute teeth about half as long as the tube: corolla 12-18 lines long, scarlet; galea completely straight and anteriorly rectilinear, very much longer and larger than the very small 3-lobed lower lip: filaments glabrous. On dry hillsides, southern Oregon and California.

23 RHINANTHUS L. Sp. 603.

Erect annual herbs with opposite leaves and yellow, blue or variegated flowers in terminal secund leafy-bracted spikes, or solitary in the upper axils. Calyx compressed, 4-toothed, much inflated, membranaceous and veiny in fruit. Corolla very irregular or bilabiate, the upper lip compressed, arched, minutely 2-toothed below the entire apex, the lower lip shorter, 3-lobed, the lobes spreading. Stamens 4, didynamous, ascending under the galea. Anthers pilose, the cells obtuse at base, transverse, distinct. Capsule orbicular, flat, loculicidally dehiscent, several-seeded. Seeds nearly orbicular, winged.

R. Crista-Galli L. Sp. 603. Glabrous, or pubescent above: stem slender, usually branched, $\frac{1}{2}$ -2 feet high: leaves lanceolate, 1-2 inches long, sessile, coarsely serrate dentate: bracts broader, ovate to ovate-lanceolate, incised-dentate, the teeth acuminate, or subulate-tipped: flowers yellow, 6-8 lines long: corolla-tube longer than the calyx, commonly with a purple spot on one or both lips: fruiting calyx ovate-orbicular, 4-8 lines

in diameter: capsule orbicular or broader, nearly as broad as the calyx, very flat, not oblique. In fields and waste places, Oregon to Alaska and across the Continent: Europe and Asia.

24 MELAMPYRUM L. Sp, 606.

Annual branching herbs with opposite leaves and small flowers solitary in the upper axils, or in terminal spikes. Calyx 4-toothed, the 2 upper teeth somewhat longest. Corolla bilabiate, the tube narrow, gradually enlarged above, the upper lip compressed, obtuse or emarginate, with a groove behind the margins, or these recurved, or with a tooth on each side, lower lip spreading or ascending, 3-toothed, 2-grooved beneath. Stamens 4, ascending under the galea. Anther-cells distinct, parallel, obtuse or mucronulate at base. Capsule flat, oblique, loculicidally dehiscent, 2-4-seeded. Seeds smooth, strophiolate.

M. lineare Lam. Encycl. iv, 22. Pubescent: stem slender, obscurely 4-sided above, at length widely branched, 6-18 inches high: leaves lanceolate or linear-lanceolate, short-petioled, acuminate or acute at the apex, narrowed, obtuse or the upper truncate at base, 1-2½ inches long, the lower all entire, the upper floral ones ovate or lanceolate with 2-6 bristle-pointed teeth near the base: flowers short-peduncled, 4-6 lines long: calyx about one-third the length of the corolla, its subulate teeth longer than its tube: corolla white or whitish, pubescent, the lower lip yellow: capsule 4-5 lines long, about 2 lines broad, twice as long as the calyx. In dry woods, Idaho to Brit. Columbia and east to the Atlantic.

ORDER LXIX. OROBANCHACEÆ Lindl. Nat. Syst. ed 2, 287.

Erect, simple or branched, brown yellowish purplish or nearly white, root-parasitic herbs with the leaves reduced to alternate appressed scales and perfect irregular flowers in terminal bracted spikes, or sometimes solitary or fascicled and peduncled in the axils of the scales. Calyx inferior, gamosepalous, 4-5-toothed or 4-5-cleft, or split nearly or quite to the base on one or both sides. Corolla gamopetalous, more or less oblique, the tube cylindrical, or expanded above, the limb bilabiate and 5-lobed. Stamens 4, didynamous, inserted on the tube of the corolla and alternate with its lobes, a fifth rudimentary one sometimes present. Anthers two-celled, the cells parallel and equal. Ovary one-celled, with apparently four parietal placentae and numerous, anatropous, ovules. Style slender, with two-lobed or four-lobed discoid stigma. Capsule one-celled, two-valved. Seeds numerous, reticulated, wrinkled or striate. Cotyledons scarcely differentiated.

* Anther-cells deeply separated from below, mucronate or aristulate at base.

- 1 *Orobanche* Flowers spicate and sessile or subsessile.
- 2 *Thalesia* Flowers pedunculate, without bracts on the peduncle or calyx.

* * Anther-cells parallel and mucronate at base.

- 3 *Boschniakia* Flowers sessile in a dense simple scaly-bracted spike.

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1 OROBANCHE L. Sp. 632. (1753.)

Glandular-pubescent reddish yellowish violet or nearly white herbs, parasitic on the roots of various plants, with scattered scales and spicate or racemose bracted and sometimes bracteolate flowers. Calyx split both above and below nearly or quite to the base, the divisions 2-cleft or rarely entire, or more or less unequally 2-5-toothed. Corolla oblique, strongly bilabiate: upper lip erect, emarginate or 2-lobed: lower lip spreading, 3-lobed. Stamens not exerted: anther-cells mostly mucronate at the base. Placentæ equidistant or approximate in pairs. Style slender, usually persistent until after the dehiscence of the capsule: stigma peltate to funnelform, entire or laterally 2-lamellate.

O. comosa Hook. Fl. ii, 93. *Aphyllon comosum* Gray. Puberulent: stems stout, 2-4 inches high, branching close to the ground: scales rather few, oblong-ovate to lanceolate: flowers corymbose or paniculate-racemose, on stout pedicels 4-8 lines long: bractlets one or two, on the pedicels or sometimes at the base of the flower: calyx deeply 5-parted; lobes subulate-linear and attenuate, 6-10 lines long: corolla pink or pale purple, an inch or more long; upper lip barely spreading, obtuse; lower lip acutely 3-toothed, spreading; anthers woolly: capsule oblong, obtuse, 6 lines long: seeds very numerous, yellowish. On dry hills, eastern Washington to California.

O. Californica Cham. & Schlect. Linn. iii, 134. *Aphyllon Californicum* Gray. Pubescent with short hairs and viscid: stems stout, 8-10 inches high: flowers crowned in an oblong dense raceme or thyrsus: pedicels shorter than the calyx: bractlets close to the calyx, linear-lanceolate: calyx deeply 5-parted, the subulate-linear lobes 6-10 lines long: corolla yellowish or purplish, but little longer than the calyx its short oblong lobes barely spreading: anthers glabrous or slightly hairy. Sandy places, Oregon to California and Nevada.

O. pinetorum Geyer. Hook. Kew Journ. Bot. iii, 297. *Aphyllon pinetorum* Gray. Pubescent with short whitish hairs: stems rather slender above the thickened tuber-like base, 6-12 inches high: flowers subsessile or short pedicelled, in a long and rather loose panicle: calyx 2-bracteolate at base, deeply 5-cleft, the lobes subulate from a broad base, not longer than the tube: corolla yellowish, 6 lines long: anthers glabrous: capsule oblong, obtuse, 4 lines long, exceeding the calyx. On the roots of coniferous trees, Oregon to Brit. Columbia.

2 THALESIA Raf. Am. Month. Mag. ii, 267. (1818.)

APHYLLON Gray Man. 290. (1848.)

Glandular or viscid-pubescent herbs, parasitic on the roots of various plants, with scattered scales, and long-peduncled yellowish white or violet complete and perfect bractless flowers. Calyx nearly equally 5-cleft, the lobes acute or acuminate. Corolla oblique: the tube elongated, curved: the limb slightly bilabiate, the upper lip erect-spreading, 2-lobed: the lower lip spreading, 3-lobed, the lobes all nearly equal. Stamens included: anther-cells mucronate at the base. Ovary ovoid: placentæ equidistant or contiguous in pairs. Style slender, deciduous: stigma peltate, or transversely bilamellate.

T. uniflora Britton Mem. Torr. Club v, 298. *Aphyllon uniflora* Gray. Stem usually less than an inch long, nearly subterranean, bearing several ovate-oblong scales and 1-4 slender erect scape-like glandular-pubescent naked 1-flowered peduncles 3-8 inches high: calyx campanulate, pubescent and glandular, 4-5 lines high, its lanceolate-acuminate lobes as long as the tube or longer: corolla violet or white, puberulous outside, 8-12 lines long, the curved tube about 3 times as long as the limb, the short lobes oval or obovate, obtuse: capsule ovoid; longer than the calyx. In woods and thickets, California to Brit. Columbia and across the Continent.

T. purpurea Heller Bull. Torr. Bot. Club xxiv, 313. Rootstock stout, fascicled or sparingly branched, 2-3 inches long mostly subterranean, bearing a few broad acute prominently veined glabrous scales, and few to several stout glandular-pubescent channeled scape-like peduncles 4-6 inches high: calyx glandular-pubescent, equally 5-lobed, the lobes prominently 3-nerved, the lateral nerves close to the margin, twice the length of the tube, long-acuminate from a triangular base: corolla deep violet-purple, 16-18 lines long, glandular-pubescent; lobes broadly oblong or obovate, usually notched or sometimes merely rounded, fringed with short glandular hairs, marked with 3 yellowish veins: stamens smooth; the anthers obovate, short-acuminate at base: ovary glabrous. Mouth of the Potlatch Idaho.

T. fasciculata Britton l. c. Glandular-pubescent throughout: stems erect, 2-4 inches high, bearing several oblong to lanceolate scales and 3-20 naked 1-flowered peduncles 1-4 inches long: calyx broadly campanulate, 3-5 lines high; its lobes triangular-lanceolate or triangular-ovate, acute, equalling or shorter than the tube: corolla nearly an inch long, yellowish, often tinged with purple, the curved tube 3 times as long as the limb, the lobes oblong, obtuse: capsule ovoid to globose. On sandy banks, Brit. Columbia to California and Indiana.

3 BOSCHNIAKIA C. A. Meyer Bong. Veg. Sitcha. 159.

Erect simple brown or reddish densely scaly glabrous herbs, parasitic on Ericaceous shrubs or trees, with numerous flowers in a simple dense scaly-bracted cone-like spike. Flowers all alike and fertile, sessile, or short-pedicelled. Calyx short, cupuliform, posteriorly truncate or obliquely shorter, and with 3 distant teeth in front. Corolla ventricose: upper lip erect or fornicate, entire, lower 3-parted. Stamens slightly exerted: anther-cells closely parallel and mucicose at base. Stigma dilated and bilamellar or 4-lobed. Seeds with a thin reticulated or favose coat.

B. strobilacea Gray Pacif. R. Rep. iv, 118. Stems clustered, 4-12 inches high stout and thick, brownish-red: scales ovate or the upper ones more or less cuneate below, much imbricated: flowering from near the ground: pedicels stout, a line or two long: calyx with a pair of setaceous bractlets at base, irregularly 2-5-toothed, the teeth subulate: from a broad base, 3-4 lines long, about as long as the tube: corolla bilabiate, 8-10 lines long, upper lip entire, its margins involute, lower lip 2-lobed, naked: stamens densely woolly at base, shorter than the upper lip, anthers woolly style a little longer than the stamens; stigma irregularly 3-5-lobed: capsule globose, 4-valved, 1-celled: seeds globose, a line long, light-colored, with spongy coat. In open woods, southern Oregon to California.

B. Hookeri Walp. Rep. iii, 479. ? Stem comparatively slender, 3-6 inches high: scales oblong to broadly ovate, lax or densely imbricated: flowers sessile: calyx ebracteolate, 4-toothed, the triangular acute teeth a line or two long, about as long as the tube: corolla 6-8 lines long, upper

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lip entire, a little longer than the 3-toothed lower one. all more or less ciliate: filaments woolly at base: anthers white, cili. on the sutures: style shorter than the stamens, with irregularly 2-5-lobed stigma. On sandy plains near the sea, Oregon.

ORDER LXX LENTIBULARIACEÆ Lindl. Veg. Kingd. 686,

PINGUICULACEÆ

Aquatic herbs, or terrestrial in wet places, with the leaves all radical, or when floating opposite or verticillate, and mostly showy flowers solitary or racemose on scapes or scape-like peduncles. Calyx inferior, 2-5-parted. Corolla bilabiate, the upper lip usually erect, concave, or the sides plicate, entire or 2-lobed. lower lip larger, spreading or reflexed, 3-lobed, with a palate projecting into the throat and a nectariferous spur beneath. Stamens two: anther-cells confluent into one. Ovary ovoid or globose, one-celled ovules numerous. Style short or none: stigma bilamellate. Fruit a capsule, irregularly bursting or dehiscent by valves. Seeds anatropous, rugose, reticulated, or bristle-bearing.

1 *Utricularia* Aquatic or bog plants: foliage often dissected and bladder bearing.

2 *Pinguicula* Terrestrial herbs: leaves all radical, in a rosette tuft, entire.

1 UTRICULARIA L. Sp. 18.

Herbs floating free in water, or rooting in mud, the aquatic species with stems usually bearing finely dissected leaves and minute bladders: marsh species with a few bladder-bearing leaves or rootlets under ground. Flowers racemose or solitary at the summits of slender scapes, the pedicels two-bracteolate. Calyx deeply two-lobed, the lobes equal or nearly so. Corolla bilabiate, the upper lip usually erect and entire; the lower larger, 3-lobed, spurred at the base and with a prominent palate, commonly bearded in the throat. Capsule many-seeded.

U. vulgaris L. Sp. 18. Stem long and rather stout, densely leafy: leaves 2-3-pinnately divided into filiform segments, very bladdery: bladders about 2 lines long: scapes a foot or less long, 5-16 flowered: corolla yellow, half inch or more broad, with sides of lips reflexed; upper lip nearly entire, hardly longer than the prominent palate; the lower one slightly 2-lobed and longer than the conic, blunt or acutish somewhat curved spur. Slow streams and ponds, Brit. Columbia to California and across the Continent: Europe and Asia.

U. occidentalis Gray Proc. Am. Acad. xix, 95. Stems filiform, 8-10 inches long: leaves scattered, repeatedly dichotomously divided, the small setaceous segments a line or two long: scapes 6-10 inches high, 3-5-flowered: corolla yellow, 4-6 lines long: upper lip a little longer than the broad rounded palate; spur broadly conical, acutish, 2 lines long, ascending. In shallow water on boggy meadows near the base of Mount Adams, Washington.

U. minor L. Sp. 18. Stems slender, floating, short: leaves much scattered dichotomously divided, the divisions few and setaceous: bladders borne among the leaves, few, often none, the largest not over a line long:

scapes slender 2-2½ inches high, racemously 1-10-flowered: corolla pale yellow, 2-3 lines broad, ringent, the upper lip smaller than the lower; spur usually reduced to a broad blunt protuberance, shorter than the lips. In shallow ponds and bogs, Brit. Columbia to California and across the Continent: also Europe.

U. intermedia Hayne in Schrad. Journ. Bot. 1, 18. Stems floating 2-6 inches long: leaves 3-6 lines long, more or less scattered, 2-ranked, repeatedly dichotomous, the segments linear, flat, the margins bristly-ciliate: bladders with rare exceptions borne on leafless branches: scapes capillary, 2-10 inches high, naked, or with a few scales, 1-5-flowered: corolla 6 lines broad, its lower lip broad with a large palate and exceeding the upper one: spur conic, subacute, nearly as long as the lip, to which it is appressed. In shallow water, Brit. Columbia to California and across the continent: also in Europe.

2 PINGUICULA L. Sp. 17.

Acaulescent herbs with fibrous roots, entire rosulate-tufted leaves, the upper surface covered with a viscid secretion to which insects adhere and are captured by the involution of the sensitive margins, and naked one-flowered scapes. Calyx 4-5-parted, or bilabiate, the upper lip 2-parted, the lower 3-parted. Corolla bilabiate, the upper lip 2-cleft, the lower 3-cleft; the base produced into a nectariferous spur. Capsule 2-valved, or 4-valved. Seeds oblong, wrinkled or reticulated.

P. vulgaris L. Sp. 17. Scapes glabrous or minutely puberulent, 2-8 inches high, recurved at the apex and bearing a single large blue flower: leaves 3-7 in a rosette at the base of the scape, greasy to the touch on the upper side, ovate to lanceolate, obtuse, 1-2 inches long, short-petioled or sessile: corolla 3-5 lines broad when expanded, bilabiate, the upper lip 2-lobed, the lower 3-lobed, larger, the tube gradually contracted into an acute or obtuse nearly straight spur 2-4 lines long: capsule globose-ovoid, longer than the calyx. On wet rocks, southern Oregon to Alaska and across the Continent: also Europe and Asia.

ORDER LXXI LABIATÆ B. Juss. Hort. Trian. 1759.

Herbs shrubs or rarely trees, mostly aromatic, usually with square stems, simple opposite leaves without stipules and rather small perfect flowers usually clustered in the axils of the upper leaves or bracts. Calyx 3-5-cleft, 3-5-toothed or bilabiate, persistent. Corolla bilabiate; upper lip 2-lobed or entire, the lower 3-cleft or 3-parted, or rarely as if 4 lobes in the upper and one in the lower lip. Stamens mostly 4 and didynamous, rarely equal, sometimes only two with or without staminoides; filaments distinct, mostly slender, alternate with the lobes of the corolla. Anthers introrse, 2-celled or confluent 1-celled, or sometimes of a single cell. Ovary 4-lobed or 4-parted, superior, each lobe or division with 1, mostly anatropous, ovule. Style arising from the centre of the lobed or parted ovary, filiform, 2-cleft at the apex, often unequally so, or one of the cells obsolete: stigma minute, usually 2-lobed. Fruit of 4 one-seeded nutlets. Seeds erect from the base of the nutlet, mostly

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I Ovary merely 4-lobed, or not deeply 4-parted.

TRIBE I Stamens mostly exerted from the upper side of the corolla, 4 in all our genera.

- 1 *Trichostema* Limb of the corolla merely or hardly oblique, of 5 somewhat equal and similar lobes.
- 2 *Teucrium* Limb of the corolla irregular, seemingly bilabiate the upper lip either split down or very short.

II Ovary deeply 4-parted.

TRIBE II Stamens not declined, the posterior pair shorter or wanting.

* Flowers capitate-glomerate: corolla about equally 4-lobed, small and short, hardly irregular, but the upper lobe often broader than the others and emarginate: anther-cells parallel, without any thickish connective.

- 3 *Mentha* Stamens 4, similar and nearly equal.
- 4 *Lycopus* Stamens only 2 with anthers, the upper pair sterile rudiments or wanting.

** Calyx striate-nerved or costate, not much changed in fruit: corolla more or less evidently bilabiate, the upper lip erect, the lower spreading and 3-cleft, destitute of bearded ring within.

- 5 *Monardella* Flowers densely spicate-verticillastrate; upper lip of the corolla 2-cleft: stamens distant and straight, often divergent, never convergent nor curved.
- 6 *Micromeria* Flowers few, in the axils of the leaves: upper lip of the corolla plain or slightly concave and straight: stamens unequal exerted: anther-cells often divergent.

- 7 *MELISSA* Flowers rather few, in the axils of the upper leaves: corolla-tube not longer than the calyx, curved.

- 8 *Pogogyne* Flowers verticillastrate-glomerate and spicate: upper lip of the corolla short, erect and entire: stamens ascending and above somewhat approximate in pairs.

TRIBE III Stamens only 2, the posterior pair rudimentary or wanting, straight or commonly parallel-ascending.

- 9 *Audibertia* Calyx bilabiate and spathaceous, its lower lip 2-cleft: filaments exerted and bearing one-celled anthers-

- 10 *Monarda* Calyx elongated-tubular, regular or nearly so: anthers 2-celled, both cells fertile and similar.

TRIBE IV Stamens 4, both pairs fertile: the posterior pair longest.

* Anthers separated or distinct, not approximate in pairs, their cells parallel or nearly so.

- 11 *Agastache* Stamens divergent or distant, exerted.

** Anthers more or less approximate in pairs; their cells divaricate or divergent: filaments ascending, not exerted.

12 *NEPETHA* Erect plants: flowers verticillate-glomerate and spicate: calyx tubular, not bilabiate, nearly equally 2-toothed.

13 *GLECOMA* Trailing plants: flowers axillary: calyx unequally 5-toothed.

14 *Dracocephalum* Erect plants with glomerate-spicate inflorescence: calyx bilabiate, the upper tooth largest.

TRIBE V Stamens 4, ascending and parallel, all fertile; the the anterior pair longer with the anthers by abortion one-celled; those of the posterior pair 2-celled.

15 *Scutellaria* Calyx with a strong projection on the upper side.

TRIBE VI Stamens 4, all fertile, parallel and ascending under the concave or somewhat galeate upper lip of the bilabiate corolla.

* Calyx reticulate-veiny, membranaceous or chartaceous, more or less inflated, deeply bilabiate; the lips flattened and closed in fruit; upper lip plain and broad: corolla with inflated throat from a more or less exerted tube.

16 *Brunella* Inflorescence verticillate-capitate or spicate: calyx oblong, somewhat 10-nerved, upper lip truncate, 3-toothed.

** Calyx more or less membranaceous and inflated or enlarged after flowering, obscurely nerved, but somewhat veiny, 3-5-lobed, not bilabiate, open: corolla showy; throat inflated, upper lip more or less concave, not galeate: filaments more or less villous.

17 *Physostegia* Flowers simply opposite in the axils of the leaves or bracts: calyx nearly regular and equally 5-toothed.

*** Calyx of firmer texture, distinctly 5-10-nerved or striate, 5-10-toothed.

— Stamens included in the short tube of the corolla, the upper lip of which is merely concave.

18 *MARRUBIUM* Calyx tubular-cylindrical, strongly ribbed, and with 5 or 10 subulate or spinulose teeth.

— — Stamens ascending under the galeate upper lip of the corolla

19 *LEONURUS* Calyx turbinate, 5-nerved, and with 5 subulate spinescent teeth.

20 *LAMIUM* Calyx tubular or turbinate-campanulate, the 5 teeth subulate but not spinescent.

— — — Stamens all or the lower pair sometimes deflexed to the sides of the throat or contorted after anthesis.

21 *Stachys* Calyx tubular-campanulate or turbinate, 5-10-nerved and 5-toothed.

I Nutlets rugose-reticulated, with introrsely very oblique or even ventral and comparatively large scar of attachment. Ovary merely 4-lobed or not very deeply 4-parted. Seeds exalbuminous.

Tribe 1 *Ajugoidæ* Benth. in DC. Prodr. xii, 571. Calyx 5-10-nerved. Stamens ascending, mostly exerted from the upper side of the corolla, 4 in our genera. Ovules and seeds more or less amphitropous. Nutlets obovoid, dry.

Annual plants with sized, most dense cylindrical limb declined. in the unclo divergent ovules and

T. oblong or branching oblong or ovate-veined calyx nearly long, much surpassing the western Washington

T. laxum annual: stem distant, lanceolate, obscurely pin flowers in rat long: calyx acute lobes lous: stamens Oregon to Ca

T. lanceol stem 6-12 inch longer than to a very short: flower shorter than about 2 lines corolla blue, Common in O

Herbs or pink, white heads, or ve nerved, equal limb irregul or declined, ones, the loo een the two Anther-cells gose-reticula

T. occidentale stem erect rat ascending: le

1 TRICHOSTEMA L. Sp. 598.

Annual or perennial erect branching herbs or suffrutescent plants with entire or slightly repand leaves and small or middle-sized, mostly blue, flowers, paniculate or in axillary loose or dense cymes. Calyx campanulate, very unequally or almost equally 5-lobed. Corolla with narrow tube and more or less oblique limb; the somewhat similar lobes oblong and more or less declined. Stamens 4, with long filaments that are spirally coiled in the unopened limb, at length long-exserted, and divaricate or divergent anther-cells. Ovary deeply 4-lobed. Amphitropous ovules and seeds ascending, being attached below the middle.

T. oblongum Benth. Lab. 659. Soft-villous throughout; stem simple or branching from the base, 2-12 inches high from an annual root: leaves oblong or oval, with narrowed base, an inch or less long, membranaceous, costate-veined: flowers in short glomerate cymules shorter than the leaves: calyx nearly equally 5-parted, its lanceolate acuminate lobes about 3 lines long, much longer than the tube: corolla blue, inconspicuous, its tube not surpassing the calyx: filaments blue, long-exserted. In moist places, western Washington to California.

T. laxum Gray Proc. Am. Acad. vii, 387. Minutely soft-pubescent annual: stem 6-14 inches high, simple or loosely branched: leaves rather distant, lanceolate and oblong-lanceolate, acuminate, 1-2 inches long, rather obscurely pinnately veined tapering at base, mostly into a slender petiole: flowers in rather loose often forked long-peduncled cymules: pedicels a line long: calyx campanulate, about 2 lines long, its equal ovate-triangular acute lobes longer than the tube: corolla blue, 3-4 lines long, almost glabrous: stamens 6-8 lines long. On gravelly bars along streams, southern Oregon to California.

T. lanceolatum Benth. l. c. Cinereous-pubescent or villous annual: stem 6-12 inches high, rather sparingly branched, very leafy: leaves much longer than the internodes, ovate-lanceolate to lanceolate, narrowed below to a very short petiole or sessile, acute and minutely cuspidate, strongly nerved: flowers in small sessile or very short-peduncled cymules much shorter than the leaves: pedicels a line or two long: calyx campanulate, about 2 lines long, its triangular-ovate acute lobes longer than the tube: corolla blue, 6 lines long, the tube almost filiform, somewhat pubescent. Common in dry ground, western Oregon to California.

2 TEUCRIUM L. Sp. 562.

Herbs or shrubs with dentate or entire leaves and rather small pink, white or purplish flowers in terminal bracted spikes or heads, or verticillate in the upper axils. Calyx campanulate: 10-nerved, equally or unequally 5-toothed. Corolla-tube short, the limb irregularly 5-lobed, the two short upper lobes oblong, erect or declined, the lateral lobes more or less united with the upper ones, the lower lobe larger, declined. Stamens 4, exserted between the two upper lobes of the corolla, the anterior pair longest. Anther-cells divergent, confluent at base. Nutlets obovoid, rugose-reticulated, with a broad introrse areola.

T. occidentale Gray Syn. Fl. ii, 349. Villous or pubescent perennial: stem erect rather stout, usually much branched, 1-3 feet high, the branches ascending: leaves lanceolate or ovate-lanceolate, thin, acute or acuminate

at the apex, sharply dentate, mostly rounded at base, usually slender-petioled, 1-3 inches long: spikes dense, becoming 3-8 inches long in fruit: bracts lanceolate-subulate or the lower sometimes larger: calyx villous-pubescent, its 3 upper teeth acute or acutish: corolla 4-6 lines long. In moist soil, eastern Washington to California, Pennsylvania and Ontario.

II Ovary deeply 4-parted. Nutlets smooth or granulate, with small basal scar of attachment. Seeds mostly exalbuminous.

Tribe 2 Menthoideæ Benth in DC. Prodr. xii, 149. Corolla less strongly bilabiate and the lobes flatter than in the succeeding tribes, upper lip not galeate or concave. Stamens not declined, the posterior pair shorter or wanting. Anthers, in our genera, 2-celled; the cells distinct or more or less confluent.

3 MENTHA L. Sp. 576

Erect or diffuse herbs with simple mostly punctate leaves and small pink, purple or white flowers in axillary whorls, or dense or interrupted terminal spikes. Calyx campanulate to tubular, 10-nerved, regular to slightly bilabiate, 5-toothed. Corolla with tube shorter than the calyx, and somewhat irregular 4-cleft limb; the posterior lobe usually somewhat broader than the others, entire or emarginate. Stamens 4, equal, erect, sometimes imperfect: filaments glabrous: anthers two-celled, the cells parallel. Ovary 4-parted: style cleft at the summit. Nutlets ovoid, smooth.

M. Canadensis L. Sp. 577. More or less pubescent perennial: stems erect, simple or branched, usually slender, 6-30 inches high: leaves oblong or ovate-oblong- or oblong-lanceolate, slender-petioled acute at the apex, or the lower obtuse, sharply serrate, narrowed to a somewhat cuneate acute or obtuse base, glabrous or very sparingly pubescent, the larger 2-3 inches long: flowers all in short and dense sessile axillary glomerules: calyx oblong-campanulate, densely or sparingly pubescent all over, its teeth about one third as long as the tube. In moist meadows, Brit. Columbia to California and across the Continent.

4 LYCOPUS L. Sp. 21,

Perennial herbs with erect or diffuse stems, mostly dentate leaves and small flowers bracted and verticillate in dense axillary clusters. Calyx campanulate, regular or nearly so, 4-5-toothed, not bearded in the throat. Corolla campanulate to cylindrical, equalling or longer than the calyx, the limb nearly equally 4-cleft, or one of the lobes larger and emarginate. Perfect stamens 2, anterior, the posterior pair rudimentary or wanting; anther-cells parallel. Nutlets smooth, trigonous, truncate at the summit.

L. Virginicus L. Sp. 21. Glabrous or puberulent: stems slender, 6-24 inches high, simple or branched: propagating by long filiform sometimes tuber-bearing stolons: leaves lanceolate to ovate-lanceolate, acuminate at the apex, coarsely and sharply dentate, narrowed or cuneate at the base, 1-3 inches long, 6-18 lines wide, petioled, or the upper sessile: bracts short, oblong: calyx about a line long, 4- or sometimes 5-toothed, the teeth ovate or ovate-lanceolate, obtuse or subacute: corolla about a line broad, nearly twice as long as the calyx: nutlets as long or longer than the calyx.

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In wet places, throughout most of North America.

L. rubellus Moench Meth. Suppl. 146. Glabrous or minutely puberulent: stems erect or ascending, simple, or at length freely branched, 1-3 feet high: leaves ovate to oblong-lanceolate, or narrower, acuminate at the apex, sharply dentate, narrowed or cuneate at base. 2-5 inches long, 6-18 lines wide, usually tapering into conspicuous petioles: bracts minute, acute or acuminate: calyx-teeth triangular-subulate, herbaceous, one-half as long as the tube or more: corolla longer than the calyx: rudimentary posterior filaments oval or oblong: nutlets much shorter than the calyx. In wet soil, western Oregon and Washington to New York and Florida.

L. Americanus Muhl, Bart. Fl. Phil. Prodr. 15. *L. sinuatus* Ell. Puberulent or glabrous, perennial by suckers: stems stiff, erect, simple or branched, 1-2 feet high: leaves lanceolate or ovate-lanceolate in outline, incised, pinnatifid or the uppermost merely serrate, acute at the apex 2-4 inches long, petioled: bracts subulate, the outer ones sometimes exceeding the calyx: teeth of the calyx triangular-subulate, cuspidate, rigid: corolla little exceeding the calyx: rudimentary filaments thickened at their tips: nutlets much shorter than the calyx. In wet soil, Brit. Columbia to California and across the continent.

L. lucidus Turcz. Benth in DC. Prodr. xii, 178. Pubescent or glabrate: stems usually stout, erect, strict, leafy, simple, or sometimes branched, 1-3 feet high: leaves oblong-lanceolate, acute at the apex, narrowed or rounded at base, sessile or very short-petioled, 2-6 inches long, 4-12 lines wide, sharply serrate with acute ascending teeth: bracts ovate or lanceolate, acuminate-subulate, the outer ones often as long as the flowers: calyx-teeth 5, subulate-lanceolate, nearly as long as the tube: corolla little longer than the calyx: rudimentary filaments slender, thickened at the tips: nutlets much shorter than the calyx. In wet soil, eastern Washington to California and Minnesota.

5. MONARDELLA Benth. Lab. 331.

Low annual or perennial herbaceous or suffrutescent plants with mostly entire leaves and small red purple or white flowers in terminal heads subtended by broad often membranaceous and colored bracts. Calyx tubular, often elongated, 10-13-nerved, 5-toothed: the teeth short, nearly equal, straight; the throat naked within. Corolla-tube as long as the calyx: the throat glabrous within: the limb somewhat bilabiate, the upper lip two-cleft, the lower 3-cleft, and the lobes all oblong or linear, flat and nearly equal. Stamens 4, more or less unequal, or the lower ones longer, straight, divergent and exerted. Anthers with two parallel cells becoming divergent or divaricate. Style very shortly two-cleft.

M. villosa Benth. Lab. 332. Somewhat canescent: stems slender, 6-18 inches high; branching from a perennial woody base, stiff and erect or ascending: leaves rather distant, ovate to ovate-lanceolate or oblong, entire, 6-12 lines long, all short-petioled: heads sessile, 6-10 lines high, very dense; bracts broadly ovate to elliptical, 6-8 lines long, 7-9-nerved, villous-ciliate: tinged with purple: calyx 4-6 lines long, pubescent, its short subulate teeth villous: corolla purple to white, pubescent, the tube gradually enlarged from the base and at length a line or more longer than the calyx; the oblong lobes 2-3 lines long. On dry ridges, southwestern Oregon to California.

M. reflexa. More or less cinereous with a minute scurfy puberulence: stems slender, 6-14 inches high, from a woody perennial base, simple, or more or less branched: leaves ovate to lanceolate, 6-12 lines long, not as

long as the internodes, all petioled: heads often peduncled, 6-8 lines high: bracts foliaceous, spreading or reflexed, lanceolate to ovate, sometimes acuminate from an orbicular base: calyx about 5 lines long, pubescent; its triangular-subulate teeth ciliate: corolla purple to white; its pubescent tube almost filiform, hardly at all enlarged upward, not longer than the calyx; its linear lobes nearly as long as the tube. On gravelly banks and bars of the Rogue river, Oregon.

M. purpurea. Very smooth and shining except the inflorescence: whole herbage usually reddish-purple: stems slender, 3-8 inches high, simple, from a woody perennial base: leaves oblong-ovate to lanceolate, 4-12 lines long, mostly longer than the internodes, all petioled, very entire and obtuse: heads broad and rather loose, 8-10 lines high, often peduncled: bracts broadly ovate to oblong, never reflexed, tinged with purple, villous-ciliate, 4-6 lines long: calyx about 5 lines long, glabrous; its subulate teeth hirsute: corolla about 10 lines long; its pubescent tube very slightly enlarged upward, much longer than the calyx the linear lobes about 4 lines long. In dry rocky places, eastern base of the Coast Mountains, southwestern Oregon.

M. odoratissima Benth. Lab. 332. Somewhat cinereous with a minute scurfy puberulence: stems often stoutish and much branched, 4-10 inches long, very numerous from a perennial woody base, decumbent or ascending: leaves lanceolate or oblong-lanceolate, subsessile, 4-12 lines long, mostly longer than the internodes, acute at both ends: heads 6-10 lines high: bracts broadly ovate, very obtuse, 4-6 lines long: calyx about 5 lines long, puberulent. its triangular acute teeth softly villous: corolla rose-color, its pubescent tube slightly dilated upward, a line or more longer than the calyx, lobes oblong-linear, 3-4 lines long. In rocky ravines, eastern Washington to California and the Rocky Mountains.

M. discolor Greene Pitt. ii. 24. "Rigidly suffrutescent, diffuse, a span high: leaves small, ($\frac{1}{4}$ - $\frac{3}{4}$ inch long), ovate-lanceolate, entire, short-petioled, green and nearly glabrous above, white-tomentose beneath, scarcely punctate, the veins prominent beneath: heads small, bracts few, ovate or oblong, obtuse, of firm texture, tomentose-canescens, not colored, parallel-nerved: calyx-teeth short, acutish, woolly-hairy without: corollas light purple."

"Gravelly banks of the Yakima River near Clealum Washington."

6 MICROMERIA Benth, in Bot. Reg. under n. 1282.

Shrubs or herbs with entire or merely dentate leaves and small flowers in bracted spikes, or few in the axils of the leaves. Calyx tubular, 13-15-nerved, 5-toothed, the teeth subequal or somewhat bilabiate. Corolla short, its straight tube usually shorter or hardly longer than the calyx; the limb bilabiate; upper lip erect entire or emarginate, lower lip spreading, 3-lobed. Stamens 4, arcuate, shorter than the corolla, the anterior pair longest: anthers 2-celled. Style beardless.

M. Douglasii Benth. Lab. 372. Minutely pubescent: stems slender, simple, trailing, 6-20 inches long: leaves round-ovate, crenate, 6-12 lines long, on petioles 2-3 lines long: flowers usually solitary in the axils of the leaves in the middle of the stem, on filiform peduncles 4-6 lines long: calyx about 4 lines long, its acute triangular teeth less than a line long: corolla about 6 lines long, white, narrow-funneliform, with slender tube about equalling the calyx, ampliate throat and short rounded lobes. Common in wooded districts, Brit. Columbia to California.

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7 MELISSA L. Sp. 592.

Herbs with leafy stems broad dentate leaves and small white or yellowish flowers in small axillary clusters. Calyx bilabiate, oblong-campanulate, 13-nerved, nearly naked in the throat: upper lip flat, 3-toothed; the lower 2-parted. Corolla exserted, its tube curved, enlarged above, naked within, the limb bilabiate; upper lip erect, emarginate; lower lip spreading, 3-cleft. Stamens 4, connivent and ascending under the upper lip of the corolla: anthers 2-celled, the cells divaricate.

M. OFFICINALIS L. Sp. 592. Pubescent perennial: stems rather stout, erect or ascending, 12-30 inches high: leaves ovate, petioled, pinnately veined, coarsely dentate or crenate-dentate, 1-2½ inches long: flowers several in the axillary clusters, short-pedicelled: calyx about 3 lines long, the teeth of its lower lip slightly exceeding those of the upper: corolla white, 5-7 lines long. In waste places: naturalized from Europe.

8 POGOGYNE Benth. Lab. 441.

Low annuals with mostly entire leaves and numerous small flowers in dense or interrupted terminal bracted spikes: the bracts usually hirsutely ciliate. Calyx deeply and unequally 5-cleft, the teeth hirsutely ciliate, the two lower longest: the tube campanulate or turbinate, mostly 15-nerved: the throat naked within. Corolla straight, tubular-funnelform, with short lips: upper lip erect, entire, lower lip 3-lobed, spreading. Stamens 4, the upper pair shortest, all with anthers, or the upper pair sterile, ascending and above more or less approximate in pairs: anthers 2-celled, the cells parallel and pointless. Style somewhat exserted, bearded above.

P. Douglasii Benth. l. c. Stem commonly 2-6 inches high, simple, or branched from the base: leaves oblanceolate to obovate, 9-15 lines long, narrowed below to a petiole: flowers in approximate whorls, forming a dense, terminal spike, often with a single accessory whorl below, or sometimes several of the lower axils with flowers: bracts linear, cuspidate, their margins ciliate with bristly white hairs: calyx about 4 lines long, the lower teeth about twice as long as the tube, much longer and narrower than the others, all bristly-ciliate: corolla 7-9 lines long, blue, the palate white dotted with purple, bristly: nutlets smooth, often mottled, minutely hispid at the apex. In low places that are covered with water in winter, Jackson Co. Oregon to California.

Tribe 3 Monardeæ Benth. in DC. Prodr. vii; 888. Antheriferous stamens only 2, straight or commonly parallel-ascending. Anthers with narrow usually oblong-linear cells, which are either widely separated on the upper and lower ends of a linear or filiform connective which is usually longer than the filament and articulated with it, or the lower cell wanting or deformed, or the two cells confluent into one linear cell.

9 AUDIBERTIA Benth. Bot. Reg. t. 1469.

Shrubs or herbs with mostly crenulate leaves and numerous flowers in capitate-glomerate or verticillate terminal heads or

spikes. Calyx bilabiate; its lower lip deeply 2-cleft, the upper 3-toothed or entire, naked within. Corolla bilabiate; its upper lip spreading, 2-lobed or emarginate, the lower lip spreading, 3-lobed, the broad middle lobe emarginate. Stamens two; filaments slender, exerted, apparently simple and bearing a linear 1-celled anther, or with an articulation, showing that the portion above it answers to a filiform connective, the lower end of which sometimes projects into a subulate point, but never showing any trace of a second anther-cell: rudiments of the posterior pair of stamens often present. Nutlets smooth, unchanged when wetted.

A. incana Benth. Lindl. Bot. Reg. t. 1469. A much branched hoary shrub 1-2 feet high, with ashy-grey shreddy bark: leaves spatulate to obovate, obtuse or retuse, entire, thick, an inch or less long, tapering below to a slender petiole: bracts obovate or oval, the innermost spatulate, pubescent and ciliate, tinged with rose or purple: calyx oblong-campanulate, 3-4 lines long, pubescent, often tinged with red, somewhat curved, its oblong lower lobes almost as long as the broad emarginate upper one: corolla blue, 6-7 lines long, the tube longer than the calyx: stamens long-exserted. On rocky banks and ridges, eastern Washington to California, Idaho and Arizona.

10 MONARDA L. Sp. 22.

Perennial or annual erect herbs with dentate or serrate leaves and rather large flowers in dense capitate, mostly bracteate and bracteolate clusters. Calyx tubular, narrow, 15-nerved, nearly or quite equally 5-toothed, mostly villous in the throat. Corolla glabrous within, usually pubescent or glandular outside: the tube slightly dilated above: the limb bilabiate: upper lip erect or arched, emarginate or entire: lower lip spreading, 3-lobed, the middle lobe longer or larger than the others. Stamens 2, ascending usually exerted, the posterior pair rudimentary or wanting: anthers linear, versatile, 2-celled, the cells divaricate, more or less confluent at the base. Nutlets ovoid, smooth.

M. scabra Beck Am. Journ. of Sci. x, 260. *M. fistulosa* var. *mollis* Benth. Puberulent perennial: stems usually slender, 1-2½ feet high, usually branched: leaves thick or firm, pale, usually short-petioled, acuminate or acute at the apex, rounded narrowed or cordate at base, sharply or sparingly serrate, canescent or puberulent or nearly glabrous, 1-3½ inches long, 6-12 lines wide: heads terminal, solitary: bracts green or tinged with pink: calyx puberulent, often hairy at the summit. densely villous in the throat, its short subulate teeth nearly erect: a yellowish or pink, about 15 lines long, pubescent, sometimes glandular: stamens exerted. On prairies and plains, Brit. Columbia to Idaho, Arizona, Texas and Neb.

Tribe 5. Nepetæ Benth. in DC. Prodr. xii, 368. Calyx usually 15-nerved; the upper teeth or lip commonly longer or larger. Corolla distinctly bilabiate. Stamens 4, all fertile: the upper pair longest.

11 AGASTACHE Clayt. Gronov. Fl. Virg. 88.

LOPHANTHUS Benth.

Tall erect perennial herbs with serrate mainly ovate petiole

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leaves and yellowish purplish or blue flowers verticillate-clustered in dense or interrupted bracted terminal spikes. Calyx narrowly campanulate, somewhat oblique, slightly bilabiate, 5-toothed. Corolla strongly bilabiate, the tube as long as the calyx: upper lip erect, 2-lobed, the lower one spreading, 3-lobed, its middle lobe broader than the lateral ones and crenulate. Stamens all antheriferous, the upper pair longest: anthers 2-celled, their cells nearly parallel. Nutlets ovoid, smooth.

A. urticifolia Rydberg. *Lophanthus urticifolius* Benth. Glabrous: stems erect and simple, 2-4 feet high: leaves thin, triangular-ovate, obtuse to acute at the apex, truncate to cordate at base, 1-3 inches long, coarsely and irregularly dentate, glabrous both sides, on petioles an inch or less long; spikes dense, 1-3 inches long, an inch or less thick, sessile: bracts linear-lanceolate, entire, or some of the lower ones ovate and more or less toothed: calyx narrow-campanulate, 4-5 lines long, its lanceolate acuminate-subulate teeth subequal, nearly as long as the tube, white or tinged with purple: corolla light violet or purplish to white, 6-7 lines long. In wet places in the mountains, Oregon to California and the Rocky Mts.

A. occidentalis Heller. *Vleckia occidentalis* Piper. Glabrous below, puberulent above: stems strict, simple, 2-4 feet high: leaves triangular-ovate, obtuse or sometimes acute at the apex, cordate at base coarsely serrate-dentate, green and glabrous above, canescent beneath, 1-2 inches long, on petioles 6-12 lines long: spikes thick and dense, 1-4 inches long an inch or more thick: calyx puberulent, narrow-campanulate, 4-5 lines long, its triangular-subulate very acute teeth not as long as the tube, tinged with violet: corolla light violet, 5-6 lines long. Wet places in the high mountains of Washington.

12 NEPETA L. Sp. 570.

Erect herbs with dentate or incised leaves and rather small flowers in verticillate clusters usually crowded in terminal spikes axillary and cymose. Calyx tubular, somewhat oblique at the mouth, 15-nerved, usually incurved, 5-toothed, scarcely bilabiate at the upper teeth usually longer than the lower. Corolla-tube enlarged above, the limb strongly bilabiate: upper lip erect, entire, marginate or 2-lobed: lower lip 3-lobed, the middle one larger than the lateral ones. Stamens 4, all antheriferous, ascending under the upper lip: anthers 2-celled, the cells divaricate. Nutlets compressed-ovoid, smooth.

N. CATARIA L. Sp. 570. (CATNIP) Densely tomentulose-canescant pale green perennial: stems stout, much branched, 2-3 feet high, the branches upright, ascending: leaves ovate to oblong, acute at the apex, coarsely serrate-dentate, mostly cordate at base, 1-3 inches long, greener above than below, all petioled: flowers in dense verticillate spikes at the ends of the branches and stems: bracts small, foliaceous: bractlets subulate: calyx densely pubescent, its teeth subulate the upper about one-half the length of the tube: corolla nearly white or pale purple, dark-dotted, pubescent outside, 5-6 lines long, its tube a little longer than the calyx, the broad middle lobe of the lower lip crenulate. In waste places, naturalized from Europe.

13 GLECHOMA L. Sp. 578.

Low diffuse creeping herbs with long-petioled crenate leaves

and comparatively large violet or blue flowers in small verticillate axillary clusters. Calyx oblong-tubular, 15-nerved, oblique at the orifice, unequally 5-toothed. Corolla-tube exserted, enlarged above, the limb bilabiate: upper lip erect, 2-lobed or emarginate, the lower spreading, 3-lobed. Stamens 4, all antheriferous, not exserted: anthers 2-celled, the cells divergent. Nutlets ovoid, smooth.

(*G. HEDERACEA* L. Sp. 578. (GROUND IVY.) Pubescent perennial: stem creeping, 6-18 inches long, the branches ascending: leaves nearly orbicular or reniform, cordate at base, 6-18 lines in diameter, green both sides, coarsely crenate: clusters few-flowered: bractlets shorter than the calyx: subulate: calyx puberulent, its teeth acute or lanceolate-acuminate, about one-third as long as the tube: corolla-tube 2-3 times as long as the calyx: upper pair of stamens much longer than the lower pair. In waste places, escaped from gardens.

14 DRACOCEPHALUM L. Sp. 594.

Herbs with dentate incised or entire leaves and blue or purple flowers in axillary and terminal bracted clusters. Calyx tubular, 15-nerved, straight or incurved, 5-toothed, the upper teeth much longer than the others, or bilabiate with the 3 upper teeth more or less united. Corolla expanded above, its limb bilabiate: upper lip erect, emarginate, the lower spreading, 3-lobed, the middle lobe largest and sometimes 2-cleft. Stamens 4, all antheriferous, the upper pair longest: anthers 2-celled, the cells divaricate. Nutlets ovoid, smooth.

D. parviflorum Nutt. Gen. ii, 35. A somewhat pubescent annual or biennial: stem rather stout, usually branched, 6-24 inches high: leaves lanceolate, ovate or oblong, serrate or the lower incised, acute or obtuse at the apex, rounded or narrowed at base, thin, 1-3 inches long, all slenderly petioled: flowers numerous, in dense terminal spikes, and sometimes also in the upper axils: bracts ovate to oblong, pectinate with awn-pointed teeth, shorter than or equalling the calyx: pedicels 1-2 lines long: upper teeth of the calyx ovate-oblong, longer than the narrow lower and lateral ones, all acuminate: corolla light blue, scarcely longer than the calyx. In dry rocky or gravelly soil, Alaska to Idaho and New York.

Tribe 5 Scutellariæ Benth. in DC. Prodr. xii, 407. Herbs bitterish, little or not at all aromatic. Calyx bilabiate, closed in fruit; the lips entire. Corolla bilabiate; but with the small lateral lobes more connected with the galeate upper lip: lower lip therefore a single lobe. Stamens 4, ascending and parallel: both pairs fertile, the lower or outer pair longer and with anthers mostly 1-celled, the upper pair 2-celled. Upper fork of the style abortive: those of the upper pair 2-celled. Upper fork of the style very short or none. Nutlets depressed or globular.

15 SCUTELLARIA L. Sp. 598.

Annual or perennial herbs, rarely shrubby, with blue or violet flowers in terminal or axillary bracted mostly secund spike-like racemes, or 1-3 in the axils. Calyx campanulate, bilabiate; lips entire, the upper one with a crest or protuberance upon the back and often deciduous in fruit; the lower one persistent

Corolla mucronate within: the lobes emarginate: the upper and lower lobes and sometimes 4, all gynobase.

S. lateriflora G. or pubescent 1-2 feet high, the apex, corolla 1-3 inches long, narrow, secund below, several nearly white, tubs: nutlets Brit. Columbi

S. nana G. 1-2 inches high near the base: long, thickish, opposite in the white or yellow lips about equ

S. tuberosa G. tubers that terminate in branching from the base to broadly lanceolate the blade 3-6 lines and opposite in the enlarged in fruit. In California.

S. angustifolia G. stems erect, woody and tapering at base: leaves sessile, the upper ones 3-5 times toothed: flower but little split to the base: nearly straight: upper lip villous with hairs, Brit. Co

S. siphocampylus G. stems erect: fibrous roots: short-petioled. Upper leaves: blue to violet, above this erect, enlarged upward

S. antirrhina G. minutely pubescent: underground s

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Corolla much exerted, recurved-ascending, dilated above, glabrous within, the limb bilabiate: upper lip arched, entire or emarginate: the lower lip spreading or deflexed, its lateral lobes small and somewhat connected with the upper, the middle lobe broad and sometimes emarginate, the margins mostly recurved. Stamens 4, all antheriferous. Nutlets borne on a short or elongated gynobase.

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S. lateriflora L. Sp. 598. Perennial by stolons: glabrous throughout, or pubescent above: stems slender, erect or ascending, usually branched, 1-2 feet high, leaves ovate to ovate-lanceolate, thin, acute or acuminate at the apex, coarsely dentate-serrate, obtuse narrowed or subcordate at base, 1-3 inches long, all on slender petioles an inch or more long: flowers in narrow, secund, axillary and often also terminal racems, leafy-bracted below, several- to many-flowered: calyx about a line long: corolla blue to nearly white, 3-5 lines long, its lips about equal, one-fifth as long as the tube: nutlets borne on a very short gynobase. In wet places, Oregon to Brit. Columbia and across the Continent,

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S. nana Gray Proc. Am. Acad. ii, 100. Minutely puberulent: stems 1-2 inches high, from thick subterranean shoots, much branched from near the base: leaves crowded, from obovate to spatulate, entire, 6-12 lines long, thickish, tapering below to a short petiole: flowers solitary and opposite in the axils of the upper leaves, calyx about 2 lines long: corolla white or yellowish, 6-8 lines long, with rather broad dilated throat, the lips about equal in length, In claye soil, southeastern Oregon to Nevada.

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S. tuberosa Benth. Lab. 441. Soft-villous or pubescent: perennial by tubers that terminate filiform underground stolons: stems 2-5 inches high, branching from the base, denselv leafy: leaves thin, from ovate or oblong to broadly lanceolate, obtuse, at the apex, subcordate to tapering at base, the blade 3-6 lines long, coarsely few-toothed, all petioled: flowers solitary and opposite in the axils of the leaves: calyx about 2 lines long, soft-villous, enlarged in fruit: corolla blue or violet, 7-9 lines long: nutlets strongly muriccate. In loose soil on dry wooded hillsides, southern Oregon to California.

407. Herba
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S. angustifolia Pursh Fl. ii, 412. Minutely pubescent or almost glabrous: stems erect or ascending, 6-12 inches high, often branched, perennial by woody and fibrous roots: leaves from linear to narrowly oblong, entire, tapering at base, the blade 6-15 lines long, short-petioled, or the upper ones sessile, the radical leaves often roundish or even cordate, and sometimes toothed: flowers solitary in the axils of the upper leaves: calyx in flower but little more than a line long, becoming much enlarged in fruit, split to the base: corolla blue or violet, 10-12 lines long, with slender tube nearly straight at base and moderately enlarged throat, the broad lower lip villous within: nutlets minutely granulate. In dry places in the m n u - plains, Brit. Columbia to California.

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S. siphocampylodes Vatke Bot. Zeit. xxx, 717. Tomentulose-canescens: stems erect, 6-12 inches high, branching, perennial by woody and fibrous roots: leaves from linear to narrowly oblong, entire, 6-15 lines long, short-petioled, or the upper sessile: flowers solitary in the axils of the upper leaves: calyx about a line long in flower, enlarged in fruit: corolla blue to violet, 10-12 lines long, the slender tube recurved at base, and above this erect or thrown somewhat backward, the throat moderately enlarged upward. In canyons, southern Oregon to western California.

S. antirrhinoides Benth. Bot. Reg. xviii, under 1493. Glabrous or minutely puberulent: stems somewhat caespitose at the ends of white fleshy underground shoots, 7-8 inches high: leaves oblong or somewhat lanceolate

or the lower obovate, 3-12 lines long, all abruptly contracted at base to short or moderately long petioles, obtuse to acute at the apex, entire: flowers solitary, in the axils of the upper leaves: peduncles 1-3 lines long, calyx hardly 2 lines long in flower, becoming moderately enlarged in fruit, minutely puberulent: corolla blue, 10-12 lines long, puberulent, with short tube and broad throat, the broad lower lip puberulent within. In moist soil along streams, Washington to California and Nevada.

S. galericulata L. Sp. 599. Puberulent or pubescent: stems solitary at the ends of underground perennial shoots, erect, usually branched, 1-3 feet high: leaves thin, oblong-lanceolate to ovate-oblong, acute at the apex, dentate with low teeth, or the upper entire, 1-1½ inches long, rounded or subcordate at base, the uppermost much smaller and sessile or nearly so, the lower ones petioled: flowers solitary in the axils of the upper leaves, short-peduncled: calyx puberulent, a line long, split to the base, enlarged in fruit: corolla blue, puberulent, 8-12 lines long, with a slender tube and slightly enlarged throat: nutlets densely muriculate-scabrous. In low wet places, Brit. Columbia to Oregon, Arizona and the Atlantic States.

Tribe 6 Stachydeæ Benth. in DC. Prodr. xii, 407. Herbage bitter-aromatic or scarcely aromatic. Calyx 5-10-nerved or veiny. Stamens 4, all with anthers, parallel and mostly ascending under the concave and commonly galeate upper lip of the bilabiate corolla, the lower or outer pair longest, except in Phlomis. Anthers 2-celled or confluent somewhat 1-celled.

16 BRUNELLA L. Sp. 600.

Perennial herbs with petioled leaves and purple or white flowers in dense bracted terminal and axillary spikes or heads. Calyx oblong, reticulate-veined, about 10-nerved, deeply bilabiate, closed in fruit: upper lip nearly truncate, or with 3 short teeth: lower lip 2-cleft, its teeth lanceolate. Corolla-tube inflated, slightly narrowed at the mouth, its limb strongly bilabiate: upper lip entire, arched: lower lip spreading, 3-lobed. Stamens 4, all fertile, the lower pair longest: filaments of the longer stamens 2-toothed at the summit, one of the teeth bearing the anther, the other sterile. Anthers 2-celled, the cells divergent or divaricate. Nutlets ovoid, smooth.

B. vulgaris L. Sp. 600. Pubescent to nearly glabrous: stems numerous, slender, erect to procumbent, 2-24 inches long, usually simple: leaves thin, ovate or oblong to oblong-lanceolate, usually narrowed at base, entire or crenate, 2-4 inches long, the lowest commonly shorter, and sometimes subcordate, all petioled: spikes usually sessile, 1-2 inches long dense, terminal: bracts broadly ovate-orbicular, strongly nerved, more or less hirsute and ciliate: calyx cylindraceous, about 4 lines long, more or less hirsute, the teeth all cuspidate and ciliate: corolla blue or violet to nearly white, 1-8 lines long. Common in open places, Alaska to California and across the Continent: also in Asia.

17 PHYSOSTEGIA Benth. Lab. 504 (1834)

Erect perennial herbs with serrate, dentate or entire leaves and middle sized bilabiate flowers in terminal bracted spikes or racemes. Calyx campanulate or oblong, membranaceous, enlarged and remaining open in fruit, 10-nerved, equally 5-toothed. Corolla much longer than the calyx, its tube gradually much en-

larged upwards spreading, 3-5 lines long, the lower pair the longest, the cells narrow spinulose or

P. parviflora Benth. Glabrous: stems 1-3 feet high, leaves mostly ovate, sharply serrate, petioled, 3-4 inches long, calyx: calyx 5-10-nerved, acute, becom- In moist meads

Perennial in dense axils 5-10-toothed, acute or bilabiate, the spreading, 2-3 lines long, Stamens 4, 2-celled, the corolla

M. vulgare L. 1-3 feet high, leaves oval or elliptical, cret 1-2 inches long, long: flowers 1-2 lines long, glabrous a white, 3-4 lines

Tall perennial leaves and stem- lary clusters of flowers, regular and equal. Corolla bilabiate, the lower lip spreading, subcordate or 2-celled, the anthers 2-celled.

L. Cardiacum L. Strict, commanding: leaves 3-5 cleft, 2-4 inches long, narrowly oblong, all slender, flowers in denser than the petioles, subulate, some purple or white

larged upward; upper lip concave, rounded, entire; the lower one spreading, 3-lobed, the middle lobe commonly emarginate. Stamens 4, ascending under the upper lip of the corolla, the lower pair the longest; filaments pubescent; anthers all alike, 2-celled, the cells nearly parallel, the margins of their valves commonly spinulose or denticulate. Nutlets ovoid-triquetrous, smooth.

P. P. parviflora Nutt. Benth. in DC. Prodr. xii, 437 as synonym. Glabrous: stems rather stout, 1-3 feet high, simple, or branched above: leaves mostly lanceolate, acute, or the lower ones obtuse, at the apex, sharply serrate, somewhat narrowed at base, all sessile or the lowest petioled, 3-4 inches long, 3-10 lines wide: spikes several-many-flowered, 1-4 inches long: bracts ovate or ovate-lanceolate, acute, shorter than the calyx: flowers in flower campanulate, 2 lines long, its teeth ovate, obtuse or acutish, becoming globose-oblong in fruit: corolla purple, 6 lines long. In moist meadows, northwestern Oregon to Brit. Columbia and Minnesota.

18 MARRUBIUM L. Sp. 582.

Perennial herbs with petioled dentate leaves and small flowers in dense axillary clusters. Calyx tubular, 5-10-nerved, regularly 5-10-toothed, the teeth nearly equal, or the alternate ones shorter, acute or acutish, spreading or recurved in fruit. Corolla bilabiate, the upper lip erect, entire or emarginate, the lower spreading, 2-cleft, its broader middle lobe commonly emarginate. Stamens 4, included, the posterior pair the shorter. Anthers 2-celled, the cells divergent. Nutlets ovoid, smooth.

M. VULGARE L. Sp. 583. (WHITE HOARHOUND.) Stems erect, stout, 1-3 feet high, white-woolly, much branched, the branches ascending: leaves oval or broadly ovate to nearly orbicular, rugose-veined, obtuse at the apex, crenate-dentate, rounded, narrowed or subcordate at base, 1-2 inches long, rough, whitish above, woolly beneath, on petioles 6-12 lines long: flowers in dense many-flowered axillary clusters: calyx-teeth usually 10, glabrous above, woolly below subulate, more or less recurved: corolla white, 3-4 lines long. In waste places: naturalized from Europe.

19 LEONURUS L. Sp. 584.

Tall perennial herbs with palmately cleft, parted or dentate leaves and small white or pink flowers in dense verticillate axillary clusters. Calyx tubular-campanulate, 5-nerved, nearly regular and equally 5-toothed, the teeth rigid, subulate or aristate. Corolla bilabiate: upper lip erect, concave or nearly flat, entire: lower lip spreading, or deflexed, 3-lobed, the middle lobe broad, obcordate or emarginate. Stamens 4, the anterior pair longest: anthers 2-celled, the cells mostly parallel. Nutlets 3-sided, smooth.

L. CARDIACA L. Sp. 584. Puberulent perennial: stems rather stout, strict, commonly branched, 2-5 feet high, the branches straight and ascending: leaves membranaceous, the lower nearly orbicular, palmately 3-5-cleft, 2-4 inches broad, the lobes acuminate, incised or dentate, upper narrowly oblong-lanceolate or rhombic, 3-cleft or the upper merely 3-toothed, all slender-petioled, canescently puberulent beneath, green above: flowers in dense glomerate clusters in the axils of the upper leaves, shorter than the petioles: calyx glabrous, about 3 lines long, its teeth lanceolate-subulate, somewhat spreading, nearly as long as the tube: corolla pink, purple or white, 3-5 lines long, its tube with an oblique ring of hairs with-

in, its upper lip slightly concave, densely white-woolly outside. In sandy places: naturalized from Europe.

20 LAMIUM L. Sp. 579.

Annual or perennial herbs with crenate dentate or incised usually cordate leaves and small flowers verticillate in axillary and terminal clusters. Calyx tubular-campanulate, about 5-nerved, 5-toothed, the teeth equal, or the upper ones larger. Tube of the corolla commonly longer than the calyx, its limb bilabiate upper lip concave, erect, usually entire, narrowed at the base: lower lip spreading, 3-cleft, the middle lobe emarginate, contracted at base, the lateral ones sometimes each with a tooth-like appendage. Stamens 4, the anterior pair longest. Anthers 2-celled, the cells divaricate, often hirsute on the back. Nutlets smooth or tuberculate.

L. AMIEXICALE L. Sp. 579. Sparingly pubescent annual or biennial: stems slender, weak, branched from the base and often from the lower axils also 6-18 inches long: leaves orbicular or nearly so coarsely crenate, 6-18 lines broad, rounded at the apex; the lower slender-petioled, mostly cordate at base; the upper sessile and more or less clasping: flowers rather few, in axillary and terminal clusters: calyx pubescent, its erect teeth nearly as long as the tube corolla purplish or red. 6-8 lines long, its tube very slender, the lateral lobes of the lower lip very small, the middle lobe spotted, the upper lip somewhat pubescent. In fields and waste places: naturalized from Europe.

21 STACHYS L. Sp. 580.

Perennial or annual herbs with square stems and small or rather large flowers loosely verticillate in terminal dense or interrupted spikes often also in the upper axils. Calyx mostly campanulate, 5-10-nerved. 5-toothed, the teeth nearly equal in our species. Corolla with narrow tube and strongly bilabiate limb: upper lip erect, concave, entire or emarginate: the lower one 3-cleft, the middle lobe broader than the lateral ones, sometimes 2-lobed. Stamens 4, the anterior pair longest, sometimes deflexed or twisted after anthesis. Anthers approximate in pairs, 2-celled, the cells mostly divergent. Nutlets ovoid or oblong.

S. pycnantha Benth. Pl. Hartw. 331. Soft-pubescent with somewhat fulvous hairs: rootstock creeping, perennial: stems rather stout, 1-3 feet high, very leafy: leaves oblong-ovate, obtuse or the upper ones acute at the apex, crenate-dentate, subcordate, 1-4 inches long, on short and stout petioles; floral leaves all reduced to small bracts of the dense oblong or cylindrical spike, each subtending about 3 flowers: calyx-teeth deltoid, mucronulate, very hirsute, fully equalling the tube of the corolla: upper lip of the corolla strongly bearded. In sandy fields, Hood River Oregon to California.

S. vestita. Soft-pubescent with whitish hairs: rootstock slender, creeping, perennial: stems rather slender, 1-3 feet high, branched above: leaves oblong-ovate subcordate, crenate-dentate, obtuse or acutish at the apex, 1-3 inches long, mostly slender-petioled: flowers 1-3 in each axil of the small lanceolate bracts: calyx campanulate, its deltoid mucronulate teeth nearly as long as the tube, strongly hirsute: corolla 6-8 lines long, the slender tube longer than the calyx, upper lip sparingly bearded. In

wet places, so

S. Palustris perennial: stems slender and red: oblong or oblong-acute at the apex: dentate: flowers pubescent, its purple to purple in moist meads

S. bullata to villous, or 3 feet high, from obtuse or the middle 1/2 inches long, in subulate and corolla 6-7 lines longer than the

S. Chamissoi pile, or branched: mostly obtuse hirsute above, base, all petioled; the floral cylindrical, teeth about one 10 lin. long, in swamps, w

S. ciliata pubescent: stems retrorsely-hispid 1/2 inches long, darker beneath the whorls approximate, about 4 lines rose red, about the upper lip Columbia.

Var. *puberula* hirsute, especially rather smaller

S. Emersoni or sparsely hispid long and weak pairs, ovate, commonly pilose-pubescent: flowers sessile, the upper corolla sessile, exceeding the tube, tipped with puberulent or Hoquiam Washington I refer here Tillamook Co.

wet places, southwester Oregon.

S. Palustris L. Sp. 580. Hirsute or pubescent: rootstock slender, perennial: stems erect, strict, simple or somewhat branched, commonly slender and retrorse-hispid on the angles, 1-4 feet high: leaves lanceolate, oblong or oblong-lanceolate, sessile or very short petioled, acuminate or acute at the apex, truncate to cordate at base, 1-5 inches long, crenate or dentate: flower-clusters 6-10-flowered, approximate or interrupted: calyx pubescent, its subulate teeth more than half as long as the tube: corolla purplish to pale red, purple-spotted, 6-8 lines long, its upper lip pubescent. In moist meadows, northern Oregon to New York and Newfoundland.

S. bullata Benth. Lab. 547. Hirsute pubescent or somewhat hispid to villous, or sometimes nearly glabrous above: stems usually slender, 1-3 feet high, from a slender perennial rootstock: leaves ovate to oblong, obtuse or the upper ones acutish at the apex, rather coarsely crenate, 1-2 inches long, rounded or subcordate at base mostly petioled: spikes 2-6 inches long, interrupted: calyx campanulate, about 4 lines long, its deltoid-subulate and aristulate-acuminate teeth fully half as long as the tube: corolla 6-7 lines long, its tube about equalling the calyx, and but little longer than the lower lip. In rather dry soil, Oregon to California.

S. Chamissonis Benth. Linn. vi, 80. Stems stout, 2-6 feet high, simple, or branched near the top, retrorsely hispid: leaves oblong-ovate, mostly obtuse at the apex, 2-6 inches long, crenate serrate, sericeous-hirsute above, softly villous-canescens beneath, rugose-veiny, cordate at base, all petioled: spikes mostly naked, at length elongated and interrupted: the floral leaves reduced to bracts and shorter than the flowers: calyx cylindraceous, densely hirsute, about 5 lines long, its cuspidate deltoid teeth about one-third as long as the tube: corolla rose-red or darker, about 10 lin. long, the tube fully twice as long as the calyx, the upper lip hirsute. In swamps, western Oregon to California.

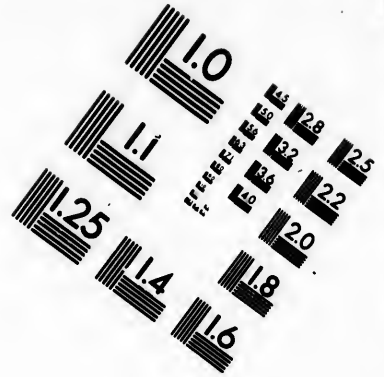
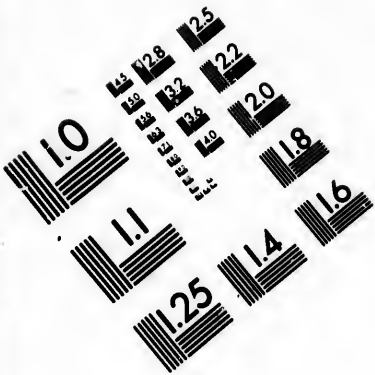
S. cillata Dougl. Benth. Lab. 539. Green and glabrate or sparingly pubescent: stems stout, 2-6 feet high, simple, or branched above, sparingly retrorsely-hispid on the acute angles: leaves thin, ovate to oblong, 2-6 inches long, crenate-toothed, subcordate, all petioled. dark green above, paler beneath: petioles retrorsely hispid-ciliate: spikes 2-8 inches long, the whorls approximate or interrupted calyx sparsely hirsute, campanulate, about 4 lines long, its cuspidate deltoid teeth about a line long: corolla rose red, about 10 lines long, the narrow tube twice as long as the calyx; the upper lip minutely pubescent. In moist alluvial soil, Oregon to Brit. Columbia.

Var. pubens Gray Syn. Fl. ii, 388. Soft pilose-pubescent or villous-hirsute, especially the calyx and lower face of the leaves: flowers commonly rather smaller or shorter. Washington to Brit. Columbia.

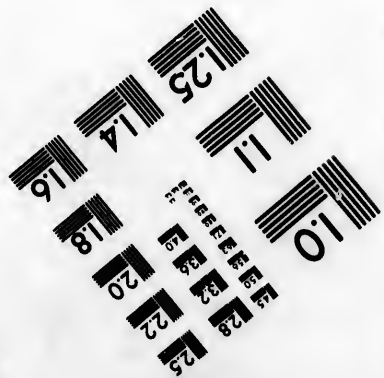
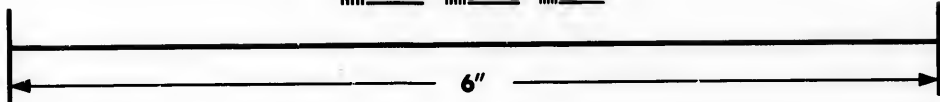
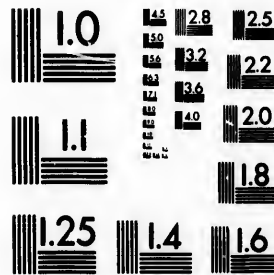
S. Emersoni Piper Eryth. vi, 31. Stems about 3 feet high, glabrous or sparsely hispid on the faces, scabrous on the angles with retrorse rather long and weak papillose-based hairs: rootstock perennial: leaves about six pairs, ovate, cordate or subcordate at base, obtuse, coarsely crenate, sparsely pilose-pubescent on both faces, 3-4 inches long by 2 inches broad, petioled: flowers solitary or in twos, the lowest in the axils of the upper leaves, the upper contracted into a leafy-bracted spike: bracts lanceolate, nearly sessile, exceeding the flowers: calyx campanulate, its teeth deltoid-acuminate, tipped with a white arista, hirsute-ciliate: corolla 6 lines long, purplish, puberulent outside; lower lip spotted with white. Along river banks, Hoquiam Washington.

I refer here with doubt specimens that I collected along Trask river Tillamook Co. Oregon.





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ORDER LXXII VERBENACEÆ J. St. Hil. Expos. Fam. i, 445.

Herbs, shrubs or trees with opposite or verticillate, rarely alternate, leaves and perfect more or less irregular, or sometimes regular, flowers in terminal or axillary spikes, racemes, cymes or panicles. Calyx inferior, mostly persistent, usually 4-5-lobed or 4-5-cleft. Corolla gamopetalous, regular or bilabiate, the tube usually cylindrical and the limb 4-5-cleft. Stamens 4, didynamous, rarely only 2 or as many as lobes of the corolla, inserted on the corolla and alternate with its lobes. Anthers 2-celled, the cells dehiscent longitudinally. Ovary 2-10-celled, composed of 2 carpels, each with 2 anatropous or amphitropous ovules, thus in 4-celled ovaries 1 ovule in each cell. Style terminal: stigmas 1 or 2. Fruit dry, separating at maturity into 2-4 nutlets or a 2-4-seeded drupe. Embryo straight, in little or no albumen.

1 VERBENA Tourn., L. Sp. 18.

Herbs or shrubs mostly with opposite leaves and variously colored flowers in terminal solitary, corymbed or paniced spikes. Calyx 5-angled, more or less unequally 5-toothed. Corolla salverform or funnelform, the tube straight or somewhat curved, the limb spreading, 5-lobed, slightly bilabiate or regular. Stamens 4, or very rarely only 2, included: connective of the anther unappendaged, or sometimes provided with a gland. Ovary 4-celled. Style usually short, 2-lobed, one of the lobes stigmatic. Fruit dry, mostly enclosed by the calyx, at length separating into 4 1-seeded linear-oblong crustaceous nutlets.

V. hastata L. Sp. 20. Roughish-pubescent perennial: stems erect, strict, 3-7 feet high, usually branched above: leaves oblong-lanceolate to lanceolate, acute or acuminate, narrowed at base, serrate or incised-dentate with acute teeth, 3-6 inches long, the lower sometimes bastately 3-lobed at base, all petioled: spikes numerous, paniced, slender, 2-6 inches long: bracts ovate, acuminate, shorter than the calyx: corolla blue, its limb about $1\frac{1}{2}$ lines broad: fruit densely imbricated on the spikes, 1- $1\frac{1}{2}$ lines high. In moist meadows, Oregon to Brit. Columbia and the Atlantic St's.

V. prostrata R. Br. Ait. Kew. ed 2, iv, 41. Soft-villous to hirsute perennial: stems ascending or spreading, at length much branched from the base, 1-3 feet high: leaves obovate or oblong in outline, coarsely toothed or incised, often 3-5-cleft or lobed, 1-2 inches long tapering at base into a margined petiole: spikes solitary or somewhat clustered, elongated, hirsute or villous: bracts subulate, shorter than the calyx: corolla violet or blue, 2 lines long. On plains and open places, southern Oregon to California.

V. bracteosa Michx. Fl. ii, 13. Hirsute-pubescent perennial: stems much branched from the base, the branches decumbent or ascending, slender, 6-18 inches long: leaves ovate, oval or obovate in outline, pinnately incised or pinnatifid, 1-3 inches long, more or less cuneate at base and narrowed into short petioles, the lobes mostly dentate: spikes sessile, stout, dense, becoming 4-6 inches long in fruit: bracts conspicuous, linear-lanceolate, rather rigid, longer than the flowers and fruits the lower ones often incised: corolla purplish-blue, about 2 lines long. On sandy plains and waste places, Brit. Columbia to California and Illinois.

ORDER LX

Annual or small flower scapes or sessile, persistent, the branaceous, filaments filiform, longitudinal to several filiform, simple or circumscissile. Cotyledons 1

Acaulescent, parallel-veined leaves, spikes or heads. Corolla salverform, the limb spreading, 4-lobed or 4-5-celled. Stamens 4, copious numbers.

P. major L. Pubescent: roots ascending, terete, narrow, often as long as the stem, cylindrical, usually flowers perfect. Stems, about half a foot high, the capsule: anthers and waysides.

P. Asiatica Ruprechtly contracted, thick, perennial, dense, linear-cylindrical, from California to Alaska.

P. eriopoda Leaves and scapes broadly lanceolate, acute, entire, 6 inches high, the anthers remote. Stamens long-eglandular. Eastern Washington.

P. macrocarpa 5-nerved, 5-lobed, long margined, dilated base of the scapes equalling

ORDER LXXIII PLANTAGINACEÆ Lindl. Nat. Syst. 267.

Annual or perennial herbs with mostly radical leaves and small flowers in bracted spikes or heads, or rarely solitary, on scapes or scape-like peduncles. Calyx inferior, 4-parted, persistent, the segments imbricated. Corolla scarious or membranaceous, mostly marcescent, 4-lobed. Stamens 4 or 2, filaments filiform: anthers versatile 2-celled, the cells dehiscent longitudinally. Ovary 1-2-celled or falsely 3-4-celled, with 1 to several peltate-amphitropous ovules in each cell. Style filiform, simple, mostly longitudinally stigmatic. Fruit a pyxis, circumscissile at or below the middle, or an indehiscent nutlet. Cotyledons but little broader than the radicle.

1 PLANTAGO Tourn. L. Sp. 112.

Acaulescent or short-caulescent herbs with mostly radical parallel-veined leaves and small white or greenish flowers in terminal spikes or heads. Calyx-segments equal, or 2 of them larger. Corolla salverform, the tube cylindric, or constricted at the throat, the limb spreading in flower, spreading, erect or reflexe in fruit, 4-lobed or 4-parted. Stamens 4 or 2. Ovary 2-celled, or falsely 3-4-celled. Fruit a membranaceous capsule. Seed-coat developing copious mucilage when wetted.

P. major L. Sp. 112. (COMMON PLANTAIN). Glabrous or more or less pubescent: rootstock perennial, short and thick, erect: leaves spreading or ascending, the blade mostly ovate, obtuse or acutish, entire or coarsely dentate, narrowed, rounded or cordate at base, 1-10 inches long, on petioles often as long as the blade: scapes longer than the leaves: spikes linear-cylindric, usually very dense and blunt at the summit, 2-10 inches long: flowers perfect, proterogynous; sepals broadly ovate, scarious on the margins, about half as long as the ovoid 5-16-seeded capsule, which is circumscissile near the middle: corolla-lobes spreading on the summit of the capsule: anthers long-exserted on capillary filaments. Common in gardens and waysides.

P. Asiatica L. Sp. 113. Leaves ovate or oval, several-ribbed, the base abruptly contracted into a distinct petiole, not fleshy: rootstock short and thick, perennial: scapes longer than the leaves: spikes 2-20 inches long, dense, linear-cylindrical: stamens 4, long-exserted: capsule globose-ovoid, circumscissile near the base and much within the calyx. Near the coast of California to Alaska.

P. eriopoda Torr. Ann. Lyc. N. Y. ii, 237. Perennial: base of the leaves and scapes densely invested with long rusty brown wool: leaves broadly lanceolate, 4-6 inches long, 1-2 inches broad, attenuate at each end, acute, entire, smooth, distinctly 5-nerved, long-petioled: scapes 6-12 inches high, terete, very glabrous: spikes cylindrical, 3-6 inches long, of rather remote perfect flowers: bracts broadly ovate, obtusish: style and stamens long-exserted: capsule 2-celled, 4-5-seeded; seeds not hollowed. Eastern Washington to California and Colorado.

P. macrocarpa Cham. & Schl. Linn. i, 106. Leaves lanceolate, acute 7-nerved, 5-15 inches long, 4-18 lines wide gradually tapering below into long margined petioles, often some of the outer ones linear and with dilated base much broader than the blade: rootstock thick, perennial: scapes equalling or surpassing the leaves, densely woolly above: spikes

oblong, dense, 1-2 inches long: bracts round-ovate or oval, fleshy-herbaceous and scarious-margined: sepals similar to the bracts but almost wholly scarious: flowers perfect: corolla-lobes oval: stamens 4, exserted: capsule ovoid-oblong, 3-4 lines long, 1-2-seeded: seeds narrowly oblong, flat or slightly concave on the face. Along the coast, Washington to Alaska.

P. maritima L. Sp. 114. Leaves linear, fleshy, glabrous, very obscurely nerved, 2-10 inches long, 2-4 lines wide, entire or remotely few-toothed, sessile or narrowed into short margined petioles: rootstock rather slender, branched, perennial: scapes as long or longer than the leaves, more or less pubescent: spikes dense, linear-cylindrical, blunt, 1-5 inches long: bracts ovate, acuminate, as long as the perfect flowers: sepals ovate-lanceolate to nearly orbicular, green, somewhat keeled: corolla pubescent outside, its lobes spreading: capsule ovoid-oblong, obtuse, 2-4-seeded, circumscissile at about the middle, nearly twice as long as the calyx: seeds nearly flat on the face. On rocky banks along the coast, California to Alaska.

P. lanceolata L. Sp. 113. More or less pubescent: rootstock short with tufts of brown hairs at the base of the leaves, perennial or biennial: leaves narrowly lanceolate, mostly erect, entire, acute or acuminate, gradually narrowed into petioles, 3-5-ribbed, 2-12 inches long, 3-12 lines wide: scapes slender, channelled, 6-30 inches high: spikes very dense, at first short and ovoid, becoming cylindrical, blunt, $\frac{1}{2}$ -4 inches long in fruit: flowers perfect: sepals ovate, with a narrow green midrib and broad scarious margins, the 2 lower ones commonly united: corolla glabrous, its tube very short: stamens exserted: capsule oblong, very obtuse, 2-seeded, slightly longer than the calyx, circumscissile at about the middle: seeds deeply excavated on the face. Common in fields and waste places: introduced from Europe.

P. Purshii R. & S. Syst. iii, 120. *P. Patagonica* var. *gnaphalioides* Gray. White-woolly or silky pale green annual: leaves ascending, linear, acute or acuminate, narrowed into margined petioles, 1-3-nerved, 2-10 inches long, entire or with a few small teeth: scapes 2-15 inches high: spikes very dense, hoary, cylindrical, obtuse, 1-6 inches long, very woolly: bracts rigid, equalling or slightly longer than the perfect flowers, linear-subulate: sepals oblong, obtuse, scarious-margined: corolla-lobes broadly ovate, spreading: stamens 4, just exserted from the tube or with long capillary filaments: capsule oblong, obtuse: seeds 2, light brown, oblong, convex on the back, deeply concave on the face. On dry plains, Oregon to Brit. Columbia and Illinois.

P. spinulosa Decaisne in DC. Prodr. xiii, 713. *P. Patagonica* var. *spinulosa* Gray. A light to bright green glabrate to villous annual: leaves linear to linear-lanceolate, acuminate and involute at the apex callous-tipped, entire, narrowed to a margined sheathing petiole in which 3 ribs remain free, 3-6 inches long, 1-4 lines wide, 3-5 ribbed: scapes 2-8 inches high, pubescent: spikes cylindrical, 2-4 inches long, at length somewhat interrupted, pubescent: bracts rather rigid-herbaceous, 2 or more times as long as the perfect flowers, linear-subulate to aristate, acute: calyx-lobes pubescent, scarious, with light green midribs or the lower ones nearly herbaceous, spatulate-oblong, a line long: corolla-lobes strongly reflexed: stamens 4, and with the style just exserted from the tube or a little longer: capsule oval, circumscissile at the middle: seeds 2, dark brown, oblong, finely pitted. Oregon to lower California and east to Texas and Dakota.

P. aristata Michx. Fl. i, 95. *P. Patagonica* var. *aristata* Gray. A dark green villous to glabrate annual: leaves narrowly to broadly linear, acute or acuminate and callous-tipped, entire, narrowed below to margined petioles, 3-8 inches long, 1-3 lines wide, 3-5-nerved: scapes stout, 6-10 inches high, glabrous to pubescent: spikes in glabrate forms when young

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